Do Female Executives Acquire Greener Targets?

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Abstract

I examine the M&A behaviour of firms with female executives. Companies with female executives acquire greener targets than those with male executives. Female executives prefer less polluting private targets. I explore various measures of firm environmental performance, such as total toxic releases, environmental penalties, emissions-related words in 10-K filings, and green innovations. The study suggests that women executives pay close attention to ecological concerns as they make financial decisions, especially when selecting targets for mergers and acquisitions. Female executives tend to be more concerned about the environment than male executives. Additionally, I do not find that this prosocial behaviour is at the expense of shareholders' value.

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"We need the three W's – women, water and well-being."

Muhtar A. Kent
(ex-CEO of Coca-Cola Company)

1. Introduction

In recent years, a growing body of evidence shows that managerial fixed effects can explain a significant portion of the firm's practice variation (Bertrand and Schoar, 2003; Adams, Almeida, and Ferreira, 2005; Bennedsen, Kongsted, and Nielsen, 2008). Researchers have investigated some specific individual traits and personal characteristics, such as age, education, and early experience, that might drive managers' decision-making (Malmendier and Tate, 2005; Yim, 2013; Bernile, Bhagwat, and Rau, 2017).

In the meanwhile, more and more researchers study the differences between male and female behaviours. Some of these studies explain the psychological differences between women and men. For example, Huang and Kisgen (2013) find that female executives are less overconfident than their male counterparts. Weber, Blais, and Betz (2002) suggest that women are more risk-averse than men in all domains except social risk. The difference is also reflected in financial decisions. As compared to male managers, female managers invest in less risky assets (Sunden and Surette, 1998; Bernasek and Shwiff, 2001; Agnew, Balduzzi, and Sunden, 2003), conduct fewer acquisitions, and issue less debt (Huang and Kisgen, 2013).

Some researchers, moreover, assert that female managers add more value to a firm than men do. Weber and Zulehner (2010) suggest that the presence of female leaders helps firms operate for longer. Studies further argue that female managers help firms improve stock price informativeness, avoid operations-related lawsuits, and enhance the board's advisory quality (Adhikari, Agrawal, and Malm, 2019; Gul, Srinidhi, and Ng, 2011; Kim and Starks, 2016).

In this paper, I investigate female executives' (CEO and CFO) environmental protection awareness in Mergers and Acquisitions (M&A) decisions. Previous literature suggests that females react more than men to social and emotional stimuli in many contexts (e.g. Brody and Hall, 2008; McManis, Bradley, Berg, Cuthbert, and Lang, 2001, etc.), and women care more about the social context (Croson and Gneezy, 2009). Given that environmental protection and climate change have become essential issues in society, it is reasonable to believe those female executives are more environmentally friendly and more influenced by their ecological awareness when making corporate decisions. A recent working study by Wang and Yu

(2019) supports this hypothesis. They suggest that female CEOs are more environmentally friendly, and when they lead firms, they pollute less and receive fewer environmental penalties. Ginglinger and Gentet-Raskopf (2021) find that female directors have unique qualities, experiences, as well as preferences, and the presence of women on boards increases a firm's Environment and Social (E&S) performance.

I take a closer look into how female executives' tendency to protect the environment affects acquisitions. Specifically, I study the types of acquisitions female executives make in regard to the target's environmental attributes, for example, the target's toxic releases, environmental penalties, environment-related discussions in the 10-K filings as well as green innovations. M&A is a vital investment activity of a company closely related to its top executives. Although acquirer executives have clear incentives to focus exclusively on value-building for shareholders and thus make good deals, their personal traits can still affect their decision-making. For example, prior literature finds that target firms' public status is essential in the selection process. Entrenched managers tend to avoid private targets to preserve their entrenchment and avoid further internal scrutiny (Harford, Humphery-Jenner, and Powell, 2012).

Furthermore, behavioural experiments show that male and female brains process prosocial and selfish behaviour differently. For women, prosocial actions trigger a more grounded reward signal, while male reward systems react more emphatically to egotistical conduct (Soutschek, Burke, Raja Beharelle, Schreiber, Weber, Karipidis, Ten Velden, Weber, Haker, Kalenscher, et al., 2017). Given this evidence, I hypothesise that pollution level may be an essential factor for female executives in choosing potential targets.

I first construct a database by merging data from several sources: pollution data from the U.S. Environmental Protection Agency (EPA), M&A data from Thomson One Banker, financial data from Compustat, executive information from ExecuComp and BoardEx, 10-K filings data from SEC EDGAR, and patent data from Intellectual Property database. I identify the differences between female and male executives in target selection. I find that firms with female executives acquire greener targets.

First, I observe that female executive prefers private targets. I then prove that they prefer private equity-backed firms, which have been proven to be the less polluting firms among private targets (Bellon, 2020). Then, more direct evidence is provided by analysing numerous measures of firm pollution as dependent variables, such as total toxic releases, environmental penalties, and green innovation. I determine that female executives acquire targets which release less toxic pollution, receive fewer environmental penalties and issue more green patents. I also look more closely into targets' environment-related discussions in their 10-K filings and find that firms with female executives acquire targets which mention

fewer environment-related words in their 10-K filings. Shive and Forster (2020) prove that one extra instance of "greenhouse gas" in the 10-K is associated with an 2.09% increase in emissions. Thus, the negative coefficient on female executives shows that they avoid targets with more environment-related words, for they prefer less polluted firms.

A potential concern is the endogeneity problem, which means that female executives may not be randomly assigned to firms. This selection bias problem comes from firms as well as executives. On the one hand, only boards of specific firms may consider women candidate for CFO or CEO. However, such an endogeneity concern may be minor to this study. By investigating academic research and publishing articles, Wang and Yu (2019) suggest that, in comparison to financial indicators, the non-financial outcome such as the awareness of environmental protection is not a factor worthy in executive selection. On the other hand, female executives may self-select themselves for CEO/CFO candidacy only for a certain business. An observed fact is that those female executives are more unlikely to work in the highly polluting gas and oil industries, among others.[1]

I deal with the issue of endogeneity by employing the instrumental variable approach. I use two instruments for female executives. First, following Huang and Kisgen (2013) and Sugarman and Straus (1988), I use the calibration of a state's level of gender status equality as an instrument. I conjecture that the friendlier a state is to women's equality generally, the more likely a firm headquartered in that state is to have a female executive. Conversely, and perhaps more importantly, there is no evident reason for state-level gender equality to directly affect target selection for a firm's acquisitions. As such, this instrument appears to satisfy the exclusion criterion. .

Second, **?** show that low-skilled immigration inflows induce young women to enter occupations with higher returns to overwork and shift women toward higher quantiles of the male wage distribution. Thus, I use share of low-skilled immigration in the labour market as the second instrument. The intuition behind this is that states that receive a large influx of low-skilled immigrants have greater availability of market substitutes for household production, thus enabling highly-skilled women in these states to increase their market work (**?**). Therefore, if the firms are located in states with higher low-skilled immigration rates, there will be more females in the local labour market, and the firms will be more likely to hire female executives. Besides, the firm's acquisition decisions should not be related to the share of low-skilled workers, which allows us to address the identification problem.

The empirical results show that both instrumental variables are significantly related to hiring a female executive in the first stage. Second-stage results further confirm the previous

[1] see,`https://www.mckinsey.com/industries/oil-and-gas/our-insights/how-women-can-help-fill-the-oil-and-gas-industrys-talent-gap`

findings.

The paper contributes to several branches of the existing literature. First, the paper provides supplementary evidence that female executives make more prosocial decisions as compared to male managers. Prior studies suggest that women are more selfless (Eckel and Grossman, 1998). Compared to men, women engage more in volunteer actions (Babcock, Recalde, and Vesterlund, 2017). The results further confirm that firms with female executives are more environmentally friendly.

Second, the study complements existing studies by studying how top executives' (CFO and CEO) gender affects corporate decisions. Previous psychology and finance literature finds that men are more overconfident and less risk-averse than women. These characteristics result in different firm financial decisions by females and males. Huang and Kisgen (2013) find that women make fewer acquisitions and issue less debt. Other researchers suggest that women invest in less risky assets in their investment portfolios (Sugarman and Straus, 1988; Bernasek and Shwiff, 2001; Agnew et al., 2003). The study suggests that environmental protection is vital for female executives when making financial policies, specifically in the M&A target selection process.

Third, I study the role of female executives in firms. Prior literature indicates that hiring female employees and managers is also in the firms' interest. Weber and Zulehner (2010) suggest that females help firms operate longer. Adhikari et al. (2019) find that firms with female managers avoid operations-related lawsuits. Gul et al. (2011) assert that female directors improve stock price informativeness. Wang and Yu (2019) demonstrate that female CEOs improve the firm's environmental protection. The study proves that female executives have a greater awareness of environmental protection. Furthermore, I also find that this prosocial and pro-ecological behaviour is not at the expense of shareholders' value.

The rest of the paper is organised as follows: Section 2 presents the data; in Section 3, I provide the main empirical tests; in Section 4, I conduct additional tests to solve the endogeneity problem; in Section 5, I examine deal performance; and in Section 6, I sum up the conclusions.

2. Data and Descriptive Statistics

2.1. Acquirers' executives and financial data

Following Huang and Kisgen (2013), I focus on CEOs and CFOs. Prior evidence suggests that while CEOs play a vital role in a firm's major corporate decisions, CFOs also have a great influence on firms' activities, such as investment and financing policies (Bertrand and

Schoar, 2003; Frank and Goyal, 2007).

The initial data comes from ExecuComp, which contains companies once listed on the S&P 1500 index. The sample covers the period from 1993 to 2019. I further exclude all financial and utility firms (SIC 6000-6999 & 4900-4999), as they operate quite differently from regular firms. I identify CEOs following the database's classification, which means "CEOANN" equals "CEO". Then, I further identify CFOs with "CFOANN" equals to "CFO". Since item "CFOANN" only indicates CFO from 2006, I further identify CFOs based on the item "titleann" in ExecuComp. Following Jiang, Petroni, and Wang (2010), I use the following phrases to identify CFO in the annual title: CFO, chief financial officer, chief finance officer, treasurer, controller, and vice president-finance. If ExecuComp reports more than one CEO or CFO in the same year, I further check the 10-K filing and choose the executive reported in the annual report. For the remaining firm-year observations, I additionally collect data from BoardEx. Finally, I have 34,980 firm-year observations for which the name and gender of the executives are available.

To obtain financial and stock data, I merge the data with Compustat and CSRP. I require that each company has non-missing data on main regression variables, and thus the initial sample is reduced to 32,278 firm-year observations with 6,104 unique CEOs and 7,340 CFOs, 2790 firms.

The primary explanatory variable of interest is the presence of a female executive in the firm. Thus, the Female is a dummy variable that takes the value of 1 if the firm's CEO or CFO is a woman in a given fiscal year and 0 otherwise.

2.2. Mergers and acquisitions data

To examine the influence of female executives on a firm's acquisition decisions, I collect deal information from the Thomson One Banker database. The initial sample includes all completed M&A done by U.S. public firms involving public, private, and subsidiary targets from 1993 to 2019. I exclude acquirer firms with SIC codes 6000-6999 & 4900-4999. I require that the control be transferred from the targets to the bidder after the transaction, which is to say, the percentage of shares acquired by the acquirer is higher than 50%. Following the previous literature, I further require that a deal's transaction value be over 1 million dollars. Then, I match each deal to the firm-year sample in Section 2.1 based on the announcement date of the acquisition. Among those deals, 76.5% of the targets are U.S. firms, and I further limited the data sample to domestic deals. This procedure yields 6,782 deals in the final M&A sample.

2.3. Target's environment performance data

2.3.1. Emissions data

Following Shive and Forster (2020), I obtained plant-year level emission and penalties data from the EPAs' Enforcement and Compliance History Online (ECHO). This data set contains emissions, penalties and other information related to the environment on EPA-regulated facilities. I link plants and their parental firms and hand match firms' names in EPA to that of a target firm.

The Toxics Release Inventory (TRI) is a resource for learning about toxic chemical releases and pollution prevention activities reported by industrial and federal facilities. EPA includes TRI data from 1987 with 2,821,553 plant-year level observations. The data set covers 61,180 plants and 14,363 parental firms. I converted the data set into a firm-year level data set and manually matched the TRI firm names to the target firms.[2]

EPA enforcement data comes from the Integrated Compliance Information System for Federal Civil Enforcement Case Data (ICIS FEC). This data set contains information on informal and formal administrative cases and judicial cases. I obtain penalty amounts data. To assign a year to the case in ICIS FEC, I use the first data that the case was filed with the EPA to match. I use logarithms of all these measures to avoid the potential skewness problem.

2.3.2. SEC 10-K filings data

To measure the target firm's environment-related issues, I extract information reported in 10-K filings. Prior literature shows that 10-K filings are the primary source of information for investors. The S.E.C. does not require firms to specifically disclose information related to emissions or the environment. However, managers might discuss environmental issues in the annual filings. Those environmental discussions can be found in several sections of the 10-K file. For example, according to the S.E.C. interpretive release, discussions related to climate change are usually presented in the Description of Business, Legal proceedings, Risk Factors and Management's discussion and analysis (M.D.A.). Li (2008), Loughran and McDonald (2014) analyse the number of words per sentence, syllables per word, and the file size. They suggest that those indicators help investors understand a firm's performance,

[2]I did not use the Greenhouse Gas Reporting Program (GHGRP) and Clean Air Markets program data. The former measures and collects air emissions data from more extensive facilities; the data has been collected since 2010. The latter data set includes data for the largest emitters and measures emissions of fine particles, ozone, sulphur dioxide, nitrogen oxides, mercury, and other significant air pollutants from 2007. Although this data set is generally considered the highest quality air emissions data according to the EPA's website, the limited data years resulted in a poor matching result with the target sample.

business, and financial conditions. I thus expect that environment-related words can provide us with insight into targets' environmental performance.

I limited the sample to targets that file 10-K. Wang and Yu (2019), Shive and Forster (2020) create variables measuring the presence of language related to environmental awareness in 10-K filings, such as "climate change", "greenhouse gas", and "emissions". Sautner, van Lent, Vilkov, and Zhang (2020) adapt a machine learning method and identify the keywords that can capture exposure related to opportunity, physical, and regulatory shocks associated with climate change. Following the literature, I include three groups of words to reflect the environmental discussions of the firm. The first set of words includes broad climate terms, such as "climate change", "greenhouse gas", and "extreme weather". The second set of terms relates to the firm's climate goal and targets. Those terms include "sustainability", "E.S.G.", "social responsibility", "emission reductions", "net zero", and "zero emissions". Finally, I also measure the terms which indicate the firm's climate actions, such as "renewable energies", "carbon/environment footprint", "energy transition", and "carbon offsets". I first count the related terms in the 10-K each year for every group. I then create variables to indicate word frequency per every one hundred thousand words.

2.3.3. Patent data

I collect data on patents granted in the United States from the Orbis Intellectual Property database provided by Bureau van Dijk (BvD). Following Cohen, Gurun, and Nguyen (2020), the IPC code is used to classify each patent into green or non-green. The classification is according to the guideline from the OECD environment technology. This guideline reports the International Patent Classification (IPC) classes associated with environmentally friendly technologies in fields such as environmental management, water adoption, biodiversity protection, climate change mitigation, and greenhouse gas management.[3] The analysis of green patents will be based on the number of green patents granted per firm and the percentage of the firm's green patents to its total patent numbers.

2.4. Summary statistics

All variable definitions are reported in Table 1. All continuous variables are winsorized at their 1st and 99th percentiles to reduce the influence of outliers.

Table 2, Panel A, shows descriptive statistics of female executives in the panel. Overall, 11% of firm-year observations are from female executives. The majority of female executives serve in the CFO role.

[3]See Haščič and Migotto (2015) for detailed descriptions of environmental-related patents' identification.

[Insert Table 2 near here]

Table 2, Panel B, further presents the bidder's characteristics. Compared to male executives, univariate tests predict that female executives are more likely to work in larger, more mature firms. Huang and Kisgen (2013) suggest that larger companies are more visible, and therefore directors or managers of those firms might be more careful not to discriminate in hiring and promotion decisions. They also hold more cash and prefer lower leverage. The firms with female executives have higher free cash flow alongside a higher Tobin's Q. This mitigates the concern about the potential agency problem. An additional point is that, when the CEO serves as the board chairman, it is less likely for the firm to have a female executive.

Panel C presents the targets' environment-related performance. The univariate results indicate that acquirer firms with female executives have different propensities when bidding on the targets. For example, the targets acquired by females release fewer toxic emissions.

Finally, Panel D shows deal characteristics, showing the differences between M&A conducted by male and female executives. The fractions of public, private, and subsidiary targets are 20%, 45%, and 35%, respectively. Female executives prefer cash deals and are less likely to finance a deal with equity than male executives are.

[Insert Table 3 near here]

The results of correlational analysis among variables are displayed in Table 3. Almost all variables report low pairwise correlations, which should mitigate multicollinearity concerns.

3. Empirical Results

3.1. Empirical methodology

To explore the influence of executives' gender on target selection in acquisitions, I analyse the following empirical specification:

$$Pr(Deal_{i,j,k}) = \alpha_0 + \beta Female_i + \gamma X_{j,k} + \lambda X_{i,j,k} + \nu_{i,t} + \epsilon \tag{1}$$

Where $Deal_{i,j,k}$ stands for deal characteristics to a bidder j and target k conducted by executive i. The dependent variable $Deal_{i,j,k}$ could be one of the toxic releases, penalty amounts, an indicator of whether issue SEC filing, etc. The primary variable of interest is a dummy variable ($Female_i$) that equals one if an executive is female; otherwise, the value is zero. I further include a set of firm characteristics which have been documented to affect acquisition decisions and emissions (e.g. Harford, 1999; Shive and Forster, 2020), such as

leverage and firm size. I also use Tobin's Q as a control for investment opportunities. Harford (2005) shows that mergers occur in waves and that they are clustered within industries, so I include industry times year dummies in all specifications. The detailed definitions of all variables are in Table 1.

3.2. Target's listing Status

I examine female executives' preference for target listing status in a multivariate setting. Literature indicates that the behaviour of firms with different listing statuses is varied. Hart and Zingales (2017) prove that private firms will more often make prosocial decisions. Shive and Forster (2020) further study the impact of listing status on environmental externalities. They provide further evidence that, compared to public firms, private firms are less likely to pollute and incur EPA penalties. If female executives act more in the interest of environmental protection, they will prefer private targets and avoid public targets.

Following Harford et al. (2012), I use a two-step Heckman procedure that controls the selection inherent in a bidder choosing to bid. In the first step, the selection equation controls for the female dummy variable. I then include control variables, such as the bidder's industry concentration (Herfindahl-Hirschman Index), cash holdings scaled by total assets, the number of previous deals size, book leverage, profitability and Tobin's Q. The results are presented in Table 4.

Columns (1) and (2) show that firms' female executives have a significantly lower fraction of public targets, all else equal. I did not find those female executives have a significant preference for subsidiary targets in column (3).

[Insert Table 4 near here]

To find more evidence, I collect the ownership data of those private targets. Bellon (2020) documents that PE ownership leads to pollution reduction. I thus divide private targets into independent privates and sponsor-backed privates. Coefficients in column (4) suggest that female executives tend to acquire more private sponsor-backed firms, indicating that female executives acquire less polluted targets. Another important piece of evidence is that the magnitude of the coefficient on the interested variable-Female also increased, compared to it in column (2), which again strengthens the belief that female executives choose greener targets.

While I cannot conclusively determine the motivations of female executives, this set of results is consistent with the conjecture that, compared to male executives, female executives prefer greener targets. However, on the other hand, the target listing status selection may

simply be profit-maximizing decisions in M&A. Some researchers prove that public deals are more likely to decrease in value (Fuller, Netter, and Stegemoller, 2002). Female executives may have fewer agency problems and make decisions to benefit shareholders. Thus, I study other direct measures of pollution data from the U.S. Environmental Protection Agency (EPA) to obtain more direct evidence.

3.3. Target's emission and penalties

This section examines the target firms' emission and penalties data from the EPA website. Table 5 columns (1) and (2) present the regression results that link executives' gender and target releases. The dependent variable in column (1) is the firm's total toxic releases. I define total toxic releases as the total quantity of toxic chemicals released on-site at all facilities of the firm plus the total amount of toxic chemicals reported as transferred to off-site locations for release or disposal. In column (2), the dependent variable is a dummy variable. I regard the target as a more polluted firm when the firm's releases exceed the industry median. The dependent variable High-TTR will equal one; otherwise, the dependent variable equals zero.

[Insert Table 5 near here]

The estimated coefficients for the Female variable indicate a negative and significant relationship between the acquirer female executive and the target's total toxic releases. The results are also economically meaningful. Specifically, the results in column (1) suggest that the target firm chosen by an acquirer's female executive has 35% lower total toxic releases than the target chosen by a male executive. The coefficient in column (2) further indicates that female executives are 49.5% less likely to acquire highly polluting targets.

Table 6 column (1) presents the effects of acquirers' female CEOs on the target's number of EPA penalties, whereas Table 3.6 column (2) presents their effects on the penalty amounts. In both regressions in Table 6, the estimated coefficients for Female enter negatively. Female executives choose targets with a significantly lower number of penalties.

[Insert Table 6 near here]

3.4. Target's environmental discussion in the 10-K form

The above empirical analyses showed that a female executive significantly acquires targets with fewer emissions in terms of total toxic releases. I further investigate the target firm's environment-related discussions in the 10-K form, apart from the measurable indicators.

An article in TIME magazine suggested that general terms relating to climate change had already crept in 10-K filings by 2012.[4] I believe that the specific terms relating to corporate climate goals and initiatives in 10-K filings have recently become part of companies' thought processes regarding the environmental crisis. There are two possibilities for the presence of environment-related words in the 10-K form. First, the environmental discussions may reflect firms' growing awareness of the need for environmental protection. Second, firms speak of environmental terms because they are highly polluting firms and thus discuss risk factors in pollution or climate change in the filings. Therefore, the relationship between female executives and the target's environmental discussion is unknown.

The results are presented in Table 7. In columns (1) and (2), I find a negative correlation between the acquirer's female executives and the target's mention of the environment-related terms in the 10-K. The number of environment-related words in the 10-K form will be marginally lower by 1.95% for a target acquired by female executives.

[Insert Table 7 near here]

As mentioned in the above discussion, one possible interpretation of these results is that polluting firms have more exposure to climate change risk. Thus, they mention environmental issues on the form to discuss how the firm may be affected by potential future regulations. Shive and Forster (2020) support the results. They prove that one extra instance of "greenhouse gas" in the 10-K is associated with an 2.09% increase in emissions. Thus, the negative coefficient on female executives shows that they avoid targets with more environment-related words, for they prefer less polluted firms with fewer environmental risk factors.

3.5. Target's patent

Firms' patents are vital signs of innovation, and no firm or industry in the world economy is unaffected by innovation (Cohen et al., 2020). In this section, I examine specifically the green patents issued by targets. Green patents can potentially lessen environmental problems. These patents are classified into various broad environmental technology categories, for example, environmental management, water-related adaptation technologies, biodiversity protection and ecosystem health, climate change mitigation technologies related to energy generation, and waste-water treatment or waste management. I examine both the total number of green patents issued by a firm and the ratio of green patents to the total number of patents as measurements.

[Insert Table 8 near here]

[4] see,`https://time.com/6166171/companies-financial-documents-climate-change/`

Table 8 shows the results. The limitation of patent data reduces the sample size. However, I can still find a significant positive coefficient for the variable "Female". Compared to their male peers, female executives are more likely to acquire targets with more green patents or a higher percentage of green patents to total patents.

4. Identification Concerns

One potential concern is that female executives are not randomly assigned to firms. The systematic differences between firms with male and female executives could lead to the results Huang and Kisgen (2013). For purposes of this section, I adopt an instrumental variable approach to mitigate potential endogeneity concerns. My first instrument is based on a previous study that calibrates a state's gender status equality (Huang and Kisgen, 2013; Sugarman and Straus, 1988).

Sugarman and Straus (1988) evaluate the 51 U.S. states and assign each one a score for gender status equality. I conjecture that the more favourable a state is to women's equality, the more likely a firm headquartered in that state is to have a female executive. This variable should not directly affect the firm's target choice but correlate with the presence of female executives of the firm headquartered in that state. Since the interested variable-Female, is a dummy variable, I implement a two-stage residual inclusion estimation following Wooldridge (2002) and Terza, Basu, and Rathouz (2008). In the first stage, I estimate a probit of the Female on the instrument variable and other controls. In the second stage, I add fitted residuals in the first stage as an additional regressor and rerun the primary regression. Using this approach, I take the binary nature of the endogenous variable into account and avoid endogeneity bias.

[Insert Table 9 near here]

Panels A, B, C, D and E in Table 9 show the regression results separately for listing status, PE ownership, emissions, penalties, and SEC filing. By reporting the results for the first stage, I see from column (1) in each Panel that the instrumental variable correlates with the higher gender equality scores of the state where it is headquartered. For example, in panel A, the coefficient on the gender equality variable is significant at 1%, suggesting a strong positive relationship between state-level gender equality and the presence of a female executive.[5]

[5]In unreported tests, following Roodman (2007), I first add the instrument to the second stage to test the validity of the instrument variable. Then, I test the instrument variable's weakness through the use of first-stage diagnostics such as those from the linear two-stages model. Although their theoretical grounding does not fully carry over the first-stage probit model, the test results can still be cited as indicative.

Panel A columns (2) - (4) and panel B column (2) report the results of the primary model in Table 4. As shown in column (2) of both panels, the coefficients on instrumented females are again positive and significant, consistent with the previous findings. The results in Panels C and D also remain robust. However, I cannot find significant results when analysing the green patents; one potential explanation is that the IV is a state-level variable and did not change over time, and the patent sample size is not big enough.

The second instrument is the share of lower-skilled immigrants in the labour market. **?** show that low-skilled immigration inflows induce young women to enter occupations with higher returns to overwork and shift women toward higher quantiles of the male wage distribution. Thus, in states with a large influx of low-skilled immigrants, there are more market substitutes for household production, allowing highly-skilled women to increase their market work (**?**). If the firms are located in states with higher low-skilled immigration rates, there will be more females in the local labour market, and the firms will be more likely to hire female executives. Following **?**, I extract US Census Integrated Public Use Microdata Samples from `ipums.org` (see **?**) to measure the concentration of low-skilled immigrants among states.

[Insert Table 10 near here]

Table 10 shows the results using the second IV. The empirical results in the first stage indicate that firms located in a state with a higher share of low-skilled immigrants are more likely to hire a female executive. Second-stage results further confirm the previous findings.

5. Female Executive and Market Reaction

To evaluate the impact of female executives on mergers and acquisitions activities, I examine the announcement returns associated with those transactions. If female executives prefer prosocial deals to shareholder value, I might find female executive firm transactions to have worse market reactions than those of male executive firms.

The regression equation is as follows:

$$CAR_{i,j\ ,k} = \alpha_0 + \beta Female_i + \gamma X_{j,k} + \nu_{i,t} + \epsilon \tag{2}$$

where $CAR_{i,j\ ,k}$ stands for acquirers' cumulative abnormal announcement returns to a bidder j and target k conducted by CEO i. I calculated both three-day and five-day windows to capture announcement effects.

Following prior literature (Custódio and Metzger, 2013; Huang and Kisgen, 2013), I calculate CAR by the three-factor Fama-French model. I estimate the model over a 255-day

window ending 21 days prior to the announcement date using the CRSP value-weighted index as the market proxy. As suggested in the literature (Custódio and Metzger, 2013; Moeller, Schlingemann, and Stulz, 2004), I include a set of firm and deal-level control variables. M&A often occurs in waves and is clustered by industry (Harford, 2005); thus, I also include industry times year dummies to control for fixed effects in the regression.

[Insert Table 11 near here]

Table 11 presents the results. The dependent variables in columns (1) and (2) are three-day CARs and five-day CARs, respectively. Most coefficients on control variables document consistent results (Andrade, Mitchell, and Stafford, 2001). However, the study finds neither positive nor negative effects on returns. These results suggest that female executives did not sacrifice shareholder value when conducting M&A.

6. Conclusion

In addition to the previously documented differences between female and male firm leaders, this paper offers novel empirical evidence on the role that gender plays in a firm's M&A behaviours.

There are two main empirical results in the paper. First, on average, female executives acquire greener targets. I provide several pieces of evidence to support the conclusion; for instance, I measure the target's environmental performance by examining listing status, toxic releases, environmental penalties, 10-K forms texts and green patents. Second, I confirm that female executives' prosocial behaviour is not at the cost of shareholder value by investigating the abnormal announcement returns.

Overall, these results highlight the importance of executives' gender differences in firm behaviour and indicate that the environmental issue has been considered when making M&A decisions.

There are still remaining questions for further work. For example, this study is silent on the possible channels of females' prosocial behaviours. Given the growing number of female leaders in firms and the recent surge of climate change impact, I believe that it would be interesting to further investigate why female executives offer society positive externalities.

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Table 1: Variable Definitions

Variable	Definition
Panel A: Independent Variable	
Female Dummy	Dummy variable equals one if the CEO or CFO is female.
Panel B: Dependent Variables	
CAR [-1:1]; CAR [-2:2]	Three-day (-1,1) or five-day (-2,2) cumulative abnormal return (%) calculated using Fama-French three factors model. The market model parameters are estimated using the return data for the period (-270, -21).
Green Patent	The number of green patents for patent-issued firms.
Green Patent Ratio	The ratio of firm's green patents to the firm's total number of patents.
Number Of Penalties	Target's number of penalties received in the sample. Number of penalties in each year is calculated by log (1+number of deferral enforcement cases with penalty record). The penalties include both federal penalties and state/local penalties.
Number of Environment-related Words	The number of environment-related words, which appear in the SEC 10-K filing.
Frequency of Environment-related Words	The number of environment-related words in SEC 10-K filing for every one hundred thousand words.
High_TTR	Dummy variable equals one if target toxics releases are higher than the sample industry median value.
Public Dummy	Dummy variable equals one if target is a public firm.
Private Dummy	Dummy variable equals one if the target is a private firm.
Private-Sponsor	Indicator variable for firms with equity ownership that is untraded on an exchange and that is controlled by a private equity firm.
Total Penalty Amounts	The average value of target's penalty amounts in the sample. Penalty amounts are calculated by log (1+federal penalty amounts plus state/local penalty amounts).
Total Toxic Releases	Target's average total toxics releases in the sample period before it was acquired. Total Toxics releases are calculated by log (1+ total on-site release and the total off-site release) (kilo pounds)

Subsidiary Dummy	Dummy variable equals one if the target's public status is subsidiary.
Panel C: Control Variables	
All Cash Deal	Dummy variable equals one if the deals are paid 100% in cash and zero otherwise.
Book Leverage	Ratio of total debt ($dltt$+dlc) to book value of assets (at).
Cash Flow Measures	Operating Cash flows ($sale - cogs - xsga + dp$) over (at).
Cash Holdings	Cash and marketable securities (che) scaled by total assets (at).
Diversifying Dummy	Dummy variable equals one if the target and the acquirer differ in their Fama-French 12 –Industries classification.
Free Cash Flow	Operating income before depreciation ($oibd$)-interest expense ($xint$)-income tax(txt)-capital expenditures($capddx$) scaled by total assets(at).
Firm Size	Calculated as: $Log(at)$.
Firm Age	Number of years between fiscal year ($fyear$) and CRSP listing year ($listyear$).
Gender Equality	Overall gender equality index based on economic, political, and legal performance (Sunden and Surette, 1998)
Low-skilled Immigrants	State-level share of low-skilled immigrants in the labour force (**?**)
Profitability	Ratio of earnings before interest and taxes ($ib + xint + txt$) to value of assets (at).
PPE	Ratio of net plant, property, and equipment ($ppent$) to value of assets value(at).
Revenues	The logarithm of total annual revenues ($revt$).
Stock Deal	Dummy variable equals one if the deals that paid a positive fraction of the transaction value with stock and zero otherwise.
Relative Size	Transaction value / Acquirer market value of equity.
Tobin Q	Calculated as: $(at - ceq + prcc\_f * csho)/at$.
Transaction Value	Deal value in millions of dollars taken from the Thomson M&A database.

Table 2: Summary Statistics

The sample consists of Compustat S&P 1500 firms with non-missing firm characteristics controls in the main regression for which CEO data are available from ExecuComp in the 1993-2019 period. All variables are winsorized at 1% and 99% values. The sample in Panel A and B includes 32,278 firm-year observations on 6,104 CEOs and 7,340 CFOs. 3,538 firm-year with at least one acquisition. The sample in Panels C and D is limited to M&A conducted by the above-mentioned firms. Variable definitions are as defined in Table 1. ***p<0.001, 0.05**p<0.05, *p<0.1.

Panel A: Female Executives

	Mean	p25	Median	p75	SD	N
CEO Female Dummy	0.029	0	0	0	0.168	32,278
CFO Female Dummy	0.085	0	0	0	0.278	32,278
Female Dummy	0.110	0	0	0	0.312	32,278

Panel B: Bidder Characteristics

	Mean	p25	Median	p75	SD	N	Female Executive	Male Executive	Diff.
Book Leverage	0.244	0.082	0.225	0.356	0.197	32,278	0.222	0.246	−0.024***
Firm Size	7.378	6.241	7.278	8.421	1.607	32,278	7.464	7.368	0.096***
Free Cash Flow	0.036	0.011	0.049	0.085	0.0972	32,278	0.049	0.035	0.014***
Profitability	0.074	0.038	0.087	0.138	0.131	32,278	0.081	0.073	0.008***
Tobin's Q	2.042	1.231	1.623	2.334	1.329	32,278	2.117	2.033	0.084***
Cash Holdings	0.149	0.028	0.085	0.209	0.168	32,278	0.172	0.146	0.025***
Firm Age	20.39	8	18	31	14.34	32,270	20.78	20.34	0.441*
PPE	0.274	0.100	0.206	0.389	0.224	32,248	0.252	0.277	−0.025***
Revenue	7.292	6.223	7.235	8.343	1.611	32,229	7.433	7.274	0.159***
Cash Flow Measure	0.180	0.125	0.174	0.233	0.103	30,483	0.184	0.179	0.005***

Panel C: Target Environmental-related Variables

	Mean	p25	Median	p75	SD	N	Female Executive	Male Executive	Diff.
Frequency of Environment-related Words	2.551	0	0	0	10.73	1,455	0.745	2.705	−1.960*
Number of Environment-related Words	2.863	0	0	0	10.95	1,455	1.102	3.013	−1.911*
Number of Penalties	2.242	1.681	2.159	2.813	0.748	688	1.817	2.241	−0.424**
Total Penalty Amounts	5.252	4.069	4.988	6.682	1.971	627	5.307	5.232	-0.075
Total Toxic Releases	2.306	0.438	0	1	2.03	504	1.611	2.365	0.754**
High_TRR	0.466	0	0	1	0.499	504	0.282	0.482	0.200**
Green Patent	0.084	0	0	0	0.581	395	0.383	0.05	−0.333***
Green Patent Ratio	0.004	0	0	0	0.027	395	0.014	0.003	−0.011**

Panel D: Deal Characteristics

	Mean	p25	Median	p75	SD	N	Female Executive	Male Executive	Diff.
All Cash Deal	0.393	0	0	1	0.488	6,782	0.438	0.388	0.049**
Diversifying Dummy	0.286	0	0	1	0.452	6,782	0.280	0.287	-0.007
Public Dummy	0.199	0	0	0	0.399	6,782	0.188	0.200	-0.013
Private Dummy	0.452	0	0	1	0.498	6,782	0.470	0.450	0.020
Subsidiary Dummy	0.349	0	0	1	0.477	6,782	0.342	0.350	-0.007
Relative Size	0.110	0.011	0.038	0.113	0.194	6,782	0.116	0.110	0.007
Stock Deal	0.349	0	0	1	0.477	6,782	0.181	0.219	−0.038**

Table 3: Correlation Matrix

This table displays the correlational analysis among variables. Variable definitions are as defined in Table 1.

Panel A: Acquirers' Firm Characteristics

	Female	Book Leverage	Firm Size	Free Cash Flow	Profitability	Tobin's Q	Cash holdings	Firm Age	PPE	Cash Flow Measures
Female	1									
Book Leverage	-0.038***	1								
Firm Size	0.019***	0.266***	1							
Free Cash Flow	0.046***	-0.125***	0.170***	1						
Profitability	0.020***	-0.113***	0.158***	0.675***	1					
Tobin's Q	0.020***	-0.149***	-0.142***	0.200***	0.280***	1				
Cash Holdings	0.047***	-0.335***	-0.312***	-0.081***	-0.107***	0.381***	1			
Firm Age	0.010	0.027***	0.357***	0.124***	0.090***	-0.110***	-0.172***	1		
PPE	-0.035***	0.199***	0.136***	-0.264***	0.011*	-0.184***	-0.367***	0.031***	1	
Cash Flow Measures	0.016**	-0.024***	0.066***	0.631***	0.707***	0.346***	-0.130***	0.025***	0.231***	1

Panel B: Target Environment-related Variables

	Female	Frequency of Environment-related Words	Number Of Environment-related Words	Number of Penalties	Total Penalty Amounts	Total Toxic Releases	Green Patent	Green Patent Ratio
Female	1							
Frequency	-0.045	1						
# Of Environment-related Words	-0.033	0.855***	1					
Number Of Penalties	-0.089*	-0.227	-0.462***	1				
Total Penalty Amounts	-0.051	-0.360*	-0.129	0.279***	1			
Total Toxics Releases	-0.099*	0.046	0.082	0.034	-0.014	1		
Green Patent	0.173***	0.107*	0.083	0	0	0.003	1	
Green Patent Ratio	0.123*	0.019	0.006	0	0	-0.022	0.676***	1

Panel C: Deal Characteristics

	Female	All Cash Deal	Diversifying	Public	Private	Relative Size	Subsidiary	Stock Deal
Female	1							
All Cash Deal	0.029*	1						
Diversifying	-0.004	-0.017	1					
Public	-0.009	0.062***	-0.048***	1				
Private	0.012	-0.106***	0.020	-0.453***	1			
Relative Size	0.010	-0.078***	-0.050***	0.231***	-0.191***	1		
Subsidiary	-0.004	0.058***	0.020	-0.365***	-0.665***	0.006	1	
Stock Deal	-0.026*	-0.421***	-0.034**	0.259***	0.012	0.242***	-0.230***	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Female Executives and Target's Listing Status

This table examines the target's listing status of acquirers who make at least one acquisition. The dependent variable in column (1) is the dummy variable that equals one if the target is a public firm. Similarly, the dependent variables in columns (2) and (4) are private and subsidiary target indicators. In column (3), the sample is limited to private targets and the dependent variable is an indicator variable for firms that are controlled by a private equity firm. Following Huang, Jiang, Lie, and Yang (2014), all models use a Heckman procedure to control self-selection into making more than one bid. Female is a dummy variable which takes the value of one if the CFO or CEO in a given year is female and zero otherwise. The other control variables are defined in Table 1. All regressions include the fixed effects of year times industry. Variables are winsorized at 1% and 99%. T-values are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1) Public	(2) Private	(3) Private-Sponsor	(4) Subsidiary
Female	-0.107*	0.111**	0.257***	-0.038
	(-1.67)	(2.00)	(2.98)	(-0.67)
Book Leverage	-0.128	-0.448***	0.313*	0.590***
	(-1.11)	(-4.44)	(1.86)	(5.83)
Firm Size	0.230***	-0.197***	0.019	0.023**
	(17.71)	(-16.27)	(0.97)	(1.99)
Tobin's Q	0.039***	0.019	-0.058***	-0.065***
	(3.17)	(1.63)	(-3.23)	(-4.78)
Profitability	-0.728***	-0.128	-0.511	0.677***
	(-3.17)	(-0.65)	(-1.59)	(3.30)
Free Cash Flow	0.696**	0.280	1.554***	-0.685**
	(2.20)	(1.03)	(2.96)	(-2.51)
Firm Age	0.004***	-0.004***	0.009***	0.002
	(2.77)	(-3.48)	(4.24)	(1.46)
Inv. Mills	0.291***	-0.649***	-0.192**	0.471***
	(4.60)	(-11.05)	(-2.11)	(7.88)
Intercept	-3.353***	2.508***	-0.644**	-1.230***
	(-18.72)	(15.27)	(-2.50)	(-7.65)
N	6782	6782	2738	6782
Year*Industry Fixed Effects	YES	YES	YES	YES
R^2	6.5%	6.8%	2.6%	3.8%

Table 5: Female Executives and Target's Toxic Releases

This table examines the relationship between targets' emissions and the gender of the acquirer's executives. The dependent variable in column (1) is the target total toxic releases. The dependent variable in column (2) is a dummy variable that equals one if the target's releases are higher than the year-industry median releases. Female is a dummy variable which takes a value of one if the CFO or CEO in a given year is female and zero otherwise. The other control variables are defined in Table 1. All regressions include fixed effects of the year times industry. Variables are winsorized at 1% and 99%. T-values are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1) Total Toxic Releases	(2) High_TTR
Female	-0.807***	-0.573**
	(-2.70)	(-2.54)
Book Leverage	0.088	0.283
	(0.14)	(0.70)
Firm Size	-0.028	-0.103
	(-0.17)	(-0.96)
Revenue	0.203	0.191*
	(1.19)	(1.65)
PPE	2.399***	0.849**
	(3.68)	(2.53)
Firm Age	-0.007	-0.005
	(-1.14)	(-1.30)
Tobin's Q	0.032	0.041
	(0.45)	(0.86)
Cash Holdings	1.386*	0.900
	(1.67)	(1.55)
Intercept	0.330	-0.937**
	(0.57)	(-2.45)
N	504	504
Year*Industry Fixed Effects	YES	YES
R^2	6.9%	3.1%

Table 6: Female Executives and Target's Enforcement Penalties

This table examines the relationship between the gender of the acquirer's executives and targets' emissions and environmental penalties. The dependent variable in column (1) is the total number of federal and local penalties. The dependent variable in column (2) is the total amount of federal and local penalties. Female is a dummy variable taking a value of one when the CFO or CEO in a given year is female and zero otherwise. The other control variables are defined in Table 1. All regressions include year times industry fixed effects. Variables are winsorized at 1% and 99%. T-values are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1) Number of Penalties	(2) Penalty Amounts
Female	-0.217**	-0.352
	(-2.29)	(-1.57)
Book Leverage	-0.385*	-0.445
	(-1.82)	(-0.82)
Firm Size	0.018	-0.052
	(0.31)	(-0.33)
Revenue	-0.167***	0.125
	(-2.64)	(0.67)
PPE	-0.566***	2.968***
	(-2.83)	(4.93)
Firm Age	0.007***	0.010*
	(3.47)	(1.86)
Tobin's Q	-0.005	-0.116
	(-0.21)	(-1.60)
Cash Holdings	0.317	1.408
	(1.03)	(1.49)
Intercept	3.521***	4.068***
	(19.71)	(6.86)
N	688	627
Year*Industry Fixed Effects	YES	YES
R^2	10.8%	7.1%

Table 7: Female Executives and Target's Environment-related Discussions in 10-K Filings

This table examines the relationship between the targets' environmental activities reflected in the 10-K filing and the gender of the acquirer's executives. The sample is limited to the targets who file the 10-K in EDGAR. The dependent variable in column (1) is the number of environment-related words in the SEC 10-K form. The dependent variable in column (2) is the number of words in every one hundred thousand words. Female is a dummy variable taking a value of one when the CFO or CEO in a given year is female and zero otherwise. The other control variables are defined in Table 1. All regressions include fixed effects of the year times industry. Variables are winsorized at 1% and 99%. T-values are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1) Number of Words	(2) Frequency of Words
Female	-1.954***	-1.742***
	(-3.33)	(-3.78)
Book Leverage	-3.756**	-2.362
	(-2.54)	(-1.64)
Firm Size	2.109***	1.246***
	(4.14)	(3.30)
Revenue	-1.987***	-1.540***
	(-4.75)	(-4.79)
PPE	-0.434	-3.921***
	(-0.21)	(-2.65)
Firm Age	0.070***	0.105***
	(3.23)	(5.06)
Tobin's Q	-0.003	0.133
	(-0.02)	(1.39)
Cash Holdings	-6.952***	-8.428***
	(-3.20)	(-3.63)
Intercept	1.827	4.376***
	(1.17)	(2.70)
N	1455	1455
Year*Industry Fixed Effects	YES	YES
R^2	3.1%	3.2%

Table 8: Female Executives and Target's Green Patents

This table examines the relationship between the targets' environmental activities reflected in the patents issued and the gender of the acquirer's executives. The sample is limited to targets which have been issued at least one patent. The dependent variable in column (1) is the number of green patents. The dependent variable in column (2) is the ratio of green patents to the total firm patent number. The other control variables are defined in Table 1. All regressions include fixed effects of year times industry. Variables are winsorized at 1% and 99%. T-values are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1) Green Patent	(2) Green Patent Ratio
Female	0.375*	0.011*
	(1.82)	(1.79)
Book Leverage	-0.104	-0.005
	(-1.00)	(-0.56)
Firm Size	0.018	0.002
	(0.42)	(0.52)
Revenue	-0.027	-0.003
	(-0.64)	(-0.58)
PPE	-0.080	0.022
	(-0.47)	(1.07)
Firm Age	0.004*	0.000
	(1.90)	(0.32)
Tobin's Q	0.034	-0.001
	(1.03)	(-0.70)
Cash Holdings	-0.525**	-0.015**
	(-2.05)	(-2.16)
Intercept	0.248*	0.008*
	(1.80)	(1.83)
N	393	393
Year*Industry Fixed Effects	YES	YES
R^2	7.3%	4.5%

Table 9: Instrument Variables Estimation (Gender Equality)

This table presents the two-stage residual IV model regression results. Column (1) reports the results from the first-stage probit regressions with the female dummy as the dependent variable. Instrumented Female is the fitted value of the female indicator from first-stage regressions. The instrumental variable in the first stage is the state-level gender equality index proposed by Sugarman and Straus (1988). The dependent variable in column (1) is the total target toxic releases. The dependent variable in column (2) is a dummy variable that equals one if the target's releases are higher than the year-industry median releases. Definitions of other variables can be found in Table 1. All regressions include year fixed effects times industry fixed effects. T-statistic results are shown in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

Panel A:	(1) First Stage	(2)	(3) Second Stage	(4)
	Female	Public	Private	Subsidiary
Instrumented Female		-0.414	1.084***	-1.144***
		(-0.67)	(3.14)	(-2.89)
Book Leverage	-0.375***	-0.149	-0.368***	0.471***
	(-2.66)	(-1.20)	(-3.51)	(3.94)
Firm Size	0.072***	0.233***	-0.201***	0.036***
	(4.40)	(17.11)	(-16.72)	(2.93)
Tobin's Q	-0.014	0.038***	0.019*	-0.062***
	(-0.78)	(3.14)	(1.69)	(-4.54)
Profitability	0.024	-0.732***	-0.109	0.621***
	(0.09)	(-3.19)	(-0.56)	(3.09)
Free Cash Flow	1.720***	0.785**	0.020	-0.316
	(3.99)	(2.17)	(0.07)	(-1.01)
Firm Age	-0.004**	0.004**	-0.004***	0.001
	(-1.98)	(2.45)	(-2.88)	(0.73)
Gender Equality	0.011***			
	(3.81)			
Intercept	-3.288***	-3.384***	2.539***	-1.345***
	(-12.10)	(-18.41)	(15.69)	(-8.42)
N	6782	6782	6782	6782
Year*Industry Fixed Effects	YES	YES	YES	YES

Panel B:	(1) First Stage	(2) Second Stage
	Female	Private-Sponsor
Instrumented Female		1.273***
		(2.69)
Book leverage	-0.203	0.192
	(-0.99)	(0.85)
Firm Size	0.003	0.213***
	(0.11)	(8.38)
Tobin's Q	-0.049*	0.015
	(-1.96)	(0.72)
Profitability	-0.267	-0.896**
	(-0.71)	(-2.16)
Free Cash Flow	1.129*	2.192***
	(1.68)	(3.02)
Firm Age	-0.003	-0.002
	(-0.91)	(-0.86)
Gender Equality	0.015***	
	(3.38)	
Intercept	-2.020***	-3.294***
	(-7.36)	(-9.94)
N	2738	2738
Year*Industry Fixed Effects	YES	YES

Table 9: Instrument Variables Estimation (continued)

This table presents the two-stage residual IV model regression results. Column (1) reports the results from the first-stage probit regressions with the female dummy as the dependent variable. Instrumented Female is the fitted value of the female indicator from the first-stage regressions. The instrumental variable in the first stage is the state-level gender equality index proposed by Sugarman and Straus (1988). The dependent variable in column (2) is the target total toxic releases. The dependent variable in column (3) is a dummy variable that equals one if the target's releases are higher than the year-industry median releases. Definitions of other variables can be found in Table 1. All regressions include year fixed effects times industry fixed effects. Variables are winsorized at 1% and 99%. T-statistic results are shown in parentheses. * p ¡0.1, ** p ¡0.05, *** p ¡0.01. * p <0.1, ** p <0.05, *** p <0.01.

Panel C	(1) First Stage	(2) Second Stage	(3)
	Female	Total Toxic Releases	High_TTR
Instrumented Female		-0.862***	-0.583**
		(-2.91)	(-2.57)
Book Leverage	-0.786	0.175	0.346
	(-1.38)	(0.28)	(0.85)
Firm Size	-0.344**	0.012	-0.075
	(-2.24)	(0.08)	(-0.70)
Revenue	0.369**	0.159	0.160
	(2.28)	(0.93)	(1.39)
PPE	0.738	2.358***	0.819**
	(1.42)	(3.60)	(2.44)
Firm Age	0.001	-0.007	-0.005
	(0.16)	(-1.14)	(-1.30)
Tobin's Q	-0.136*	0.044	0.050
	(-1.68)	(0.63)	(1.05)
Cash Holdings	0.917	1.244	0.801
	(1.10)	(1.50)	(1.39)
Gender Equality	0.027**		
	(2.44)		
Intercept	-2.762***	0.276	-0.976**
	(-3.35)	(0.48)	(-2.55)
N	504	504	504
Year*Industry Fixed Effects	YES	YES	YES

Table 9: Instrument Variables Estimation (continued)

This table presents instrumental variable estimation results. Columns (1) and (3) report the results from the first-stage regressions with the female dummy as the dependent variable. Instrumented Female is the fitted value of the female indicator from the first-stage regressions. The instrumental variable in the first stage is the state-level gender equality index proposed by Sugarman and Straus (1988). The dependent variable in column (2) is the number of penalties. The dependent variable in column (4) is the total amount of penalties. Definitions of other variables can be found in Table 1. All regressions include year fixed effects times industry fixed effects. Variables are winsorized at 1% and 99%. T-statistic results are shown in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

Panel D	(1) First Stage	(2) Second Stage	(3) First Stage	(4) Second Stage
	Female	Number of Penalties	Female	Number of Penalties
Instrumented Female		-0.233**		-0.401*
		(-2.44)		(-1.68)
Book Leverage	-0.068	-0.384*	-0.147	-0.416
	(-0.13)	(-1.81)	(-0.29)	(-0.77)
Firm Size	-0.488***	0.034	-0.436**	-0.028
	(-2.91)	(0.59)	(-2.52)	(-0.18)
Revenue	0.560***	-0.185***	0.517***	0.099
	(3.04)	(-2.94)	(2.73)	(0.54)
PPE	0.835	-0.583***	0.692	2.954***
	(1.38)	(-2.91)	(1.10)	(4.90)
Firm Age	0.002	0.007***	-0.002	0.010*
	(0.41)	(3.44)	(-0.25)	(1.82)
Tobin's Q	0.073	-0.009	0.091	-0.122*
	(1.07)	(-0.35)	(1.35)	(-1.66)
Cash Holdings	1.238	0.267	1.203	1.367
	(1.57)	(0.87)	(1.44)	(1.45)
Gender Equality	0.024**		0.026***	
	(2.48)		(2.77)	
Intercept	-3.385***	3.531***	-3.399***	4.053***
	(-4.85)	(19.77)	(-4.81)	(6.82)
N	688	688	627	627
Year*Industry Fixed Effects	YES	YES	YES	YES

Table 9: Instrument Variables Estimation (continued)

This table presents instrumental variable estimation results. Column (1) reports the results from the first-stage regressions with the female dummy as the dependent variable. Instrumented Female is the fitted value of the female indicator from the first-stage regressions. The instrumental variable in the first stage is the state-level gender equality index proposed by Sugarman and Straus (1988). The dependent variable in column (2) is the number of environment-related words on the SEC 10-K form. The dependent variable in column (3) is the number of such words in every one hundred thousand words. Definitions of other variables can be found in Table 1. All regressions include year fixed effects times industry fixed effects. Variables are winsorized at 1% and 99%. T-statistic results are shown in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

Panel E	(1) First Stage	(2) Second Stage	(3)
	Female	Number of words	Frequency
Instrumented Female		-2.008***	-1.810***
		(-3.38)	(-3.83)
Book Leverage	-0.303*	-3.657**	-2.272
	(-1.82)	(-2.48)	(-1.58)
Firm Size	0.037	2.098***	1.236***
	(0.82)	(4.13)	(3.28)
Revenue	0.004	-1.988***	-1.540***
	(0.08)	(-4.75)	(-4.79)
PPE	0.001	-0.405	-3.895***
	(0.00)	(-0.20)	(-2.64)
Firm Age	-0.003	0.071***	0.106***
	(-1.63)	(3.28)	(5.09)
Tobin's Q	-0.053***	0.012	0.146
	(-3.28)	(0.11)	(1.54)
Cash Holdings	0.170	-7.031***	-8.496***
	(0.92)	(-3.23)	(-3.65)
Gender Equality	0.010***		
	(2.92)		
Intercept	-1.914***	1.691	4.252***
	(-9.28)	(1.08)	(2.63)
N	1455	1455	1455
Year*Industry Fixed Effects	YES	YES	YES

Table 10: Instrument Variables Estimation (Share of Low-skilled Immigrants)

This table presents the two-stage residual IV model regression results. Columns (1) in Panel A and Panel B report the results from the first-stage probit regressions with the female dummy as the dependent variable. Instrumented Female is the fitted value of the female indicator from first-stage regressions. The instrumental variable in the first stage is the state-level share of low-skilled immigrants in the labour force (**?**). The dependent variable in Panel A column (2) is the dummy variable that equals one if the target is a public firm. Similarly, the dependent variables in columns (3) and (4) are private and subsidiary target indicators. In Panel B, column (2), the sample is limited to private targets and the dependent variable is an indicator variable for firms that are controlled by a private equity firm. Following Huang and Kisgen (2013), all models use a Heckman procedure to control self-selection into making more than one bid. Female is a dummy variable which takes the value of one if the CFO or CEO in a given year is female and zero otherwise. All regressions include year-fixed effects times industry fixed effects. T-statistic results are shown in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

Panel A:	(1) First Stage	(2)	(3) Second Stage	(4)
	Female	Public	Private	Subsidiary
Instrumented Female		-1.087**	0.400***	-0.114
		(-2.13)	(2.80)	(-0.72)
Book leverage	-0.431***	-0.219*	-0.427***	0.585***
	(-2.88)	(-1.69)	(-4.22)	(5.75)
Firm Size	0.083***	0.231***	-0.200***	0.024**
	(4.73)	(15.54)	(-16.53)	(2.05)
Tobin's Q	-0.005	0.031**	0.019*	-0.065***
	(-0.24)	(2.26)	(1.67)	(-4.78)
Profitability	0.118	-0.746***	-0.123	0.675***
	(0.39)	(-3.37)	(-0.63)	(3.29)
Free Cash Flow	1.968***	1.084***	0.201	-0.663**
	(4.23)	(2.63)	(0.74)	(-2.40)
Firm Age	-0.002	0.003*	-0.004***	0.002
	(-1.24)	(1.77)	(-3.33)	(1.42)
Low-skilled Immigrants	0.034***			
	(4.24)			
Intercept	-3.156***	-3.323***	2.536***	-1.240***
	(-11.60)	(-16.03)	(15.50)	(-7.66)
N	5181	5181	5181	5181
Year*Industry Fixed Effects	YES	YES	YES	YES

Panel B:	(1) First Stage	(2) Second Stage
	Female	Private-Sponsor
Instrumented Female		0.255
		(1.37)
Book leverage	-0.659***	0.313*
	(-2.76)	(1.86)
Firm Size	0.070**	0.019
	(2.45)	(0.97)
Tobin's Q	-0.029	-0.058***
	(-0.91)	(-3.22)
Profitability	-0.394	-0.511
	(-0.92)	(-1.59)
Free Cash Flow	1.809**	1.554***
	(2.27)	(2.95)
Firm Age	-0.003	0.009***
	(-0.95)	(4.24)
Low-skilled Immigrants	0.020*	
	(1.72)	
Intercept	-3.024***	-0.643**
	(-7.32)	(-2.50)
N	2232	2232
Year*Industry Fixed Effects	YES	YES

Table 10: Instrument Variables Estimation (continued)

This table presents the two-stage residual IV model regression results. Column (1) reports the results from the first-stage probit regressions with the female dummy as the dependent variable. Instrumented Female is the fitted value of the female indicator from the first-stage regressions. The instrumental variable in the first stage is the state-level share of low-skilled immigrants in the labour force (**?**). The dependent variable in column (2) is the target total toxic releases. The dependent variable in column (3) is a dummy variable that equals one if the target's releases are higher than the year-industry median releases. All regressions include year fixed effects times industry fixed effects. Variables are winsorized at 1% and 99%. T-statistic results are shown in parentheses. * p ¡0.1, ** p ¡0.05, *** p ¡0.01. * p <0.1, ** p <0.05, *** p <0.01.

Panel C	(1) First Stage	(2) Second Stage	(3)
	Female	Total Toxic Releases	High_TTR
Instrumented Female		-0.804***	-0.573**
		(-2.72)	(-2.53)
Book Leverage	-0.269	0.268	0.405
	(-1.60)	(0.43)	(0.98)
Firm Size	0.025	-0.036	-0.104
	(0.578)	(-0.22)	(-0.96)
Revenue	0.009	0.199	0.185
	(0.21)	(1.16)	(1.59)
PPE	-0.120	2.487***	0.896***
	(-0.81)	(3.76)	(2.63)
Firm Age	-0.002	-0.009	-0.006
	(-1.04)	(-1.36)	(-1.52)
Tobin Q	-0.054***	0.040	0.049
	(-3.33)	(0.56)	(1.03)
Cash holding	0.094	1.375	0.863
	(0.51)	(1.63)	(1.46)
Low Skilled Immigrants	0.031***		
	(3.58)		
Intercept	-1.571***	0.310	-0.961**
	(-10.16)	(0.54)	(-2.50)
N	492	492	492
Year*Industry Fixed Effects	YES	YES	YES

Table 10: Instrument Variables Estimation (continued)

This table presents instrumental variable estimation results. Column (1) reports the results from the first-stage regressions with the female dummy as the dependent variable. Instrumented Female is the fitted value of the female indicator from the first-stage regressions. The instrumental variable in the first stage is the state-level share of low-skilled immigrants in the labour force (**?**). The dependent variable in column (2) is the number of environment-related words on the SEC 10-K form. The dependent variable in column (3) is the number of such words in every one hundred thousand words. Definitions of other variables can be found in Table 1. All regressions include year fixed effects times industry fixed effects. Variables are winsorized at 1% and 99%. T-statistic results are shown in parentheses. * p <0.1, ** p <0.05, *** p <0.01.

Panel D	(1) First Stage	(2) Second Stage	(3)
	Female	Number of words	Frequency
Instrumented Female		-1.431**	-0.896**
		(-2.56)	(-2.52)
Book Leverage	0.403	-1.046	0.873
	(1.20)	(-0.91)	(0.96)
Firm Size	0.030	1.540***	0.569**
	(0.34)	(3.48)	(2.43)
Revenue	0.091	-1.396***	-0.830***
	(1.07)	(-3.88)	(-4.15)
PPE	-0.120	3.261*	0.450
	(-0.41)	(1.78)	(0.47)
Firm Age	-0.005	0.025	0.050***
	(-1.24)	(1.38)	(3.40)
Tobin's Q	-0.076**	-0.058	0.064
	(-2.47)	(-0.54)	(0.84)
Cash Holdings	0.248	-1.146	-1.503
	(0.61)	(-0.89)	(-1.43)
Low-skilled Immigrants	0.068***		
	(3.80)		
Intercept	-2.403***	-0.706	1.388
	(-6.53)	(-0.58)	(1.23)
N	1437	1437	1437
Year*Industry Fixed Effects	YES	YES	YES

Table 10: Instrument Variables Estimation (continued)

This table examines the relationship between the targets' environmental activities reflected in the patents issued and the gender of the acquirer's executives. The sample is limited to targets which have been issued at least one patent. The instrumental variable in the first stage is the state-level share of low-skilled immigrants in the labour force (**?**). The dependent variable in column (2) is the number of green patents. The dependent variable in column (3) is the ratio of green patents to the total firm patent number. All regressions include fixed effects of year times industry. Variables are winsorized at 1% and 99%. T-values are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Panel E	(1) First Stage	(2) Second Stage	(3) Second Stage
	Female	Green Patent	Green Patent Ratio
Instrumented Female		0.427*	0.011*
		(1.91)	(1.84)
Book Leverage	-0.153	-0.106	-0.006
	(-0.29)	(-0.98)	(-0.58)
Firm Size	0.244	0.017	0.003
	(1.33)	(0.45)	(0.53)
Revenue	0.001	-0.013	-0.003
	(0.00)	(-0.33)	(-0.53)
PPE	0.676	0.053	0.026
	(1.16)	(0.37)	(1.18)
Firm Age	-0.014*	0.003	-0.000
	(-1.93)	(1.32)	(-0.04)
Tobin's Q	-0.149	0.026	-0.001
	(-1.58)	(0.87)	(-0.96)
Cash Holdings	0.875	-0.338*	-0.011*
	(1.24)	(-1.77)	(-1.91)
Low-skilled Immigrants	0.064*		
	(1.91)		
Intercept	-3.320***	0.170	0.006
	(-4.47)	(1.46)	(1.43)
N	384	384	384
Year*Industry Fixed Effects	YES	YES	YES

Table 11: Acquirers' Announcement Return Regressions

This table reports the results of ordinary least squares regressions. The dependent variable is the acquirer's cumulative abnormal returns (in percentage), measured using the Fama-French three factors model. The dependent variables in columns (1) are three-day CARs, and five-day CARs in column (2). All regressions include year fixed effects times industry fixed effects. T-values are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1) (-1,1)	(2) (-2,2)
Female	-0.315	-0.460
	(-1.25)	(-1.64)
Firm Size	-0.282***	-0.303***
	(-6.32)	(-5.84)
Tobin's Q	0.098*	0.057
	(1.92)	(0.96)
Free Cash Flow	5.875***	7.981***
	(4.43)	(5.11)
Cash Flow Measures	-3.241***	-4.590***
	(-2.95)	(-3.56)
Book Leverage	2.084***	2.421***
	(4.33)	(4.41)
Relative Size	0.274	-0.103
	(0.39)	(-0.14)
Stock Deal	-0.080	-0.024
	(-0.33)	(-0.09)
All Cash Deal	0.584***	0.635***
	(3.79)	(3.65)
Public	-1.339***	-1.253***
	(-5.99)	(-4.96)
Subsidiary	0.690***	0.838***
	(4.24)	(4.56)
Diversifying	-0.159	-0.210
	(-1.02)	(-1.19)
Intercept	2.040***	2.166***
	(4.45)	(4.07)
N	5954	5954
Year*Industry Fixed Effects	YES	YES