2025

GENDER & GREEN GOVERNANCE

Do Female Mayors Increase LEED-Certified Infrastructure?

Emmett Frett

B.A. Economics & Finance

Gender and Green Governance

Do Female Mayors Increase LEED-Certified Infrastructure?

Abstract

Women remain significantly underrepresented in politics. This paper investigates whether, when women are elected, their gender influences the likelihood of implementing green building projects at the municipal level. Leadership in Energy and Environmental Design (LEED) buildings were chosen as a proxy for environmental building concern. The method used was a naive model using Ordinary Least Squares (OLS) regression, controlling for political affiliation, incumbent status, and race. To further isolate causal effects, a Regression Discontinuity (RD) design is employed, focusing on elections where mayoral candidates narrowly won or lost. The OLS regression model showed no significance; however, the RD model found a significant positive effect ($p = .049$) of female leadership on state-funded LEED buildings. Despite limitations, this paper contributes to the literature by offering novel empirical evidence of gender-based differences in the implementation of green infrastructure.

1. Introduction

Women remain significantly underrepresented in political leadership. On average, only one in five members of national parliaments are women (Funk & Gathmann, 2014), and the disparity deepens at higher levels—just 20 of 180 global heads of state are women (The

Economist, 2012). This underrepresentation raises a crucial question: when women do hold office, do they govern differently?

This paper examines whether female mayors and county executives are more likely to prioritize green infrastructure at the local level. Prior work suggests that women in political office tend to prioritize social welfare and environmental protection (Clots-Figueras, 2012; Funk & Gathmann, 2014) and are more likely to support environmental treaties and allocate sustainability funding. Research in environmental psychology also consistently finds that women express greater concern for environmental protection (Zelezny et al., 2000; Tikka et al., 2000; Casey & Scott, 2006).

It remains unclear, however, whether gender-based policy preferences translate into tangible outcomes at the municipal executive level. For example, Ferreira and Gyourko (2014) found few differences in policy outputs between male and female mayors, aside from the strategic use of political capital. This suggests that institutional context may play a key role in determining whether gendered preferences influence governance. To explore this, I analyze U.S. local election data using both Sharp Regression Discontinuity (RD) and Ordinary Least Squares (OLS) methods, focusing on the impact of female leadership on investment in Leadership in Energy and Environmental Design (LEED) certified infrastructure. LEED, the world's leading standardized rating system for green buildings, provides a "framework for healthy, highly efficient, and cost-saving green buildings, which offer environmental, social, and governance benefits" (U.S. Green Building Council, n.d.-b). Today, nearly 200,000 LEED projects exist across 186 countries (U.S. Green Building Council, n.d.-b). My analysis finds that female mayors and county executives significantly increase the number of state-funded LEED projects ($p = .049$), while having no comparable effect on those funded at the federal or local levels.

This study contributes to two central debates: (1) whether gendered environmental preferences translate into real policy change, and (2) whether such effects are observable in local executive offices, where authority and resources are often limited.

The remainder of this paper is organized as follows: Section 2 reviews relevant literature on gender and environmental governance. Section 3 describes the theoretical framework. Section 4 presents data and the identification strategy. Section 5 presents the empirical results. Section 6 discusses implications and potential mechanisms. Section 7 concludes.

2. Lit Review

General Gender Differences in Environmentalism

Meta-analytic research by Zelezny et al. (2000) established a significant and consistent pattern wherein women exhibit greater support for environmental protection initiatives compared to men. Their findings suggest that these gender-based disparities are, in part, attributable to differential socialization processes, indicating a role for societal norms and expectations in the development of environmental attitudes. Notably, their study revealed that gender is a stronger predictor of actual environmental behavior than self-reported environmental beliefs, thereby underscoring a potential incongruence between stated values and corresponding actions.

Extant literature across diverse demographic cohorts consistently substantiates the observation that females demonstrate a heightened sense of environmental responsibility relative to their male counterparts. This trend has been documented among female adolescents (Hampel et al., 1996), university students (Tikka et al., 2000; Rideout et al., 2005), and working adults (Casey & Scott, 2006), indicating a relatively robust and pervasive phenomenon across various stages of the life course. Collectively, these studies suggest a greater propensity among women towards environmentally conscious behaviors and cognitions.

However, Eagly's (1987) research offers a more nuanced perspective, proposing that a considerable portion of the observed variations in environmental attitudes, alongside broader belief systems and behaviors, can be associated with societal role expectations. Eagly's framework posits that the magnitude of inherent sex differences may be less pronounced upon controlling for the influence of these role expectations. This perspective highlights the critical importance of considering the socio-contextual framework when examining gender-based variations in environmentalism.

Furthermore, Reingold (2003) emphasizes the comparatively greater influence of political party affiliation in shaping attitudes and behaviors, particularly within the political domain. As noted, virtually all studies in political science indicate that “sex differences pale in comparison to party differences” (p. 172). This observation underscores that, at least within the sphere of political behavior, such as voting patterns, an individual's political affiliation constitutes a substantially more potent predictor than their sex or gender. This comparison serves to contextualize the relative impact of gender alongside other significant determinants of beliefs and actions.

Gender and Environmental Policy Decisions

While attitudinal differences are well documented, it remains an open question whether these differences translate into policy outcomes when women hold power. Funk and Gathmann (2014) offer compelling evidence from Switzerland, where citizens vote directly on policy issues. Their findings show that female voters are more likely than men to support environmental protection, along with policies favoring equal rights, public health, and disability support—while being more skeptical of military spending. Switzerland's direct democracy allows researchers to examine enacted preferences rather than relying solely on survey data.

Ferreira and Gyourko (2014) explore the extent to which gender shapes policy outcomes once individuals attain formal leadership positions. Their empirical analysis of U.S. mayoral administrations reveals no statistically significant differences between male and female leaders concerning the size of local government, the distribution of municipal spending, public sector employment, or crime rates. In contrast, Schwindt-Bayer (2006) presents evidence suggesting that gendered policy preferences may become more salient, rather than attenuated, within formal political office. Her research indicates that female legislators tend to prioritize policy areas traditionally associated with women—such as gender equality, family welfare, and children's issues—while comparatively deprioritizing domains such as agriculture and labor market policy. This divergence may reflect both internalized value orientations and the influence of societal expectations, which often confine female politicians to operate within "feminized" policy arenas, while affording male counterparts broader latitude over conventionally 'serious' or high-status issues. The apparent inconsistency between the two studies may, in part, be attributed to the divergent institutional contexts under investigation: Ferreira and Gyourko (2014) assess executive-level roles in the U.S. municipal system, characterized by centralized authority, whereas Schwindt-Bayer (2006) examines legislative positions in Latin America, where policymaking authority is more dispersed. These institutional variations suggest that gendered policy expression may be contingent upon the structural configuration of political office.

Ferreira and Gyourko's (2014) findings echo the Median Voter Theorem (Downs, 1957), which posits that elected officials, regardless of personal beliefs, converge toward policies preferred by the median voter. This would predict no policy differences between male and female politicians. Yet in practice, elected officials often diverge along ideological lines, even when their constituencies are similar (Abramowitz & Webster, 2016). The citizen-candidate model (Alesina, 1988; Besley & Coate, 1997) resolves this tension by arguing that candidates with strong preferences—and no credible way to commit to centrism—will implement divergent policies once elected.

Trade, Fiscal, and Regulatory Policies

Gender differences extend beyond environmental policy into international trade and fiscal behavior. Bros et al. (2024) find that female heads of state are more likely to enact protectionist trade policies than men. Interestingly, this tendency appears less driven by nationalistic impulses than by strategic gender dynamics. Protectionist measures are disproportionately directed toward countries led by male leaders, suggesting an attempt to counteract perceived bias or assert credibility rather than protect domestic interests per se.

Domestic fiscal policy also reveals gendered patterns. Betz et al. (2020) examine import tariffs across 67 democracies between 1995 and 2015 and uncover a consistent bias: goods marketed to women face tariffs 0.7% higher on average than similar goods marketed to men. Analyzing nearly 74,000 product pairs, they find this disparity diminishes in legislatures with more female representatives. Four mechanisms may be at play: female legislators may advocate for women's goods, exhibit greater group solidarity, resist adopting unequal tariff structures, or alter male legislators' behavior through their presence.

These findings align with Critical Mass Theory (Dahlerup, 2006), which posits that increasing women's representation can shift not only priorities but also the policymaking culture itself. Together, the studies point to measurable effects of gender on both domestic and international economic policies—effects that are conditional on representation and institutional structure.

Why Gender Might Matter for Green Infrastructure

Taken together, these strands of research suggest that gender can influence not only environmental attitudes but also policy behavior—though this influence appears to be deeply conditional on institutional context, political structure, and the type of policy in question. While scholars like Zelezny et al. (2000) and Funk & Gathmann (2014) provide robust evidence for gendered differences in environmental concern and preference expression, others, such as Ferreira & Gyourko (2014), caution against overgeneralizing these differences into expectations about policy outcomes once women are in office. Institutional structure, role expectations, and political incentives all play mediating roles.

The contrasting findings across studies reveal a critical gap in the literature: whether, and under what conditions, gendered differences in environmental attitudes translate into concrete environmental infrastructure outcomes at the municipal level. Much of the prior work has focused on voter preferences, legislative behavior, or broad fiscal and regulatory trends. Far less is known about how gender operates in local executive leadership, particularly in relation to physical, on-the-ground environmental investments like green infrastructure.

This study seeks to address that gap directly. By asking "Does the gender of municipal leaders affect the propensity to build green infrastructure?" it bridges attitudinal research and institutional analysis, offering a concrete test of whether the well-documented environmental inclinations among women translate into real-world infrastructure decisions in cities and counties. As the literature shows, gender matters—but whether it matters for building a greener world at the municipal level remains an open and urgent question.

3. Theoretical Framework

The literature reveals persistent gender gaps in environmental policy priorities, but offers mixed evidence on whether these preferences translate into tangible policy outcomes when women hold formal local executive office. To explain these patterns, we turn to theoretical frameworks exploring why and under what conditions gender might shape policy decisions—from economic models of time discounting to sociopsychological theories of socialization and stereotype navigation.

Gendered Discounting

The theory most related to economics is the time discounting of future rewards and present pains. Utility discounting (Samuelson, 1937), delay discounting, or, sometimes, just discounting, is the mental heuristic used to assess the value of some reward or punishment that is temporally lagged. For example, a future reward is considered less good than a present one, and a future pain is regarded as less bad than a current one (Odum, 2011). Individuals who discount the future more steeply place less value on future outcomes, perceiving them as less desirable than someone who discounts the future more gradually. In the context of this paper, the "good outcome" is a future with a healthy, livable climate. Individuals who discount the future more slowly are more likely to value long-term environmental benefits and, as a result, may be more inclined to support or implement environmental protection policies. Therefore, it is important to investigate whether systematic gender differences exist in the degree and speed of future discounting, as these differences may help explain gender-based patterns in environmental policymaking.

Recent research by Malesza (2019) found that women tend to discount future outcomes more slowly than men, suggesting that they may place greater value on long-term benefits, such as those associated with environmental sustainability. This finding aligns with broader evidence that women express stronger concern for long-term social and ecological outcomes (Zelezny et al., 2000; Hampel et al., 1996; Tikka et al., 2000; Rideout et al., 2005; Casey & Scott, 2006, see literature review). However, the relationship between gender and temporal discounting is far from settled. Earlier studies present conflicting evidence: Reynolds et al. (2006), for example, found that women actually discounted the future more steeply than men, implying a stronger preference for immediate rewards. In contrast, Logue and Anderson (2001) found no significant gender differences in discounting behavior, while Kirby and Maraković (1996) reported results more in line with Malesza (2019), indicating that men tend to discount the future more than women.

Linguistic, social gender theories.

Recent research highlights that both decision-making and perception are shaped by gendered context. Dietrich et al. (2019) examine how women present women's issues compared to men, and how men respond when women advocate for these issues. They find that congresswomen tend to use a higher-pitched and more emotionally expressive vocal tone when discussing women's issues—subtle but meaningful shifts that are often difficult to consciously control. These vocal cues can influence how messages are received and interpreted by audiences.

Furthermore, the study finds that male legislators are more likely to engage with or advocate for women's issues when in the presence of female colleagues who are vocal on those topics. The finding that men are more likely to support policies benefiting women in the presence of female colleagues is reinforced by Mendelberg et al. (2014). Their research shows that women's issues receive the strongest support under majority-rule conditions when women constitute a significant proportion of the decision-making body. In such settings, women hold greater influence, and male representatives are also more likely to vote in favor of policies that advance women's interests.

Overcoming Gender Bias

Work by Bros et al. (2024) theorizes about the underlying causes of gender-based differences in policy decisions, particularly in the realm of international trade. They find that female heads of state are more likely than their male counterparts to implement protectionist trade measures, especially when dealing with male-led governments. However, Bros et al. (2024) argue that this pattern does not stem from an inherent preference for contingent protection among women. Instead, it reflects a strategic response to gendered expectations in international relations. Female leaders, particularly early in their tenure, may feel pressure to assert strength and competence in traditionally male-dominated arenas like trade and diplomacy. This interpretation is supported by the observation that female leaders tend to rely less on contingent protection policies as their time in office increases. In other words, once they have established credibility and overcome initial stereotypes, their policy behavior begins to converge with that of male leaders. These findings suggest that policy differences are not solely the result of individual preferences but are also shaped by the need to navigate and counteract systemic gender biases.

The Socialization of Women as Caregivers

The socialization of women into caregiving roles, shaped by various psychological and sociocultural phenomena, may influence their leadership and policy preferences, particularly in the realm of environmental sustainability. This section examines key theories, including Social Learning Theory, Gender Schema Theory, Psychoanalytic Theory, Social Role Theory, and Doing Gender Theory, to explore how societal expectations around caregiving may lead women to adopt more environmentally protective policies. Understanding these frameworks can provide insight into why female leaders may be more inclined to prioritize the care of natural resources and ecosystems, as their roles as caretakers may extend beyond the family or local environment to encompass broader environmental concerns.

First, we turn to the Social Learning Theory. Social Learning Theory comes from the behaviorist tradition of psychology and is mainly associated with the work of psychologist Albert Bandura (Kretchmar, 2014). The mechanism of Social Learning Theory is reinforcement, both positive and negative, of gender-appropriate and inappropriate behavior (Wharton, 2004; Shawn Meghan Burn, 1996; Kretchmar, 2014). Social Learning Theory theorizes that it is role models of the child's respective gender who implement reinforcements. For example, a young boy playing with dolls may be ignored by his father until he stops playing with them, which serves as a negative reinforcement to adhere to “male” gender expectations. Or, parents might hug a young girl when she is crying (but less often a young male), thereby positively reinforcing young girls to cry more than young boys. This process begins at a very young age, as research shows that children internalize gender roles early in life (Canales et al., 2020).

The Social Learning Theory was first proposed in the 1950s and 1960s. However, it has not withstood the test of time very well (Kretchmar, 2014). Stockard (2006) found that parents who display gender-stereotypical behaviors are no more likely to have children who adopt similar behaviors than parents who do not exhibit gender-stereotypical behaviors. This discredits the idea that children "imitate same-sex adults" (Kretchmar, 2014). Additionally, evidence is mixed as to what extent parents actually reinforce children of different sexes differently (Kretchmar, 2014). In light of these critiques, a different theory, Gender Schema Theory, offers an alternative perspective on gender socialization.

Gender Schema Theory, unlike Social Learning Theory—a theory of learned socialization—is a cognitive theory of gender socialization. Unlike learning theories, cognitive theories emphasize the bilateral learning process where children play an active role in their own development of gender ideas (Stockard, 2006). Gender Schema Theory was developed by Sandra Bem as a way to show how children in cultures where gender differences are highly emphasized "learn to use gender as a way to process information about the world." (Kretchmar, 2014). Cognitive structures—called schemas in psychology—serve as lenses through which individuals observe the world. Gender schemes help children organize information and maintain consistency (Stockard, 2006). They also tend to be highly polarized, so "what is acceptable and appropriate for females is not acceptable or appropriate for males (and vice versa)" (Wharton, 2004, p. 34). Additionally, in cultures with highly emphasized and reinforced gender expectations, children tend to receive and internalize positive messaging of "male" gender norms and therefore consider them superior to "female" gender expectations (Wharton, 2004).

Building upon the idea that early influences shape gender understanding, Psychoanalytic Theory offers a distinct view of gender socialization. Psychoanalytic Theory differs from both cognitive and social learning theories of gender in one important aspect: it presumes that the main way that gender is embodied is through an unconscious process rather than via a conscious learning or creating process (Kretchmar, 2014). Psychoanalytic theories were first created by Sigmund Freud, but their first application to gender was outlined by Nancy Chodorow (Kretchmar, 2014). To Chodorow, the most important factor for gender socialization is the mother as the primary caregiver (Stockard, 2006). Because children spend more time with their mothers than fathers, the first identification with gender is the feminine. It is only later that boys learn to be masculine. This intimate knowledge of the feminine early in life guides young boys to define masculine as “not feminine” (Stockard, 2006). Additionally, this theory posits that in the process of disidentification, boys learn to devalue the feminine. This theory has received its fair share of criticism, though. Wharton (2004) argues that a) it is difficult to conduct empirical research on this theory, as the unconscious processes it emphasizes are not easily observable or measurable; b) it reinforces gender stereotypes by focusing on the mother as the central figure in gender socialization and overlooking other social influences; and c) it places too much emphasis on the unconscious role of gender socialization, which limits understanding of the active, conscious ways children internalize gender norms.

In contrast to the psychoanalytic focus on family dynamics, Social Role Theory shifts attention to broader societal influences. Unlike the previous three theoretical explanations for how people learn gender roles, Social Role Theory is rooted in cultural rather than familial conditioning. Schwindt-Bayer (2006) shows how, in politics, women are pressured into staying in "female domains," whereas men are given the "more important issues." Thereby, society as a whole—rather than individual family units—becomes the vessel for the generational passing on of gender norms.

Eagly and Wood (2012) explain that Social Role Theory is fundamentally concerned with society's stereotypes of gender rather than innate abilities or functions. This creates a self-reinforcing cycle. They use the example of how, in industrialized societies, women are more likely to take on caretaking roles both in employment and at home. As a result, people infer that women are inherently communally oriented and caring. Eagly and Wood (2012) trace the origin of these gender roles to the evolved physical differences between the sexes, which led people to self-sort by sex to maximize societal efficiency. This created a bio-social reinforcement loop, in which men and women continue to sort according to “hormonal fluctuations that regulate role performance, self-regulation to gender role standards, and social regulation to others’ expectations about women and men” (Eagly & Wood, 2012).

Building on this idea of societal expectations and role enforcement, the Doing Gender Theory offers a different perspective on how gender is perceived and performed in society. The seminal work of Doing Gender (West & Zimmerman, 1987) holds two core beliefs. The first is a tenet core to all of the above gender theories—people expect that people will adhere to the same gender norms as their sex assigned at birth. The second tenet flips the so far examined idea of gender on its head. West and Zimmerman (1987) argue that gender is not something we are as members of society, but something we do as members of society. Explaining gender as a “routine, methodical, and recurring accomplishment.” This transforms the perspective of what gender is from an internal way of being to an external way of functioning. West and Zimmerman (1987) say the “‘doing’ of gender is undertaken by women and men whose competence as members of society is hostage to its production.” We expect people to perform actions according to their sex, and if they do not, society shuns them. Thereby, gender non-conforming or non-cisgender individuals are faced with ridicule because of the “violation” of gender stereotypes.

The Doing Gender Theory speaks to the interdependence and mutual influence between individuals and society in the construction of gender. It emphasizes that gender is not a fixed trait residing within a person, but rather an ongoing process that is continuously shaped by social expectations and interactions. In this view, we do not passively receive gender roles from society, nor do we craft them in isolation. Instead, we participate in a dynamic exchange—our behaviors both respond to and reinforce the norms around us. We actively decide, perform, and reinforce our gender identities in everyday life.

Together, these theories reveal that gendered policy outcomes are shaped by a complex mix of internalized norms, strategic responses to bias, and social reinforcement. Unlike in physics, there is no single unifying theory in sociology to explain complex human behavior; rather, it is likely a combination of frameworks that provides the most insight. To investigate how these dynamics manifest in real-world governance, particularly at the local executive level, we now turn to our empirical approach.

4. Method

Data Sources

This analysis merges multiple data sources to examine the relationship between municipal electoral variables, particularly candidate gender, and subsequent investment in sustainable infrastructure, as proxied by LEED-certified building projects squarefootage lagged from the date of the election by 2 years.

The study of local elections has long been hindered by the lack of aggregated local information. Most research, therefore, has focused on a very limited scope. For example, focusing only on one time period (e.g., Sances, 2017), one location (e.g., Arnold & Carnes, 2012), or one office (e.g., Ferreira & Gyourko, 2009). The work of de Benedictis-Kessner et al. (2023) has changed the playing field, and for the first time, a broad examination of U.S. local election outcomes and races can be conducted. Their work introduced a dataset of about 78,000 local election candidates across 57,000 elections. In the dataset, the collection includes seven election office types for all medium and large cities from 1990 to 2021.

This paper uses LEED building square footage, lagged by two years from the date of each election, as a proxy for environmental building efforts by municipal leaders. These data are drawn from the U.S. Green Building Council's (n.d.-a) LEED project directory. Additional data sources include geographic information from the U.S. Census Bureau (2025), crosswalk data from HUD User (U.S. Department of Housing and Urban Development's Office of Policy Development and Research, 2024), and local RStudio FIPS data for verification and NA imputation.

Data Cleaning and Processing

LEED Projects

The LEED dataset was cleaned, filtered, and transformed to produce standardized, county-level measures of LEED building projects that could reasonably be linked to municipal elections. First, the dataset was restricted to U.S.-based projects with non-missing, non-zero, and non-confidential square footage, reducing the number of observations from 206,304 to 115,532. All area measurements were then converted to square footage using project-reported units, standardizing entries originally recorded in either square feet or square meters.

Next, the dataset was reshaped into a wide format, with separate columns for square footage by year and by funding or ownership type. These categories—local government, state government, federal government, and non-government—were selected for their geographic relevance. A detailed description of how ownership types were classified into these four categories can be found in Appendix A.

Because LEED project locations are recorded by address and municipal data is organized by county, ZIP-FIPS crosswalk files from HUDUser were used to match and aggregate projects by county FIPS code. Finally, the data was grouped by lag year and FIPS code, and standardized by dividing total LEED square footage by county land area (in square miles), producing a consistent measure of environmental building intensity.

Municipal Election Data

The election dataset was cleaned and standardized to facilitate alignment with LEED metrics. First, the data was restricted to relevant municipal offices—Mayor, County Legislature, County Executive, and City Council—while positions such as Sheriff, School Board, and Prosecutor were excluded. Next, all place and county FIPS codes were reformatted to a uniform five-digit standard by adding leading zeros where necessary. A crosswalk file was created for consistency, and a small number of FIPS codes were manually corrected in cases of missing or ambiguous identifiers.

To account for the time delay between the election and observable LEED certification outcomes, a two-year temporal lag variable was created. This lag reflects the median time between LEED project registration (typically occurring at the start of construction) and final certification (at project completion), which was found to be 725 days, or approximately two years.

Dataset Construction

The first step in constructing the full dataset was to merge the LEED and municipal election data by FIPS and year, assigning multiple LEED projects to their associated year(s) and FIPS in the municipal dataset. Since the LEED project data is organized by address, and municipal data is by county FIPS code, the ZIP-FIPS crosswalk file helps aggregate zip codes to 5-digit county FIPS codes, allowing for a seamless merge of the two datasets. Some municipal FIPS codes were 7-digit place codes, so manual imputation was required for those cases.

Descriptive Statistics

Next, we explore the data structure and assess variation in outcomes and predictors. Table 1 shows the distribution of LEED square footage by funding type (e.g., locally funded, state funded, etc.). The table displays both raw LEED square footage and standardized LEED square footage, which is adjusted for county size and reported as square footage per square mile.

TABLE 1

Descriptive Statistics of LEED square footage (standardized and raw) by funding type and land area per county.

Variables	Min	Max	Mean	SD	Obs
Local Government LEED Square Footage	0.00	26,815,777	189,910	1,041,304	91,332
State Government LEED Square Footage	0.00	3,076,111	118,070	305,691	91,332
Federal Government LEED Square Footage	0.00	4,028,988	48,790	222,751	91,332
Non-Government LEED Square Footage	0.00	40,975,554	2,387,590	5,069,439	91,332
County Land Area (sq. miles)	14.94	24,707	966	1,445	2,273
Local Government LEED Square Footage per Square Mile	0.00	1,031,495	460	9,644	91,332
State Government LEED Square Footage Per Square Mile	0.00	95,185	461	4,927	91,332
Federal Government LEED Square Footage Per Square Mile	0.00	65,913	191	1,755	91,332
Non-Government LEED Square Footage Per Square Mile	0.00	1,808,436	16,492	120,888	91,332

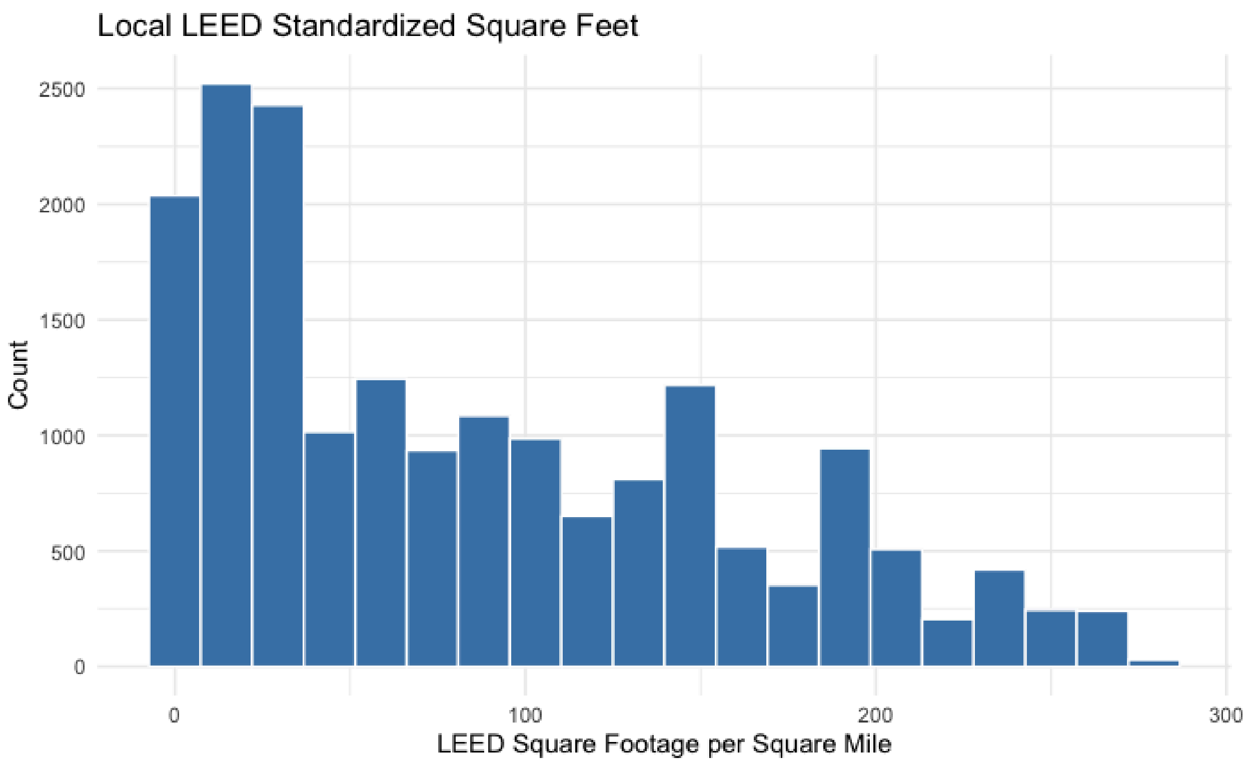
Note: County land area is reported for the year 2021. Additionally, “Obs” refers to the number of total observations.

For ease of visualization, histograms of standardized LEED square footage by funding type are included. Figures 1.1 and 1.2 show the distribution of locally funded and state-funded standardized LEED buildings, respectively. Federally funded and non-government funded LEED buildings distributions can be found in Appendix B.

All four funding types exhibit heavily right-skewed distributions. The removal of high outliers and 0s for visualization de-emphasizes this skew, particularly for non-government funding, where a small set of high-density counties appear to drive the bulk of the observed LEED development.

FIGURE 1.1

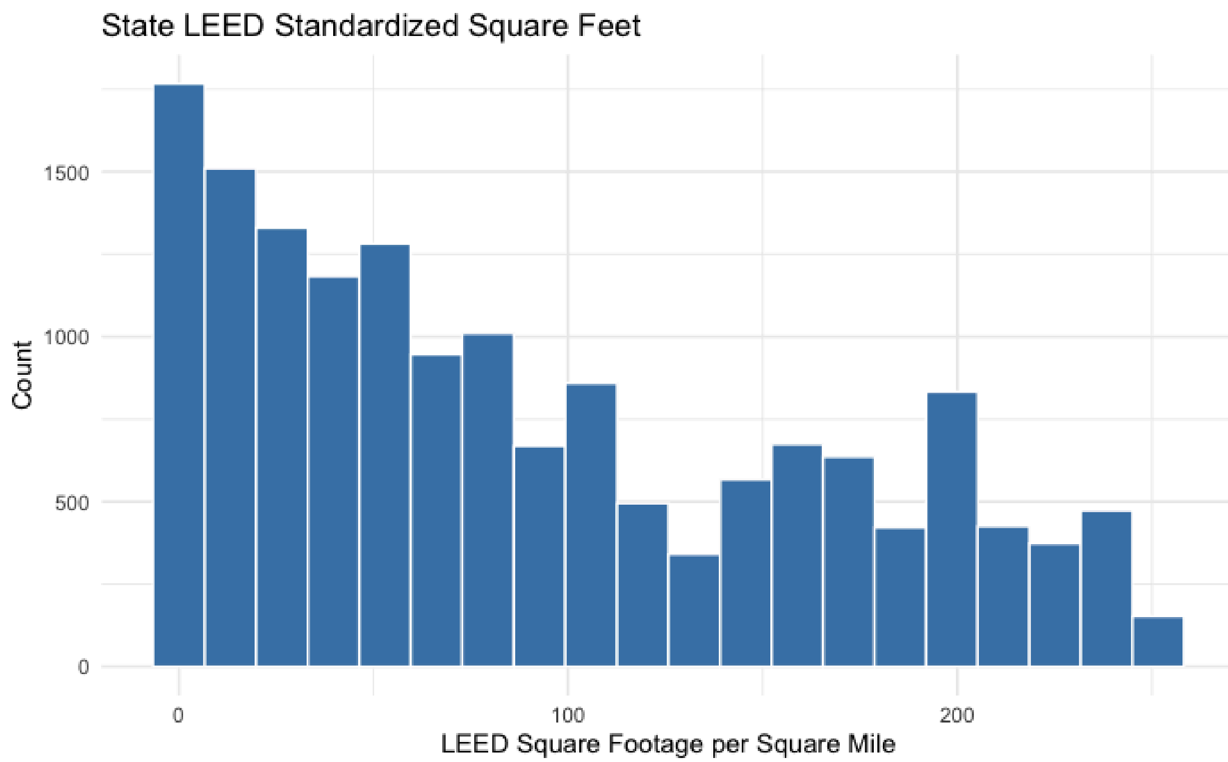
Distribution of locally funded LEED buildings reported by square feet per square mile.



Note: This histogram removes high outliers using the interquartile (IQR) method of outlier detection and 0s to ease viewing. In total, 41,463 of the 91,332 observations were removed—8,990 are outliers and 32,473 are 0s.

FIGURE 1.2

Distribution of state-funded LEED buildings reported by square feet per square mile.



Note: This histogram removes high outliers using the interquartile (IQR) method of outlier detection and 0s to ease viewing. In total, 43,909 of the total 91,332 observations were removed—8,781 are outliers and 35,128 are 0s.

Finally, we examine the proportions of election outcomes by office and gender. Table 2 presents the distribution of victories across gender and office categories. It is important to note that this table does not directly compare win rates between genders within each office. Instead, it shows the total number of races in which individuals of a given gender competed, alongside the number they won, broken down by office type.

Women had higher win rates in city council and county legislature races, while men held an edge in executive and mayoral contests. These patterns may reflect differences in candidate pools or electoral dynamics between office types. Men also composed a larger share of total candidates across all categories.

TABLE 2

Descriptive Statistics of election race win rate subdivided by office and gender.

Gender	Office	Total Races	Total Wins	Win Rate
F	City Council	12001	6141	51.17%
F	County Executive	215	95	44.19%
F	County Legislature	9698	5427	55.96%
F	Mayor	1616	617	38.18%
M	City Council	30066	13226	43.99%
M	County Executive	1096	561	51.19%
M	County Legislature	27240	15290	56.13%
M	Mayor	6391	2551	39.92%

Analytical Approach

Naive OLS Linear Regression Models (No Controls)

To begin, this paper estimates a naive OLS regression to model the marginal effect of a female versus a male winning a local election across four office types: mayor, county executive, county legislature, and city council. The initial regression equation is:

$$Y_i = \beta_0 + \beta_1 \cdot Female_i + \varepsilon_i$$

Female is a dummy variable where 1 is a female candidate and 0 is a male candidate for observation i. $\hat{Y}$ represents LEED-certified square footage per square mile for observation i. ε_i represents the error term. This paper hypothesizes the following:

$$H_0: \beta 1 = 0$$

$$H_1: \beta 1 > 0$$

The regression results are presented in Table 3.1 (locally funded LEED buildings), Table 3.2 (state funded), and Table 3.3 (federally funded). The female dummy variable is inconsistent in sign and consistently statistically insignificant across all office types for both locally and state-funded standardized LEED building square footage. The only statistically significant result is observed in the marginal effect of electing a female county executive on standardized federally funded LEED square footage. In this case, the coefficient is positive, indicating an increase of 84.79 square feet per square mile of county area associated with electing a female county executive. However, this result is only significant at the 0.1 level. Therefore, using the naive model, we fail to reject the null hypothesis in favor of the alternative across all funding types and office types.

TABLE 3.1

Naive OLS regression of locally funded standardized LEED building square footage on a gender indicator variable (Female).

	Mayor	**County Legislature**	**County Executive**	**City Council**
(Intercept)	236.249***	255.102*	129.291***	362.817***
Standard Error	-28.244	-105.946	-19.639	-16.48
Female	***74.625***	***-40.695***	***21.044***	***3.256***
Standard Error	-61.526	-196.837	-48.106	-28.947
Num.Obs.	2050	11643	348	14273
R^2	0.001	0	0.001	0
R^2 Adj.	0	0	-0.002	0

Note: + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

TABLE 3.2

Naive OLS regression of state-funded standardized LEED building square footage on a gender indicator variable (Female).

	Mayor	County Legislature	County Executive	City Council
(Intercept)	256.267***	105.297***	81.293***	583.482***
Standard Error	-62.525	-9.617	-15.622	-58.748
Female	***-33.06***	***23.972***	***37.683***	***-43.459***
Standard Error	-136.203	-17.867	-38.266	-103.192
Num.Obs.	2050	11643	348	14273
R^2	0	0	0.003	0
R^2 Adj.	0	0	0	0

Note: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

TABLE 3.3

Naive OLS regression of locally funded standardized LEED building square footage on a gender indicator variable (Female).

	Mayor	County Legislature	County Executive	City Council
(Intercept)	107.321**	54.976***	68.890***	204.748***
Standard Error	-33.64	-5.999	-19.557	-15.959
Female	***65.442***	***4.847***	***84.788+***	***-15.24***
Standard Error	-73.28	-11.145	-47.905	-28.032
Num.Obs.	2050	11643	348	14273
R^2	0	0	0.009	0
R^2 Adj.	0	0	0.006	0

Note: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Controlled OLS Models

Building on the naive model without controls, we introduce control variables to account for potential bias in the coefficient estimates. Each regression is limited to county executives and mayors to more directly address the central research question: Does the gender of municipal executive leaders affect green infrastructure outcomes? Each specification begins with a naive model including only the outcome variable—standardized LEED square footage—and a gender indicator variable (female). Control variables are subsequently added. Each model begins with the following regression equation:

$$Y_i = \beta_0 + \beta_1 \cdot Female_i + \varepsilon_i$$

Where Y_i is the standardized LEED square footage for observation i, $Female_i$ is an indicator variable (1 = female and 0 = male) for observation i, and ε_i is the error term.

Each model then advances to this regression equation:

$$Y_i = \beta_0 + \beta_1 \cdot Female_i + \beta_2 \cdot Race_i + \varepsilon_i$$

$Race_i$ is a vector of race indicator (dummy) variables for observation *i*, including the categories Black, Hispanic, Asian, and Other. The White (or Caucasian) category is omitted as the reference group to avoid perfect multicollinearity. As a result, each element of the coefficient vector β_2 represents the expected difference in the outcome variable Y_i between individuals of that race and White individuals, holding other variables constant.

Each regression then moves on to:

$$Y_i = \beta_0 + \beta_1 \cdot Female_i + \beta_2^{\top} \cdot Race_i + \beta_3 \cdot Incumbent_i + \varepsilon_i$$

$Incumbent_i$ is a binary indicator variable equal to 1 if the individual is an incumbent, and 0 otherwise for observation *i*.

The final derivation of controls implemented is as follows:

$$Y_i = \beta_0 + \beta_1 \cdot Female_i + \beta_2^{\top} \cdot Race_i + \beta_3 \cdot Incumbent_i + \beta_4 \cdot Democratic_i + \varepsilon_i$$

$Democratic_i$ is a binary indicator variable equal to 1 if the individual is democratic, and 0 if they are republican for observation *i*.

This paper hypothesizes the following:

$$H_0: \beta 1 = 0$$

$$H_1: \beta 1 > 0$$

The paper's hypothesis can be explained in plain English as follows: it proposes that the election of a female county executive or mayor is associated with an increase in the amount of LEED-certified building space, measured in square footage per square mile. This is the alternative hypothesis, suggesting a positive relationship between female leadership and environmentally certified construction. In contrast, the null hypothesis states that the gender of the county executive or mayor does not affect the amount of LEED-certified space being built in the county.

Table 4.1 presents the first OLS regression model, which examines the relationship between locally funded LEED-certified square footage per square mile and the gender of the county executive or mayor. Column 1 reports the results of a simple regression of standardized LEED square footage on gender alone. Column 2 introduces a control for race, with white individuals serving as the reference category. Column 3 adds a binary variable indicating incumbent status, where a value of 1 denotes an incumbent and 0 indicates a non-incumbent. Finally, Column 4 incorporates an estimated party affiliation, represented by a binary indicator in which 1 corresponds to affiliation with the Democratic Party and 0 to the Republican Party.

TABLE 4.1

OLS regression model of locally funded standardized LEED building square footage on Gender, Race, Incumbent status, and Party Affiliation.

	Base	**Race**	**Incumbent**	**Party Affiliation**
(Intercept)	219.992***	175.793***	200.648***	139.889**
SE	-24.24	-26.25	-38.239	-48.615
Female	***71.879***	***63.876***	***61.563***	***66.071***
SE	-53.625	-53.359	-56.303	-58.286
Race - Black		323.487***	325.658***	287.064***
SE		-68.735	-71.417	-75.024
Race - Hispanic		-41.63	-37.192	-56.567
SE		-94.35	-100.344	-104.492
Race - Asian		512.542***	547.158***	553.561***
SE		-139.048	-146.067	-149.372
Race - Other		-193.624	-190.993	-239.961
SE		-430.213	-440.389	-446.69
Incumbent			-40.073	-52.978
SE			-45.582	-47.054
Democratic				116.827*
SE				-49.679
Num. Obs.	2398	2398	2281	2207
R^2	0.001	0.015	0.016	0.019
R^2 Adj.	0	0.013	0.013	0.016
F-Stat	1.797 on 1 and 2396 DF	7.381 on 5 and 2392 DF***	6.191 on 6 and 2274 DF***	6.095 on 7 and 2199 DF***

Note 1: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note 2: Female, Incumbent, and Democratic are all binary indicator variables that are 1 if an observation fits the given category and 0 if not.

Table 4.1 shows that standardized LEED-certified square footage from locally funded projects does not appear to be statistically significantly related to the gender of the county executive or mayor. However, two race categories—Black and Asian—are strongly (p-value < 0.001), consistently (across all model specifications), and positively associated with higher levels of standardized LEED square footage. Additionally, affiliation with the Democratic Party is significantly (p-value < 0.05) and positively related to the amount of LEED-certified square footage per county.

This paper theorizes that women are not only more likely to directly increase locally funded LEED-certified square footage per square mile but also more likely to advocate for environmentally sustainable development at the state and national levels. As a result, we would expect to observe higher levels of state- and federally funded standardized LEED square footage when a female leader is in office compared to when a male leader holds the position. Tables 4.2 and 4.3 examine this theory.

TABLE 4.2

OLS regression model of state-funded standardized LEED building square footage on Gender, Race, Incumbent status, and Party Affiliation.

	Base	**Race**	**Incumbent**	**Party Affiliation**
(Intercept)	229.672***	201.906***	236.240**	117.607
SE	-53.299	-58.08	-84.758	-108.03
Female	***-18.803***	***-22.263***	***-28.317***	***-34.156***
SE	-117.909	-118.061	-124.797	-129.521
Race - Black		169.953	162.879	80.507
SE		-152.083	-158.296	-166.715
Race - Hispanic		-76.447	-79.696	-131.215
SE		-208.757	-222.414	-232.199
Race - Asian		577.237+	591.852+	597.039+
SE		-307.657	-323.761	-331.927
Race - Other		-164.729	-165.965	-264.855
SE		-951.885	-976.128	-992.615
Incumbent			-46.618	-59.567
SE			-101.032	-104.562
Democratic				228.101*
SE				-110.394
Num. Obs.	2398	2398	2281	2207
R^2	0	0.002	0.002	0.004
R^2 Adj.	0	0	-0.001	0.001
F-Stat	0.02543 on 1 and 2396 DF	0.9782 on 5 and 2392 DF	0.7967 on 6 and 2274 DF	1.287 on 7 and 2199 DF

Note 1: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note 2: Female, Incumbent, and Democratic are all binary indicator variables that are 1 if an observation fits the given category and 0 if not.

TABLE 4.3

OLS regression model of federally-funded standardized LEED building square footage on Gender, Race, Incumbent status, and Party Affiliation.

	Base	**Race**	**Incumbent**	**Party Affiliation**
(Intercept)	101.480***	59.745+	103.072*	54.862
SE	-28.788	-31.278	-45.476	-57.975
Female	***69.024***	***63.22***	***48.77***	***49.49***
SE	-63.685	-63.579	-66.958	-69.509
Race - Black		270.946***	260.704**	229.373*
SE		-81.9	-84.931	-89.469
Race - Hispanic		8.884	10.65	-5.198
SE		-112.421	-119.333	-124.611
Race - Asian		500.371**	530.494**	537.475**
SE		-165.681	-173.709	-178.132
Race - Other		-20.242	-9.541	-51.803
SE		-512.614	-523.727	-532.696
Incumbent			-73.818	-83.118
SE			-54.207	-56.114
Democratic				96.433
SE				-59.244
Num. Obs.	2398	2398	2281	2207
R^2	0	0.008	0.009	0.011
R^2 Adj.	0	0.006	0.007	0.007
F-Stat	1.175 on 1 and 2396 DF	4.049 on 5 and 2392 DF**	3.514 on 6 and 2274 DF**	3.376 on 7 and 2199 DF**

Note 1: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note 2: Female, Incumbent, and Democratic are all binary indicator variables that are 1 if an observation fits the given category and 0 if not.

As shown in Tables 4.2 and 4.3, there is no clear or statistically significant relationship between gender and standardized LEED square footage from either state or federal funding sources. However, the race indicator variables for Black and Asian individuals continue to show a strong (p-value < 0.001) and positive association with federally funded standardized LEED square footage. At the state level, the effect of being Black loses statistical significance entirely, while the Asian variable remains positive but shows a reduced level of significance (p-value $<$ 0.1). The Democratic Party affiliation indicator remains positively and significantly associated (p-value < 0.05) with state-funded standardized LEED square footage. This relationship does not hold for federally funded projects, where the coefficient remains positive but is no longer statistically significant.

Sharp Regression Discontinuity (RD) Design

Building on the work of Ferreira and Gyourko (2014), this paper employs a Regression Discontinuity Design to test whether the gender of a narrowly elected county executive or mayor causally influences the amount of LEED-certified square footage funded at the local, state, or federal level. The alternative hypothesis suggests that electing a female candidate leads to greater LEED-certified building space (per square mile) compared to electing a male candidate. In contrast, the null hypothesis maintains that there is no significant difference in LEED-certified building outcomes based on the gender of the elected official.

$$H_0: \beta 1 = 0$$

$$H_1: \beta 1 > 0$$

Adopting a more sophisticated modeling approach, this paper proceeds with a sharp regression discontinuity (RD) design. To facilitate this analysis, the dataset is restricted to mayoral and county executive races in which the top two candidates were one male and one female. Vote margin is calculated by subtracting the male candidate's vote share from the female candidate's vote share, thereby constructing the running variable for the RD analysis. A positive vote margin indicates a female electoral victory, while a negative margin indicates a male victory. The regression discontinuity analysis is conducted using the rdrobust package in RStudio.

Figure 2.1 presents the results of the regression discontinuity (RD) design, where the outcome variable is locally funded standardized LEED square footage and the running variable is vote margin. The analysis employs a triangular kernel and the mimicking variance method for bin selection to optimize bandwidth and minimize estimation bias.

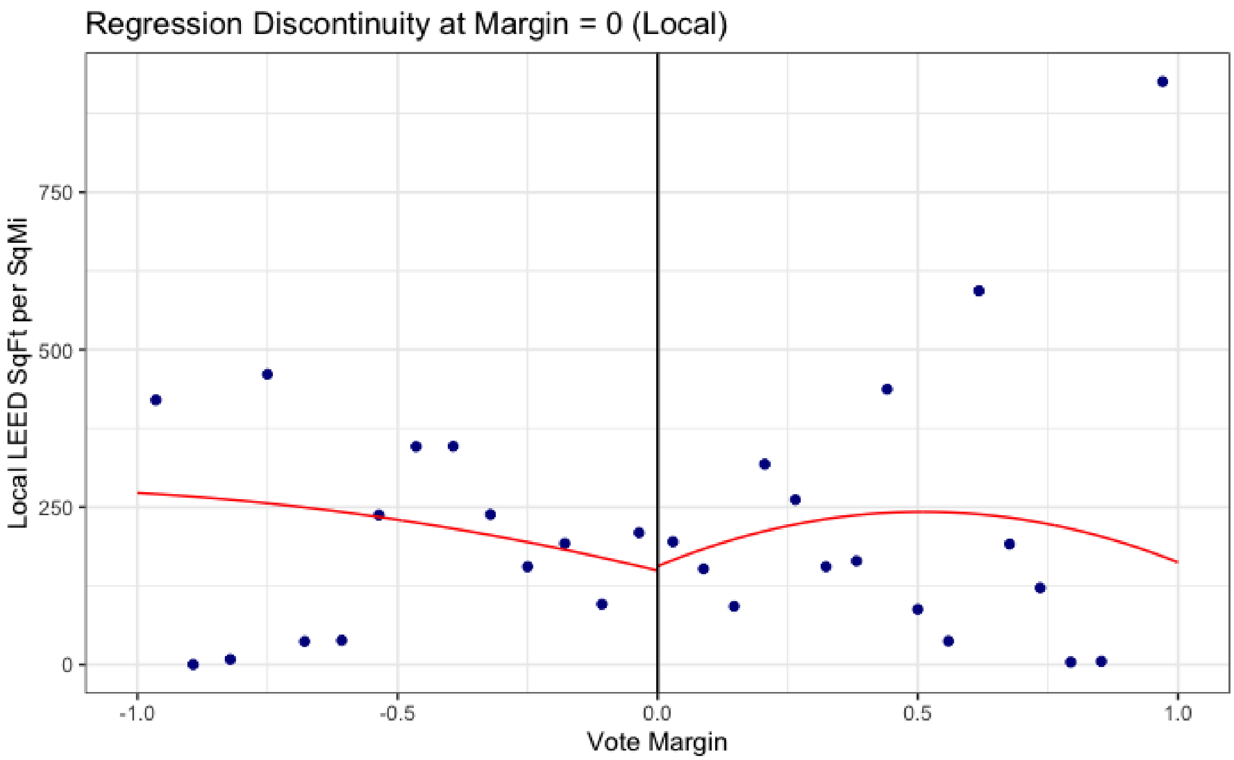
To evaluate the efficiency and robustness of the estimates, the analysis considers the impact of polynomial order on model fit and the bias-variance tradeoff. While higher-order polynomials can capture more complex relationships between the running variable and the outcome, they may also introduce overfitting and increase variance. The optimal polynomial order was selected to balance flexibility with stability, with a third-order specification offering a suitable compromise.

In contrast, fourth-order and higher polynomials introduced additional complexity but tended to inflate bias.

Regarding robustness, the third-order specification produced the most stable coefficient estimates. Higher-order polynomials yielded more variable estimates and, in some cases, reduced statistical significance, indicating that increased complexity was not necessarily beneficial.

FIGURE 2.1

Sharp Regression Discontinuity analysis with Vote Margin as the running variable and locally funded LEED square footage per square mile as the outcome variable.



Note: Positive vote margin is associated with a female electoral race win, and negative vote margin is associated with a male electoral race win.

The statistical output from the regression discontinuity analysis is presented in Table 5.1, which summarizes the relationship between vote margin and locally funded standardized LEED square footage. This table reports the coefficient estimate, standard error, z-value, p-value, and 95% confidence interval for the treatment effect. The results help assess whether electing a female leader—captured by a positive vote margin—is associated with any meaningful change in LEED development outcomes at the local funding level.

TABLE 5.1

Regression discontinuity analysis of locally funded standardized LEED square footage where the running variable is vote margin.

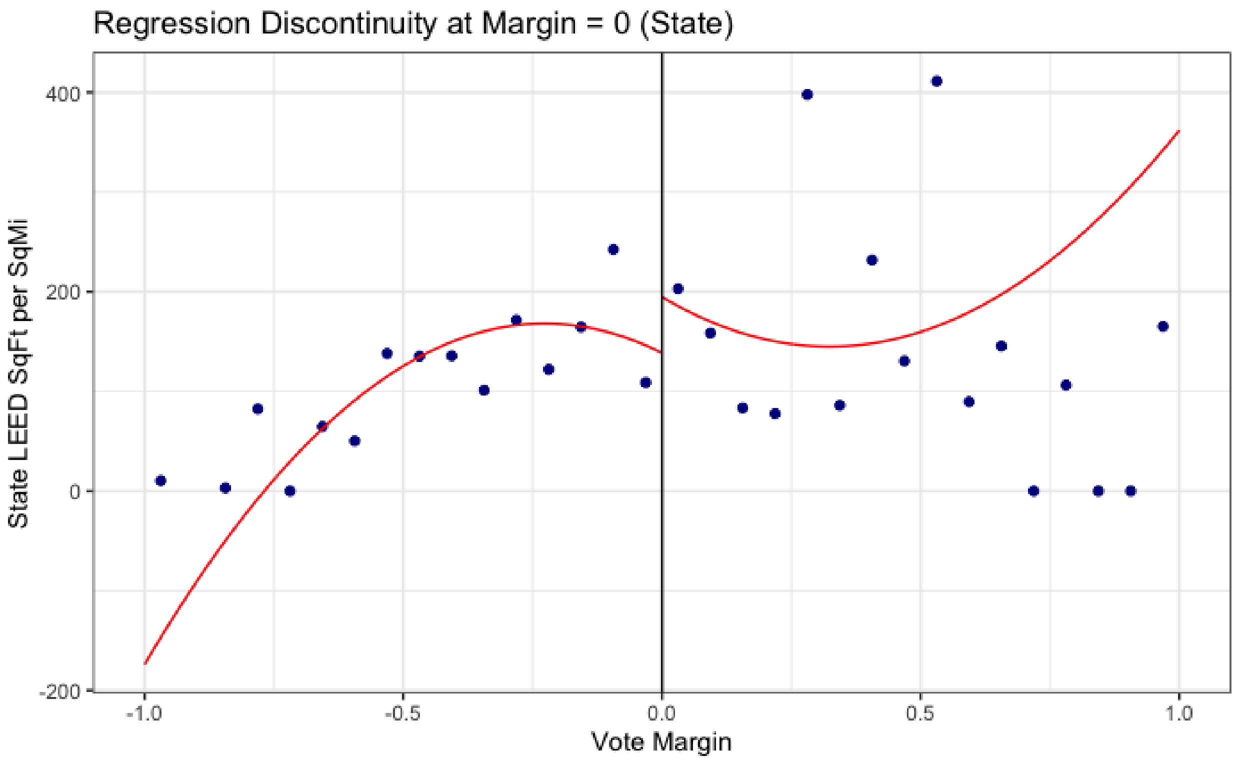
Funding Level	Coefficient	Standard Error	z-Value	P-Value	95% Confidence Interval
Local	-59.228	196.167	-0.302	0.763	[-443.708, 325.253]

As shown, the coefficient is not statistically significant, indicating that the estimated effect of gender on locally funded LEED square footage is negligible. These findings align closely with those produced by the naive OLS model, suggesting no robust relationship between leader gender and local LEED outcomes within this modeling framework.

Continuing the analysis, the paper next examines state and federally funded LEED square footage to assess whether female leaders are more likely than their male counterparts to advocate for environmentally certified construction. In addition to direct advocacy, female leaders may also be more effective partners with state and federal programs that support LEED initiatives. Figures 2.2 and 2.3, along with Table 5.2, present the results of the regression discontinuity analysis for state and federally funded standardized LEED square footage.

FIGURE 2.2

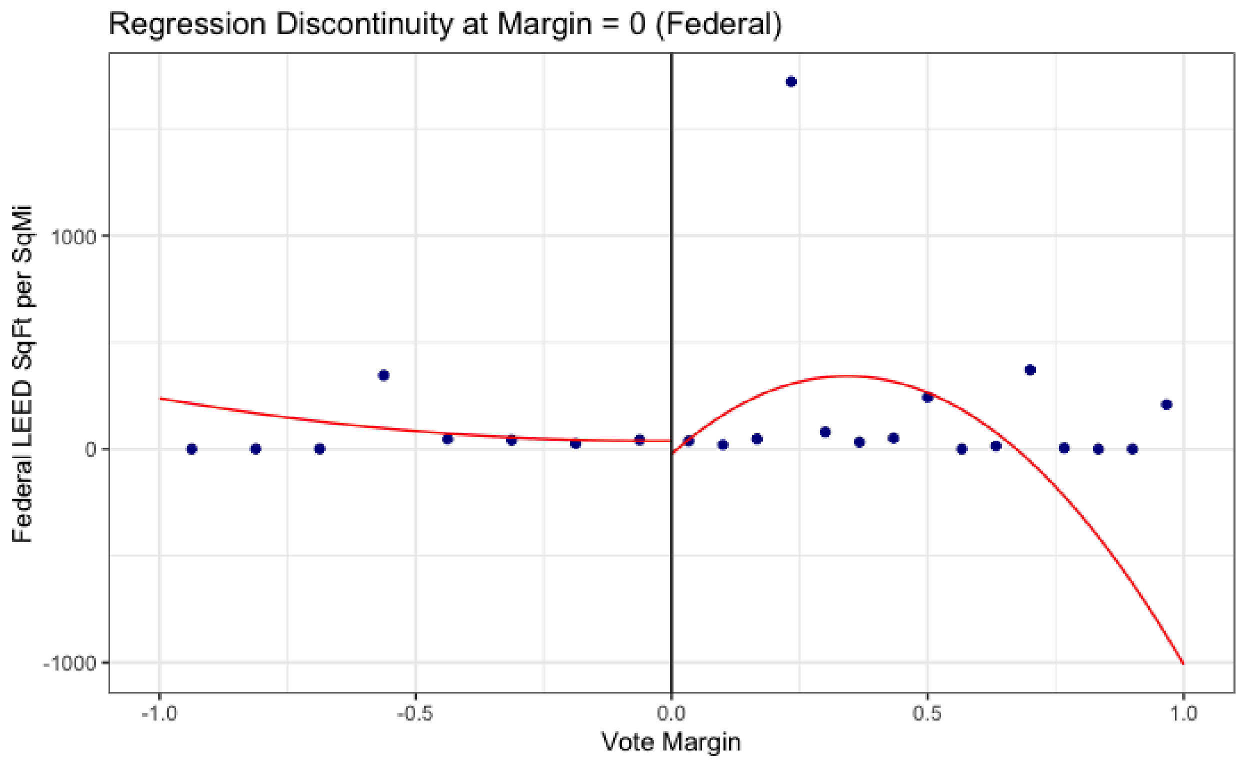
Sharp Regression Discontinuity analysis with Vote Margin as the running variable and state-funded LEED square footage per square mile as the outcome variable.



Note: Positive vote margin is associated with a female electoral race win, and negative vote margin is associated with a male electoral race win.

FIGURE 2.3

Sharp Regression Discontinuity analysis with Vote Margin as the running variable and federally funded LEED square footage per square mile as the outcome variable.



Note: Positive vote margin is associated with a female electoral race win, and negative vote margin is associated with a male electoral race win.

TABLE 5.2

Regression discontinuity analysis of state and federally funded standardized LEED square footage, where the running variable is vote margin.

Funding Level	Coefficient	Standard Error	z-Value	P-Value	95% Confidence Interval
State	338.139	171.659	1.97	0.049	[1.693, 674.585]
Federal	26.33	68.245	0.386	0.7	[-107.427, 160.087]

As shown, the effect of gender on federally funded LEED building square footage is not statistically significant. However, the findings differ at the state level. Here, gender is positively and significantly associated with state-funded standardized LEED square footage ($p < 0.05$). This result is further supported by the 95% confidence interval, which does not contain zero. Accordingly, we reject the null hypothesis in favor of the alternative, suggesting that female leadership is associated with increased investment in state-funded environmentally certified construction.

5. Results

To investigate the relationship between mayoral gender and subsequent investment in green building, we employed a sharp regression discontinuity (RD) design centered at the vote margin between female and male mayoral candidates. A positive margin indicates a woman won the election, while a negative margin reflects a male victor. The outcome variable is the amount of LEED-certified square footage constructed per square mile in the jurisdiction two years following the election.

At the local level, results reveal no significant difference in green building activity based on the gender of the elected mayor. The estimated treatment effect was -59.228 (SE = 196.167), with a z-score of -0.302 ($p = 0.763$). The 95% confidence interval ranged from -443.708 to 325.253, encompassing zero and indicating a null effect. These findings suggest that electing a female mayor does not systematically increase or decrease locally funded green infrastructure outcomes after two years.

At the state level, however, the results provide marginal evidence that electing a female mayor may positively influence subsequent green building. The coefficient estimate was 338.139

(SE = 171.659), with a z-score of 1.97 and a p-value of 0.049. The corresponding 95% confidence interval does not include zero ([1.693, 674.585]). This result suggests a potentially meaningful relationship between female mayoral leadership and state-level green building efforts. Rather than the direct funding of green infrastructure, this seems to suggest female leaders are better advocates or partners with state funding agencies.

In contrast, the federal level analysis showed no evidence of an effect. The estimated coefficient was 26.33 (SE = 68.245), with a z-score of 0.386 and a p-value of 0.7. The 95% confidence interval ranged from -107.427 to 160.087, further reinforcing the null result.

Together, these findings indicate that while mayoral gender appears unrelated to LEED outcomes at the local and federal levels, there is evidence that electing a woman mayor may contribute to increased green building activity as funded by the state two years after the election. Further research is warranted to explore the underlying mechanisms and policy contexts that may explain this pattern.

6. Discussion

Summary of Key Findings

This paper finds that female local leaders do not have a statistically significant effect on locally funded LEED-certified green infrastructure, as demonstrated through both an OLS regression and a sharp regression discontinuity design. This finding aligns with Ferreira and Gyourko (2014), who observed limited gender differences in local policy decision-making.

In contrast, the analysis shows that female leadership has a statistically significant ($p = 0.049$) and positive effect on state-funded LEED-certified green infrastructure, based on the sharp regression discontinuity design. This suggests that women in leadership roles may be more effective advocates or collaborators with state legislatures in securing funding for environmentally sustainable projects.

However, this pattern does not extend to federally funded green infrastructure, where the effect of female leadership is not statistically significant. This lack of significance may stem from bureaucratic inertia within federal funding processes or from entrenched partisan dynamics that limit the influence of individual local leaders.

Interpretation in Theoretical Context

This paper suggests that one explanation for a non-null result could be that women discount time less than men, making them more inclined to support environmental policies such as green building investments. The literature, however, offers mixed evidence on whether women actually discount differently (Malesza, 2019; Reynolds et al., 2006; Logue and Anderson, 2001; Kirby and Maraković, 1996; see the theoretical framework). The null result at the local level aligns with Logue and Anderson (2001), who find no significant gender differences in discounting. This suggests that even if female mayors hold stronger long-term environmental orientations, they may lack the institutional tools or discretionary budgets necessary to translate those preferences into outcomes within a two-year window.

In contrast, the marginally significant result at the state level aligns with findings such as Malesza (2019), which suggest women may indeed discount less than men. In this context, female mayors may act more effectively as policy entrepreneurs or collaborators when broader institutional support and external funding streams are available.

This context dependence may be further explained by Critical Mass Theory (Mendelberg et al., 2014; Dahlerup, 2006), which holds that isolated representation is rarely sufficient for sustained influence. Female mayors may require broader representation, such as gender-balanced state legislatures or intergovernmental partnerships, to enact environmental policy effectively. Local governments may simply lack the institutional mass necessary to convert individual leadership into structural change.

How female leadership is received likely shapes outcomes as well. Dietrich et al. (2019) argue that women often adopt distinct rhetorical strategies, which can influence how their policy efforts are perceived. At the local level, where decision-making is fragmented, those strategies may reduce traction for environmental initiatives. The marginal state-level effect, by contrast, may reflect a context where such strategies are more effective or better aligned with institutional dynamics.

Strategic behavior may also complicate the relationship between gender and environmental outcomes. Bros et al. (2024) argue that female leaders, particularly early in their terms, may downplay stereotypically feminine policy areas to avoid appearing unserious or fiscally irresponsible. The absence of observable local investment may thus reflect strategic delay or deflection, rather than a lack of commitment. The state-level effect could result from behind-the-scenes coalition-building or agenda-setting that yields outcomes indirectly, without triggering gendered backlash at the local level.

Gender socialization theories further suggest that women are more likely to internalize communal values such as environmental stewardship. Yet these internalized preferences require institutional amplification. The null result at the local level may reflect a disconnect between values and decision-making power, particularly in resource-constrained municipalities. By contrast, the state-level findings suggest that gendered values can shape outcomes when paired with supportive institutional ecosystems.

Finally, broader political dynamics may overshadow gendered effects. Preliminary OLS results indicate that race and party affiliation—specifically, Black and Asian candidates and Democrats—are more consistent predictors of green building than gender. This supports Reingold (2003), who finds that partisanship more strongly shapes policy behavior than gender alone. These results raise the possibility that gendered preferences are mediated or masked by intersecting political identities.

Still, the observed null effects may not reflect an absence of impact. They may instead stem from methodological constraints, short policy time horizons, or strategic behavior—possibilities explored further in the next section.

Limitations

The work of de Benedictis-Kessner et al. (2023) opened new possibilities for large-scale analysis of local elections, enabling empirical exploration of outcomes previously inaccessible to quantitative research. This paper benefits from that development, but several limitations remain.

Measurement Validity

One key concern is that LEED project activity may reflect broader local trends rather than direct policy action. Although the regression discontinuity design attempts to isolate the causal impact of mayoral gender, the popularity of LEED projects may still correlate with unobserved factors such as patterns of blue-state urbanization. In such cases, LEED uptake may be more of a proxy for the political or cultural environment than for the individual influence of elected officials.

Unobserved Confounding Variables

While the analysis includes controls for key observable factors, omitted variables—such as local activism, civic engagement, or pre-existing sustainability priorities—could bias estimates. This concern is particularly acute for the OLS regressions, which rely on a limited set of control variables. Although the regression discontinuity design helps address unobserved variable bias near the electoral margin, it cannot fully eliminate the risk of bias from unmeasured confounders.

Data Construction Constraints

Timing effects and strategic behavior may also obscure the gender-policy relationship. Bros et al. (2024) find that female leaders in international trade contexts often adopt more aggressive protectionist stances early in their terms, potentially as a strategy to counteract gendered perceptions of weakness. If environmental policy is similarly coded as “feminine,” female mayors may delay green infrastructure initiatives to build political capital or avoid backlash. Uneven lags in project initiation across genders could therefore introduce unobserved bias, particularly if the timing of project implementation systematically varies.

A broader set of constraints arises from how the LEED dataset was constructed. This analysis uses a two-year lag to attribute LEED certifications to the election of a new mayor. The lag is based on the average time between project registration and certification, assuming that mayors initiate green infrastructure immediately upon entering office. However, this simplification may miss projects initiated later in a term or those with atypical construction timelines. As a result, the measure may capture only a narrow window of mayoral influence—those who act immediately and whose projects proceed on schedule. This limitation restricts the ability to detect gendered patterns that unfold more gradually.

Future Research Directions

The most important avenue for future research is exploring the mechanisms behind the statistically significant results identified in this paper. Specifically, the finding that female leaders—mayors and county executives—are positively associated with state-funded green infrastructure ($p = .049$) suggests that this relationship may be driven by more aggressive advocacy or the maintenance of strategic relationships with state funding bodies. Investigating these mechanisms in greater detail could uncover critical insights into how female leadership influences environmental policy at different levels of government.

Another direction for future research is testing different lag times for measuring the impact of leadership on LEED building square footage. Currently, this study uses a two-year lag, but experimenting with alternative timeframes or creating an aggregate measure of LEED building square footage over a leader's full tenure could provide a more accurate reflection of their impact. For example, summing all square footage that was initiated to be built within a county during a leader’s time in office could offer a more nuanced and comprehensive estimate of the relationship between leadership and green infrastructure. If data on tenure lengths were available or could be constructed, combining it with LEED building square footage data would provide a clearer picture of the contributions attributable to each candidate.

This paper does not explore the possibility that female leaders may prioritize different types of LEED buildings based on gendered preferences. Previous research has suggested that women tend to make more prosocial decisions than men (Funk & Gathmann, 2014), but it remains unclear whether this trend holds in the political sphere (Ferreira & Gyourko, 2014). Further investigation into the specific types of LEED projects prioritized by female leaders could yield valuable insights into the broader implications of gender on policy choices.

Exploring the intersectionality of gender and race in relation to LEED buildings is another promising direction for future research. Including interaction terms for gender and race could reveal important dynamics in how these factors influence green building initiatives. Additionally, examining the strong positive correlation between Black and Asian candidates and standardized LEED building square footage could provide important context and highlight factors beyond gender that contribute to environmental policymaking.

Lastly, expanding this research by drawing on international examples, as in the work of Funk & Gathmann (2014), could offer a broader perspective on female leadership and its relationship with environmentally sustainable practices. Comparing findings from different countries or regions could help assess whether these trends are specific to local political contexts or whether they offer more generalizable insights into the influence of female leadership on green building practices.

7. Conclusion

This paper demonstrates that the impact of gender on environmental policy is both context-dependent and potentially limited. While a positive and statistically significant relationship between female leadership and green infrastructure was observed, this effect was confined to state-level funding for green projects. No significant impact was found at the local or federal levels of funding for green infrastructure under female leadership, and the significance was only present in one of the models analyzed.

These findings highlight the importance of broader institutional and policy support, rather than focusing solely on gender as a determinant of environmental outcomes. They suggest that the conditions in which female leaders operate—particularly the institutional structures and available funding at different levels of government—play a crucial role in shaping their ability to influence environmental policy. This underscores the need to move beyond the simplistic question of "do women govern differently?" and instead ask, "under what conditions, if any, do they govern differently, and how can those conditions be leveraged to create more effective environmental policies?"

The results of this study point to the necessity of understanding the broader context in which female leadership interacts with environmental policymaking. This research opens up avenues for exploring how gender, institutional support, and policy frameworks intersect to produce varying outcomes in environmental initiatives.

Appendix A

Each LEED project was categorized into one of the following ownership groups by matching the OwnerTypes field to one of the four categories of government defined by this paper: Local, State, Federal, or Non-Government. Below is a full listing of the ownership type strings associated with each category. Author comments are denoted by hashtags.

Local Government

Projects were assigned to the **Local Government** category if their ownership type matched any of the following:

- Local Government
- Other, Local Government
- Non-Profit Org., Local Government
- Profit Org., Local Government
- State Government, Local Government
- Local Government, Non-Profit Org.
- Local Government, Other
- Local Government, Profit Org.
- Local Government, State Government
- Government Use: Local, City
- Government Use: Other (utility, airport,
- Government Use: Local, County
- Government Use: Other (utility, air
- Government Use: Local, Public Housi
- Local Government (municipalities an
- Public Sector: Local Government

- Government (Public sector)
- Government Use: Local, Publlic Hous
- Local Government (municipalities and cou
- Educational: K-12 School, Public

State Government

Projects were classified under **State Government** if their ownership type matched any of the following:

- Other, State Government
- State Government
- State Government, Local Government
- Individual, State Government
- State Government, Other
- Local Government, State Government
- Profit Org., State Government
- State Government, Profit Org.
- State Government, State Government
- Government Use: State
- Educational: University, Public
- Educational: Community College, Pub
- Educational: Community College, Public
- Government *# These are all public k-12 schools*
- University
- Educational: University, public
- Public Sector: College or Universit

Federal Government

Projects were categorized as **Federal Government** if their ownership type matched:

- Federal Government, Local Government
- Federal Government
- Federal Government, Other
- Federal Government, Profit Org.
- Non-Profit Org., Federal Government
- Profit Org., Federal Government
- Government Use: Federal
- Federal government
- Government use: Federal
- "Government Use: Federal\n"

Non-Governmental

Projects were assigned to **Non-Governmental** if their ownership type was **not** listed under the Local, State, or Federal Government categories above. The classification logic explicitly assigns a value of 1 to Non_Gov when **none** of the above categories apply.

In other words, Non_Gov includes all projects *not matching* any of the values in the Local, State, or Federal categories.

However, to ensure consistency with your code (which includes overlapping owner types in all government categories), here are the **only owner types** that **did not** appear in any of the government lists and were therefore classified as **Non-Governmental**:

- Individual
- Individual, Other
- Individual, Profit Org.
- Individual, Non-Profit Org.
- Individual, Family
- Religious
- Corporate: Privately Held
- Corporate: Publicly Traded
- Corporate, non-traded
- Investor: Individual/Family
- Investor: Bank
- Investor: Equity Fund
- Investor: Endowment
- Investor: Pension Fund
- Investor: REIT, Publicly traded
- Investor: REIT,Non-traded
- Investor: REIT, Non-traded
- Investor: ROEC
- Investor: Investment Manager
- Business Improvement District
- Real Estate
- Landlord
- Private Developer
- Private Sector: Private Developer
- Private Sector: Other
- Community Development Corporation or Non
- Community Development Corporation o
- Educational: University, Private
- Educational: College, Private
- Educational: College, Public
- Educational: Early Childhood Educat

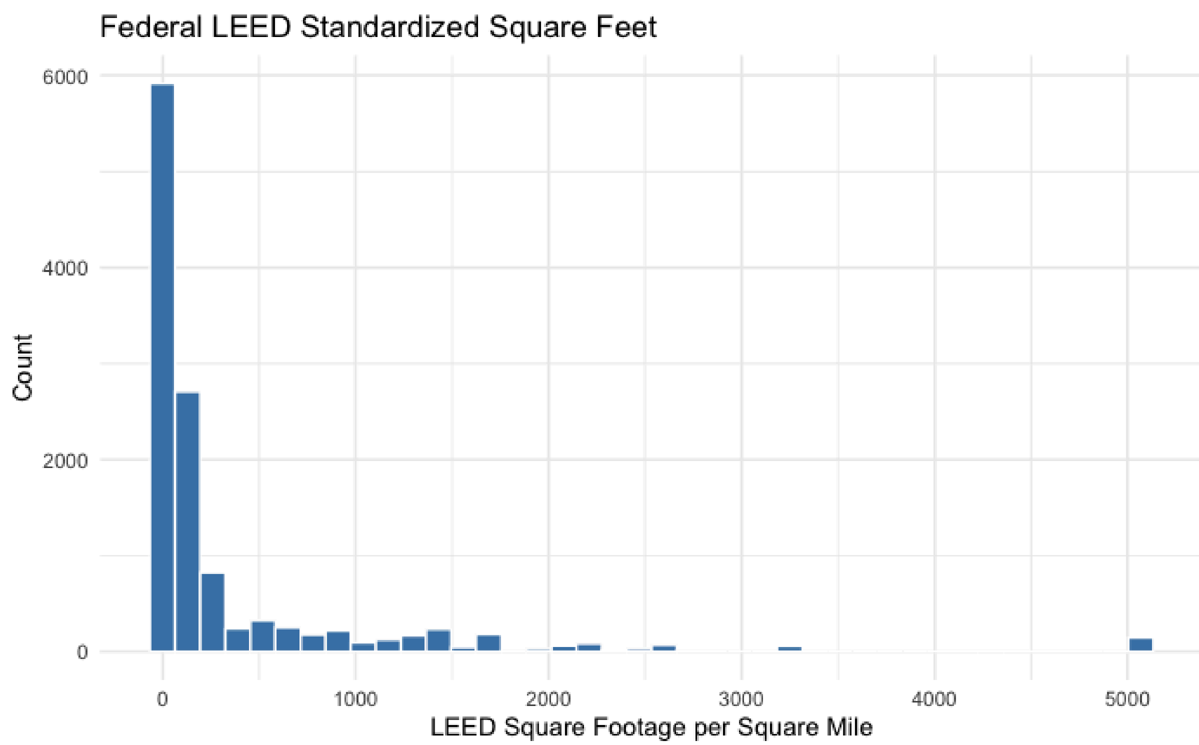
- Educational: Early Childhood Education/D
- Educational: Community College, Pri
- Educational: Community College, Public (if not matched earlier)
- Main Street Organization
- Non-Profit Org.
- Non-Profit Org., Profit Org.
- Non-Profit Org., Other
- Non-Profit Org., State Government (if not caught by State)
- Non-Profit Org., Federal Government (if not caught by Fed)
- Non-Profit Org., Local Government (if not caught by Local)
- Non-Profit Org., Non-Profit Org.
- Non-Profit (that do not fit into other categories)
- Non-Profit (that does not fit into
- Public-Private Partnership (PPP)
- Honorable Mayor Ras Baraka
- Residential
- Urban Development Authority
- Public Sector: Other
- Public Sector: College or University (if not matched to State)

(*Note: Some of these may have been redundantly classified due to overlapping definitions across categories. This is why this paper never uses a total government figure to avoid double-counting categories.*)

Appendix B

FIGURE 1.3

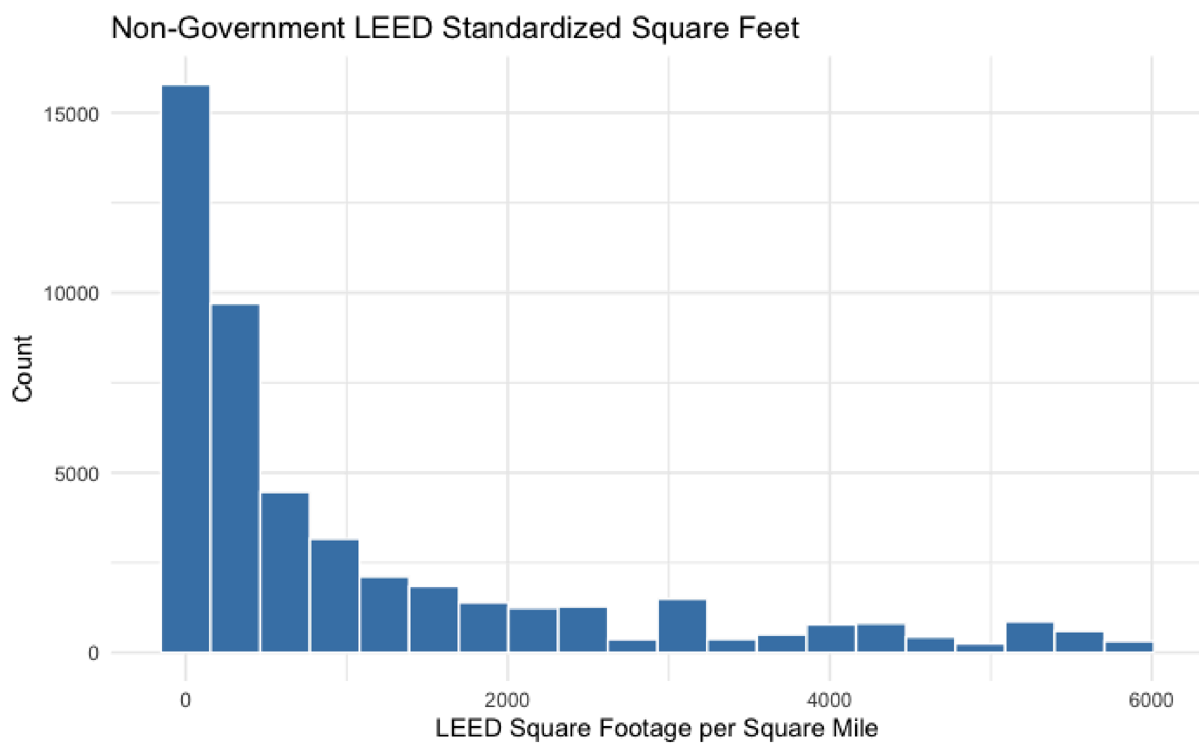
Distribution of federally funded LEED buildings reported by square feet per square mile.



Note: This histogram removes 0s and outliers 3 standard deviations above the mean for ease of viewing. In total, 47,810 of the total 91,332 observations were removed—442 are outliers and 47,368 are 0s.

FIGURE 1.4

Distribution of non governmentally funded LEED buildings reported by square feet per square mile.



Note: This histogram removes high outliers using the interquartile (IQR) method of outlier detection and 0s to ease viewing. In total, 12,074 of the total 91,332 observations were removed—7,202 are outliers and 4,872 are 0s.

Bibliography

Abramowitz, A. I., & Webster, S. (2016). The rise of negative partisanship and the nationalization of U.S. elections in the 21st century. *Electoral Studies*, *41*, 12–22. https://doi.org/10.1016/j.electstud.2015.11.001

Alesina, A. (1988). Credibility and Policy Convergence in a Two-Party System with Rational Voters. *The American Economic Review*, *78*(4), 796–805.

Arnold, R. D., & Carnes, N. (2012). Holding Mayors Accountable: New York's Executives from Koch to Bloomberg. *American Journal of Political Science*, *56*(4), 949–963. https://doi.org/10.1111/j.1540-5907.2012.00603.x

Besley, T., & Coate, S. (1997). An Economic Model of Representative Democracy. *The Quarterly Journal of Economics*, *112*(1), 85–114. https://doi.org/10.1162/003355397555136

Betz, T., Fortunato, D., & O'Brien, D. Z. (2020). Women's Descriptive Representation and Gendered Import Tax Discrimination. *American Political Science Review*, *115*(1), 307–315. https://doi.org/10.1017/s0003055420000799

Beutel, A. M., & Marini, M. M. (1995). Gender and Values. *American Sociological Review*, *60*(3), 436. https://doi.org/10.2307/2096423

Bros, C., Lochard, J., & Upadhayay, N. B. (2024). Does gender matter for trade policy? Evidence from contingent protection. *Oxford Economic Papers*. https://doi.org/10.1093/oep/gpae047

Canales, I. S., Montesino, S. V., & Hernández, P. H. (2020). Socialization of Gender Stereotypes Related to Attributes and Professions Among Young Spanish School-Aged Children. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.00609

Casey, P. J., & Scott, K. (2006). Environmental concern and behaviour in an Australian sample within an ecocentric - anthropocentric framework. *Australian Journal of Psychology*, *58*(2), 57–67. https://doi.org/10.1080/00049530600730419

Clots-Figueras, I. (2012). Are Female Leaders Good for Education? Evidence from India. *American Economic Journal: Applied Economics*, *4*(1), 212–244. https://doi.org/10.1257/app.4.1.212

Dahlerup, D. (2006). The Story of the Theory of Critical Mass. *Politics & Gender*, *2*(04). https://doi.org/10.1017/s1743923x0624114x

de Benedictis-Kessner, J., Lee, D. D. I., Velez, Y. R., & Warshaw, C. (2023). American local government elections database. *Scientific Data*, *10*(1), 912. https://doi.org/10.1038/s41597-023-02792-x

Dietrich, B. J., Hayes, M., & O'Brien, D. Z. (2019). Pitch Perfect: Vocal Pitch and the Emotional Intensity of Congressional Speech. *American Political Science Review*, *113*(4), 941–962. https://doi.org/10.1017/s0003055419000467

Downs, A. (1957). An Economic Theory of Political Action in a Democracy. *Journal of Political Economy*, *65*(2), 135–150.

Eagly, A. H. (1987). Sex Differences in Social Behavior: A Social-Role Interpretation. *Contemporary Sociology*, *18*(3), 343. https://doi.org/10.2307/2073813

Eagly, A. H., & Wood, W. (2012). Social role theory. In *Handbook of theories of social psychology* (pp. 458–476). Sage.

Ferreira, F., & Gyourko, J. (2009). Do Political Parties Matter? Evidence from U.S. Cities Get access Arrow. *The Quarterly Journal of Economics*, *124*(1), 399–422. https://doi.org/10.1162/qjec.2009.124.1.399

Ferreira, F., & Gyourko, J. (2014). Does gender matter for political leadership? The case of U.S. mayors. *Journal of Public Economics*, *112*, 24–39. https://doi.org/10.1016/j.jpubeco.2014.01.006

Funk, P., & Gathmann, C. (2014). Gender gaps in policy making: evidence from direct democracy in Switzerland. *Economic Policy*, *30*(81), 141–181. https://doi.org/10.1093/epolic/eiu003

Hampel, B., Boldero, J., & Holdsworth, R. (1996). Gender patterns in environmental consciousness among adolescents. *The Australian and New Zealand Journal of Sociology*, *32*(1), 58–71. https://doi.org/10.1177/144078339603200106

Johnson, E. V., & Powell, L. (1994). Decision Making, Risk and Gender: Are Managers Different? *British Journal of Management*, *5*(2), 123–138. https://doi.org/10.1111/j.1467-8551.1994.tb00073.x

Kirby, K. N., & MarakoviĆ, N. N. (1996). Delay-discounting probabilistic rewards: Rates decrease as amounts increase. *Psychonomic Bulletin & Review*, *3*(1), 100–104. https://doi.org/10.3758/bf03210748

Kretchmar, J. (2014). Gender Socialization. In *Gender Roles and Equality* (pp. 41–52). Salem Press.

Logue, A. W., & Anderson, Y. D. (2001). Higher-Education Administrators: When the Future Does Not Make a Difference. *Psychological Science*, *12*(4), 276–281. https://doi.org/10.1111/1467-9280.00351

Malesza, M. (2019). Relationship between emotion regulation, negative affect, gender and delay discounting. *Current Psychology*, *40*(8), 4031–4039. https://doi.org/10.1007/s12144-019-00366-y

Matisoff, D. C., Noonan, D. S., & Mazzolini, A. M. (2014). Performance or Marketing Benefits? The Case of LEED Certification. *Environmental Science & Technology*, *48*(3), 2001–2007. https://doi.org/10.1021/es4042447

Mendelberg, T., Karpowitz, C. F., & Goedert, N. (2014). Does Descriptive Representation Facilitate Women's Distinctive Voice? How Gender Composition and Decision Rules Affect Deliberation. *American Journal of Political Science*, *58*(2), 291–306. https://doi.org/10.1111/ajps.12077

Odum, A. L. (2011). Delay discounting: Trait variable? *Behavioural Processes*, *87*(1), 1–9. https://doi.org/10.1016/j.beproc.2011.02.007

Osborne, M. J., & Slivinski, A. (1996). A Model of Political Competition with Citizen-Candidates. *The Quarterly Journal of Economics*, *111*(1), 65–96. https://doi.org/10.2307/2946658

Reingold, B. (2003). *Representing Women: Sex, Gender, and Legislative Behavior in Arizona and California* (1st ed.). The University of North Carolina Press.

Reynolds, B., Ortengren, A., Richards, J. B., & de Wit, H. (2006). Dimensions of impulsive behavior: Personality and behavioral measures. *Personality and Individual Differences*, *40*(2), 305–315. https://doi.org/10.1016/j.paid.2005.03.024

Rideout, B. E., Hushen, K., McGinty, D., Perkins, S., & Tate, J. (2005). Endorsement of the New Ecological Paradigm in Systematic and E-mail Samples of College Students. *The Journal of Environmental Education*, *36*(2), 15–23. https://doi.org/10.3200/joee.36.2.15-23

Samuelson, P. A. (1937). A Note on Measurement of Utility. *The Review of Economic Studies*, *4*(2), 155. https://doi.org/10.2307/2967612

Sances, M. W. (2017). Ideology and Vote Choice in U.S. Mayoral Elections: Evidence from Facebook Surveys. *Political Behavior*, *40*(3), 737–762. https://doi.org/10.1007/s11109-017-9420-x

Schwindt-Bayer, L. A. (2006). Still Supermadres? Gender and the Policy Priorities of Latin American Legislators. *American Journal of Political Science*, *50*(3), 570–585. https://doi.org/10.1111/j.1540-5907.2006.00202.x

Shawn Meghan Burn. (1996). *The Social psychology of gender*. Mcgraw-Hill.

Stockard, J. (2006). Gender Socialization. In *The Handbook of the Sociology of Gender* (pp. 215–227). Springer.

The Economist. (2012, September 8). *Female muscle*. The Economist. https://www.economist.com/books-and-arts/2012/09/08/female-muscle

Tikka, P. M., Kuitunen, M. T., & Tynys, S. M. (2000). Effects of Educational Background on Students' Attitudes, Activity Levels, and Knowledge Concerning the Environment. *The Journal of Environmental Education*, *31*(3), 12–19. https://doi.org/10.1080/00958960009598640

U.S. Department of Housing and Urban Development's Office of Policy Development and Research. (2024). *HUD USPS Zipcode Crosswalk Files*. Huduser.gov. https://www.huduser.gov/apps/public/uspscrosswalk/home

U.S. Green Building Council. (n.d.-a). *LEED project profiles*. Www.usgbc.org. https://www.usgbc.org/projects

U.S. Green Building Council. (n.d.-b). *LEED Rating System*. USGBC. https://www.usgbc.org/leed

United States Census Bureau. (2025). *Annual Geographic Information Table*. Census.gov. https://data.census.gov/table/GEOINFO2023.GEOINFO?g=010XX00US

Warshaw, C., de Benedictis-Kessner, J., & Velez, Y. (2022). Local Representation in the United States: A New Comprehensive Dataset of Elections. *SSRN Electronic Journal*, *RWP22-013*. https://doi.org/10.2139/ssrn.4208183

West, C., & Zimmerman, D. H. (1987). Doing Gender. *Gender & Society*, *1*(2), 125–151. https://doi.org/10.1177/0891243287001002002

Wharton, A. S. (2004). *The Sociology of Gender*. Wiley-Blackwell.

Zelezny, L. C., Chua, P.-P., & Aldrich, C. (2000). Elaborating on Gender Differences in Environmentalism. *Journal of Social Issues*, *56*(3), 443–457. https://doi.org/10.1111/0022-4537.00177