Essays on Tax Compliance Determinants: Social Norms, Politician Gender, and Participatory Budgeting

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A thesis submitted to
the University of Reading
for the degree of
DOCTOR OF PHILOSOPHY
Department of Economics
School of Philosophy, Politics, and Economics
University of Reading
June, 2025

Declaration

I hereby declare that this thesis has not been and will not be submitted in whole or in part to another University for the award of any other degree.

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Essays on determinants of tax compliance

"Taxes are what we pay for a civilized society."

Supreme Court Justice Oliver Wendell Holmes, Jr., 1927

Summary

Why do people pay their taxes when it seems as though cheating would go unnoticed? Perhaps the reasons stem from unselfish motivations to improve one's own community. Perhaps people feel that submitting timely tax payments gives them a greater sense of moral and ethical utility than evasion. Taxpayers may be motivated by fair and trustworthy leaders or by a deep appreciation for the challenging process of governmental budgeting.

In many developed countries, tax compliance is mandatory. However, the extremely low probability of detection and low penalties can make tax compliance appear more like a choice to many taxpayers. Each year in countries such as the US and the UK, taxpayers choose how honest their tax calculations and remittances will be. In both the US and the UK, variations in the taxpayer demographics may indicate how likely they are to comply with income and property taxes. Outside influences, such as the demographic characteristics of the local and national-level political leaders or increases in citizens' civic engagement, may also serve as important factors.

These essays explore determinants that may have a strong impact on tax compliance, which may lead to a greater understanding of how people make tax compliance decisions. These essays examine determinants such as tax compliance norms, politician gender, and participatory governance to analyze whether changes in these elements lead to increases in compliance rates.

Acknowledgments

I would like to thank everyone who helped me on this journey. Thank you to both of my supervisors, Dr. Steven Bosworth and Dr. Giovanni Razzu, who were always available to answer my questions and listen to my ideas. I am forever grateful for your time, patience, expertise, and willingness to discuss tax concepts for the past four years.

To my wonderful family, thank you for your understanding, patience, and support. I couldn't have completed this journey without knowing you were cheering for me along the way.

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Chapter 1

Introduction

Tax compliance is one of the keys to a well-functioning government and helps provide public funding for essential services. However, local and national governments often struggle with noncompliance. Although most taxpayers understand that these payments are part of a social contract, some still purposefully practice tax evasion. Surprisingly, in many countries, tax compliance is the norm, with the majority of workers remitting the required payments on a voluntary basis, even knowing that the probability of detection is very low. Many researchers have attempted to explain this overcompliance phenomenon in an attempt to understand what motivates compliance beyond theoretical cost-benefit models.

This research was motivated by a desire to understand how taxpayers' compliance decisions are shaped. What are the determinants that make tax compliance the dominant decision in countries such as the US and the UK? An early question that launched this research was whether noncompliance was considered 'normal' for certain groups of people, such as the self-employed. This question provided a starting point for the second chapter of this thesis, which examines how differences in taxpayer characteristics shape or motivate what is believed to be normal tax behavior. Increasing our understanding of taxpayer beliefs and motivations may help policymakers define and direct compliance

norms.

One of the earliest models of tax compliance determinants, the Fischer Model, separated these motivations into four distinct categories: demographic variables, noncompliance opportunities, attitudes and perceptions (e.g., social norms, tax morale), and the tax system structure (e.g., enforcement, civic engagement)(Fischer et al., 1992). Each of these categories is addressed over the next three chapters. Chapter Two begins by examining what taxpayers believe is 'normal' tax behavior for individuals based on demographic and socioeconomic variables. The examination and identification of normalcy, separated by the observer's and observed characteristics, adds to the existing literature on tax compliance by clarifying what taxpayers consider normal behavior. Chapter Three investigates the impacts of leadership demographics (gender) on the followers' tax morale, while Chapter Four examines how formal processes, such as participatory budgeting procedures, could impact tax compliance rates.

Throughout each of these chapters, visibility emerged as a unifying theme. Visible demographics and noncompliance opportunities, such as gender and, to a certain extent, income source, demonstrated impacts on tax compliance that were more significant than unobserved characteristics. In examining leadership, visible demographics (gender) at the national level led to some improvements in tax morale. Visible transparency during public budgeting processes can also improve compliance rates and citizen interest levels to some extent. The commonalities among these chapters suggest that policy interventions that visibly improve perceptions of fairness, social norms, and compliance opportunities may promote higher levels of tax morale and compliance. The research in this paper examines the institutional, social, and demographic determinants and provides empirical evidence on how norms, gender, and civic engagement influence tax morale and compliance.

The second chapter examines how demographic characteristics shape social norms of tax compliance, focusing on both descriptive norms (beliefs about what others do) and injunctive norms (beliefs about what others think one should do). The central research question guiding this chapter is: *How do demographic characteristics influence the social norms of tax compliance?*

This chapter is built on the premise that social norms of tax compliance are not uniform across society. Instead, there are statistically significant differences in tax compliance norms depending on the demographic characteristics of the taxpayer. Recognizing these variations is an important part of understanding how tax morale is developed within different demographic and socioeconomic groups and how targeted policies may be needed to address varying expectations around tax compliance because of the tendency for individuals to be responsive to normative expectations.

To address this question, the chapter used regression models to analyze how different taxpayer characteristics influence both descriptive and injunctive tax compliance norms. Primary data was collected through a survey-based vignette experiment, allowing respondents to evaluate tax compliance behavior in hypothetical scenarios that provided random variations in the demographic attributes of the taxpayers presented. The nature of the vignette provided the opportunity for survey respondents to provide honest answers about their beliefs regarding normal tax compliance without being influenced by social desirability bias. Survey questions elicited descriptive and injunctive tax compliance norms, which allowed further analysis of how differing expectations influenced compliance.

The results of this initial study indicated that both male and female respondents believed it was most normal for women to be more compliant than men. This was true when using either descriptive or injunctive norms. This may indicate that traditional gender

stereotypes can influence beliefs about tax norms. Income level and income source both significantly influenced injunctive compliance norms, with self-employed individuals and those at different income levels being judged as less compliant. Male respondents believed that characters with higher income levels would be less compliant, while female respondents believed that higher-income characters would be more compliant.

The findings from this chapter indicated that tax compliance norms vary significantly across demographic groups. Policies designed to improve compliance should consider these differences and customize tax communication for particular groups. Understanding these differences may be especially important when communicating with groups that are perceived as less likely to comply, such as the self-employed.

The emergence of gender as a significant predictor of taxpayer beliefs motivated the next chapter of this thesis. If taxpayers believe that women are more compliant than men, would their tax behavior improve if a female politician was leading them? A deeper understanding of leader-follower dynamics may help government leaders support gender parity in order to positively influence tax behaviors. These relationships were considered in the third chapter, which examined the role of politician gender in shaping citizens' tax morale, focusing on whether female political leadership influences constituents' attitudes toward tax compliance. The central research question addressed in this chapter was: *What are the effects of politician gender on tax morale?* This analysis was built on the premise that female politicians may positively influence tax morale by enhancing perceptions of government fairness, trustworthiness, and responsiveness. Given that women are often seen as more fair, trustworthy, and tax-compliant, it was expected that local area districts with female leaders would have higher tax morale.

This chapter used regression models with district fixed effects to examine this question and to control for unobserved differences across political constituencies. This approach

allowed for a robust analysis of how the gender of local and national political representatives influenced tax morale. The analysis used information from the Understanding Society survey in the UK, which included detailed data on citizens' political attitudes and demographics.

The findings revealed that a politician's gender had a statistically significant impact on tax morale at the national level, with only mild effects at the local level. Taxpayer political interest levels also emerged as having a significant influence on tax morale. These findings suggest that national-level leaders have a greater impact on compliance rates and that increasing political interest levels may help improve compliance.

These findings provided motivation that led to the next thesis chapter. The results of Chapter Three suggested that taxpayers who are more interested and engaged in politics tend to be more compliant. The question then follows: How can policymakers improve the political interest and engagement levels of their citizens? The fourth chapter examines whether participatory budgeting (PB), as a mechanism for civic engagement, influenced citizens' tax compliance rates. The central research question addressed in this chapter was: *What are the effects of civic participation on tax compliance?* Civic engagement initiatives, such as participatory budgeting, have been shown to promote a greater sense of fairness, trust, and accountability, which may encourage voluntary tax compliance. By giving taxpayers a direct role in deciding how public funds are allocated, PB can enhance citizens' willingness to contribute to these public resources and comply with tax obligations.

To investigate this relationship, the study used a synthetic control design to estimate the impact of PB on Council Tax compliance rates in Tameside, a borough in Greater Manchester, UK. Council Tax compliance rates were examined before and after the introduction of PB in Tameside relative to a synthetically constructed control area made

up of weighted averages from similar boroughs.

The results indicated a gradual and increasingly negative effect of participatory budgeting on tax compliance during the study period. While the initial years after implementation showed small or inconsistent differences, the post-treatment gaps grew larger and significantly negative over time. Placebo testing confirmed that these late-stage effects were unusually large and unlikely to have occurred by chance, with standardized p-values of zero in 2017, 2018, and 2019. The findings suggest that, in the short to medium term, participatory budgeting may not improve tax compliance as initially expected and may even be associated with a decline in compliance following the conclusion of the PB project. This trend indicates the potential risk of decreased compliance when policymakers introduce a mechanism for citizen engagement and then remove that method shortly after implementation. Policymakers considering using PB to improve compliance should be aware that its impacts may emerge gradually, and removing PB may counteract any previously observed positive effects.

Each chapter presents a unique view and examines the determinants of tax compliance through a different lens. Formal and informal institutions, demographics, attitudes, opportunities, and the tax system structure are examined. Understanding how variations within these categories impact tax compliance may provide a more complete picture to policymakers working towards improving tax compliance rates.

Chapter 2

'The Effects of Demographics on Tax Compliance Norms: Evidence from a US Vignette Experiment

2.1 Abstract

Tax noncompliance in the United States leads to a significant revenue gap. It has multiple negative effects on the country's economic prosperity, as noncompliance undermines the legitimacy of the state and forces honest citizens to carry the tax burden of the cheaters. Regardless, citizens may believe that noncompliance is quite normal under certain conditions and may act according to this perceived social norm. This research examines how demographic variations in the observer and the observed influence the social norms surrounding tax compliance. A vignette-based survey experiment was conducted to gather data on respondents' normative beliefs using descriptive and injunctive reasoning. Primary data from 438 US taxpayers was gathered and analyzed to quantify the relationships between certain characteristics- gender, income level, and income source- and perceived tax compliance norms. The findings reveal that gender has a minimally significant yet positive impact on beliefs about normative compliance, but only when respondents were prompted to use descriptive reasoning. Both male and female taxpayers revealed they had lower compliance expectations for men than women, with expectations lowest when both the taxpayer and the observed character were male. The results of this study may provide insights into how demographic, socioeconomic, and opportunistic variations shape beliefs about tax compliance norms and may offer policymakers an improved understanding of how leveraging these variations can reduce the tax gap.

Keywords: Tax Compliance, Vignettes, Injunctive, Descriptive, Social Norms
JEL Code: H26, C83, D91

2.2 Introduction

The tax gap in the United States was estimated at $696 billion for the 2022 tax year (IRS, 2022a). Tax gaps are calculated by taking the differences between what taxpayers owe based on tax law and the amount they actually pay. Honest mistakes or deliberate misrepresentation by the taxpayer when calculating the amount owed is considered tax evasion and illegal in the US. Tax evasion must not be confused with tax avoidance, which is the use of careful planning to legally reduce one's tax obligations. Tax evasion, also called tax noncompliance, can occur when taxpayers underreport income, overstate deductions, or simply neglect to file a tax return entirely. The majority of the tax gap is due to noncompliance with individual income taxes, followed by corporate income, employment, and estate taxes.

Noncompliance leads to fiscal and social challenges such as lost revenues, uneven income distribution, wealth, public unrest, and fraudulent behavior (Leicester et al., 2012). The reduction in revenue also hinders governments from providing adequate funding for essential programs like education, healthcare, and infrastructure. The motives and methods for noncompliance have varied significantly over time. Motives such as taxpayers' inability to pay, distrust in government, and tax rate increases have led to both straightforward and creative methods of noncompliance. The IRS has stated that the best method for reducing the tax gap is to take a comprehensive look at multiple strategies, such as reducing opportunities for evasion, identifying sources of noncompliance, improving technology to detect noncompliance, and increasing deterrence measures (US Department of the Treasury, 2006). Analyzing how these strategies might work together can lead to improvements in overall compliance.

In the past few decades, research examining the reasons for compliance and noncompli-

ance has started to go beyond economic factors alone and to consider social, cultural, and psychological influences as well. For example, a study by Alm et al. (1995) presented one of the earliest analyses of the interactions between social norms and tax behavior and concluded that social attitudes were significant influences on tax compliance. Governments and policymakers have used their understanding of norms to encourage desired tax behaviors, as seen in the Minnesota Income Tax Compliance Experiment conducted in 1995 and 1996 (Coleman, 1996). In this experiment, taxpayers were sent letters informing them of their area's current tax compliance norm. The state hoped that the letter would encourage taxpayers to become more compliant if the taxpayers believed high compliance was the norm in their area. This experiment showed no significant overall impact on taxpayers' compliance behavior, although certain sub-groups demonstrated stronger tax compliance tendencies than others (Slemrod et al., 2001).

Since the experiment's conclusion, policymakers in other local and national governments have used the results in Minnesota to help them design procedures and specific tax forms that use social norms to influence taxpayer behavior. An experiment in the UK used normative messaging similar to the messaging in the Minnesota experiment when communicating with taxpayers. The UK experiment resulted in a 15% increase in tax compliance rates (Cabinet Office, 2011).

Although the results of these experiments suggest that carefully constructed normative messaging can positively impact compliance, other studies have shown that norms have only a minimal impact. For example, Kleven et al. (2011) found that compliance rates were extremely high for income that was subject to third-party reporting, whereas noncompliance remained significant for taxpayers with self-reported income. These findings align with the recent statistics from the US Internal Revenue Service previously mentioned (IRS, 2022a) and suggest that the structural systems of income tax reporting may

have a greater impact than social norms on taxpayer compliance levels. The comparatively small impact of social norms may still represent a significant sum of uncollected tax liabilities, which validates continued research.

Although research on tax compliance norms has continued since the Kleven study, this research rarely distinguishes between the different types of social norms. Early research introduced by Bicchieri (2006) defined two key categories: descriptive norms, which are based on what people observe others doing, and injunctive norms, which are based on beliefs about what others expect them to do. One of the biggest challenges in studying how social norms influence tax compliance is that normative tax compliance behavior is not usually seen or disclosed by individual taxpayers, even to members of their same social groups.

How can taxpayers develop beliefs about 'normal' compliance when they cannot observe others' tax actions? Unlike social behaviors such as holding the door open for others, which are both observed and expected, tax compliance is generally expected but very rarely observed. This lack of observability means that taxpayers shape their compliance decisions only on their beliefs about what others are doing and what others expect them to do, rather than on direct observations. However, taxpayers may be using observable demographics as proxies for observable behavior, and thus forming their tax compliance beliefs based on these demographics. For example, taxpayers may believe that it is more normal for a low-income, self-employed man to be noncompliant than a high-income, company-employed woman. These observable characteristics of gender, income level, and income source may be shaping taxpayers' beliefs about normative tax compliance. Taxpayers identifying with groups they perceive as noncompliant may believe that failing to comply is normal and even socially acceptable. This chapter will investigate the following research question: How do demographic characteristics of both the taxpayer

and the observer shape perceived social norms related to tax compliance?

Economic models are often based on decisions made by so-called 'rational' individuals with the goal of maximizing their utility. In reality, individuals often make decisions based on what they perceive others are doing. These 'herd-behavior' decisions may override an individual's goals to maximize utility by promoting choices that aren't in their best interest. Examining what leads to the differences in taxpayer beliefs and behavior may provide a deeper understanding of how individuals perceive norms in their community, respond to incentives, make decisions, and comply with policies. Understanding how demographic characteristics shape the social norms of tax compliance may help policymakers build better models for human decision-making and may help shape tax compliance strategies. By examining these interactions, this study makes an original contribution to the field of behavioral economics by offering insights into how demographic factors influence tax compliance norms and help keep compliance the dominant decision by taxpayers.

This chapter is structured as follows: Section 2.3 discusses the relevant literature and identifies current gaps. Section 2.4 provides the study's data and methodology. Section 2.5 outlines the study's results, leading to the general discussion and conclusion in Section 2.6.

2.3 Literature Review

While the US enjoys a relatively high rate of tax compliance compared to other countries, it also loses the highest amount of tax revenue per year due to evasion (USSC, 2022). According to recent estimates, the voluntary compliance rate in the US is 84% (IRS, 2022b), which means that the majority of US taxpayers pay their taxes voluntarily,

accurately, and on time. To be clear, voluntary compliance does not mean US citizens can choose to pay taxes. Instead, the voluntary nature of tax compliance refers to the responsibility of each citizen to honestly and proactively disclose all income that he earned each year and to accurately calculate and remit the taxes owed on that income before the payment deadline. This process should occur without government oversight or intervention. In reality, deliberate and accidental inaccuracies result in a gap between the amount of taxes owed and the actual amount paid. Both the dollar amount of the gap and the public frustration that it causes present significant motivation for offering solutions to this ongoing issue.

2.3.1 Theoretical Frameworks on Tax Compliance

Several economic theories have been explored to determine how individuals make tax compliance decisions. A commonly explored theory in the literature is the Rational Choice Theory (RCT), which provides a model of decision-making under uncertainty. The theory describes how individuals make decisions to maximize their utility given existing constraints. Within the framework of RCT, Expected Utility Theory (EUT) expands this definition to include how individuals use the probabilities of each outcome to help inform their decisions.

Expected Utility Theory (EUT) allows for the estimations weighing benefits against costs, which individuals then use to evaluate tax compliance decisions. Early research by Hinrichs (1969) applied EUT to the analysis of tax compliance and highlighted variations in taxpayers' rationality and their perceptions of risk detection probability. Following this work, Allingham and Sandmo (1972) focused on risk aversion and examined how detection probabilities and penalties drive compliance within an EUT framework. While these early researchers made progress in understanding the motivations for compliance,

the full explanation remained incomplete.

In 2019, the probability of a US taxpayer being audited was around 0.25% (GAO, 2022). Thus, according to EUT, there was a 99.75% chance for taxpayers to evade taxes without detection or penalty. The resulting increase in taxpayer wealth improves their utility. In reality, a mere 16% of taxpayers are noncompliant, which contradicts this theory. Indeed, for the past two decades, research on tax compliance using EUT has shown that the most rational choice for the taxpayer should be noncompliance (Alm et al., 1992; Alm, 2019; Alm and Torgler, 2006; Bobek and Hatfield, 2003; Bobek et al., 2007; Frey and Torgler, 2007; Wenzel, 2005). Rational Choice and Expected Utility Theory provide different perspectives on how compliance behavior is shaped. Both theories assume that individuals are motivated to comply mainly out of financial self-interest. However, neither theory fully explains why most individuals 'irrationally' choose compliance over noncompliance.

An early model, termed Prospect Theory, was proposed by Kahneman and Tversky (1979) as an alternative to EUT. This model provides a behavioral alternative to EUT and theorizes that psychological biases lead to deviations from rationality. Prospect Theory explains how people perceive and evaluate risks, often leading to these individuals violating what economists consider rational. Within the framework of this theory, individuals use reference points to evaluate risks. While EUT assumes that people evaluate absolute outcomes such as final wealth or total utility, the Prospect Theory assumes that people focus on changes relative to a reference point and not on final outcomes.

Prospect Theory has been used to examine tax compliance behavior and provides a better-fitting explanation for why taxpayers choose compliance despite the low probability of detection. One possible explanation using this theory is that taxpayers may overweight the probability of detection, as people tend to mentally weigh the probability

of a loss more heavily than that of a gain (Alm et al., 1992). Subsequent research has examined how closely models built on Prospect Theory mirror observed tax compliance trends and has found that the observed data is consistent with the theoretical findings (Dhami and al Nowaihi, 2007). One of the key points in Prospect Theory is the concept of a reference point. According to the theory, individuals evaluate outcomes relative to a reference point instead of absolute terms. For example, taxpayers may create a reference point based on last year's tax payments. If their current tax liability is less than last year's, they may consider this year's tax payment as an increase in utility (gain) over the previous year. In an experiment with self-employed workers, research found that unexpected tax liabilities led to noncompliance while unexpected refunds led to higher than expected compliance (Kirchler and Maciejovsky, 2001). Taxpayers are more likely to be compliant if tax compliance is seen as a gain instead of a loss (Cullis et al., 2012). Expected tax refunds, comparison with peers, or social norms may also serve as reference points under the framework of Prospect Theory (Kahneman, 1992).

If taxpayers believe the prevailing social norm is that most people pay their taxes, then compliance may serve as the baseline reference point. However, if tax evasion is considered the norm, then taxpayers who comply with tax obligations may feel as though they are experiencing a loss as compared to their peers. When very high compliance is the norm, taxpayers may think that paying taxes represents a gain. Over the past few decades, research on tax compliance has started to include social norms as influences on taxpayer decision-making. For example, Gordon (1989) gave empirical evidence in his study that taxpayer interdependence played a role in evasion. His research showed that taxpayers were more likely to evade if they were aware, through various social channels, of other taxpayers' evasion. Beginning in the late 1980s, research transitioned from 'hard' determinants of compliance, such as audits and penalties, to 'soft' determinants,

such as social norms and emotional considerations. Social norms began to be explored as complementary factors to EUT in taxpayer decision-making (Alm, 2011, 2019; Alm et al., 2017; Alm and Torgler, 2006; Bobek et al., 2013, 2007; Kirchler et al., 2010; Noguera et al., 2014).

2.3.2 Tax Compliance Social Norms

The influence of social norms on individual behavior has been widely studied in multiple disciplines, including economics, psychology, and sociology. In early research, Fishbein and Ajzen (1975) introduced their Theory of Reasoned Action (TRA), which includes the belief that human behavior can be shaped by social norms. In her 2006 book, Cristina Bicchieri defined social norms as behaviors that individuals prefer to conform to if two conditions are met. Firstly, these individuals must believe that most people in their reference group behave similarly. This condition is based on empirical expectations. Secondly, these individuals must believe that the people in their reference group expect them to conform to it, while a lack of conformity may cause repercussions (Bicchieri, 2006). These conditions agree with early work by Alm et al. (2019), who defined social norms of tax compliance as behavioral patterns that are judged by others.

'Everyone else like me is doing it' is a common justification for decision-making. Individuals can easily justify their noncompliance if they see or believe that other taxpayers like them are also noncompliant. The justification may be especially true when taxpayers believe they would feel a 'loss' if they did not conform to the perceived norm. When using social norms to justify tax compliance, the challenge is that most individuals are not privy to the tax compliance behavior of others in their reference group, so there is no certainty that the other group members are noncompliant. In these situations, taxpayers may be modeling their behavior against what they believe is true, but those

beliefs may be false. Although studies have concluded that taxpayers are more likely to be compliant if they are under the impression that the existing social norm is compliance (Alm, 2019), this belief is only based on the perception of compliance, not on actual observations. Alternatively, compliance diminishes if noncompliance is believed (although not observed) to be the norm.

The effects of peer behavior on taxpayers' compliance decisions have also been examined in previous studies. Research has demonstrated that when individual taxpayers were provided with information about their neighbor's compliance behavior, it significantly influenced their own compliance decisions (Alm et al., 2017). These peer effects can be either positive or negative as taxpayers respond to the compliance or noncompliance of their peers. While peer effects influence compliance decisions through interactions or information about others' behaviors, another important perspective explains how individuals internalize perceived social judgments. The concept of the looking-glass self, first introduced by Charles Cooley, explains how individuals shape their behavior based on what they believe others think of them (Cooley, 1902). For example, if self-employed workers think that most others believe them to be tax evaders, they may shape their behavior to match those expectations of noncompliance. The looking-glass self is similar to the Social Labeling Effect, which hypothesizes that individuals tend to adopt external perceptions about them and change their behavior to match those perceptions (Becker, 1963; Lemert, 1951). Using this theory as applied to tax compliance may mean that individuals who are members of groups that are commonly labeled as noncompliant are more likely to become noncompliant in the future based on these external expectations. Both of these theories provide insights into the importance of studying not only tax compliance itself but also society's beliefs surrounding tax compliance. A key element in reducing the tax gap may be examining how to redefine society's normative expectations

of workers so that the workers do not see themselves as belonging to a noncompliant group and behave accordingly.

Another important factor in reducing the tax gap is understanding which groups society perceives as noncompliant. In the US, the IRS estimated that most noncompliant taxpayers were self-employed (IRS, 2019). Based on this estimate, society may believe it is normal for self-employed workers to evade taxes, leading to those workers internalizing the belief and conforming to the perceived norm. Are we making assumptions about the behavior of others based on what we believe is normal? What constitutes normal behavior in terms of tax compliance may change based on our own characteristics, our own beliefs, or the observed characteristics of others. Without the ability to directly observe tax behavior, taxpayers may be basing their compliance beliefs on what they can see – namely, the demographic or employment characteristics of others.

2.3.3 Demographic and Socioeconomic Influences on Tax Compliance Norms

Demographic and socioeconomic characteristics may play an important role in shaping tax compliance decisions, as factors such as age, religion, gender, income level, and income source can influence taxpayers' perceptions of fairness, risk, and social obligation. The Fischer model, an early model of tax compliance determinants, classified these variables into four main categories: demographic variables, noncompliance opportunities, attitudes and perceptions, and tax system/structure (Fischer et al., 1992). Examples of elements within the demographic category include gender and age, while noncompliance opportunities include education, income level, income source, and occupation, as shown in Figure 2.1.

Research has indicated that differences in demographic and socioeconomic characterist-

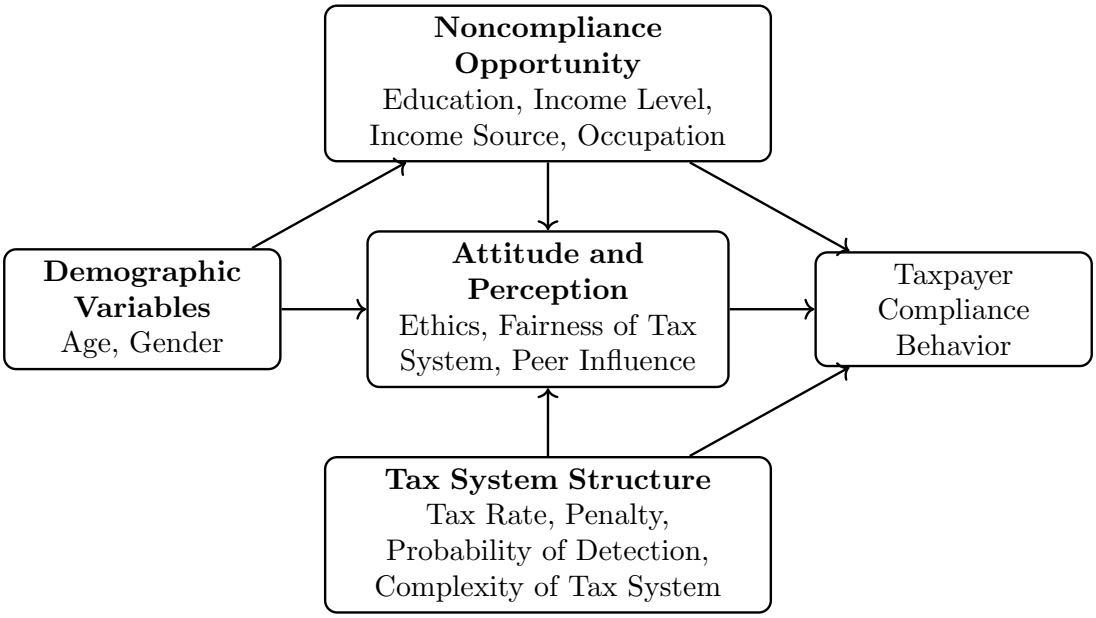


Figure 2.1: The Fischer Model of Tax Compliance, Fischer et al. (1992)

ics significantly influence taxpayers' compliance levels. For example, studies have shown that older taxpayers are generally more compliant than younger taxpayers, which may be due to more tax experience or a better understanding of tax obligations (Kornhauser, 2007). However, other studies have found conflicting results on how certain characteristics affect compliance. For example, effects based on age and education were inconsistent in both the direction and size of the relationship on compliance (Hofmann et al., 2017). Three additional demographic and socioeconomic variables that have returned conflicting results in previous literature are gender, income level, and income source. The Fischer model categorizes gender as a demographic variable while categorizing income level and source as noncompliance opportunities. However, according to the American Psychological Association, income level is considered a socioeconomic variable (VandenBos, 2007). Examining variables within each of these three categories may provide interesting insights into which types of variables have a stronger impact on the social norms

surrounding compliance. For the purposes of this research, three taxpayer characteristics will be examined: gender (demographic), income level (socioeconomic), and income source (opportunity).

Although most early studies found a strong positive relationship between gender and tax compliance, more recent research has indicated a shift in this trend, demonstrating a weakening or even reversal of the effect. For example, an early New Zealand study found that women practiced tax evasion less often than men and were more likely to comply (Oxley, 1993). Additional early studies found that, on average, women seem to have a higher compliance rate than men (Jackson and Milliron, 2002; Richardson and Sawyer, 2001). However, subsequent research has observed that this behavior may be changing with the generational shift as women make up more of the workforce and become more independent (Devos, 2008). For example, in a study on independent entrepreneurs, characteristics such as taxpayer age and education were found to be significant influences on compliance. At the same time, gender did not provide any significance (Vincent et al., 2023). In light of these shifts and the conflicting conclusions, examining gender differences remains an important part of this research because it helps us understand not only the behavioral differences based on gender but also the differences in how normative expectations of gender have evolved.

In addition to demographic factors such as gender or age, characteristics such as income source and level may provide opportunities for noncompliance and may shape taxpayer attitudes. However, similar to the research on gender, the results of previous studies on both income level and source have found mixed results. Research on taxpayer income level has found positive, negative, and no correlation between taxpayers' income and compliance levels (Devos, 2008; Jackson and Milliron, 2002). Early studies on the theoretical compliance models have shown a negative relationship between compliance and

income level (Andreoni et al., 1998). These results agree with additional field studies that examined the effects of income level on tax compliance and found that higher-income taxpayers are less compliant (Durham et al., 2014; Houston and Tran, 2001). These results agree with the Fischer model, demonstrating that higher-income taxpayers have greater opportunities for noncompliance. For example, these taxpayers may have greater access to offshore accounts or other underreporting strategies. Conversely, some studies show that income level has a significant, positive effect on compliance (Eragbhe and Aronmwan, 2015; Kurnia and Fajarwati, 2022). The positive effects on compliance may be due to positive taxpayer attitudes and perceptions of fairness (Fischer et al., 1992). If high-income taxpayers see taxation as fair or justifiable, they are more likely to comply. Lower-income taxpayers may feel as though they are unfairly taxed relative to the wealthy and may support tax evasion as a response to these perceptions.

Income source also has the potential to influence tax compliance attitudes. Taxpayer income source refers to how income is earned. Within this variable, wage and salary earners who are company-employed are those who are typically subject to third-party withholding, such as W2 workers in the US or PAYE in the UK. Self-employed earners are sole proprietors, gig workers, or independent contractors.[1] The influence of income source on tax compliance has been extensively explored in the US by the Internal Revenue Service, which estimates that most noncompliance in the US is from self-employed workers in the form of pass-through income and self-employment taxes (GAO, 2022). The reasons for this are generally attributed to a lack of third-party reporting. How-

[1]The W2 form is issued by employers in the US to report an employee's wages and the taxes withheld from their paycheck to both the employee and the IRS. The wage withholding is similar to the system in the UK, Pay As You Earn (PAYE), which ensures that income tax and National Insurance contributions are deducted directly from employees' wages before they receive their pay. Taxes for self-employed individuals in both the US and the UK are not automatically withheld. Self-employed individuals, including sole proprietors, gig workers, and independent contractors, sometimes receive a 1099 form in the US and sometimes receive no forms. In the UK, self-employed workers must report their earnings through Self Assessment.

ever, regardless of whether or not tax forms are issued or received, many self-employed workers in the US continue to file their returns in a timely and accurate manner, raising questions about what prompts their compliance when there is minimal government oversight and a low audit probability. Due to these unanswered questions, this study will examine taxpayers' income source as a variable of interest.

An empirical study by Kleven et al. (2011) encompassed a large-scale experiment in Denmark examining compliance reactions to randomized audits and threats of audit. Their findings indicated that near-perfect compliance was present when income was subject to third-party reporting, while significant evasion continued to be present for self-employed income. According to the researchers, the high compliance observed in their experiments was driven more by the taxpayers' inability to evade rather than their unwillingness. One of the key contributions of the Kleven study is that the findings challenged some previous models, which relied heavily on tax morale and social norms to explain high compliance levels. Although the researchers indicated that tax morale and norms did have an impact on tax compliance, their findings demonstrated that these impacts were overshadowed by the significance of the tax system structure.

In a 2016 paper by Kleven et al. (2016), the authors examined how using firms as fiscal intermediaries might impact compliance. Their study extended the Allingham-Sandmo model (1972) by incorporating firm structure and economic development into compliance level estimates. The results of their study further demonstrated that improvements to structures within a firm, such as record-keeping and third-party reporting, improve tax compliance over time.

In a more recent study, Bagchi and Dušek (2021) examined individual states within the US over a nearly 40-year time period to further understand how tax structures impact compliance. Their findings suggested that withholding at the source led to a signific-

ant and sustained increase in state tax revenues, even in a country with existing high compliance rates. Specifically, their study found that withholding at the source led to reductions in the rate of non-filing.

Although the studies by Kleven et al. (2011; 2016), Slemrond and Velayudhan (2018), and Bagchi and Dušek (2021) indicate that the structural mechanisms of withholding at the source and third-party reporting are key determinants of tax compliance, they also suggest that additional factors still contribute. Even when these structures minimize opportunities for noncompliance, taxpayer demographics and socioeconomic characteristics continue to influence compliance decisions to a certain extent. These characteristics also shape tax compliance norms by influencing attitudes toward taxation, civic duty, perceptions of fairness, and perceived weighting of risk. Studies on how social norms are formed have indicated that these norms are learned through interactions within specific social contexts, which can vary across different socioeconomic groups (Zhang et al., 2023). Differences in norms across demographic and socioeconomic groups may lead to uneven compliance levels across society. Individuals from similar socioeconomic backgrounds tend to share experiences, resources, and challenges. These shared circumstances foster common values and behaviors, which can evolve into social norms within these groups (Manstead, 2018).

2.3.4 Descriptive and Injunctive Norms in Tax Compliance Research

While demographics, socioeconomic characteristics, and noncompliance opportunities have been shown to influence tax compliance norms, further research is needed to examine how these factors impact compliance under conditions of uncertainty. As previously stated, one of the difficulties taxpayers face when attempting to conform to the tax compliance norms is that these types of norms are primarily unobserved. Norms that are

both believed and observed are considered descriptive norms, while norms that are believed but unobserved are most often categorized as injunctive norms (Bicchieri, 2006). Given the importance of understanding tax compliance norms, this study separately examines injunctive norms (what a group approves or disapproves of) and descriptive norms (what a group actually does) in relation to tax beliefs.

Injunctive norms surrounding tax compliance may be based on the taxpayer's beliefs about how their group members may approve or disapprove if the taxpayer is noncompliant. These 'beliefs about beliefs' also include the perceived sanctions that may occur if a norm is not followed (Bicchieri, 2006). In contrast, descriptive compliance norms are shaped when individuals look to the actions of others to guide their own decisions (Onu and Oats, 2015; Arcos Holzinger and Biddle, 2016). These observations may be of others in the same socioeconomic or demographic group or based on observations or interactions with tax compliance statistics. For example, taxpayers follow descriptive norms when they read that other company-employed workers are highly compliant and then choose to follow that precedent themselves.

Understanding the difference between these two types of norms is key to analyzing tax compliance behavior, as studying each type separately can give a clearer picture of how compliance norms work. Policy interventions focused on compliance norms need to consider whether taxpayers respond more to what they believe is expected of them or what they perceive others actually do.

2.3.5 Concluding Remarks on the Existing Literature

The evolving results in the existing literature on how demographic and socioeconomic characteristics influence tax compliance norms provide an opportunity to examine these relationships in greater detail. Although it seems rational to financially support one's

own society and community through tax payments, some individuals may believe that tax evasion leads to higher levels of utility than compliance, especially when compared to others in their reference group. This study offers an original contribution to the field of behavioral economics by examining how observed characteristics of gender, income source, and income level influence the descriptive and injunctive social norms of tax compliance.

2.4 Methodology

Studying tax compliance and noncompliance in natural or lab settings can present challenges since taxpayers might not fully disclose their noncompliance due to social desirability bias or fear of repercussions (Kirchler et al., 2010). To counteract the potential unwillingness to share honestly, an anonymous survey was designed that included a fictionalized vignette to gather information on tax beliefs and compliance norms from individual income taxpayers in the United States.

2.4.1 Study Design: Vignettes and Factorial Surveys

Vignettes are valuable tools in survey research because they allow respondents to respond honestly to socially sensitive questions while minimizing social desirability bias (Burstin et al., 1980; Finch, 1987). Previous research has defined vignettes as concise and detailed descriptions of scenarios in line with the research topic of interest (Atzmüller and Steiner, 2010). Vignettes may contain multiple variations within the scenario that can be adjusted to create one or more experimental conditions.

The strength of the vignette method is that it gathers data on participants' beliefs, expectations, and hypothetical actions when presented with specific fictional scenarios, which are key factors when examining norms (Bicchieri et al., 2014). These vignettes

enable researchers to evaluate participants' reactions and decisions in hypothetical scenarios, such as predicting what a character might do next. This is particularly useful when measuring tax compliance as it allows respondents to report their beliefs on another person's actions without disclosing their own compliance choices (Torgler and Valev, 2006). Additionally, participants may indicate their approval or disapproval of a character's choices in a particular scenario, which may help indicate the strength of a particular norm (Atzmüller et al., 2017).

Although vignettes are effective for examining tax compliance norms, they can also present challenges. Vignettes can be time-consuming for survey respondents to read and understand, potentially leading to survey fatigue. Additionally, vignettes may unintentionally include the writer's bias, which might influence the respondents' answers. Surveys with factorial vignettes, which include many possible combinations, pose other challenges regarding the appropriate number of vignettes to display to each respondent within the survey. One practice is to offer vignettes as a within-subject design, where each respondent is shown multiple vignettes, with each scenario containing slight variations. This design method allows researchers to control for the differences in the individual respondents and requires fewer participants in the study. The alternative to this method is to show each respondent only one version of the vignette and obtain a large enough sample size that each combination of the variations is addressed a sufficient number of times throughout the experiment.

The results of previous experiments comparing vignette designs suggested that presenting only one vignette per respondent delivered equal or greater statistical power as when respondents were given multiple vignettes (Ludwick and Zeller, 2001; Dülmer, 2016). Subsequent research agreed with these findings and found that a high number of vignettes can cause survey fatigue in the respondents, possibly distorting the results of the

experiment (Silva et al., 2019). A study on preventing careless responses in social science surveys found that presenting a maximum of one vignette per respondent maximized engagement, enhanced data quality, and was most effective at disguising the research aim from the participant (Arthur et al., 2021). These findings, which show that using only one vignette per survey is one of the strongest and most reliable methods, validate the decision to use a between-subject design for the current research.

Each respondent was presented with a single vignette containing four variables (although only three were retained), with one value randomly assigned within each variable. For example, the *gender* variable included options for male and female, but respondents were not aware that other options existed within their assigned vignette. The three variables, gender, income level, and income source, represented demographic, socioeconomic, and noncompliance opportunity differences in the vignette character. The fictional vignette introduced an individual named Dana, who was assigned a random set of attributes from within the three independent variable categories.

The single vignette included 54 possible combinations of determinants and variations. This was calculated as follows:

$$54 = 3^3 \times 2 \tag{2.1}$$

Where the first three variables (*reference group, income source,* and *income level*) have three possible values, and the final variable (*gender*) has two. The original vignette included a variable representing the reference group of the character in order to elicit social norms (Bicchieri et al., 2014). However, the reference group variable was excluded from the final analysis after the original survey was administered. Previous research has shown that asking respondents to assess how one fictional character perceives another – a form of third-hand imaginary reasoning – is psychologically improbable and intro-

duces excessive complexity, making it an unreliable method for studying social norms (Kahneman and Tversky, 1982; Tourangeau et al., 2000). Due to the psychological improbability of obtaining valid estimates measuring the impact of the vignette's reference group on the fictional character, the reference group variable was not included in the final analysis. The vignette presented in the survey reads as follows, with the values for each variable shown in **bold** and parentheses.

> Dana is (**woman** | **man**) living and working in the United States and is (**self-employed** | **employed by a company** | **both self-employed and employed by a company**). Dana's pre-tax income from all sources last year was (**$46,000** | **$85,000** | **$170,000**). Now, imagine that Dana is (**a close member of your family, such as a parent or grown child** | **a close friend with whom you regularly interact** | **or a colleague who works in the same industry or at the same company as you**). Based on the amount of income Dana earned last year, he/she will need to file an individual income tax return to report income, calculate taxes owed, and make any necessary payments.

An original survey, which included the vignette, was created in Qualtrics, often used for social science research of this nature (Sauermann and Roach, 2013). The Qualtrics platform was chosen due to its ability to lead survey participants through a specific pathway using features such as embedded data, randomizer, and branch logic. The randomizer feature allowed the survey to present a randomly generated and evenly distributed combination of explanatory variables to the survey participants. Once generated, these variables became static for the respondent for the remainder of the survey.

The survey was designed to gather opinions on whether respondents believed it was

socially acceptable for individuals with specific demographic, socioeconomic, or opportunistic characteristics to be noncompliant. Variations in gender, income level, and income source were presented in the survey's vignette to create heterogeneity across these characteristics. Additionally, these variations were compared with those of the respondents to explore the concept of homophily, which is the tendency of individuals to adopt behaviors and beliefs that align with those who share similar characteristics (Garcia Alvarado, 2019). This concept, along with the social labeling theory and Cooley's concept of the looking-glass self, suggests that people are influenced not only by their actual similarities to others but also by the social expectations and labels that emerge within their groups (Becker, 1963; Lemert, 1951; Cooley, 1902).

After reading the fictional scenario, respondents answered two sections of Likert-scale questions on tax compliance norms using descriptive and injunctive reasoning. These questions assessed the strength of each respondent's beliefs about what they considered 'normal.' Previous research has explained that the use of these scales in research on social norms allows the respondents to provide nuanced answers while maintaining anonymity (Bicchieri, 2016). The questions within each of the two sections were framed to elicit either descriptive or injunctive norms on tax compliance. Economic research has demonstrated that this technique is effective at prompting respondents to engage with sensitive questions using a particular type of reasoning without revealing the researcher's intentions (Nosenzo and Görges, 2020). In both sections, which were presented in a randomized order, participants shared their opinions on what they would consider acceptable behavior for Dana.

In the first nine injunctive norm questions, the respondent was asked to respond to the questions as though they were the fictional character. They were then asked about their beliefs on how they thought others in different reference groups would perceive or

judge them. This reasoning is consistent with eliciting injunctive norms (beliefs about beliefs) (Bicchieri, 2016). The final five questions in that section asked respondents to rank the appropriateness of taxpayer behavior on a seven-point Likert scale. The remaining survey questions gathered information about the respondents' demographic and socioeconomic characteristics, their beliefs, and their behaviors. A research-based justification for how each of these questions was motivated and worded can be found in Appendix A, Table A.1. The full survey instrument is included in A.2.

2.4.2 Pilot Survey, Participant Recruitment and Sample Size

Prior to administering the full survey, a pilot survey was distributed to a group of 20 people in order to gather feedback on the layout, readability, and understanding of the survey. Participant demographics included variations in gender, income level, and income source. Twelve participants completed the survey, with ten providing detailed comments. The average completion time for all pilot participants was slightly over 10 minutes (mean time = 10.3, SD = 3.12, Min=7, Max=18). The pilot survey identified a few challenges faced by the respondents, leading to modifications that simplified the survey without diminishing the strength of the questions. All suggestions from the pilot participants were considered, and the appropriate changes were made before administering the survey to a larger random sample of US taxpayers.

For the final administration of the survey, Amazon's Mechanical Turk (MTurk) was used to recruit respondents. This platform is very commonly used for social science research (Difallah et al., 2018; Lopez et al., 2023) because it provides benefits such as allowing researchers to limit participants to certain categories, such as taxpayers living and working in the US. However, the platform does not ensure equal representation across race, gender, income level, or rural vs. urban populations (Huff and Tingley, 2015). Due to

these limitations, research in past decades has questioned the use of MTurk to generate a truly random sample, stating that, on average, MTurk users tend to be single, more highly educated, and more liberal than the actual US population (Chandler et al., 2019). Due to these potential biases, research has leaned towards treating data collected from MTurk surveys as convenience samples rather than random samples. However, more recent research presented data showing that the psychological and demographic characteristics of most MTurk participants are not significantly different from those of the participants who take part in traditional community or college surveys (Lopez et al., 2023). While not fully representative, MTurk samples can provide meaningful results for studies that examine relationships between variables (Litman et al., 2015) and for social behavior research (Goodman et al., 2013).

The survey format was designed with the practices of the MTurk worker in mind, who most commonly use mobile devices and are more likely to complete surveys lasting eight minutes or less (Difallah et al., 2018). Respondents were recruited by offering a modest compensation of $0.25 (USD) per valid survey, which aligned with standard practices for surveys of this type within the US (Hara et al., 2018). Potential respondents were screened and limited to those who were over the age of 18 and who earned at least $600 the previous year. The $600 threshold ensured that respondents had some experience declaring income and filing taxes.

Using previous literature as a guide, three methods were implemented to address validity concerns about responses gathered from the MTurk platform. First, participants answered both an attention check and data validation question (Lopez et al., 2023). Second, surveys completed in less than four minutes were invalidated based on the information gathered from the pilot survey, which showed that the average time for completion was just over 10 minutes. Previous studies have shown that surveys with

a completion time that is 40% or less than expected should be discarded (Cobanoglu et al., 2021). Finally, only respondents who completed the survey were given a unique code, which was required for them to be eligible for compensation.

The number of valid survey responses needed to obtain a robust sample with a 95% confidence interval and 5% margin of error was calculated at 385. The multilevel (factorial) characteristics of the survey were also taken into consideration when calculating a proper sample size. The survey vignette contained four factors: one with two levels and three with three levels each, leading to 54 unique versions of the vignette as previously shown in Equation 2.1. While there is some debate in the literature, the current practice suggests obtaining a minimum of 3 responses per unique combination, with a minimum sample size of 100 participants. Additional research has noted that there is no concrete rule for sample size in this type of research and that the most appropriate size depends upon the model complexity, the number of variables, and the correlation between those variables (Hox and McNeish, 2020). For the vignette in this study, three responses per unique combination would equate to a minimum of 162 responses, which is less than the preexisting target of 385 participants.

The survey yielded 600 responses from people with diverse income levels, income sources, and genders, providing a sample reflective of U.S. taxpayers. After data validation, the final sample of respondents living and working in the US comprised 438 individuals, which was above the minimum target sample size.

2.4.3 Data and Variables

In this study, the independent variables of interest representing gender, income level, and income source were shown to the respondent as variations in the vignette character. The first two variables (gender and income level) were chosen based on previous research

citing the influences of these factors on tax compliance decisions (Alm, 2019; Bobek et al., 2013; Cialdini and Trost, 1998). The fictional taxpayer was assigned one of only two gender values, male or female, to limit the number of variations within the factorial vignette.

The three income level values (low, middle, and high) were chosen based on the 2021 US Census data, which reported a median household income in the US of $70,784 (Semega and Kollar, 2022). The lower income bracket of $46,000 represents a low-income worker, as defined by the Pew Research Center, which classifies the low-income bracket as lower than 67% of the median income (Pew Research Center, 2015). For this study, the high-income bracket, defined as 200% or more than the median, was represented by the amount of $170,000.

Values for the third independent variable, income source, were selected based on IRS data indicating that self-employed workers are the primary source of the tax gap, followed by workers who are both self-employed and employed by a company, and those who are fully company-employed (IRS, 2019). These three values were included as the options for income source. Table 2.1 shows the variations of interest along with descriptions of the possible values.

Table 2.1: Vignette Character's Variations

Variations	**Number of Values**	**Value Descriptions**
Gender	2	male, female
Income Level	3	$46,000 (low), $85,000 (middle), $170,000 (high)
Income Source	3	self-employed only, both self-employed and employed by a company, employed by a company only

2.4.4 Variable Constructs

There were two main dependent variables used in this study. Both were constructed from a series of different survey questions. The variable estimating descriptive compliance norms (*desc_norm_comply*) was built using the mean response to seven scaled questions, while the variable estimating injunctive compliance norms (*inj_norm_comply*) was built using the mean response to fourteen scaled questions. These questions were developed based on previous research, which demonstrated the suitability of each question to elicit certain types of norms. See Appendix A, Table A.1 for a detailed listing of survey questions and research validation.

Responses to questions measuring descriptive norms reflected respondents' beliefs of the behavior they would expect from others or what they would consider 'normal' under certain conditions. The first four questions asked participants to rank the likelihood of certain taxpayer behaviors on a seven-point Likert scale, while the final three questions focused on the respondent's agreement with these behaviors. The seven questions below were used to create the *desc_norm_comply* variable.

Beliefs about Descriptive Compliance Norms
On a scale of 1–7, rate the likelihood of the following
(1 = Extremely unlikely, 7 = Extremely likely):

1. How likely is it that Dana will file a tax return this year based on the work performed last year?
2. How likely is it that Dana will declare 100% of his/her annual income and tax liability to the government?

The results from questions 3 and 4 were reverse-coded to provide consistency in the response format:

3. How likely is it that Dana will underreport the income received last year?
4. How likely is it that Dana will overstate deductions taken last year?

On a scale of 1–7, rate your agreement with the following
(1 = Strongly agree, 7 = Strongly disagree):

5. I believe people like Dana will underreport their income.
6. I believe people like Dana will overstate their deductions.
7. I believe people like Dana will fail to file an income tax return.

The numerical responses indicated the strength of the respondents' beliefs in Dana's compliance, with higher numbers indicating stronger normative beliefs. Reliability analysis of the seven questions returned a Cronbach's Alpha of 0.832 ($\alpha = 0.832$), indicating a high level of internal consistency. A continuous variable (*desc_norm_comply*) was, therefore, computed from the composite mean of responses to these seven questions. Similar to the process measuring descriptive norms, responses to injunctive norm questions also measured the strength of the respondents' beliefs. The question responses returned an internal consistency score of 0.987 ($\alpha = 0.987$), and the second continuous variable (*inj_norm_comply*) was computed from the composite mean of these responses. Although Likert-scale variables are generally treated as ordinal variables in social science research, the composite variables' means were treated as continuous, which is common in research that aims to measure the impact of community attitudes (Samman, 2019). In order to maintain simplicity, weighting and complex factor analysis were excluded from this study.

Beliefs about Injunctive Compliance Norms
On a scale of 1–7, rate the appropriateness of the following:
(1 = Extremely inappropriate, 7 = Extremely appropriate)

Respond to the following questions as if you were Dana:

1. How appropriate would your family consider failing to file a required tax return?
2. How appropriate would your family consider underreporting income?
3. How appropriate would your family consider overstating deductions?

4. How appropriate would your co-workers consider failing to file a required tax return?
5. How appropriate would your co-workers consider underreporting income?
6. How appropriate would your co-workers consider overstating deductions?
7. How appropriate would your friends consider failing to file a required tax return?
8. How appropriate would your friends consider underreporting income?
9. How appropriate would your friends consider overstating deductions?
10. How appropriate would Dana's family consider it if Dana underreported income?
11. How appropriate would Dana's co-workers consider it if Dana underreported income?
12. How appropriate would Dana's community members consider it if Dana underreported income?
13. How appropriate would Dana's close friends consider it if Dana underreported income?
14. How appropriate would Dana himself/herself consider it if Dana underreported income?

Separating compliance norms into descriptive and injunctive categories allowed for a more detailed analysis of how norm framing influences taxpayer beliefs. Each norm category was treated as a separate dependent variable, while variations in gender, income level, and income source—randomly assigned in the vignette—served as the independent variables. The categorical gender variable was recoded into a dummy variable, (*vig_gender_male*) using standard dummy coding with 'female' as the reference category (*vig_gender_male* = 0). The income level variable (*vig_inclevel*) used 'low-income' as the base (*vig_inclevel* = 0), with 'middle-income' and 'high-income' as the dummy variables. Similarly, the income source variable (*vig_incsource*) used 'self-employed' as the base category (*vig_incsource* = 0), with the two additional categories 'employed by both' and 'company-employed' serving as the dummy variables. Table 2.2 provides a listing of the

dependent variables and independent variables of interest examined in this study.

Table 2.2: Variable Descriptions and Data Types

Variable Name	Variable Description	Data Type
Dependent Variables		
desc_norm_comply	Respondent's (observer's) beliefs of descriptive tax compliance norms	Continuous composite (1 = low, 7 = high)
inj_norm_comply	Respondent's (observer's) beliefs of injunctive tax compliance norms	Continuous composite (1 = low, 7 = high)
Independent Variables		
vig_gender_male	Gender of vignette character	Dummy (0 = female, 1 = male)
vig_inclevel	Income level of vignette character	Ordinal (0 = low, 1 = mid, 2 = high)
vig_incsource	Income source of vignette character	Dummy (0 = company, 1 = both, 2 = self)

2.4.5 Descriptive Statistics

The Qualtrics survey platform ensured an even distribution of vignette variables among the 600 respondents. However, the data validation process outlined in the pilot survey section reduced the number of valid responses to 438. Due to the removal of invalid responses, minor imbalances were observed in the variables for the vignette character's gender (*vig_gender_male*), income level (*vig_inclevel*), and income source (*vig_incsource*). Table 2.3 provides a listing of the key variables.

Respondents were fairly evenly distributed by gender (45% male, 55% female), with the majority in the 25-44 age category (71.6%). Most participants were white, non-Hispanic, married individuals with bachelor's degrees or higher and were employed full-time, earning a middle-level income. Slightly under 30% of the respondents received form 1099-NEC the previous year, indicating that they were self-employed on either a part-time or full-time basis, while 50.9% received a form W2 indicating company employment.

Table 2.3: Descriptive Statistics of Key Variables

Variable Name	N	Mean	Std. Dev.	Min	Max
Dependent Variables					
Descriptive Compliance Norms	438	4.157	1.263	2.429	7.0
Injunctive Compliance Norms	438	3.544	2.071	0	7.0
Independent Variables: Vignette Character					
Gender	438	Male (45.0%), Female (55.0%)			
Income Level	438	Low (32.4%), Middle (34.7%), High (32.9%)			
Income Source	438	Company-Employed (34.9%), Both (31.5%), Self-Employed (33.6%)			
Independent Variables: Respondent					
Gender	438	Male (51.6%), Female (48.2%)			
Income Level	438	Low (30.1%), Middle (48.4%), High (3.2%)			
Income Source	438	Company-Employed (48.63%), Both (10.96%), Self-Employed (40.4%)			
Third Party Reporting	438	W2 Only (50.9%), W2 and 1099 (6.4%), 1099 only (29.5%), No forms (13.1%)			
Age	438	18-24 (3.0%), 25-44 (71.6%), 45-64 (20.7%), 65+ (4.6%)			
Education	438	High School or less (3.5%), Some College (68.1%), Graduate Degree (28.2%)			
Perceived Evasion Benefit	438	4.664	1.470	1.0	7.0
Perceived Evasion Cost	438	5.044	1.259	1.0	7.0
Social Desirability: SDE	438	4.760	1.718	1.0	7.0
Social Desirability: IM	438	5.484	1.548	1.0	7.0
Personal Risk Level	438	3.216	1.445	1.0	6.0
Tax Risk Level	438	4.216	0.880	1.0	6.0

The remaining respondents received income from additional sources reported through other types of 1099 forms or income that was unreported by any third party. There was a relatively even mix of male and female respondents throughout these income source categories.

On average, respondents had a medium level of tax knowledge and perceived tax-related risks as slightly higher than personal risks. They viewed tax noncompliance as providing a greater cost to them than benefit and expressed a moderate to high level of concern about the perceptions of others.

2.4.6 Regression Equations

Experiments conducted in previous studies used regression analysis when researching topics such as tax compliance and social norms. Recent studies have used the respondent's opinion as the dependent variable, while the variations in the vignette acted as the independent variables (Górecki and Letki, 2021). Many complex methods are available to measure social norms, some of which have been used with success. However, recent literature has commented that studying the nuances of social norms to create accurate measurements may have become overly complex. Indeed, the argument has been made that the more straightforward methods of measuring norms are equally as valid as some more complex methods (Cislaghi and Heise, 2016). The measurement methods used in this study will consist of a simple progression of statistical techniques used to validate and analyze data of this type.

The variations within the survey vignette allowed for the evaluation of the original hypothesis that variations in gender, income level, and income source influence descriptive and injunctive tax compliance norms. Testing this hypothesis involved analyzing two dependent variables that provide variations in types of norms. The first, *desc_norm_comply*, measured tax compliance beliefs based on descriptive norms, while the second, *inj_norm_comply*, measured compliance beliefs based on injunctive norms. The regression equation employing the full range of predictor variables examining how demographic, socioeconomic, and opportunity characteristics influence descriptive and injunctive tax is as follows:

$$\begin{aligned} Y = \beta_0 + \beta_1\, gender\_male + \beta_2\, emp\_type\_both + \beta_3\, emp\_type\_company \\ + \beta_4\, inc\_level\_middle + \beta_5\, inc\_level\_high + \epsilon \end{aligned} \tag{2.2}$$

Where:

- Y: Dependent variables (*desc_norm_comply* or *inj_norm_comply*) measuring compliance beliefs
- β_0: The estimated constant
- β_1: Effect of the vignette character being male (1) vs. female (0)
- β_2: Effect of being self-employed and company-employed (1) vs. only self-employed (0)
- β_3: Effect of being company-employed (1) vs. only self-employed (0)
- β_4: Effect of having a middle income (1) vs. a low income (0)
- β_5: Effect of having a high income (1) vs. a low income (0)
- ϵ: Error term

Multiple regression using OLS was conducted to analyze the effects of the three categorical predictor variables on the outcome variables. Ordinary Least Squares regressions have been used in previous research to examine the characteristics of an observed subject on the beliefs and opinions of the respondent. Vignette-based studies have used OLS and demonstrated that this method is an appropriate measure of the effect size and statistical significance (Ludwick and Zeller, 2001; Rossi and Nock, 1982).

Vignette-based factorial surveys were used to investigate the relationship between three taxpayer characteristics – gender (demographic), income level (socioeconomic), and income source (opportunity) – and the social norms surrounding tax compliance. The methodology for this study also considered ethical aspects by using appropriate consent procedures and data anonymization. Although the methods used in this study were determined based on previous research, some limitations to the data did exist. User demographics on the MTurk platform may have been overly biased toward certain demographic subsets. Additionally, the length of the pilot survey was slightly longer

than the ideal survey designed to hold the attention of the respondents. Although controls were included to minimize biases associated with these limitations, the challenges presented above may still have influenced the results.

2.5 Results and Discussion

2.5.1 Introduction

Building off of the previous research and frameworks presented in the literature review, the results and subsequent discussion explore the interactions between variables such as the gender, income level and income source of both the vignette character and the respondents and how these interactions and expectations impact the two types of tax compliance norms.

2.5.2 Analysis of Key Variables

The two dependent variables of interest in this study were the two that measured descriptive and injunctive compliance norms. An initial examination of the means of *desc_norm_comply* and *inj_norm_comply* displayed variations for the two different types of norms. Figures 2.2 and 2.3 provide histograms showing participants' overall beliefs regarding normal tax compliance based on descriptive and injunctive reasoning. The results displayed in these histograms represent the average (mean) beliefs of all respondents, separated by the type of norm, inclusive of all vignette variations.

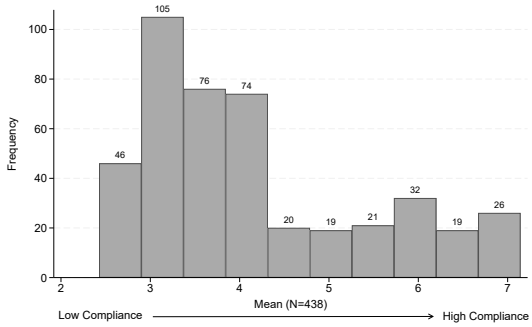


Figure 2.2: Mean of Descriptive Compliance Norms (*desc_norm_comply*)

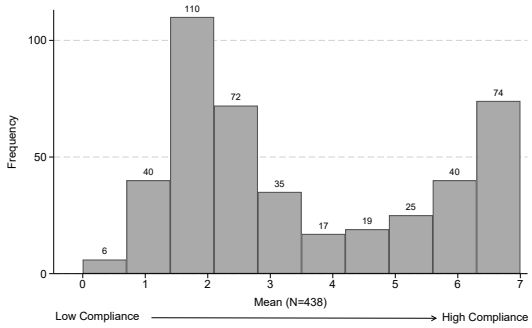


Figure 2.3: Mean of Injunctive Compliance Norms (*inj_norm_comply*)

The distinct bi-modal distribution of the *inj_norm_comply* variable, as shown in Figure 2.3, suggests the presence of sub-groups within the data. Additional analyses were conducted in a later section (2.5.3) to identify the factors contributing to the bi-modal distribution. As shown in Table 2.4, examining the interactions for each variable provided a detailed listing of how demographic variations in the character and respondent influenced the average beliefs regarding normal compliance.

An examination of the means shows that the descriptive compliance norm for both male and female respondents was lowest for characters who were male, company & self-employed, low-income taxpayers. The injunctive compliance norm for female respondents was highest for characters who were male, company-employed, middle-income taxpayers, while for male respondents, it was highest for characters who were female, company & self-employed, low-income taxpayers.

Table 2.4: Means and Standard Deviations of Compliance Beliefs by Norm Type, Gender, Income Level, and Income Source

		Respondent is Female				Respondent is Male			
		Descriptive Norm		Injunctive Norm		Descriptive Norm		Injunctive Norm	
Character is:	**Income**	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Female, Company-Employed	Low	4.54	1.56	3.59	2.43	4.24	1.33	3.49	1.99
	Middle	4.45	1.26	4.11	2.06	4.30	1.57	3.64	2.05
	High	4.25	1.22	4.51	2.03	3.52	0.95	2.89	1.89
Female, Company & Self-Employed	Low	4.26	1.41	3.64	1.88	**5.25**	1.56	**5.53**	1.72
	Middle	4.31	1.48	3.73	2.31	4.18	1.24	3.22	2.07
	High	3.97	1.16	3.48	2.24	4.12	1.42	3.60	2.12
Female, Self-Employed Only	Low	3.72	0.66	2.86	1.83	4.30	1.50	3.58	2.04
	Middle	4.70	1.63	4.29	2.34	4.19	1.18	3.08	1.92
	High	4.43	1.29	3.69	2.43	4.26	1.14	3.96	2.06
Male, Company-Employed	Low	4.39	1.30	3.81	2.12	3.52	0.81	2.89	1.66
	Middle	**5.13**	1.43	**4.80**	2.08	3.95	1.26	*2.82*	1.99
	High	3.99	1.17	3.43	2.14	4.25	1.35	3.29	2.41
Male, Company & Self-Employed	Low	*3.32*	0.43	*1.75*	0.46	*3.27*	0.48	3.20	2.18
	Middle	4.20	1.43	3.67	2.28	4.06	1.50	3.63	2.21
	High	3.67	0.95	3.16	1.89	4.02	1.26	3.07	2.46
Male, Self-Employed Only	Low	3.79	0.97	2.88	1.80	4.06	0.89	3.71	1.71
	Middle	4.00	1.20	3.52	2.27	4.12	1.15	3.11	2.07
	High	4.27	1.07	3.78	2.34	4.04	1.19	3.39	1.98

Note: The highest mean in each column is indicated in **bold**, while the lowest mean is indicated in *italics*.

The analysis of means suggests that female respondents believe the descriptive and injunctive norm for tax compliance is highest among middle-income, company-employed men. Conversely, male respondents believe that normal compliance is highest among low-income women who are both company- and self-employed. Both male and female respondents believed that it was most normal for men to be noncompliant, yet both genders had higher perceptions of compliance for the opposite gender. Male respondents exhibited a much stronger belief in women's compliance than female respondents. Additionally, respondents believed the injunctive compliance norm was lowest for self-employed characters. This became more pronounced when the respondents themselves were also self-employed.

The fact that female respondents expected middle-income, company-employed men to be the most compliant could be influenced by the belief that men have historically had a greater social responsibility. On the other hand, the belief among male respondents that women with lower incomes, regardless of whether they are self-employed or work for a company, represent the standard for compliance could show that women, especially those in lower economic brackets, are more likely to follow social norms to navigate social and economic challenges. Additionally, research has shown that both genders perceive women as displaying higher integrity and more honesty than men (Zenger and Folkman, 2019).

However, although women are believed to be less corrupt than men, they are often judged more harshly for wrongdoing (Batista Pereira, 2021; Cucchi and Cavazza, 2021). The comparatively harsher judgment towards women may be a stronger deterrent for women to break social norms. The finding that both genders view men as less compliant than women while also viewing the opposite gender as more compliant than their own highlights some of society's gender expectations and could indicate a societal tendency

to idealize the opposite gender while being overly critical of one's own group. This could also indicate the tendency for women to judge themselves more harshly than men (Reilly et al., 2022).

The differences in means revealed interesting variations in compliance expectations based on demographics and norm type, which may indicate a strong effect in real-world situations. A comparison of these means indicated that differences in gender, income level, and income source may be significant predictors of tax compliance. To test these predictors, multiple regression was run on each of the two dependent variables. The results of six different models are presented in Table 2.5.

The results revealed that only one predictor variable within the six models had a measurable and statistically significant impact, but only on descriptive compliance norms. In the first three models, which examined the effects of three predictors on descriptive compliance norms (*desc_norm_comply*), gender emerged as a partial predictor, as evidenced by the coefficient of -0.243, significant at the ($p < 0.05$) level. This suggests that respondents evaluating descriptive compliance norms see male taxpayers as significantly less compliant than female taxpayers, scoring them about 0.24 points lower on a 5-point scale of perceived compliance. No significant differences were found based on income level or income source, suggesting that gender may be a better predictor. However, the low adjusted R^2 values indicate that these three models only explain a small variance in descriptive compliance norms and that there may be other categorical variations that have stronger effects.

Models 4 through 6 in Table 2.5 present the effects of the three predictors on injunctive compliance norms. Unlike the findings for descriptive compliance norms, gender was not a significant predictor, nor were any of the other variables of interest. While gender was observed to have a partial effect on descriptive compliance norms, additional ana-

Table 2.5: Regression Results for Descriptive and Injunctive Tax Compliance Norms

	Descriptive Compliance Norms			Injunctive Compliance Norms		
	(1) Gender	(2) Income Source	(3) Income Level	(4) Gender	(5) Income Source	(6) Income Level
Character is Male	-0.243*	-0.248*	-0.245*	-0.329	-0.323	-0.321
	(0.121)	(0.122)	(0.122)	(0.199)	(0.200)	(0.201)
Character is Company Employed	—	0.037	-0.009	—	-0.022	-0.035
	—	(0.146)	(0.147)	—	(0.242)	(0.241)
Character is Self and Company Employed	—	-0.027	-0.045	—	0.059	0.050
	—	(0.147)	(0.148)	—	(0.243)	(0.245)
Character earns Middle Income	—	—	0.143	—	—	0.073
	—	—	(0.148)	—	—	(0.243)
Character earns Income	—	—	-0.134	—	—	0.055
	—	—	(0.150)	—	—	(0.247)
Constant	4.266***	4.264***	4.271***	3.692***	3.677***	3.68***
	(0.081)	(0.114)	(0.143)	(0.133)	(0.188)	(0.236)
Observations	438	438	438	438	438	438
R-squared	0.007	0.010	0.018	0.006	0.007	0.0072
Adj. R-squared	0.005	0.003	0.006	0.004	-0.000	-0.004

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

lysis tested whether gender significance changed when based on the interactions between character gender and respondent gender. To test these interactions, regression analysis filtered by respondent gender was conducted on each of the predictor variables. The results of these filtered analyses are included in Table 2.6 and 2.7.

Most interaction effects did not show statistically significant results, with a few exceptions. When using descriptive norms, female respondents reported beliefs that characters who were both company and self-employed would be less compliant, indicating a change of -0.397 on a five-point scale ($p < 0.05$). This belief also persisted when using injunctive

Table 2.6: Regression Results by Respondent Gender: Descriptive Norms

	Gender Effect		Income Level Effect		Income Source Effect	
	(1)	(2)	(3)	(4)	(5)	(6)
	Male	Female	Male	Female	Male	Female
Character is Male	-0.239	-0.226	-0.254	-0.200	-0.263	-0.204
	(0.165)	(0.178)	(0.166)	(0.178)	(0.167)	(0.178)
Character earns Middle Income	—	—	-0.025	0.294	-0.040	0.337
	—	—	(0.200)	(0.217)	(0.200)	(0.218)
Character earns High Income	—	—	-0.216	-0.062	-0.191	-0.033
	—	—	(0.205)	(0.219)	(0.206)	(0.219)
Character is Company -employed Only	—	—	—	—	0.239	-0.229
	—	—	—	—	(0.196)	(0.221)
Character is Company and Self-employed	—	—	—	—	0.273	-0.397*
	—	—	—	—	(0.212)	(0.209)
Constant	4.196***	4.323***	4.280***	4.229***	4.117***	4.417***
	(0.111)	(0.118)	(0.164)	(0.176)	(0.198)	(0.206)
Observations	226	211	226	211	226	211
R-squared	0.009	0.008	0.015	0.023	0.025	0.040

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

norms, indicating -0.602 on a five-point scale ($p < 0.05$), as shown in Table 2.7.

In contrast, male respondents believed that characters who were both company and self-employed would be more compliant, indicating a positive change of 0.632 on a five-point scale ($p < 0.05$). Additionally, when using injunctive norms, female respondents reported beliefs that characters who earned a middle income would be more compliant by 0.760 on a five-point scale than those earning a low income ($p < 0.01$). However, male respondents believed that middle-income characters would be less compliant -0.546 on a five-point scale ($p < 0.05$).

Table 2.7: Regression Results by Respondent Gender: Injunctive Norms

	Gender Effect		Income Level Effect		Income Source Effect	
	(7)	(8)	(9)	(10)	(11)	(12)
	Male	Female	Male	Female	Male	Female
Character is Male	-0.308	-0.320	-0.317	-0.304	-0.317	-0.303
	(0.269)	(0.295)	(0.269)	(0.295)	(0.270)	(0.295)
Character earns Middle Income	—	—	-0.512	0.696*	-0.546*	0.760**
	—	—	(0.324)	(0.360)	(0.323)	(0.361)
Character earns High Income	—	—	-0.453	0.390	-0.429	0.429
	—	—	(0.332)	(0.362)	(0.333)	(0.363)
Character is Company -employed Only	—	—	—	—	0.325	-0.428
	—	—	—	—	(0.317)	(0.367)
Character is Company and Self-employed	—	—	—	—	0.632*	-0.602*
	—	—	—	—	(0.343)	(0.347)
Constant	3.561***	3.806***	3.889***	3.422***	3.598***	3.729***
	(0.182)	(0.196)	(0.265)	(0.291)	(0.321)	(0.342)
Observations	226	211	226	211	226	211
R-squared	0.006	0.006	0.019	0.023	0.034	0.038

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

2.5.3 Examining Compliance Norms Across Factors: Identifying Key Predictors and Controlling for Multiple Influences

After filtering by respondent gender demonstrated somewhat significant results, alternative models were examined. Because OLS assumes a linear relationship, an alternative approach was required to analyze whether respondents were part of distinct compliance belief groups based on categorical factors. The need for further investigation arose from two key observations for injunctive compliance norms: (1) in the OLS models, there were strong variations in predictor significance between respondent genders, and (2) in the analysis of means, a bimodal distribution was present in the mean of *inj_norm_comply*.

Because OLS assumes a continuous relationship between predictors and compliance beliefs, it may not be the most appropriate approach when variables with categorical differences, such as gender and income source, are used as predictors. Therefore, a two-sample t-test and a logistic regression model were used to provide a more robust understanding of the influences of these categorical variations.

A threshold variable was created, and respondents were categorized into high- and low-compliance belief groups, followed by a two-sample t-test to compare compliance beliefs based on the income source. The results indicated that 70.8% of the higher compliance group was company-employed and received a form W2. This is in contrast to respondents with lower compliance beliefs, where only 40.1% received a W2. This 30.7 percentage point difference suggests that variations in income source may have a substantial impact on an individual's compliance beliefs.

These findings align with existing research, such as studies by the US Internal Revenue Service, which indicate that employees who receive third-party reporting forms, such as a W2, are more tax compliant than those who do not receive forms (IRS, 2022a). Not surprisingly, IRS data estimates that company-employed workers are the most compliant. Interestingly, the results of the current study indicate that company-employed workers, more so than self-employed workers, also believe others to be highly compliant. These results may be due to a projection bias, where individuals assume that others think and behave in ways similar to themselves (Krueger and Clement, 1994). Company-employed workers may be projecting their own compliance norms onto others in society, even when the actual compliance decisions may differ by income source.

While the t-test confirmed a significant difference in compliance beliefs based on income source, it did not control for potential confounding factors such as respondent gender or vignette characteristics. Therefore, a logistic regression model was estimated to examine

additional factors. Results revealed that even after controlling for these factors, respondents who were company-employed were statistically almost four times more likely to be in the high-compliance group than those who were self-employed ($OR = 3.86, p < 0.001$), as shown in Table 2.8. Male respondents were about 32% less likely to be in the high-compliance group than females ($OR = 0.680, p = 0.052$), though this result was only marginally significant. However, male vignette characters were about 38% less likely to be placed in the high-compliance group than female characters ($OR = 0.633, p = 0.033$). The income level of the vignette character was not a significant predictor of compliance beliefs in this model, suggesting that the two more visible demographic characteristics—gender and income source—have a stronger influence on compliance norms than the less visible characteristic of income level.

Table 2.8: Logistic Regression Results - Interaction Effects

	Odds Ratio	Std. Err.	z	$P > \|z\|$	95% CI Lower	95% CI Upper
Respondent Company-Emp. (W2)	3.863	0.837	6.23	0.000	2.526	5.908
Respondent Male	0.680	0.135	-1.94	0.052	0.461	1.003
Vignette Company-Emp.	1.057	0.273	0.22	0.828	0.638	1.753
Vignette Self + Company-Emp.	1.076	0.278	0.28	0.777	0.648	1.785
Vignette Male	0.633	0.135	-2.14	0.033	0.417	0.963
Vignette Middle Income	0.991	0.254	-0.03	0.973	0.599	1.639
Vignette High Income	0.806	0.212	-0.82	0.413	0.482	1.349
Constant	0.420	0.122	-3.00	0.003	0.239	0.741
Observations			438			
LR $chi^2(7)$			48.94			
Prob > chi^2			0.0000			
Log Likelihood			-263.583			
Pseudo R^2			0.0849			

This approach revealed that income source (company-employed vs. self-employed) was a significant predictor of injunctive compliance norms, even when controlling for gender and vignette characteristics. This suggests that some of the variations in significance in the OLS models were due, at least in part, to their inability to properly model categorical

differences in compliance norms. The significant variations in compliance levels due to income source are aligned with previous studies by Kleven et al.(2011; 2016 and Bagchi and Dušek 2021. These previous studies indicated a significant increase in compliance rates when tax system structures such as withholding at the source and third-party reporting were utilized.

The variations in significance in the OLS models estimating injunctive compliance norms may also be based on factors highlighted by previous research. Studies have demonstrated that people are more influenced by what others actually do (descriptive norms) than by what they believe others are doing (injunctive norms). Other possible reasons for the variations in the significance of these variables on injunctive compliance norms may be due to the lack of stated penalties within the vignettes. Earlier studies found that tax compliance rates increased when the probability of audits and penalties was emphasized to taxpayers (Alm et al., 1992). Appealing to taxpayers using only moral beliefs (injunctive norms) had little effect. Similar studies found that enforcement of compliance over ethical appeals led to greater tax compliance (Kleven et al., 2011) and that although descriptive norms significantly influenced tax compliance, injunctive norms had no effect unless tied to enforcement (Bobek et al., 2013). Respondents in the current study were not provided with information on the penalties that the vignette character would face for noncompliance. This may indicate that although respondents understand tax compliance is morally expected, the lack of consequences affected their compliance beliefs.

Injunctive norms may be useful tools in compliance but could be more influential if they are seen by others. When using injunctive reasoning, tax compliance is less influential because tax behavior is unobserved and lacks repercussions by peer groups (Slemrod et al., 2001). The issue of unobservability in compliance behavior remains an ongoing

topic in tax research.

To address the challenge of unobservable compliance behavior, the current study examined whether observable taxpayer characteristics such as gender, income source, and income level shaped respondents' compliance beliefs. Among these characteristics, gender emerged as a marginally significant influence on descriptive compliance norms, while income level and income source emerged as significant influences on injunctive compliance norms. These findings reinforce the idea that while descriptive norms are shaped by direct behavioral observations, injunctive norms may be more closely linked to structural factors such as income source, assumed or observed income levels, and perceptions of enforcement.

2.6 Conclusion

The importance of gaining a deeper understanding of tax compliance beliefs and determinants can help governments implement policy or send targeted messaging to improve compliance rates. Social norms and the examination of these beliefs using descriptive and injunctive lenses may provide additional insights into reducing the tax gap. When individuals perceive themselves as part of a group that others see as noncompliant, they may shape their behavior to match the beliefs of others. Understanding the effects of social norms on tax noncompliance is just one step toward increasing the compliance rates in the United States.

The results of this study indicate that policymakers could use descriptive reasoning to frame compliance campaigns. These campaigns may feature high compliance rates among women but could also introduce male compliance as a descriptive norm. 'Compliance rates by male taxpayers are on the rise,' or other statements like this using

descriptive norms could help prevent men from internalizing noncompliance stereotypes. The tax compliance beliefs presented in this study when injunctive reasoning was used demonstrate that tax compliance is not purely based on norms but also on structural characteristics, such as third-party withholding and tax forms.

As the noted tax compliance researchers Alm and Torgler have indicated, a wide variety of compliance strategies should be used in order to effectively control tax evasion (Alm and Torgler, 2011). The nuanced differences in the types of normative beliefs and how each type affects compliance can also improve government policies aimed at deterrence. When societies' normative expectations are for certain demographic groups to be less compliant than others, it may indicate that evasion deterrence policies should be re-crafted to consider these differences. The distinctions between the types of societal norms and the differing expectations between men and women may help inform future tax compliance strategies and policies, leading to improvements in economic stability and growth.

Chapter 3

Political Leader Gender and Tax Morale: Evidence from the UK Elections

3.1 Abstract

Using longitudinal data from the Understanding Society survey in the UK, this study investigates the effects of politician gender at both the local and national levels on the tax morale of their constituents. While prior research has explored how government structure, tax laws, and political leadership influence tax morale, fewer studies have examined whether leader gender shapes taxpayer attitudes through avenues such as legitimacy, trust, and perceived fairness. Results indicate that while the gender of the politician at the national level has a significant and positive impact on tax morale, especially for female constituents, the gender of the politician at the local level does not have a statistically significant effect. The constituents' political interest and civic engagement levels were also found to have a significant, positive impact on tax morale. The results imply that fostering female leadership at the national level or promoting constituents' political and civic engagement may improve tax morale and compliance. Insights from this research may help guide policies designed to strengthen political gender diversity or improve civic engagement for constituents.

Keywords: Tax morale, political leadership, gender

JEL Code: H26, J16, D72

3.2 Introduction

In countries such as the US and the UK, there are still unexplained motivations for the high compliance rates by taxpayers. Identifying the reasons that compliance rates are relatively high compared to other countries, as well as methods for increasing these rates and reducing the tax gap, remains an ongoing subject of interest. This tax gap, which exists even in strong economies, results in potentially billions in lost revenue, which is one of several reasons researchers strive to identify and understand compliance determinants. The concept of tax morale may help explain why compliance rates remain high and why individuals may be framing tax compliance as a moral and social gain rather than a financial loss. The concept of tax morale extends beyond traditional deterrence-based theories to incorporate moral, psychological, and social factors as well.

A commonly used definition for tax morale in the literature is the intrinsic motivation to pay taxes (Frey, 1997). It is a set of attitudes or beliefs that help explain why people voluntarily conform to tax laws. Although tax morale has close ties with tax compliance, there are important distinctions between the two terms. Tax morale includes all non-monetary, non-enforcement motivations for compliance that are not incorporated into the expected utility model (Luttmer and Singhal, 2014). On the other hand, tax compliance is a term for the actual behavior of the taxpayer, which may be influenced by both intrinsic and extrinsic factors such as deterrence, penalties, or third-party reporting. A fully compliant taxpayer is one who fully and accurately submits their tax obligations in a timely manner (Jackson and Milliron, 2002). A simple distinction is that tax morale defines taxpayers' motivations, while tax compliance defines their behavior. The two concepts are linked, with previous research demonstrating that tax morale is a key determinant leading to tax compliance (Alm and Torgler, 2006).

A high tax compliance rate is essential for a strong, well-functioning economy as these revenues fund services such as education, healthcare, and sanitation. According to the World Bank, effective tax systems are a key component in creating a country's stable economy as well as promoting growth and development (Dom et al., 2022). Low compliance contributes to government budget deficits and reductions in public spending on priorities that benefit society as a whole. Given the positive societal impacts of tax compliance, both researchers and political leaders have attempted to better understand the factors that influence individuals' willingness to pay taxes.

Studies have shown that some of these influencing factors may be based on variations in demographic groups (Daude et al., 2013). Specifically, gender has emerged as a key demographic factor (Bruner et al., 2017). Studies suggest that both men and women tend to perceive female constituents as more tax-compliant than male constituents (D'Attoma et al., 2017). Building on these findings, this study examines whether the demographic characteristics of political leaders – particularly gender – shape the tax morale and compliance of their constituents. Given that constituents' perceptions of individual tax compliance are influenced by gender, it is worth exploring whether these gendered perceptions extend to their views of political leaders and how leader gender influences their 'intrinsic motivation' for tax compliance.

There are other leadership characteristics in addition to gender that may also influence tax morale. Qualities such as honesty, fairness, and accountability have also been shown to positively impact constituents' sense of tax morale (Torgler, 2005). However, the directional impacts of gender have not been fully explored. Do the positive effects of those characteristics increase, decrease, or remain unchanged when examining their interactions with gender differences in politicians? Examining the role of women in political leadership positions is necessary to understand whether gender has an influence on the

relationship between political leaders and tax morale. However, although there have been improvements in understanding the impact of gender governance, research in this area is still limited due to the underrepresentation of women in the political arena.

Despite progress toward gender parity in politics, opportunities to study the impact of female political leaders on constituents' tax behavior remain limited. A 2024 report by UN Women emphasized this challenge and stated that gender equality is still far away (UNWomen, 2024). The report also confirmed that women worldwide continue to be underrepresented in political decision-making bodies. Even though female politicians are still a minority, research has demonstrated numerous benefits of including women in political leadership roles. For example, prior studies have found that increasing the number of women in political leadership positions increases the self-reported life satisfaction of the constituents (York and Bell, 2014) and the adoption of favorable environmental policies (Norgaard and York, 2005). Additionally, a 2023 paper indicated that higher levels of female representation in political positions contributed to a shift in government priorities away from military spending and toward public benefits, such as health initiatives and gender equality (Mirziyoyeva and Salahodjaev, 2023). These findings agree with previous studies that suggested women in political positions can positively affect both economic growth (Baskaran et al., 2024) and attitudes toward government budget stability (Balaguer-Coll and Ivanova-Toneva, 2021). Given that female political leaders have been shown to influence policy priorities and improve constituents' well-being, there is a strong rationale for examining whether female leadership also fosters greater tax morale among citizens.

Although a wealth of previous literature has examined the determinants of tax morale, such as economic (Lago-Peñas and Lago-Peñas, 2010), social (Luttmer and Singhal, 2014), and demographic (Daude et al., 2013) factors, the influence of political leaders'

gender on constituents has not received much attention. This chapter aims to fill this gap by examining how the gender of political leaders influences the tax morale of their constituents.

The study used a longitudinal analysis of the UK's Understanding Society survey data, focusing on respondents' self-reported levels of tax morale alongside the gender and other demographic attributes of their elected Member of Parliament (MP) and the Prime Minister (PM). A reduced form design was used with a fixed effects technique, which controlled for constituent characteristics that were constant over time. This method allowed the focus to remain on the influence of the PM's and MP's gender. The results provided insights into how tax morale varies based on changes in the leader's gender. Addressing these relationships involved examining tax morale through the lens of leader-follower dynamics, gender roles in politics, and electoral gender representation.

3.3 Literature Review

It has been decades since Allingham and Sandmo's key research on tax compliance presented the Expected Utility Theory (EUT) as a foundational explanation for tax compliance. The EUT examines tax compliance through a cost-benefit framework, where taxpayers weigh financial benefits against possible penalties (Allingham and Sandmo, 1972). However, the traditional model is unable to fully explain the high levels of voluntary compliance in countries such as the US and the UK. Based on this model, taxpayers' high expected utility from noncompliance should result in much lower compliance rates than those experienced in these countries. Due to this discrepancy, subsequent models began exploring the non-financial motivations of voluntary tax compliance in addition to expected utility. These intrinsic motivations, collectively termed tax morale, included

moral, social, psychological, and cultural variables and focused on factors other than audits or penalties, such as personal morals, social norms, trust, or gender (Alm and Torgler, 2011).

3.3.1 Theoretical Framework for Tax Morale: Psychological Contracts, Fairness, and Leadership Gender

In 2018, a comprehensive examination of over 600 studies on tax morale determinants was conducted, which sorted these determinants into three categories: formal institutions, informal institutions, and sociodemographic traits and personal values (Horodnic, 2018). Formal institutions include determinants such as trust in the government and the perceptions of effective government spending, while informal institutions include determinants such as cultural and social norms. Sociodemographic characteristics include age, gender, and education, which can all impact taxpayers' perceptions of themselves, their communities, and their government (Horodnic, 2018).

Trust in the government and other determinants in the formal institution category may be partially explained by the psychological contract theory, which explores how taxpayers' willingness to comply depends on their perception of the government's fairness, efficiency, and responsiveness (Feld and Frey, 2007). According to this theory, tax compliance is based on a sense of mutual obligation between the taxpayer and the government, similar to an unwritten but mutually understood contract. When taxpayers believe their government is efficient, responsive, and fair, their intrinsic motivation to pay taxes increases (Hofmann et al., 2008; Frey and Torgler, 2007). Conversely, if the government is seen as corrupt, inefficient, or unable to fulfill its side of the contract, then taxpayers may feel the contract has been broken and may feel that lower compliance is justified (Alm et al., 2012).

Certain sociodemographic characteristics have also been shown to have an impact on compliance (Horodnic, 2018). For example, numerous studies have examined the relationships between taxpayer gender and tax morale and have consistently found that female taxpayers have higher tax morale than their male counterparts (Alm and Torgler, 2004; Doerrenberg and Peichl, 2013; María-Dolores et al., 2010; Torgler and Valev, 2006; Torgler, 2012). These findings indicate that women may have a stronger intrinsic sense of moral responsibility, which could be leveraged in leadership positions to influence government initiatives and policy-setting.

Research examining leader-follower dynamics indicated that there were strong connections between leadership behavior, followers' responses, and perceptions of what the followers considered normal. For example, research exploring the spread of social norms from leaders to followers found that citizens were more likely to cooperate with their role models when the behavior was perceived by the citizens as trustworthy and reliable (Acemoglu and Jackson, 2015). These tendencies can have positive effects when leaders act with integrity. However, if leaders demonstrate unreliable or unethical behavior, both the citizen's moral beliefs and the social norms of the entire community may experience a negative shift (Taggar and Ellis, 2007; Gächter and Renner, 2018).

School settings have also been used to study how leaders' behaviors impact followers' responses. In a study from Mexico, researchers found that student cheating rates increased significantly after local officials' corrupt behavior was made public (Ajzenman, 2021). This was one of the first studies that demonstrated the causal effects that leaders can have on their followers' ethical decisions. The study also prompted further questions about whether the leader's characteristics, in addition to their behavior, influenced the students' cheating activities. For instance, characteristics such as leadership competencies or leadership gender may also have influenced the students' ethical decisions.

Although earlier studies had examined the pathways from political corruption at the leader level to unethical behavior at the follower level (Barr and Serra, 2010; Fisman and Miguel, 2007; Gächter and Schulz, 2016), a strong causal link had not been established until Ajzenman's study.

Social norms have also been explored to examine how leadership decisions impact citizens' attitudes and behavior. For example, studies using laboratory experiments have examined the role of injunctive and descriptive norms to examine how the behavior of the leaders influenced the followers' moral decisions (d'Adda et al., 2020). The findings of these studies indicated that leaders who were more honest and transparent about their behavior were more successful in setting norms and guiding followers' actions.

Leader-follower dynamics have been studied across various other domains, including corporate and educational settings. Ethical leadership in the top levels of corporate management and its influence on middle and lower-level management has been found to improve employee well-being and satisfaction and increase overall organizational productivity (Mozumder, 2018). In addition to political and corporate leadership, the influence of educational administrators has also been studied. For example, research indicated that ethical behavior by school principals influenced the organizational commitment of the teachers. This was especially true for female teachers (Karakuş, 2018). The ethical behavior shown by the principal and the resulting behavior of the teachers demonstrated the influence of leadership across different types of organizations.

3.3.2 Tax Morale and Female Leadership

Research examining the differences in leadership behavior by gender suggests that female politicians are often perceived as more trustworthy, ethical, and fair in governance (Barnes and Beaulieu, 2019). If female leaders enhance perceptions of fairness and gov-

ernment responsiveness, citizens may develop a stronger intrinsic motivation to comply with taxes, improving tax morale. Additionally, empirical evidence has shown that countries with higher levels of institutional trust tend to have greater tax compliance (Torgler, 2005) and that women are less likely to agree that cheating is justified (Torgler, 2008). If female leadership enhances institutional trust, this could lead to increased tax morale.

In addition to being perceived as more trustworthy, women in political leadership roles are often associated with policies that prioritize social welfare. Positive social welfare policies may increase citizens' perceptions of government fairness, leading to improvements in compliance. Suppose female leaders implement policies that are seen as fair and equitable. In that case, taxpayers may reciprocate with higher tax morale and compliance as a way of fulfilling their side of a psychological contract. If trust in government, perceptions of fairness, and social norms all play a role in tax morale, then a shift in leadership gender in a traditionally male-dominated industry could alter these perceptions and lead to improvements in taxpayer behavior.

3.3.3 Female Leadership and Corruption

Tax evasion or noncompliance can be thought of as a form of corruption when it involves activities such as intentional fraud or abuse of power. Understanding some of the underlying factors that deter related forms of corruption may help uncover how to promote compliance. One of the early studies examining the relationship between female political leadership and corruption found a negative correlation between the number of women in parliament and the level of corruption within the country (Dollar et al., 2001). Their study examined data from over 100 countries, controlling for variables such as economic prosperity, education level, and civic freedom. The results indicated a significant re-

lationship between female political representation and reduced government corruption. A similar study indicated that higher levels of female participation in government were associated with fewer instances of citizen corruption, even after accounting for gender discrimination and selection bias, (Swamy et al., 2001). These conclusions aligned with the previous findings but went a step further than studying leader-government interactions and also included leader-follower interactions. These studies formed a foundation for subsequent research on the links between gender representation in leadership and the corruption levels within the followers.

These studies have raised questions about why female leadership leads to lower corruption within governments or if there are additional confounding factors apart from gender. To understand these questions, research has examined countries that have instituted gender quotas in governing bodies to see whether women are less corrupt than men due to limited experience or judgment severity, where women politicians are judged more harshly than men by voters (Pereira and Fernandez-Vazquez, 2023). However, their findings indicated that a higher proportion of women in governmental positions does tend to deter corruption, regardless of experience or judgment severity. Additional studies that explored the causes of reduced corruption under female leadership suggested that because women are relatively new to the political field, they have been less exposed to the networks of corruption that have existed for years (Goetz, 2007). However, this explanation assumes a temporary effect that should diminish as women gain more experience and exposure in the political arena. Other researchers, such as Torgler and Valev (2006), argued that women tend to have greater self-control than men and exhibit stronger anti-corruption norms, suggesting that the effect of female leadership on corruption is not solely a new phenomenon but should persist over time.

Contrary to earlier findings, one recent study used a fixed effects technique to analyze

data from 177 countries over 16 years. Researchers found no direct link between female political participation and corruption levels, although masculine cultural characteristics were partially influential (Debski et al., 2018). However, the results indicated that a significant number of women in certain levels of government changed public spending priorities. This was further confirmed in another study that demonstrated that female policymakers were more likely than their male counterparts to approve budgets and policies supporting public education and health (Jha and Sarangi, 2018). These initiatives, demonstrating government quality and spending effectiveness, may have reduced taxpayer corruption by increasing the sense of fairness and effective government spending among constituents.

Another possible explanation is the concept of the 'interest mechanism,' where women in decision-making roles are more likely to vote for policies that support women's interests and priorities, such as healthcare, education, childcare, and gender equality (Alexander and Ravlik, 2015; Bauhr et al., 2019). Women's political behaviors have been shown to not only benefit constituents through these policies but also contribute to perceptions of fairness (Bauhr et al., 2019; Bolzendahl, 2009; Jha and Sarangi, 2018). Risk aversion and increased accountability by women in political environments may also contribute to reducing corruption. Studies have shown that women are less likely than men to engage in corrupt practices when there is a risk of detection (Schulze and Frank, 2003). Additional studies have indicated that women in political positions were judged more harshly than men for unethical behavior, which may be one of the reasons women are less likely to engage in practices that could be considered corrupt (Batista Pereira, 2021). Although substantial research has demonstrated that female politicians are associated with a decrease in government corruption at the state and national levels (Jha and Sarangi, 2018; Kim, 2022; Pereira and Fernandez-Vazquez, 2023), little attention has been given to how

women in elected offices influence corruption at the constituent level.

Although the literature presents some conflicting results, the majority of the studies indicate that a high number of female representation in political leadership is strongly correlated with lower amounts of corruption in the country. This relationship is both direct, through women's ethical decision-making, and indirect, through women's influence on public spending and governmental priorities. By supporting transparency and reducing opportunities for corruption, female leadership may contribute to a more ethical and fair political system (Pereira and Fernandez-Vazquez, 2023). Given that empirical research indicates women in political leadership positions are perceived as more fair, trustworthy, efficient, and honest than their male counterparts and that these attributes have been shown to positively influence tax morale, then it follows that the presence of women in politics should contribute to higher tax morale among taxpayers. Although research has shown female leadership to be negatively correlated with corruption, the effects may be even stronger as the percentage of women in political organizations increases.

3.3.4 Critical Mass Theory

The concept of critical mass is another important factor to consider when examining the relationship between female leadership and tax morale. This theory states that women must hold a certain percentage of corporate or government leadership positions to effectively influence group decisions and policy-making. After this 'critical mass' has been achieved, minority group members, such as women, can begin to make a meaningful difference in group dynamics and group decisions. However, some studies have found conflicting results (Studlar and McAllister, 2002). While the exact percentage varies across the literature, 30% is often used as the target for women in decision-making positions (Dahlerup, 2006). This percentage remains commonly used in quotas and as a

measure of the critical mass of women in political leadership positions.

The Critical Mass Theory was originally developed from Kanter's 1977 article on gender ratios and the concept of 'token' women in organizations (Kanter, 1977). Kanter classified four categories of organizations based on the following ratios:

- Uniform: Composed entirely of one type (100:0).
- Skewed: High ratio of one type (dominant) over another (token) (up to 85:15).
- Tilted: A majority still exists, but there is a substantial minority (65:35).
- Balanced: Nearly equal distribution (50:50).

The article described critical mass within organizations, saying that when groups achieve a 'tilted' ratio, the minority group begins to form coalitions, which can affect the group culture as a whole. These ratios demonstrate how obtaining higher ratios of representation can provide the mechanism for minority groups to begin changing the dominant group's norms and behaviors. The increase in the percentage of female Members of Parliament (MP) in the UK's House of Commons presents a natural opportunity to study how this theory applies. In the early 2000s, women comprised around 20% of the 650 MPs. After the 2024 election, this percentage had increased to 40%.

Critical mass theory applies not only to political settings but also to the corporate world. Studies examining corporations have observed that company boards consisting of at least 30% women saw positive and measurable improvements in the company's outcomes (Joecks et al., 2013). Similar studies found that gender diversity in the boardroom significantly improved the firm's financial performance. The effects were even stronger when three or more board members were female (Brahma et al., 2021). This research supports the theory that a critical mass of women in representative groups has a strong positive effect on the outcome at the firm level, which may also translate to the political arena.

Supporting the public good through tax compliance is generally perceived as the right decision. However, ensuring that tax compliance remains the dominant decision for all citizens remains challenging for many governments. Examining gender roles within political leadership may help governments better understand how shifting policies may improve their country's tax compliance rates. By examining the interactions between politician gender and constituent tax morale, this research offers additional insights that may help governments better understand how to support and foster high tax morale.

3.4 Methodology

3.4.1 Theoretical Framework

In order to examine the interactions between politician gender and tax morale, existing theoretical models were examined. The Allingham and Sandmo model, which depicts taxpayers as utility maximizers (U_i), incorporates three key components: taxpayer gross income (Y_i) taxes owed (T_i), and the probability of detection (p) with the financial costs of being caught (F_i) (Allingham and Sandmo, 1972).

$$U_i = f(Y_i, T_i, p, F_i)$$

Subsequent research expanded this model to include additional non-financial factors that influence taxpayer utility, such as individual consumption (C_i), the efficiency of public expenditures (ω), and the provision of public goods (C_i) (Méder et al., 2012).

$$U_i = f(C_i) + (\omega X_i)$$

While models like these examined the economic determinants of taxpayer utility, they still struggled to explain why tax compliance rates were often higher than expected under a rational, utility-based framework.

To address this discrepancy, research started shifting away from models that examined how taxpayer utility was maximized to models that focused on how tax compliance was maximized. Studies began examining possible factors that influenced taxpayers' decisions. These determinants (C_i) could include both financial factors such as the traditional utility maximizing factors, or non-financial factors, such as government power (P_i), trust in government (T_i), and tax morale (M_i) (Frey and Torgler, 2007).

$$C_i = f(P_i, T_i, M_i)$$

This shift in how tax compliance models were structured led to a deeper analysis of the components of tax morale. Within the Frey and Torgler (2007) model, tax morale is represented as M_i, a factor that influences compliance beyond financial deterrents. Studies on tax compliance aim to identify not only the determinants of compliance but also the motivating factors behind those determinants.

The current research examines tax morale (M_i) as the dependent variable of interest to analyze how it is influenced by political interest(PI_i), local politician gender (MPg), and prime minister gender (PMg). The gender variables may act as a mechanism to increase perceptions of government fairness, effective government spending, and ethical behavior.

$$M_i = f(MPg, PMg, PI_i)$$

By examining individual tax morale, this model captures some of the non-financial determinants of tax compliance and provides a framework for analyzing how leadership

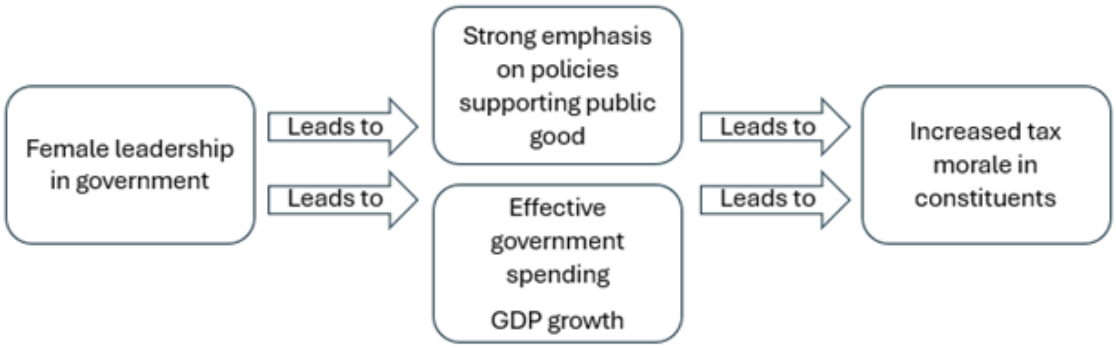
demographics, such as gender, affect taxpayer behavior.

The relationship between politician gender and constituent tax morale may not be a direct path from one to the other. Instead, there may be interim steps that connect these factors. Studies examining the relationship between the gender of political leaders and constituent behavior have shown this is more of a three-step process (Pereira and Fernandez-Vazquez, 2023). The following illustration shows this progression:

$$A \rightarrow B, \quad \Rightarrow \quad B \rightarrow C$$

For example, the first step may be when female political leaders enter the political arena (A). Within this arena, they tend to propose and support policies that positively impact society or increase the country's economic growth (B). This demonstrates the efficiency of public spending or perceptions of government fairness. As the final step, these efficiencies or perceptions are seen and felt by the constituents, prompting higher tax morale (C). The gender of the politician may start a positive chain reaction, leading to improvements in social policies and subsequent improvements in constituent tax morale as shown in Figure 3.1.

Figure 3.1: Three-Step Model: From Leadership Gender to Effective Policies to Tax Morale



Given that empirical research indicates that women in political leadership roles are perceived as more fair, trustworthy, efficient, and honest than their male counterparts, and that these attributes have been shown to positively influence tax morale, then it follows that the presence of women in politics should contribute to higher tax morale among taxpayers.

$$A \rightarrow B, \quad B \rightarrow C \quad \Rightarrow \quad A \rightarrow C$$

This chapter is based on the assumption that the effects of female leadership on tax morale capture all of the intermediary impacts within the model. Instead of modeling the three-step process as shown in Figure 3.1, a reduced form (A $\rightarrow$ C) was used, as shown in Figure 3.2.

Figure 3.2: Reduced Form Model: From Leadership Gender to Tax Morale

As evidenced in the literature, female presence in parliaments and other political bodies has a significant and positive impact on the perceptions of effective government spending and GDP growth per capita (Dahlum et al., 2022; Mirziyoyeva and Salahodjaev, 2023). Additional literature has demonstrated that the efficiency of public spending improves the taxpayer's attitude toward tax compliance and that inefficiencies in government spending negatively affect tax morale (Barone and Mocetti, 2011).

More recent research has shown that increasing expenditures on public goods leads to a positive and lasting effect on tax compliance and that taxpayer attitudes toward tax compliance improve when taxpayers perceive that financial resources are being spent

more efficiently (Carrillo et al., 2021; Castañeda-Rodríguez and Lisi, 2024; Giaccobasso et al., 2022). Using previous literature as a guide, the data sources described below were used to empirically examine the effects of politicians' gender on constituent tax morale.

3.4.2 Data Sources

The main data source for this study was the UK's Understanding Society survey for the years 2009-2022 (University of Essex Institute for Social and Economic Research, 2023). This longitudinal panel study consists of approximately 25,000 households in the UK, surveyed over thirteen waves from 2008 through 2023, and remains ongoing. The survey includes questions on demographics, perceptions of government, and self-employed respondents' tax-filing behavior. A licensed version of the survey was used for this study, which identified the respondents' political constituency based on political boundaries. These data points, collected over a span of years, may help show whether an individual's behavior changes when a female MP or PM represents the respondent's district or country.

The key benefit of using this survey was the consistency of households and individuals from one wave to another. Participating households were revisited during each wave to record changes within the house or in individual attitudes and circumstances. This consistency in data collection from wave to wave and person to person allowed a robust analysis of the changes in individuals' behavior and beliefs. Demographic data on the local and national-level politicians, including political party, gender, and gender percentage in the political body, were obtained from public information made available by the House of Commons Library for election years 2010, 2015, 2017, and 2019.

The expanded models presented in the previous section informed the selection of data and variables. Independent variables in this study included the MP's gender and polit-

ical party, the PM's gender and political party, the respondent's political interest level, and the percentage (critical mass) of female MPs in the House of Commons. Additionally, two indicator variables were included that flagged whether the political party or gender of the political leader at the local (MP) or national (PM) level matched that of the respondent.

This research examined the leader-follower dynamics between politicians at the local level, separated into 650 constituencies, and the taxpayers within those political boundaries. Survey data was gathered on key variables before, during, and after the introduction of women in parliamentary offices. Table 3.1 summarizes the start dates of each survey wave alongside the dates of the House of Commons elections.

Table 3.1: Map of Survey Waves to Election Dates

Survey Wave and Date Range	**House of Commons (HoC) Elections & Change in PM**	**% Female MPs**	**PM (gender)**	**PM Party**
1 (Dec 2008–Mar 2011)		20%	G. Brown (m)	Labour
2 (Jan 2010-Mar 2012)	May 2010 (HoC)	22%	G. Brown (m)	Labour
	May 2010 (New PM)	22%	D. Cameron (m)	Conservative
3 (Jan 2011–Jul 2013)		22%	D. Cameron (m)	Conservative
4 (Jan 2012–Jun 2014)		22%	D. Cameron (m)	Conservative
5 (Jan 2013–Jun 2015)		22%	D. Cameron (m)	Conservative
6 (Jan 2014–May 2016)		22%	D. Cameron (m)	Conservative
7 (Jan 2015–May 2017)	May 2015 (HoC)	29%	D. Cameron (m)	Conservative
8 (Jan 2016–May 2018)	July 2016 (New PM)	29%	T. May (f)	Conservative
9 (Jan 2017–May 2019)	June 2017 (HoC)	32%*	T. May (f)	Conservative
10 (Dec 2017–May 2020)		32%	T. May (f)	Conservative
11 (Dec 2018–May 2021)		32%	T. May (f)	Conservative
12 (Dec 2019–May 2022)	July 2019 (New PM)	32%	B. Johnson (m)	Conservative
	Dec 2019 (HoC)	34%	B. Johnson (m)	Conservative
13 (Dec 2020–May 2023)		34%	B. Johnson (m)	Conservative

Note: *Critical Mass above 30% was reached during this election.

Although each survey wave took approximately 24-28 months to complete, data lim-

itations restricted the ability to separate each respondent's information by exact date. Thus, the survey month and year at the beginning of the wave closest to the month and year of the House of Commons election or PM transition was used for joining wave data with election data. The timing of the wave data and election data resulted in the percentage of female MPs reaching 32% during wave 9, which is a possible indication of critical mass. The timing of this increase was within six months of the appointment of a female Prime Minister. The collinearity between these two variables made it necessary to discontinue the analysis of the variations in critical mass in order to robustly analyze the effects of the national-level leader's gender.

3.4.3 Dependent Variables

The ongoing assumption in this paper is that tax morale has a strong correlation with tax compliance. Tax morale is the intrinsic motivation prompting an individual to pay taxes, and tax compliance is correctly calculating and paying all taxes owed. Tax morale is often measured from survey responses (Alm and Torgler, 2004; Frey and Feld, 2002), whereas tax compliance is often measured by audit information, the rate of tax return filings, and the accuracy of reported income. The determinants of tax morale and compliance can vary significantly due to differences in political, social, educational, and gender norms and are subjects of ongoing research. Thus, when using secondary data, capturing and measuring tax morale can present challenges. Because the Understanding Society survey did not report direct observations of tax morale, several variables were examined to determine if they would function as proxies for tax morale.

Data from the Understanding Society survey contained several key questions that captured the respondents' levels of political efficacy, broadly defined as feeling as if the political actions of the individual could have an impact on politics (OECD, 2021). Pre-

vious literature on political efficacy indicated a strong link between the degree to which an individual believes they have a say in the government (political efficacy) and tax morale. Research on democratic participation and tax morale in both the United States and Switzerland found a positive link between political participation or political involvement and tax morale (Feld and Frey, 2002).

Questions from the Understanding Society survey regarding political efficacy and tax behavior included:

> **poleff_1**: I consider myself to be well qualified to participate in politics.
>
> **poleff_2**: I think I am better informed about politics than most people.
>
> **poleff_3**: Public Officials don't care much about what people like me think.
>
> **poleff_4**: People like me don't have any say in what the government does.
>
> **tax_comp**: In this job/business, are annual business accounts prepared for the Inland Revenue for tax purposes?
>
> *University of Essex Institute for Social and Economic Research (2023)*

The first two questions measured the respondent's political efficacy, while the second two measured the respondent's influence in political matters. The final question regarding taxes prepared was only asked of those respondents who indicated that they were self-employed earlier in the survey, which meant that the analysis of this variable was restricted to self-employed respondents. However, this question was directly related to tax compliance as it directly asked respondents about their tax compliance behavior, which served as a strong proxy for tax morale, warranting its inclusion in this analysis. Respondents selected one of three choices for this question: *no*, *not yet*, and *yes*. A response of *not yet* indicated partial noncompliance because the respondent indicated that the tax paperwork and payment were not submitted in a timely manner. A response

of *no* indicated that self-employed individuals were noncompliant with taxes. Although there may have been other reasons why respondents selected a negative response for this question, this paper made the assumption that the majority of negative responses were due to noncompliance, regardless of the reason. Factor analysis was performed on these five components to determine the appropriate factor loadings and to determine their suitability as proxies for tax morale, as seen in Table 3.2.

Table 3.2: Factor Loadings

Variable	Factor 1	Factor 2	Uniqueness
poleff1	0.776	0.075	0.393
poleff2	0.774	0.021	0.400
poleff3	0.016	0.726	0.473
poleff4	0.089	0.728	0.462
tax_comp	0.056	0.001	0.997

Factor analysis on these five components resulted in the identification of two main factors: perceived political capability, derived from the response to *poleff1* and *poleff2*, and perceived political influence, derived from the responses to *poleff3* and *poleff4*. The fifth question concerning tax compliance behavior, *tax_comp*, exhibited a high uniqueness and did not load significantly on either of the identified factors, suggesting it did not fit well into the two-factor model, although it could still provide key insights into taxpayer behavior.

Based on the factor analysis results, three separate dependent variables were identified and chosen to be included in the regression analysis. The first of these dependent variables, *pol_cap*, representing perceived political capability, was created based on the

average of *poleff1* and *poleff2*. The second, *pol_influ*, representing perceived political influence, was created based on the average of *poleff3* and *poleff4*. The pre-existing variable, *tax_comp*, served as the third dependent variable. These three dependent variables were measured on a 5-point ordinal scale. For the *pol_cap* and *pol_influ* variables, a score of 1 indicated low capability or influence, while 5 indicated high capability or influence. For the *tax_comp* variable, a response of 1 indicated "No" (not compliant), 3 indicated "Not yet, but will be" (partially compliant), and a score of 5 indicated "Yes" (fully compliant). Table 3.3 provides a complete listing of variables.

Table 3.3: Summary Statistics

Variable	Description	N	Statistics
Dependent Variables			
pol_cap	Political capability (Avg. of poleff1 and poleff2)	52,574	Mean = 2.787, SD = 0.973, Min = 1, Max = 5
pol_influ	Political influence (Avg. of poleff3 and poleff4)	52,574	Mean = 2.670, SD = 0.903, Min = 1, Max = 5
tax_comp	Tax compliance level if self-employed	3,822	Mean = 4.449, SD = 1.266, Min = 1, Max = 5
Independent and Control Variables			
mp_female	Gender of MP	52,574	26.5% Female, 73.5% Male
mp_gendermatch	Gender match: MP and respondent	52,574	47.5% Match, 52.5% No Match
pm_female	Gender of Prime Minister	52,574	23.1% Female, 76.9% Male
pm_gendermatch	Gender match: PM and respondent	52,574	47.1% Match, 52.9% No Match
resp_female	Gender of the respondent	52,574	55.4% Female, 44.6% Male
mp_party	Political party of MP	52,574	46% Conservative, 33% Labour, 21% Other
pm_party	Political party of PM	52,574	100% Conservative
vote4	Political party of respondent	52,574	45% NA, 19% Conservative, 22% Labour, 14% Other
win_margin_percent	MPs election win margin (%)	52,574	Mean = 0.249, SD = 0.166, Min = 0, Max = 0.771
age_dv	Age of respondent	52,574	Mean = 49.15, SD = 18.478, Min = 15, Max = 103
gross_moinc_decile	Monthly income of respondent	52,574	Mean = 3.000, SD = 1.843, Min = 1, Max = 10
wealth_nonfin_decile	Accumulated non-financial wealth	52,574	Mean = 2.526, SD = 1.927, Min = 1, Max = 10
wealth_fin_decile	Accumulated financial wealth	52,574	Mean = 2.798, SD = 2.454, Min = 1, Max = 10
pol_int	Political interest level	52,574	Mean = 3.330, SD = 0.953, Min = 1, Max = 5
crit_mass_percent	% of Female MPs	52,574	Mean = 0.266, SD = 0.054, Min = 0.220, Max = 0.338

3.4.4 Independent Variables

Official data on the gender, political party, and years in office for each of the 650 Members of Parliament was obtained from the House of Commons General Election Results for each of the years of interest (2010; 2015; 2017; 2019) and from the National Archives in the UK for the Prime Minister (2023).

In addition to gender, other political and social factors, such as alignment with political leaders, perceived fairness, and political interest, have also been shown to contribute to tax morale (Alm and Torgler, 2006; Kirchler, 2007). Variations in political interest at the individual level (*pol_int*) were included in this analysis and were based on one survey question, which captured this data for each respondent. The inclusion of this variable was based on previous literature, which suggested that there is a strong, causal link between political interest or political participation and tax morale (Alm et al., 1992; Engel et al., 2024; Feld and Frey, 2002; Frey and Feld, 2002; Lamberton et al., 2018). In previous research, political participation was defined as reading or watching news stories on current political issues, writing political opinion pieces for news outlets, or voting.

3.4.5 Control Variables

Control variables that indicated political alignment, *party*, and *party_match*, were included in this study. The *party* variable indicated the respondent's political party affiliation, while the *party_match* variables denoted whether the respondent's party matched that of the Prime Minister (PM) or the Member of Parliament (MP). These controls were included so the respondents' specific political identity would not overshadow the effect of MP or PM gender on tax morale. Including these variables allows this analysis to more accurately isolate the influence of leadership gender on the dependent variable. The

categorical *party* variable was also used to create the *party_match* indicator variables. Although the party categories, such as Labour, Conservative, etc., were not studied as variables of note in this chapter, the impact of the MP's or PM's specific political party on their constituents' tax morale may be an interesting topic for future research.

This study included demographic information on local and national-level politicians during the years of interest. The percentage of female MPs in the House of Commons during these years showed a small and steady increase from one election to another. The gender of the prime minister, which alternated back and forth between male and female over different election cycles, was also included in this study and recorded, along with the dates in office. The inclusion of both levels of government acknowledges the dual role of MPs. Although the individuals in these positions primarily represent local constituencies, their decisions influence policy at the national level as they vote as part of a national body. The survey responses that related to tax behavior were limited to the national level, which most likely aligns more closely with actions at the national government level, represented by the Prime Minister. However, due to data limitations, information on local income tax behavior was not available. Thus, by expanding the focus to include both MPs and the Prime Minister, a natural link is captured between local constituencies and national political policies.

Although there is scholarly debate on whether critical mass theory is an appropriate measure of women's effectiveness in politics, this theory was initially included as a variable of interest to add to the literature on this topic. Although collinearity prevented the inclusion of both *pm_female* and *crit_mass_percent* in the same data analysis, separating these effects may provide valuable analysis in future research.

An additional control variable, *win_margin_percent*, was calculated based on the percentage difference between the winner's vote share and that of the closest competitor. This

variable was included to control for variations in the characteristics of different local constituent areas, thus ensuring that these areas are comparable. Respondent income and accumulated wealth were included in the economic model to calculate taxpayers' utility. These variables were calculated from survey responses and included in the regression analysis.

Due to the comprehensive nature of the secondary data, the income and wealth variables were translated into deciles to handle the challenges posed by extreme values in the income data. Deciles are common in economic research when examining topics such as income, wealth, and income equality (Piketty and Saez, 2003). Additionally, in a 2011 report, the OECD used deciles to help provide a clearer picture of how income is distributed across different population segments within and between countries (OECD, 2011).

Constituent income, *gross_moinc_decile*, was derived from a survey question asking respondents to report their gross monthly income. However, the survey data had limitations regarding a variable for either 'wealth' or 'consumption.' There were no consistent questions across every wave (year) of interest that measured wealth, defined as financial plus non-financial assets net of liabilities. To address this, a proxy for financial wealth, *wealth_fin_decile*, was created by recording the annual amount of all interest and dividends for each household. The assumption was that the investment income the constituents received was proportional to their accumulated wealth. The purpose of the variable was to examine relative accumulated wealth rather than specific absolute amounts. Due to compounding, the assumption was made that households with higher accumulated wealth received more investment income. However, the focus remained on comparing households relative to each other and over time, not on the absolute amounts. Therefore, financial wealth was converted into a decile variable.

This *wealth_fin_decile* variable did not include non-financial assets, such as the value of the house or other personal or income-generating property. As such, another variable was created as a proxy for non-financial wealth, *wealth_nonfin_decile*, which was calculated based on the respondent's self-reported value of the primary residence (if owned) and adding the value of any secondary or income property before subtracting out a first or second mortgage on all properties. Essentially, this equated to real estate assets minus all associated liabilities. One data limitation with this variable is the assumption that the homeowners were able to estimate the current market value of their properties without bias.

Based on the theoretical framework presented, this study examines three possible dependent variables and several independent and control variables. The three dependent variables display a range between 1 and 5, with the means of political capability ($M = 2.787$) and political influence ($M = 2.670$) slightly above average on a five-point scale. The mean of tax compliance among the self-employed displayed higher levels of compliance ($M = 4.449$), although the smaller number ($N = 3,822$) indicates that self-employed is a minority status in the dataset.

Key political variables show that, within the time frame of this study, all observed Prime Ministers were from the Conservative Party. Additionally, the Conservative Party held the majority of the seats in Parliament, with the Labour Party holding the second most seats. Respondents reported moderate to high levels of political interest ($M = 3.33$), with a high number of survey respondents not disclosing their political affiliation (45%). For those who did, the Labour Party was the most common (22%), followed by the Conservative Party (19%).

In terms of economic factors, monthly income (*gross_moinc_decile*) showed a mean of 3.00 on a scale of one to ten, suggesting most respondents fall within the lower-

middle income deciles. Financial and non-financial deciles showed that financial wealth (*wealth_fin_decile*) had a slightly higher mean than non-financial wealth (*wealth_nonfin_decile*) ($M = 2.798$ vs. 2.526), suggesting that respondents hold a similar amount of wealth in investments and property.

3.4.6 Regression Estimates and Model Specifications

Regression analysis was conducted on the data to estimate the impact of politician gender on the dependent variables. In this study, Ordinary Least Squares (OLS) analysis was used for linear relationships, and a fixed effects method was used to account for unobserved heterogeneity in the panel data. These methods help address potential biases and improve the estimates. The economic model was estimated using the following equation.

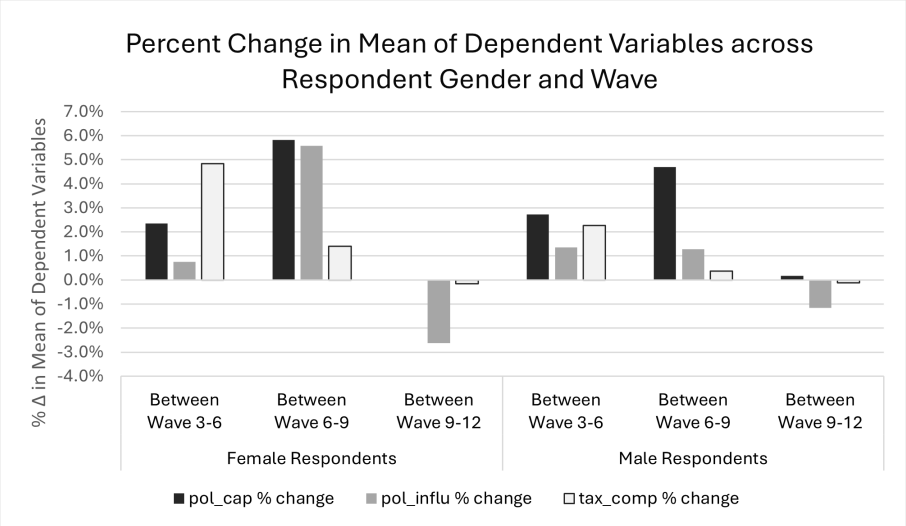
$$\begin{aligned} Y = \beta_0 + \beta_1\, mp\_female + \beta_2\, mp\_partymatch + \beta_3\, pm\_female \\ + \beta_4\, pm\_partymatch + \beta_5\, pol\_int + \gamma X + \epsilon. \end{aligned} \tag{3.1}$$

Where Y represents the three proxies for tax morale (political influence, political capability, and self-employed respondents' tax compliance), each analyzed separately. The coefficients β_i represent the change in tax morale proxies based on the independent variables. The term γX represents the combined influence of the control variables, and ϵ represents the error term. This equation displays the coefficients of *mp_female* and *pm_female* as positive, following the assumption that female leadership is linked to higher tax morale.

3.5 Results and Discussion

After factor analysis confirmed there were three separate factors that could serve as proxies for tax morale, the means of each of these three proxies were examined for each of the survey waves. The results, separated by respondent gender, are provided in Figure 3.3. A notable observation when looking at changes in the three proxy variables was the

Figure 3.3: Percent Change in Mean of Tax Morale Proxy Variables by Respondent Gender and Wave



percent increase in the mean of the political capability (*pol_cap*) variable between waves 6 and 9 for both male and female respondents. Additionally, the mean of the political influence variable (*pol_influ*) showed a strong increase for female respondents during the same time. Surprisingly, the percent change in the mean of (*tax_comp*) showed a visible decrease for male and female respondents between these waves. The increase in the proxy variables *pol_cap* and *pol_influ* aligned with an increase in the percentage of female MPs from 29% to 32% between waves 6 and 9 as well as aligned with the election of a female Prime Minister during Wave 8. These initial observations suggest a potential

link between the presence of female politicians and improvements in tax morale.

Initial regression analysis was conducted using an OLS model, followed by fixed effects regressions. These analyses were conducted separately for male and female respondents, allowing the analysis of whether respondent gender plays a role in addition to politician gender. The full results from the OLS and fixed effects models are presented in Appendix B, Table B.3, and the results by model are presented and discussed in the following sections.

3.5.1 OLS Model: Political Capability

The OLS model was used to examine how MP and PM gender influenced the three proxies for tax morale: political capability, political influence, and self-employed tax compliance. Each of these three proxies was examined individually, beginning with political capability. The results of the OLS estimations are included in Table 3.4.

Table 3.4: Regression Results on the Dependent Variables pol_cap, pol_influ, tax_comp using Three Predictors

	OLS Regression					
	Female respondents			Male respondents		
	pol_cap	pol_influ	tax_comp	pol_cap	pol_influ	tax_comp
mp_female	0.024**	0.007	0.011	0.015	0.025**	-0.098**
	(0.010)	(0.011)	(0.075)	(0.011)	(0.013)	(0.049)
pm_female	-0.017*	0.081***	-0.008	-0.018*	0.049***	0.032
	(0.009)	(0.010)	(0.071)	(0.010)	(0.012)	(0.047)
mp_partymatch	-0.036***	0.018***	0.009	-0.036***	-0.000	0.009
	(0.004)	(0.005)	(0.032)	(0.005)	(0.006)	(0.022)
pm_partymatch	-0.056***	0.204***	0.037	-0.037***	0.135***	0.094
	(0.013)	(0.014)	(0.089)	(0.013)	(0.015)	(0.058)
pol_int	0.582***	0.050***	0.017	0.593***	0.034***	0.041
	(0.006)	(0.007)	(0.045)	(0.006)	(0.007)	(0.029)
Constant	0.845***	2.445***	4.101***	0.927***	2.320***	4.070***
	(0.030)	(0.033)	(0.241)	(0.033)	(0.038)	(0.161)
Observations	29189	29189	1428	23385	23385	2394
R-squared	0.344	0.028	0.013	0.386	0.029	0.016

Note: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

For female respondents, the estimated coefficients indicated that the gender of the MP had a moderate effect on the respondent's political capability, with a coefficient of 0.024 on a scale of one to five ($p < 0.05$), meaning that when the MP of a constituency was female, the respondents' reported levels of political capability increased by 0.024 out of 5. In contrast, the relationship between MP gender and political capability for male respondents was not significant. Although *mp_female* was insignificant for male respondents, political interest *pol_int* had a significant positive effect. Additionally, for male and female respondents, the variables representing wealth and income showed small but significant positive influences on political capability.

For male and female respondents, political capability was negatively influenced by party alignment with either the PM or MP (*pm_partymatch, mp_partymatch*). These findings may indicate that respondents do not feel as politically capable when they compare themselves to political leaders in the same party. A female PM (*pm_female*) negatively impacted female respondents' political capability, but the presence of a female PM had a positive and significant effect on male respondents. Other factors, such as the respondent's age and education level, were negatively associated with political capability. This may indicate that respondents who are older or more highly educated do not necessarily feel a higher sense of political capability.

3.5.2 OLS Model: Political Influence

The political influence proxy variable (*pol_influ*) was most strongly affected by political interest (*pol_int*) for both female and male respondents. Unlike the previous proxy variable, political capability, the presence of a female Prime Minister had a significant positive effect on political influence for both women and men. However, the effect was slightly weaker for men than for women. Additionally, party alignment at the local level

(*mp_partymatch*) positively impacted political influence for female respondents, although not male respondents. This may be due to women feeling stronger political identification with the relative 'novelty' of female representation. These women constituents may feel an increased sense of political identity and political inclusivity or that a female MP will focus on policies supporting public benefits. Respondent age seemed to have a slight negative effect on the perceived political influence of men and women, with the effect being stronger for men.

3.5.3 OLS Model: Tax Compliance

The tax compliance proxy variable (*tax_comp*) was positively influenced by respondents' gross monthly income (*gross_moinc_decile*). This was consistent for both male and female respondents. This result may suggest that constituents with more significant financial resources are more willing to comply with taxes. This result can be seen as counterintuitive, as previous literature has demonstrated that taxpayers with lower financial resources are generally more compliant, possibly due to a greater reliance on government services and a higher risk aversion to tax penalties (Alm et al., 1992; Kirchler, 2007).

An important variation in the tax compliance proxy variable in this study is that the variable was only collected from self-employed respondents, which may explain some of the deviations from previous research. Self-employed taxpayers, especially those with higher incomes, may have a higher risk of audit than the average taxpayer. Related research has found that wealthier, self-employed individuals had their taxable income more closely examined by tax authorities (Slemrod et al., 2001).

Respondent age had a negative impact on tax compliance for both women and men, although the effects were not significant for men. This negative response may be due to generational differences, where older women may not have strong financial literacy or

may have negative attitudes towards civic duties, including tax compliance.

For male respondents only, the presence of a female MP had a significant adverse effect on their tax compliance. This may be due to gender biases, disagreement with public policy, or distrust of female political leaders at the local level.

3.5.4 Fixed Effects Model: Political Capability, Political Influence, and Tax Compliance

Additional regression estimates used the fixed effects method to control for differences between constituencies. This method provided greater accuracy in the regression estimates as it accounted for time-invariant differences in historical, geographical, political, or cultural traits between constituencies or the long-standing attitudes toward gender roles in each constituency. Although these differences may influence how the constituents perceive their local or national leaders, the FE model will not capture them because they do not vary over time. Within the licensed version of the Understanding Society survey, each participant was assigned a constituency identifier (*pcon*), which allowed the use of area fixed effects in the regression analysis. Table 3.5 provides the results of key variables, with the full results reported in Appendix B, Table B.3.

Using the fixed effects model at the constituency level provided a more accurate data analysis. The clearest indicator that the FE model helped isolate the effects of the MP gender was the change in the significance of the *mp_female* variable. In the OLS model, the presence of a female MP had varying but significant effects across the three proxy variables for both female and male respondents. In the FE model, the *mp_female* variable no longer showed any significance. These results demonstrated that when controlling for differences in the constituency areas, the gender of the MP was not significant.

Similar to the OLS model, the variable with the strongest positive impact on political

Table 3.5: Regression Results on the Dependent Variables pol_cap, pol_influ, tax_comp using Three Predictors

	Fixed Effects Regression					
	Female respondents			Male respondents		
	pol_cap	pol_influ	tax_comp	pol_cap	pol_influ	tax_comp
mp_female	.0150	0.015	0.129	-0.041	0.010	-0.037
	(0.025)	(0.029)	(0.239)	(0.028)	(0.032)	(0.135)
pm_female	-0.016*	0.082***	-0.036	-0.016	0.047***	0.070
	(0.009)	(0.010)	(0.076)	(0.010)	(0.012)	(0.049)
mp_partymatch	-0.036***	0.016***	0.011	-0.033***	-0.001	-0.001
	(0.004)	(0.005)	(0.032)	(0.005)	(0.006)	(0.022)
pm_partymatch	-0.048***	0.200***	0.123	-0.030**	0.131***	0.089
	(0.013)	(0.015)	(0.113)	(0.014)	(0.016)	(0.070)
pol_int	0.577***	0.047***	-0.067	0.588***	0.030***	0.013
	(0.006)	(0.007)	(0.054)	(0.006)	(0.008)	(0.033)
Constant	0.846***	2.405***	3.821***	0.941***	2.303***	3.878***
	(0.037)	(0.041)	(0.345)	(0.041)	(0.047)	(0.217)
Observations	29189	29189	1428	23385	23385	2394
R-squared	0.324	0.024	0.020	0.362	0.020	0.023
Constituencies	588	588	462	588	588	533

Note: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

capability and political influence using the FE model was political interest *(pol_int)*. This was significant for both male and female respondents. Similar to OLS, in this model, PM and MP party alignment (*pm_partymatch, mp_partymatch*) significantly negatively affected the political capability of both genders. For one of the tax morale proxy variables, political influence, respondent age provided a minimal but significant negative effect for both genders. This may indicate that older respondents tend to feel less influential in politics. For the proxy variable, tax compliance for self-employed workers *tax_comp*, none of the variables of interest returned significant results.

For two of the proxy variables, political capability (*pol_cap*) and political influence (*pol_influ*), increases in financial variations, such as the respondents' income and wealth, resulted in small but significant increases in these proxy variables for both genders. These results may indicate that tax morale acts as a normal good, where individuals

with higher income levels tend to have higher tax morale. Conversely, if tax morale were considered an inferior good, then individuals with lower incomes would show higher levels of morale.

The political efficacy theory may offer a partial explanation for tax morale appearing as a normal good. This theory suggests that taxpayers with higher incomes may feel as though they have a greater influence on political matters, in other words, that they are more effective. This explanation agrees with previous studies that found that higher-income taxpayers exhibited greater levels of tax morale (Alm and Torgler, 2006). Additionally, Luttmer & Singhal (2014) found that wealthier citizens were more likely to have a stronger sense of civic duty and exhibit higher compliance rates. In the fixed effects model, the tax compliance variable for self-employed taxpayers was not significantly affected by financial variations (wealth and income).

3.5.5 Key differences in the FE Model by Respondent Gender

For male respondents, age (*age_dv*) had a minimal but positive influence on tax compliance. This indicates that older men may feel a greater sense of civic responsibility than the younger generation. Figures 3.4 and 3.5 display the independent variables with the highest positive or negative influence on the three dependent variables in the fixed effects model.

Figure 3.4: Variables with a Statistically Significant Influence on Male Respondents

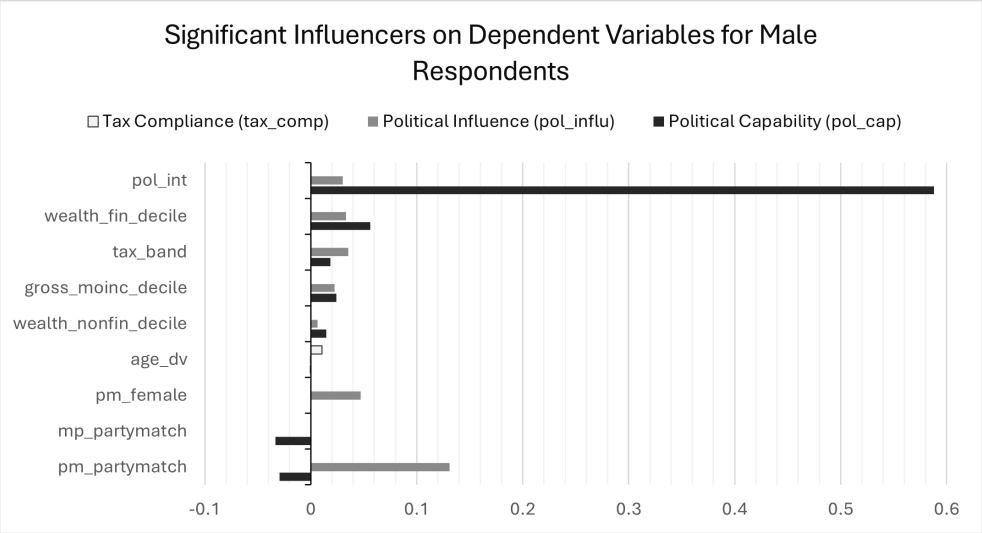
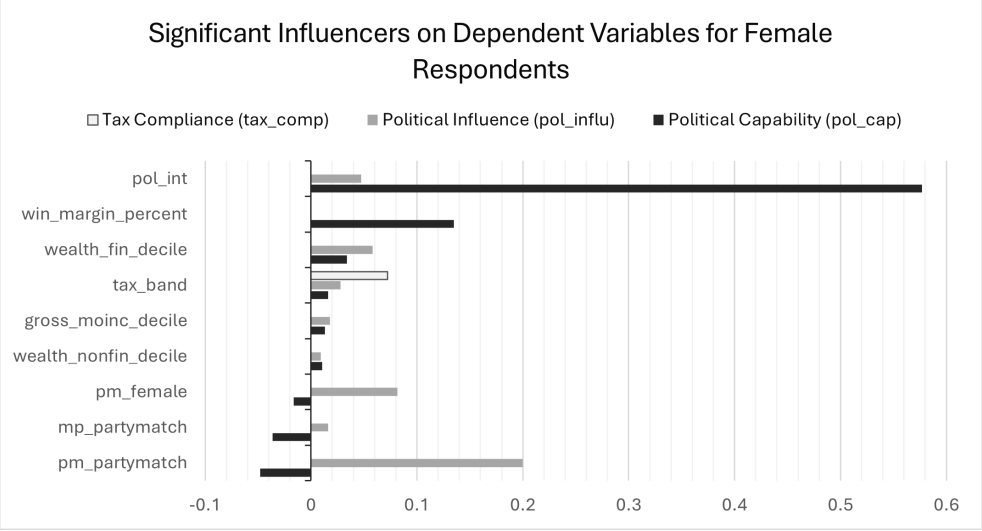


Figure 3.5: Variables with a Statistically Significant Influence on Female Respondents



3.6 Conclusion

The expected outcome for this paper was a demonstration that female political leaders have a significant and positive impact on the tax morale of their constituencies.

A reduced-form model was used to examine how the gender of the Members of Parliament (MPs) and the Prime Minister (PM) influenced the tax morale of their constituents. The model controlled for variables such as wealth, income and education, among others, in an attempt to isolate the effects of leaders' gender. The findings revealed a significant and positive relationship between citizens' tax morale and the gender of national-level political leaders, particularly the Prime Minister, demonstrating the influence of female leadership on constituent behavior. These findings highlight the importance of gender representation in political offices. The analysis also explored possible interactions between gender and political party. These interactions returned small yet significant results, suggesting that respondents who share the same political ideals as their leader tend to demonstrate higher levels of political capability and influence. This impact was expected to be apparent at the local (MP) and national (PM) levels. However, the results of the regressions show that female political leaders have a significant, positive impact on tax morale at the national level but not at the local level. This may be due to the taxes being levied at the national level or due to greater visibility and familiarity of the PM and her policy decisions than a constituency's MP. The results of this study indicated that although the coefficients of *pm_female* were modest in all models, they remained statistically significant, which indicates a positive effect of a female Prime Minister on constituent tax morale.

The most notable result was the variable measuring the impact of political interest *(pol_int)*, which proved to be a significant predictor of tax morale across all models. The comparatively strong positive coefficient of political interest in the fixed effects model (0.154) suggests that an increase in political interest or civic engagement may be an effective strategy to increase tax morale. Additional research on the types of constituent activities or government policies that increase civic engagement may provide deeper

insights into these strategies.

Although outside the window of this study, the July 2024 election in the UK resulted in a ratio of 40% women in the House of Commons. This 6% increase from the previous number of female MPs may be an interesting topic for future research on tax morale and Critical Mass Theory. Additionally, although the specific political parties of both the MP and PM were not a focus of this study, the impact of the political party on tax morale may be an interesting topic for future research. It may help provide insights into whether certain parties are perceived as more effective or trustworthy in managing government spending, thus improving tax morale.

One determinant discussed in tax compliance literature is the role of taxpayers' social norms. Although social norms are not explicitly addressed in this chapter, several assumptions in this research are based on existing theories on social norms. For example, if we define tax compliance social norms as the taxpayer's inference on what is appropriate, we assume these norms may change based on the leader's characteristics or behavior.

The findings of this study may have important policy implications. Local or national governments may continue exploring gender quotas to promote effective government spending, improve tax morale, and increase tax compliance. The data and analysis in this research highlight the positive impact of female leadership at the national level on the political attitudes of the constituents. Public and governmental programs aimed at increasing political interest and civic engagement among taxpayers may also significantly improve tax morale and lead to the goal of greater tax compliance.

Chapter 4

The Effects of Participatory Budgeting on Local Government Tax Compliance: An Experiment in Greater Manchester

4.1 Abstract

This study investigates the impact of participatory budgeting on local tax compliance in the United Kingdom. A quasi-experimental design was used along with the synthetic control method to analyze Council Tax compliance trends in Tameside, a borough within Greater Manchester. Compliance rates were examined before and after the introduction of participatory budgeting. The findings of this analysis suggest that while Council Tax collection rates improved slightly after the participatory budgeting process was used, these rates showed a statistically significant decline compared to the synthetic control group after the process was discontinued. Results from placebo testing support the conclusion that these effects were statistically meaningful and not likely due to chance. The results of this study may provide governments with additional insights into how starting and stopping civic engagement initiatives can lead to changes in compliance rates.

Keywords: Tax Compliance, Participatory Budgeting, Synthetic Control Method

JEL Classification: H26, H71, H72

4.2 Introduction

Traditional, representative democracies sometimes can leave citizens feeling disengaged or under-represented (Geissel, 2009), potentially leading to low tax morale and compliance. In contrast, methods of direct democracy can address citizen disengagement by allowing citizens to take an active role in shaping the policies they abide by. Initiatives designed to improve civic engagement and active participation may play a crucial role in strengthening tax morale, ultimately leading to improvements in tax compliance.

Local and national governments have implemented programs designed to increase citizen participation, such as town hall meetings for urban planning decisions, Denmark's co-creation model for welfare programs, Paris' Climate Plan for environmental policies, and even neighborhood watch community policing programs. These initiatives encourage citizens to take an active role in the decisions that affect them on a political, environmental, or fiscal level.

Although there are some slight variations on the definition of civic engagement, a broad interpretation can be given as community participation with the goal of improving the lives of individuals and community members. (Adler and Goggin, 2005). Civic engagement events may include activities such as public forums or door-to-door surveys to help identify issues affecting the group (Arvanitidis, 2017). Activities such as these may help promote a stronger sense of tax morale, leading to improvements in tax compliance. This idea is supported by previous research, which explains that taxpayers who are more interested or feel more engaged in civic activities tend to have higher levels of tax morale (Alm et al., 1999). When these taxpayers feel they have a voice in decisions that affect the community, they may be more motivated to pay the taxes that support these community initiatives. Local tax payments are then used to fund services that support

the well-being of the community members, such as local welfare programs, public parks, or fire and police protection services.

If civic engagement is a mechanism for improving citizens' tax morale, then governments would be well served by identifying ways to encourage the active participation of their citizens. Ways to increase civic engagement can vary significantly depending on political, social, and economic factors. Still, some local and regional governments have improved civic engagement through initiatives such as community advisory boards, town hall meetings, open data programs, and participatory budgeting processes.

Participatory Budgeting (PB) is a civic engagement process that was first publicly implemented in 1989 in the city of Porto Alegre in Brazil as a response to significant social and economic challenges, including inequality, lack of basic infrastructure, inefficient use of public resources, and widespread mistrust in the government due to corruption and inefficiency (Baiocchi, 2001). Participatory budgeting has both broad and narrow definitions, depending on the scope. However, at the broad level, PB can be defined as a process by which local citizens decide how part of a public budget is spent through voting mechanisms and meetings with political representatives (Goldfrank, 2007).

In Porto Alegre, PB was launched to increase government transparency, citizen engagement, and public confidence by allowing citizens to vote on projects with immediate and visible community benefits. Evaluations of PB in Porto Alegre revealed that voting allowed the citizens to express their priorities and led to improvements in infrastructure, education, and public health. These improvements led to positive political outcomes as well. After the visible community benefits were in place, there was a reduction in reported government corruption as well as improvements in government transparency (Bhatnagar et al., 2003).

Studies on PB in Porto Alegre found that when citizens have a voice in how public funds

are allocated, it can result in higher levels of political efficacy and citizen engagement (Wampler, 2008). These direct effects provide positive validation for the use of PB in local and regional governments. There may also be indirect effects, such as tax and compliance, which are not studied as often. Understanding both the direct and indirect effects of civic engagement initiatives can help promote long-term improvements in tax compliance behavior. This research examines the borough of Tameside, one of ten boroughs in the Greater Manchester Combined Authority (GMCA) in the UK, to analyze these possible effects.

In 2012, Tameside introduced PB to its taxpayers while the neighboring boroughs maintained their traditional budgeting processes. This natural experiment increased civic engagement opportunities for taxpayers and provided an ideal setting to examine how increasing citizen involvement in public budgeting affects tax compliance rates.

This chapter is motivated by the premise that increasing civic participation and engagement opportunities positively affects tax compliance rates. The natural experiment in Tameside was coupled with accessible Council Tax compliance rate data at the borough level. This data allowed the isolation of participatory budgeting as the treatment variable of interest and provided the opportunity to analyze how this treatment affected compliance rates in one borough compared to a control borough before and after the treatment was implemented.

A differences-in-differences design was initially considered to analyze the data across areas and over time to determine the effects of civic participation on tax compliance. However, no single borough in the GMCA provided a valid comparison group due to geographical, political, and socioeconomic differences between Tameside and the surrounding areas. Because of these significant differences, the synthetic control method (SCM) was explored to see if it would be appropriate for studies examining policy changes

such as this. Based on a 2010 study, SCM involves creating a 'synthetic' control area by identifying and assigning weights to untreated donor boroughs in order to create a similar pre-treatment borough (Abadie et al., 2010). The synthetically calculated control area can be used as the valid counterfactual area when comparing the outcome variables between areas and over time.

While the empirical analysis focuses on the case of Tameside, the broader question remains: How does participatory budgeting, as a mechanism for civic engagement, influence tax compliance? To better understand these interactions, Section 4.3 reviews existing literature on participatory budgeting, civic engagement, and tax morale, providing theoretical and empirical insights that inform this study's methodology in Section 4.4. The methodology is followed by the results, analysis, and a concluding discussion beginning in Section 4.5.

4.3 Literature Review

According to the Participatory Budgeting World Atlas, PB is a practice that has grown in popularity in the past several years. In 2019, there were 11,825 PB projects in over 70 countries (Dias et al., 2019), which represented a significant increase from a 2012 global study that estimated the number of projects to be between 1500 and 2500 (Sintomer et al., 2013). In the United Kingdom, the number of projects has increased significantly since the first local government in Bradford instituted the practice in 2004 (Röcke, 2014). The growing use of PB by local governments has been associated with benefits for citizens and communities. The results of some studies have suggested that PB leads to improvements in government fairness and accountability (Wampler, 2012). Later studies on improvements in taxpayers' perceptions have explored connections between PB and

improvements in tax morale (Wampler et al., 2024). However, the relative newness of PB as a process for civic engagement, as well as the wide range of methods and goals for PB in different countries, provides many opportunities for additional research. For example, strong direct evidence measuring changes in tax compliance in areas with PB remains relatively unexplored. This study fills that gap in the literature by examining how PB affects citizens' willingness to pay local taxes over time.

Participatory budgeting can have benefits not only for the taxpayers but also for their local or national governments. A simple model demonstrating the road from PB to tax compliance is shown in Figure 4.1. This model presents three possible pathways leading from the starting point of PB to the final goal of tax compliance. Possible pathways include:

- Visibility of budgeting process and the results
- Perceptions of government fairness
- Trust in the government / government accountability

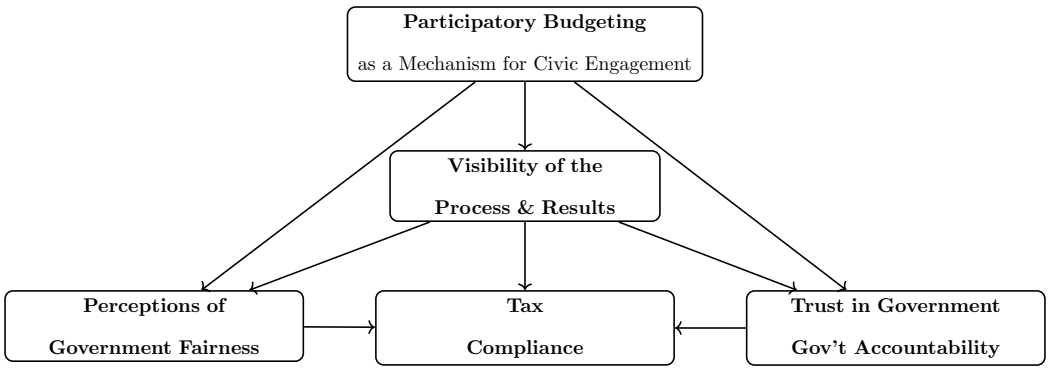


Figure 4.1: The Pathways from Participatory Budgeting to Tax Compliance: An Explanatory Model

This research was based on two key theories: the social contract theory and the fiscal exchange theory. These theories both use slightly different lenses and provide a deeper understanding of the relationship between citizen engagement, government spending,

and tax compliance.

The social contract theory suggests that citizens pay taxes as part of an unwritten 'social contract' between themselves and the government. According to the understood 'contract,' taxes are paid by the citizens in exchange for the government providing services such as healthcare and infrastructure (Kolm, 1997). However, if governments are unwilling or unable to deliver these services, taxpayers may believe that the social contract has been broken. The perceptions of broken contracts may result in lower tax morale and reduced compliance rates by the taxpayers.

The fiscal exchange theory is similar to the social contract theory but focuses more on the taxpayer's cost-benefit evaluation. The fiscal exchange theory is based on the concept that taxpayers are more likely to comply when they perceive a fair, valuable, and direct return on their tax contributions (Feld and Frey, 2002). Taxpayers who are unhappy with the spending allocations or who find fault with the methods of government spending may be less willing to comply. Both of these theories provide a foundation that will be used to examine and analyze the influence of PB on tax compliance rates.

4.3.1 Participatory Budgeting as a Mechanism for Citizen Engagement

Several previous studies examining citizen engagement have proposed that it may be one of the key determinants for improving tax morale and compliance (Feld and Frey, 2002; Frey and Torgler, 2007; Torgler, 2005; Torgler et al., 2007). When governments provide opportunities for citizens to actively participate, these governments promote a greater sense of civic duty, often leading to higher compliance rates. Building on these previous studies, additional research has examined how taxpayers who participate in community decision-making on how to distribute funding feel a stronger sense of ownership with the funded initiatives and the community (Lamberton, 2013).

A comprehensive case study in Africa agreed with these findings and argued that PB is an effective tool for increasing citizen engagement, as it acknowledges and reinforces the value of citizens' opinions (Matovu and Mumvuma, 2008). Related studies examining the associations between PB and direct democracy have found the relationship to be primarily positive. (Donovan et al., 2009; Kukučková and Bakoš, 2019).

4.3.2 Participatory Budgeting: Visibility of the Process and Results

When citizens are able to see how their tax payments are used, it may increase their willingness to pay. Soliciting taxpayer input provides opportunities for the budgeting process to be visible, transparent, and better understood.

In representative democracies, the budgeting process is not usually structured to include regular input from the taxpayers. However, the traditional budgeting process may lead to uninformed budgeting, inefficient public resource distribution, or lack of funding in the areas that need it most (Schugurensky and Mook, 2024). Because of these drawbacks, governments have sought alternative approaches to improving how public service needs are identified and fulfilled. Participatory budgeting (PB) has been utilized as one of the possible solutions by giving citizens direct control over a portion of public money allocation. Rather than relying solely on top-down government decisions, PB provides avenues for communities to voice their priorities so that public money is spent on projects with community needs in mind. Studies show that solutions are more effective when designed by those directly experiencing the problem (Schugurensky and Mook, 2024).

Case studies examining PB have indicated that when the citizens are involved in deciding how public budgets are spent, they are likely to prioritize spending on projects that improve public services. In Porto Alegre, Brazil, citizens involved in PB voted to improve street lighting in high-crime areas. These upgrades resulted in improvements

to public safety and nighttime transportation. This case is considered one of the earliest and most successful implementations of PB. Since 1989, the city has used PB to democratically allocate public funds, resulting in infrastructure and public service improvements (Wampler, 2012).

Subsequent projects in Porto Alegre led to increased road paving and sewage system expansion in low-income neighborhoods that were previously unfunded by the local and national governments. Funding for these projects illustrated how citizen involvement can ensure that public funds are used for high-priority needs, as identified by the community members, instead of politically driven projects. Similarly, PB in Chicago's 49th Ward resulted in public park renovations, expanding access to recreational spaces and increasing community engagement (Williams et al., 2019). In Chicago, PB resulted in higher levels of civic engagement because community members saw that their votes directly impacted tangible improvements in their neighborhoods.

Paris launched a PB program in 2014, shifting budgetary decision-making from centralized government officials to residents, allowing communities to directly influence how municipal funds were spent. Subsequent research on the program in Paris found that the visibility of PB and the citizens' interactions with the process ensured these funds were distributed more equitably across neighborhoods rather than being concentrated in politically favored areas (Cabannes, 2004).

Challenges can arise when citizens benefit from publicly provided goods without directly contributing to their funding (Tanzi, 2005). When communities have non-contributors, the lack of equity can prompt a sense of unfairness from other members of society, lowering tax morale and compliance and eventually leading to underfinanced public services. Another important determinant of tax compliance is ensuring citizens believe and see tangible benefits from their tax contributions. Participatory budgeting may improve

these perceptions by increasing the visibility and accessibility of knowledge of how these tax contributions are spent. An increase in visibility may reinforce the relationship between taxation and the delivery of public services. For instance, in Vallejo, California, PB was employed to fix curbs and sidewalks to improve commonly used public infrastructure (Lerner, 2011). In Lisbon, Portugal, PB participants allocated resources toward bicycle lanes, demonstrating how citizen-directed spending can prioritize services that promote visible, long-term community benefits (Costa et al., 2024). In an experimental voting model that examined the practice of allowing taxpayers to decide how their tax payments should be used, researchers found that democratic participation in spending decisions increased trust in government and enhanced tax morale (Feld and Tyran, 2002). Drawing on this, additional research suggested that tax earmarking, also known as hypothecation, in which taxpayers could choose spending categories, could improve compliance by increasing taxpayers' social preferences and sense of reciprocity (Sausgruber and Tyran, 2011).

In another experimental study, researchers found that taxpayers contributed more to funding community services when they could vote on how these funds were used and if they could see the direct benefits (Wahl et al., 2010). The results suggest that the visibility of these benefits and services strengthens tax morale. Wahl's findings agree with earlier research, which demonstrated that when taxpayers feel they have greater control over the allocation of funding, their compliance levels increase (Alm et al., 1993; Feld and Frey, 2002; Torgler, 2005). Additional studies examined taxpayer behavior and used experimental models to analyze how allowing taxpayers to allocate funds for specific goods and services affected compliance. Their study demonstrated how taxpayer agency facilitated compliance by causing tax payments to feel more like voluntary contributions to benefit the community, reducing the psychological cost of paying taxes, and increasing

perceptions of fairness (Alm et al., 1992).

Following these earlier studies, Lamberton et al. (2018) applied a utility-based model in the US to assess the benefits of taxpayer agency, suggesting that control over spending creates psychological rewards similar to charitable giving. Their results showed that the greater the taxpayers' control over spending decisions, the greater the psychological value attached to tax payments, leading to increases in compliance.

4.3.3 Participatory Budgeting, Perceptions of Fairness and Trust in the Government

One of the broader challenges in tax compliance is demonstrating fairness in taxation and efficiency of government spending to the taxpayers. Research suggests that taxpayers are more willing to comply when they trust that their contributions are used effectively (Torgler et al., 2007). By increasing transparency and citizen participation, PB can improve compliance and address concerns about misallocated or inefficient uses of tax revenues. A review of 29 European countries revealed that taxpayers are more likely to accept higher taxation when they see their governments as fair and efficient (Svallfors, 2013). The sense of fairness leads to higher compliance rates. Similar empirical examinations of tax compliance determinants in Latin America found that citizens are more willing to contribute to publicly funded services when they see tangible improvements in those goods and feel that the government fairly represents their preferences (Bird et al., 2006). Conversely, when governing bodies have exclusive control over how funding is allocated, public trust in government fairness and transparency decreases while perceptions of government corruption increase (Bird et al., 2006; Torgler et al., 2007).

Citizens may feel as though they are taking a risk by paying taxes because they expect public services, representation, and government fairness in return but may not receive it.

If this exchange fails to occur, tax morale and compliance decrease (Chan et al., 2018). In some cases, citizens may believe they receive little or no public benefit for the taxes they pay, leading to noncompliance (Tanzi, 2009). Research in the United States further shows that tax evasion and fraudulent claims for public benefits create an inequitable tax burden on honest taxpayers and undermine perceptions of fairness (Tanzi, 2009). Citizens' expectation of public services, community goods, and government fairness in exchange for tax payments represents a social contract between the state and its citizens (Kolm, 1997). If the expected goods and services are unfairly allocated, inefficient, or not visible, tax morale may decline, leading to reductions in tax compliance (Torgler et al., 2007).

Civic engagement processes such as participatory budgeting can positively reinforce this social contract by including the citizens in the budgeting process. PB also provides strong transparency for public spending decisions. When taxpayers directly observe how their tax money is spent, they are more likely to perceive taxation as fair and necessary (Horodnic, 2018; Luttmer and Singhal, 2014).

Governments at both the local and national levels fund public initiatives through taxation. National taxes, such as income taxes, are paid to finance public benefits on a national scale, such as defense and retirement pensions. In contrast, local taxes, such as property taxes, finance local services like parks, libraries, police, and fire departments. Providing these goods can play an important role in influencing citizens' tax compliance as taxpayers are more likely to contribute when they see direct and tangible benefits from their tax payments (Kolm, 1997).

4.3.4 Research Gap

Although PB can provide multiple benefits to taxpayers, the process does have its limitations. Previous studies examining citizen disengagement suggested that relying solely on direct democracy should not be the only solution (Krenjova and Raudla, 2013). Instead, a dual-pronged approach is necessary, which includes both direct and representative democracy. The inclusion of both types of democracy was examined in one study that indicated that while PB improves civic engagement, it must be coupled with clear governmental guidelines and constraints to address complicated socioeconomic issues effectively (Krenjova and Raudla, 2013). The authors compared PB with the process of building a sophisticated piece of equipment, arguing that governments should not ask citizens to build a car when the average citizen does not understand how an engine works.

Additional studies found that trust in government is one of the strongest determinants of tax compliance (Luttmer and Singhal, 2014). Since PB enhances trust by making the process and use of tax funds more visible, implementing PB may lead to improvements in compliance. While previous studies suggest that participatory budgeting improves the allocation of public funding (Dias et al., 2019; Röcke, 2014), the direct impact of PB on tax compliance has not been fully explored.

This study seeks to address this gap by investigating whether PB, as a mechanism for civic engagement, influences tax compliance behavior in local authority districts in the UK by examining a political locality that used PB and comparing tax compliance trends over time and between areas. By examining a political locality that used PB and comparing tax compliance trends over time and between areas, this study seeks to address this gap by investigating whether PB, as a mechanism for civic engagement, influences tax compliance behavior in local authority districts in the UK.

4.4 Methodology

This research uses a quasi-experimental design to test whether participatory budgeting influences tax compliance behavior over time in a jurisdiction where it was implemented. Council tax collection rates in an area using PB were compared over time against the rates in areas using traditional budgeting processes.

4.4.1 Council Tax Collection Rate as a Measure of Tax Compliance

Council Tax in the UK is a mandatory local tax assessed on residents within local council areas. Each domestic property is assigned one of eight tax bands based on its assessed value as of April 1991 (2003 in Wales) rather than current property values. Local councils determine the tax rates for each band based on their budgetary needs. The tax is paid by the current residents of the property, whether they are owners or renters, and is used to fund public services such as recycling, rubbish collection, and adult and children's social services. According to the Ministry of Housing, Communities and Local Government (MHCLG), in 2010, Council Tax represented approximately 30 percent of a local authority's annual budget, with variations based on the different local authorities (Sayer, 2019). Grants from the central government to Tameside and all local authorities were significantly cut during this time, resulting in a higher percentage of local authority budgets being funded through Council Tax payments. Although Council Tax is mandatory, some residents may be late or delinquent in their payments. Financial, physical, or mental hardship can make it difficult for some to pay the required amounts (Murray and Smith, 2024), while others may contest the legitimacy of the tax. Delinquent taxpayers can be penalized by wage deductions, bailiff visits, or imprisonment for not paying.

Independent research organizations have criticized Council Tax as regressive because

tax bands are still linked to a property's valuation as of April 1991. This may lead to perceptions of unfairness or of an outdated system. Residents of lower-band homes pay a larger share of their property's value in tax compared to those in higher bands (Leishman et al., 2014). Additionally, aggressive debt collection practices by some councils have been criticized as being inconsistent with the amount and nature of the tax (Murray and Smith, 2024).

Although legal exemptions and reductions are available, the expected Council Tax receipts reflect the differences in tax bands, property values, and estimated exemptions. The mandatory nature of the tax, in addition to the social benefits funded by the tax make the local authority's Council Tax collection rate an appropriate stand-alone measure of tax compliance for this study.

4.4.2 Setting

In order to examine the effects of PB on tax compliance, it was necessary to identify a location that had implemented PB and where the necessary data was available to analyze. The urban borough of Tameside in the UK met both of these conditions and was chosen for this study. Tameside is a metropolitan borough within the Greater Manchester Combined Authority and is classified as an urban area, with a population of 219,324 as of 2011. The median age of residents at that time was 39, with 64 percent of households owning their residence either with a mortgage or outright. The population was 51 percent female and 49 percent male. In 2010, Tameside piloted a small-scale PB initiative, which helped inform best practices for the rollout of what was meant to become a long-term method of allocating funds for community initiatives.

The borough's first large-scale PB project was drafted in 2011 and funded through savings on landfill fees due to improved recycling practices by residents. The project,

branded as *You Choose*, also marketed as *You Recycle, You Choose*, allowed residents to submit requests to fund new or ongoing community initiatives (Tameside MBC, 2011). Proposed uses for PB funds were required to align with one or more of Tameside's Sustainable Community Strategy themes (see Appendix C, Table C.1).

In the third quarter of 2011, participatory voting events were held in eight district assembly areas across Tameside. At these events, community members were guided through the PB process and were able to vote on each of the funding proposals using Likert-scale surveys. Participants were asked to assess the extent to which each proposal:

1. Would benefit the area and its citizens.
2. Would help the area achieve the Tameside Priorities as outlined in the Sustainable Community Strategy.
3. Could be delivered effectively by the group proposing the project.
4. Was a good use of public money (Tameside MBC, 2011).

Funding from a pool of £500,000 was awarded to winning proposals related to children's programs, safety, health and fitness initiatives, community recreation, and more. Follow-up surveys indicated that voter participation during the 2011/2012 PB cycle represented a broad cross-section of Tameside's population, with approximately 40 percent of PB voters completing the survey. During this period, 739 residents voted (representing 0.34% of the total population), with 97 percent expressing satisfaction with the event and 87 percent agreeing that *You Choose* and PB in general, were effective ways to allocate public funds (Tameside MBC, 2012). Based on survey responses, the local authority district concluded that PB successfully increased community engagement.

A second round of PB in Tameside occurred in 2012/2013, with a reduced funding pool of £440,000. However, like many UK boroughs, Tameside faced significant budget cuts in the following years. After 2012, the borough transitioned to an online budgetary consultation simulation, replacing in-person PB as a strategy to address decade-long budget

cuts of £200 million (Tameside MBC, 2013). This shift effectively brought traditional PB in Tameside to a close. However, the demonstration of citizen influence over public spending at the local level provides motivation for examining whether this participation led to measurable changes in local tax compliance rates. The corresponding data availability led to Tameside being selected as the treatment area for this study.

4.4.3 Research Design and Data Sources

This research examined Council Tax compliance rates from 2009 to 2019, covering both pre- and post-treatment periods. Throughout these periods, the treatment area was compared with nearby boroughs that did not implement PB. Including all boroughs within Greater Manchester at the beginning of the study provided nine possible control areas against which Tameside could be compared. Due to the non-random selection of the treatment area, this study employed a quasi-experimental design. The variations between Tameside (treatment) and comparable boroughs (control) post-treatment enabled the estimation of the effects of PB on tax compliance rates.

The sources used for this study included the Understanding Society survey conducted regularly in the UK, as well as public records available from the Ministry of Housing, Communities and Local Government (MHCLG) and the Office of National Statistics (ONS). These datasets provided both individual-level demographic information and borough-level economic indicators, enabling a robust analysis of tax compliance trends before and after the introduction of PB.

The Understanding Society survey was used to collect data on demographic and socioeconomic data for individual taxpayers in the treatment area and all all remaining boroughs in the GMCA. These data were used as control variables to account for differences in gender, income, employment status, education levels, and other key socioeco-

nomic factors that may influence tax compliance. The licensed version of the survey included additional identifiers such as constituency and local authority. The inclusion of these area-specific variables allowed for the analysis of taxpayer behavior within different boroughs over time.

The MHCLG data provided council tax collection rates at the borough level during the years of the study. These rates served as the primary dependent variable and represented average tax compliance rates both before and after the implementation of PB in Tameside.

Additional economic indicators were provided at the country and local level by The Office of National Statistics (ONS). These included inflation rates, unemployment rates, population estimates, geographic size, and population density. These factors were included as control variables to account for geographic and economic trends that could affect tax compliance and political interest levels.

The study population comprised the ten boroughs within the Greater Manchester Combined Authority (GMCA), the UK's second most populous metropolitan area. The study period spanned years from 2009 to 2019, covering both pre- and post-treatment periods surrounding the introduction of PB in Tameside in 2012.

4.4.4 Identification of Control Boroughs

Tameside was identified as the treatment area based on its initial implementation of participatory budgeting (PB) in 2012. The remaining nine boroughs within the Greater Manchester Combined Authority (GMCA) served as potential control groups based on geographic proximity to and inclusion in the same combined authority as the treatment borough. However, proximity and membership in a political district do not ensure that treatment and control areas share similar traits, so statistical testing was necessary.

The main outcome variable of interest was the Council Tax compliance rate for each borough, measured annually from 2009 to 2019. A visual inspection of the pre-treatment collection rate trends (2009–2011) was conducted to examine the suitability of each potential control borough. Since the initial inspection suggested only mild similarity between Tameside and other boroughs, a regression analysis was conducted to formally test for parallel trends during the pre-treatment years. The results of the parallel trends tests comparing each possible control group against the treatment group returned p-values indicating significant pre-treatment differences between groups ($p \leq 0.05$). Although a difference-in-differences (DiD) design was originally considered for this study, the significant pre-treatment differences in boroughs indicated that the standard DiD method would not provide reliable estimates of a relationship between PB and Council Tax compliance. Due to this indication, additional methods for identifying and creating a control area were explored.

In a 2010 paper, researchers presented a technique known as the synthetic control method (SCM) for creating parallel control areas (Abadie et al., 2010). According to their study, this method can be reliably used to create a 'synthetic' control area, which could then be used to analyze the effects of policy changes between areas and over time. Unlike traditional DiD, which assumes pre-treatment parallel trends between treatment and control groups, the synthetic control process constructs a data-driven weighted combination of control areas that best matches the pre-treatment trends of the treated area. The estimated policy effects can be estimated by examining the size and direction of the gap between the original observed outcome and the outcome predicted by the synthetic control area during the post-treatment period.

While SCM provides a strong alternative to traditional difference-in-differences, it does have some limitations. This method assumes that a specific weighted combination of

control areas can reasonably match the pre-treatment trends of the treated area. Also, the SCM does not produce conventional standard errors. As a result, any inference is typically based on placebo testing across untreated areas to determine whether the observed treatment effect is unusually large. In this study, the SCM was implemented first manually and then automated using the `synth_runner` tool in Stata. While the manual approach helped visualize the treatment effect, the `synth_runner` method generated placebo-based and standardized p-values. These methods provided additional evidence of statistical significance for the post-treatment effects.

Preparing the data prior to implementing SCM involved determining which variables were strongly correlated with Council Tax compliance. A basic correlation test was conducted, and the measure of area prosperity from the Index of Multiple Deprivation was identified as having the strongest correlation with Council Tax collection rates (-0.8804). Appendix C, Table C.5 provides the detailed results of these correlations.

Following best practices in synthetic control estimation, lagged values of the Council Tax compliance rate were included to improve pre-treatment fit (Abadie et al., 2010). Creating and including lagged outcome variables is a recommended method for ensuring that the synthetic control closely matches the pre-treatment trends of the treated area. The inclusion of the lagged variables also minimizes Root Mean Squared Prediction Errors (RMSPE) (McClelland and Gault, 2017). Including two lagged variables successfully reduced the RMSPE to 0.1313, validating the selection of three predictors:

- *lad_imd*: An area-level prosperity predictor, showing the strongest correlation with Council Tax compliance.
- *lag1_colrate*: Council Tax compliance rate from the previous wave.
- *lag2_colrate*: Council Tax compliance rate from two waves before the treatment year.

Analysis of these predictors indicated that Rochdale, Salford, and Trafford (areas 5, 6,

and 9) were most similar to Tameside (area 8) in terms of prosperity (IMD scores) and historical Council Tax compliance. These three boroughs were the only units assigned nonzero weights in the synthetic control, contributing most to the construction of a valid counterfactual. Table 4.1 provides each borough and the resulting weights, while Table 4.2 displays the balance of the three predictor means when applying those weights.

Table 4.1: Borough Weights resulting from the Synth Process: Council Tax Compliance Rates

	Borough	**Unit Weight**
1	Bolton	0
2	Bury	0
3	Manchester	0
4	Oldham	0
5	Rochdale	0.721
6	Salford	0.097
7	Stockport	0
9	Trafford	0.182
10	Wigan	0
8	Tameside	*NA - Treatment*

Table 4.2: Pre-treatment Means of Predictor Variables using Synthetic Control Weights

Predictor	**Treated**	**Synthetic**
lad_imd	29.62	30.84488
lag1_colrate	95.4949	95.40076
lag2_colrate	95.74	95.64477

Using these new weights identified through SCM, a synthetic control borough (Borough 11) was created in the dataset to allow robust comparisons between treatment and control groups. The Council Tax collection rate assigned to this new borough was generated as the weighted average of the Council Tax collection rate variable in the three donor boroughs (areas 5, 6, and 9). The weights were derived from the Synth procedure, ensuring that their combined trend closely resembled that of Tameside before 2012. The

synthetic Council Tax collection rate variable (*synthlad_colrate*) was defined as:

$$\widehat{\text{synthlad\_colrate}}_t = 0.721(\text{lad\_colrate}_{5,t}) + 0.097(\text{lad\_colrate}_{6,t}) + 0.182(\text{lad\_colrate}_{9,t}) \tag{4.1}$$

Where:

- $\widehat{\text{synthlad\_colrate}}_t$ represents the synthetic Council Tax collection rate at time t for the treated borough.
- The weights (0.720, 0.097, 0.182) are assigned to donor boroughs 5, 6, and 9, respectively, based on the Synth procedure.
- $\text{lad\_colrate}_{i,t}$ is the observed Council Tax collection rate in donor borough i at time t.

By applying these weights to the outcome variable, the synthetic control closely mirrored the pre-treatment trend of Tameside, allowing for a valid counterfactual comparison. Essentially, by using the SCM process, a customized counterfactual area was created, showing how the compliance rates in Tameside would have behaved if no treatment were given. The process allows the examination of how the treatment area (Tameside) changed relative to its counterfactual self. To facilitate comparison, the original values for Tameside were retained in the dataset alongside the synthetic control, allowing for a side-by-side visual analysis as shown in Figure 4.2. The line graph indicated that the compliance rate for the synthetic control area closely tracked Tameside's compliance rate before the treatment, suggesting an improved parallel trend compared to any single borough alone.

After successfully validating the synthetic control area, the dataset was prepared to formally estimate the effect of participatory budgeting on tax compliance. All non-relevant boroughs (i.e., those not part of the synthetic control) were removed from the dataset,

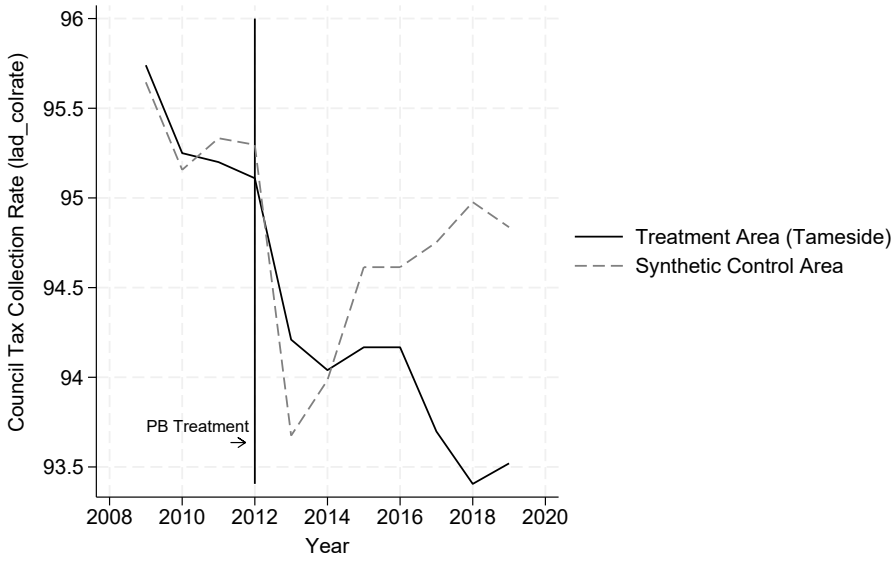


Figure 4.2: Council Tax Collection Rate by Year and Area

leaving only areas 11 and 8 representing the new control area and the treatment area. Each of these two areas had one observation of the mean Council Tax collection rate per year from 2009 to 2019, resulting in a dataset with 22 observations (n=22). Table C.2 in Appendix C presents descriptive statistics for key variables, including the dependent variable (council tax compliance rates), key demographic controls (e.g., income, employment status, education), and borough-level economic indicators (e.g., inflation and unemployment rates).

After confirming that the synthetic control closely replicated Tameside's pre-treatment trends, the next step was to assess whether the observed post-treatment effect was statistically meaningful and not due to chance. To assess the robustness of the estimated treatment effect for Tameside (Area 8), placebo tests were conducted by applying the synthetic control method to three untreated areas: Area 5, Area 6, and Area 9. Each placebo unit was assigned a hypothetical treatment in 2012, and synthetic control series were constructed using the same method. For each placebo test, the donor pool was ad-

justed to exclude the placebo unit itself. The resulting gaps were compared to Tameside's treatment effect to evaluate whether similar gaps were present in the untreated areas.

4.4.5 Error Estimation with the Synthetic Control Method

Unlike traditional regression models, the synthetic control method (SCM) does not rely on conventional standard errors to determine significance. Because the treatment effect is estimated as the difference between the treated unit and a weighted combination of control units, standard error calculations such as clustering or robust standard errors are no longer appropriate. Instead, the best practice for SCM is to conduct placebo (permutation) tests on several untreated units to assess whether the observed treatment effect was likely to have occurred by chance (Abadie et al., 2010). When using SCM, the placebo testing is a robust and data-driven method for evaluating statistical significance.

4.4.6 Additional Variables of Interest

While the primary analysis focused on the effects of participatory budgeting on Council Tax compliance, two additional variables that are relevant for further analysis emerged throughout this study. One of the secondary goals of Participatory Budgeting (PB) in Tameside was to encourage borough residents to increase their recycling rates. Therefore, recycling behavior was examined as a variable of interest in this study using borough-level recycling rates (*lad_recyc*).

Previous research has indicated that financial and non-financial incentives can encourage recycling rates across a wide range of populations. Studies by Viscusi et al. (2011) demonstrated that financial incentives such as deposit refunds or direct payments can increase recycling rates by lowering both the time and costs of recycling. These rewards seemed to incentivize higher recycling rates even among citizens with lower environ-

mental awareness. Additionally, Li et al. (2021) showed that certain non-financial incentives such as public recognition and thank-you messages can also increase recycling rates. These non-financial rewards were most effective in communities where citizens had a higher emotional engagement with their community.

Tameside's approach to offering incentives included both financial and non-financial elements. The existing recycling program resulted in monetary savings, which were not distributed directly back to the citizens but rather pooled into a fund to support visible community improvements. The PB project in Tameside provides an interesting opportunity to examine how a reward which blends financial and non-financial incentives impacts recycling rates.

In addition to tax compliance and recycling rates, taxpayers' political interest levels (*pol_int*) were analyzed before and after the intervention due to the previous connections between this variable and citizens' tax compliance.

Notable results from Chapter 3 of this thesis indicated that respondents' levels of political interest (*pol_int*) were a significant predictor of tax morale across both OLS and fixed effects models. These findings align with previous research demonstrating a strong, causal link between political interest and tax morale (Alm et al., 1992; Engel et al., 2024; Feld and Frey, 2002; Lamberton et al., 2018). Given its significant role in shaping civic engagement and attitudes toward government, political interest itself was examined as a key outcome variable. Therefore, this study used the initial synthetic control procedure to identify an appropriate control area and then proceeded with a difference-in-differences (DiD) analysis to assess whether the Participatory Budgeting (PB) intervention influenced residents' political interest levels over time. By investigating political interest (*pol_int*) as a secondary dependent variable, this research provides insight into whether PB can foster greater political engagement alongside any fiscal impacts.

Unlike the Council Tax collection rates, which were only available at the borough level, political interest levels were available at the individual level. As with Council Tax collection rates, the goal was to identify an appropriate control group that closely mirrored Tameside's political interest trends citizens in Tameside before treatment. The individual analysis began with 33,000 individual observations. However, since the focus was on evaluating the political interest level of individuals within fixed boroughs, all individuals who moved boroughs during the study period were removed from the data set. This ensured that changes in location from one borough to another would not confound changes in political interest levels. Following the identification of individuals who changed boroughs, all observations in which any variable of interest had a missing value were also excluded. This reduced the dataset to just under 4,000 observations.

To determine an appropriate counterfactual for Tameside (area 8), a preliminary visual inspection of the political interest trends was conducted across nine potential donor areas. As with the borough-level analysis, no areas were perfectly parallel, but a few exhibited similar trends in the pre-treatment period. The 'Synth' process was executed in Stata to assess which areas were most comparable. Once again, the data was collapsed by area and year, resulting in 110 observations showing the difference in the mean political interest level across areas and over time. This step identified areas 4 and 10 as the closest matches to Tameside in terms of political interest trends before the intervention and the only areas that received nonzero weights, as shown in Table 4.3.

To verify these results, a parallel trends regression analysis was conducted at the individual level using only the pre-treatment data ($year < 2012$) for individuals in Tameside (area 8) and the two previously identified control areas (4 and 10). The following model

Table 4.3: Borough Weights resulting from the Synth Process: Political Interest

	Borough	**Unit Weight**
1	Bolton	0
2	Bury	0
3	Manchester	0
4	Oldham	0.972
5	Rochdale	0
6	Salford	0
7	Stockport	0
9	Trafford	0
10	Wigan	0.028
8	Tameside	*NA - Treatment*

was estimated:

$$pol\_int_{it} = \beta_0 + \beta_1 treatment_i + \beta_2 year_t + \beta_3 (treatment_i \times year_t) + \epsilon_{it},$$
$$\text{for } year_t < 2012, \quad i \in \{4, 8, 10\} \tag{4.2}$$

The interaction term ($treatment \times year$) tested whether the slope of *pol_int* differed significantly between Tameside and the control areas in the pre-treatment period. The results indicated no significant difference in trend ($p = 0.667$), meaning the parallel trends assumption held with the observations at the individual level for control areas 4 and 10. All observations of individuals residing in other control areas were removed, reducing the dataset to approximately 2,600 observations.

Another visual inspection of the collapsed data's pre-treatment trends showed that Oldham (area 4) was more closely aligned with Tameside than Wigam (area 10). An additional model was estimated, limiting the analysis to areas 4 and 8 (treatment). The second model, without including area 10, provided a higher p-value ($p = 0.695$), indicating a more parallel pre-treatment trend. Given this, and since the parallel trends assumption held for *pol_int* without needing a weighted synthetic control, only area 4

was retained as the final control group. Figure 4.3 shows the pre- and post-treatment trends between the treatment area of Tameside (area 8) and the control area of Oldham (area 4).

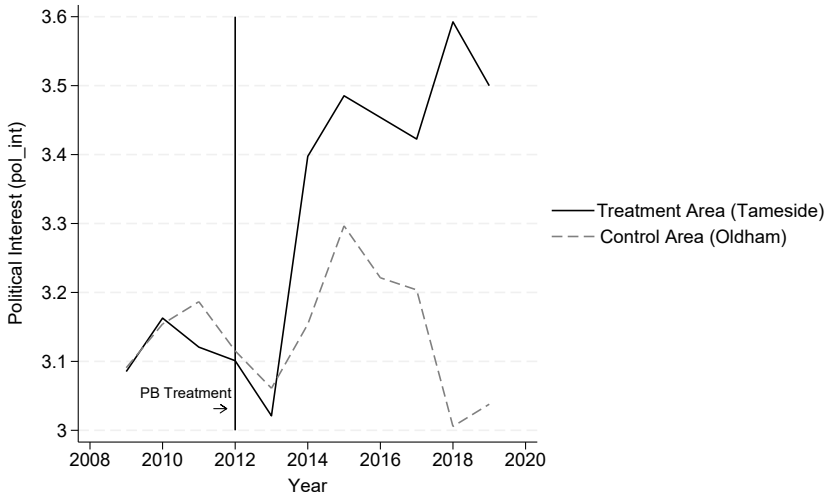


Figure 4.3: Political Interest Level by Year and Area

Unlike the process for Council Tax collection rate (*lad_colrate*) analysis, constructing a synthetic control variable was not necessary. Additionally, individual-level data does not allow for this type of aggregation. However, running the SCM procedure helped identify which control areas exhibited the most parallel pre-treatment trends in political interest levels with Tameside.

After area 4 was identified as the most valid counterfactual, the final difference-in-differences (DiD) regression was run with clustered standard errors at the borough level. This model estimated the impact of PB on political interest in Tameside compared to the control area of Oldham:

$$pol\_int_{it} = \beta_0 + \beta_1 treatment_i + \beta_2 post\_pb_t + \beta_3 (treatment_i \times post\_pb_t) + \epsilon_{it}, \quad i \in \{4, 8\} \tag{4.3}$$

Studies examining the determinants of successful PB projects indicate that additional variables such as size, diversity, and prosperity were key factors in their success (Krenjova and Raudla, 2013). Although the motivation for this study was not to define or analyze all of these factors, including these variables helped identify similarities and differences between the treatment and control boroughs, ensuring robust comparisons.

Control variables were selected to address potential confounding factors and isolate the effect of PB implementation on political interest levels. Data on population size and land area were sourced from the Office of National Statistics for the years of interest (ONS, 2023). Population figures were divided by the number of square kilometers to calculate population density for each local authority (*ladpop_dens*), which was used as one of the control variables.

Diversity was measured as the percentage of non-white residents in each local authority district, based on the 2011 Census (ONS, 2011). However, due to the lack of annual data on changes in non-white population percentages, further analysis of diversity was not conducted in this study.

Prosperity was measured using the Index of Multiple Deprivation (IMD), a combined metric designed to identify areas experiencing multiple forms of deprivation and in need of additional resources or policy interventions (Smith et al., 2015). Additional control variables included unemployment and inflation rates at both local and national levels (ONS, 2023). Country-level annual inflation rates were also gathered (ONS, 2024). These controls allowed the analysis to account for broader economic conditions that could influence political interest independently of PB.

Together, these variables were included to reduce potential biases and provide robust estimates of the relationship between PB and political interest. By accounting for both demographic and economic differences over time, they enable a more precise comparison

between the treatment and control boroughs.

Tables C.2 and C.3 in Appendix C contain a complete listing of each variable, relevant information, and descriptive statistics.

4.4.7 Methodology Conclusion

This study used a quasi-experimental approach to assess the impact of participatory budgeting (PB) on tax compliance, applying the Synthetic Control Method (SCM) to construct a valid counterfactual. Instead of assuming pre-treatment parallel trends, as required in traditional difference-in-differences (DiD) methods, the SCM was used to build a weighted combination of control areas that best replicated the treated area's outcomes prior to the treatment. This approach strengthened the identification strategy by improving the pre-treatment fit and enabling a more credible comparison between treatment and control outcomes in the post-treatment period.

Because SCM does not produce conventional standard errors, statistical inference was conducted through placebo testing, where the treatment was reassigned to control units to assess how often similar or larger treatment effects would occur by chance. This approach allowed for the evaluation of statistical significance even in a small-sample setting.

Despite the challenges of working with limited observational units, this study provides useful insights into the application of SCM in public policy evaluation. The findings contribute to both the literature on participatory budgeting and the growing use of synthetic controls by demonstrating how permutation-based significance (placebo) testing can provide robust and valid results when traditional regression techniques are not appropriate. The following section presents the results of the analysis as well as additional details on how the synthetic control methods were implemented.

4.5 Results and Discussion

4.5.1 Council Tax Compliance Rates

Before participatory budgeting was instituted in 2012, Tameside closely matched its synthetic control counterpart, which indicates a good pre-treatment fit. In the years following treatment, there was a brief period where Council Tax compliance was slightly higher than the synthetic control area (2013), but this effect only persisted in the short term as shown in Figure 4.4.

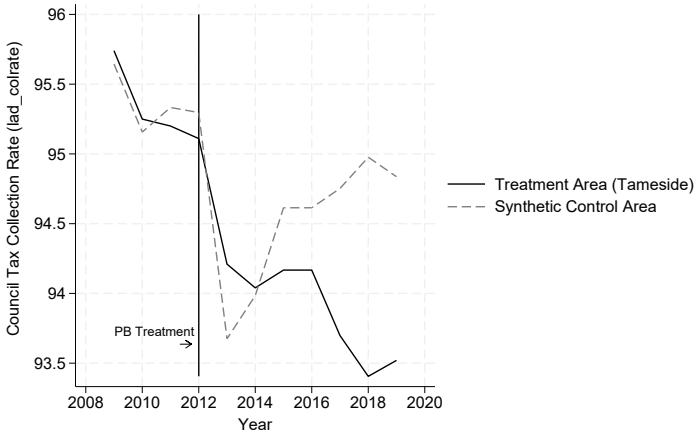


Figure 4.4: Council Tax Collection Rate by Year and Area

Beginning in 2015, Tameside underperformed relative to the synthetic control area, with the gap widening significantly during the final three years of the study. These results suggest an increasingly negative treatment effect that may reflect unintended policy consequences after PB was discontinued. The results may also suggest the presence of unobserved external factors that affected the treated unit.

As shown in Table 4.4, Tameside's post-treatment gaps become notably more negative in the later years, and in several years, these gaps exceed the gaps observed in the placebo

areas. While the gaps were not consistently larger across all post-treatment periods, the pattern and magnitude of Tameside's gaps suggest that the observed effect was most likely not due to chance alone.

Table 4.4: Council Tax Collection Gaps: Tameside vs. Placebo Areas

Year	**Tameside Gap**	**Placebo 5 (Rochdale)**	**Placebo 6 (Salford)**	**Placebo 9 (Trafford)**
2009	0.095	0.331	0.074	0.050
2010	0.093	-0.600	-0.149	0.168
2011	-0.133	-0.369	-1.353	0.550
2012	-0.186	-0.424	-1.126	0.720
2013	0.535	-0.721	0.342	0.750
2014	0.056	0.386	-0.348	0.790
2015	-0.447	-0.146	-0.635	0.956
2016	-0.447	-0.146	-0.635	0.956
2017	-1.054	0.059	-1.991	1.354
2018	-1.571	0.332	-0.987	1.571
2019	-1.317	0.610	-0.830	1.610

In the years prior to the treatment (2009–2011), Tameside's synthetic control model showed a close fit, with small and stable pre-treatment gaps of 0.095, 0.093, and -0.133, respectively. In contrast, the placebo areas show more variability during the same period. For instance, in 2011, Placebo Area 5 had a gap of -0.369, Placebo Area 6 showed a much larger gap of -1.353, and Placebo Area 9 showed a moderate positive gap of 0.550. These differences suggest that the SCM procedure achieved a closer pre-treatment fit for Tameside than for the placebo areas. The closer fit indicates that Tameside was well-suited for synthetic control estimation. Because a well-fitting pre-treatment match is a key requirement to validate the SCM, the consistency of Tameside's pre-treatment gaps demonstrates the reliability of its synthetic counterfactual.

Following the introduction of participatory budgeting in 2012, Tameside began to display a sustained and increasingly negative gap between its actual and synthetic Council

Tax collection rate. The post-treatment gaps for Tameside were -0.186 (2012), -0.447 (2015 and 2016), and -1.054, -1.571, and -1.317 in the final three years (2017–2019). In contrast, none of the areas examined in the placebo tests showed the same sustained and directional pattern as Tameside. Figure 4.5 shows the magnitude of the gap over time. The detailed values for the gap calculations are included in Appendix C, Table C.8.

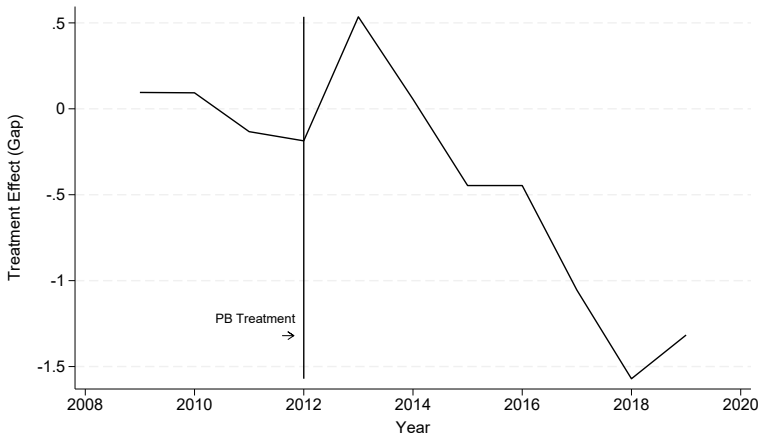


Figure 4.5: Gap Between Treatment and Synthetic Control area Post-Treatment

The differences were most pronounced between 2017 and 2019, when Tameside's gaps remained consistently negative and substantially larger in magnitude than those of the placebos. In 2019, Tameside's gap was -1.317, compared to +0.610 (Placebo 5), -0.830 (Placebo 6), and +1.610 (Placebo 9).

The results of the previous tests were based on individual placebo tests conducted separately on Areas 5, 6, and 9. To provide additional analysis and to formally test for statistical significance, placebo testing was also conducted using the automated `synth_runner` package in Stata, developed by Galiani and Quistorff (2017). This procedure generated placebo distributions across untreated units and computed both raw and standardized p-values. Table 4.5 provides the results of this test and indicates that the estimated treatment effects for the final three post-treatment years were statistically significant.

Table 4.5: Post-Treatment Effects and Placebo Results from `synth_runner`

Year	Estimated Gap	Placebo p-value	Standardized p-value
2012	-0.186	0.889	0.556
2013	0.535	0.556	0.222
2014	0.056	1.000	0.889
2015	-0.447	0.667	0.333
2016	-0.447	0.667	0.333
2017	-1.054	0.444	0.000
2018	-1.571	0.000	0.000
2019	-1.317	0.111	0.000

The years 2017 through 2019 showed standardized p-values of 0.000. These findings suggest that the observed post-treatment gap for Tameside is unlikely to have occurred by chance.

Both the direction and the size of the treatment effect (gap) in Tameside when compared to the placebo areas strengthens the suggestion that the observed changes in Council Tax were affected by participatory budgeting. These findings align with Abadie et al. (2010), who argue that when the treated unit shows a substantially larger gap than any placebo, and especially when that gap diverges after treatment while placebo gaps do not, the results can be interpreted as strong evidence of a policy effect.

To estimate the economic implications of the observed post-treatment gaps, the percentage point differences between actual and synthetic council tax collection rates were multiplied by the average tax per dwelling (MHCLG, 2025), and the number of chargeable dwellings per year (MHCLG, 2024). Table 4.6 summarizes these findings. Beginning in 2017, the decreases in revenue became especially pronounced, with potential revenue losses exceeding £1 million each year.

These results highlight the possible financial consequences that a borough such as Tameside might face following the implementation and subsequent withdrawal of a civic engagement initiative.

Table 4.6: Estimated Post-Treatment Revenue Impact of Gaps in Council Tax Collection

Year	Tameside Gap (%)	Average Tax per Chargeable Dwelling (£)	No. of Chargeable Dwellings	Revenue Impact (£)
2012	-0.19	941	99,573	-174,279
2013	0.54	810	100,141	433,961
2014	0.06	802	100,504	45,138
2015	-0.45	832	100,968	-375,504
2016	-0.45	872	101,421	-395,323
2017	-1.05	939	101,932	-1,008,827
2018	-1.57	1,005	102,365	-1,616,195
2019	-1.32	1,080	103,154	-1,467,221

4.5.2 Borough Recycling Rates and Individual Political Interest Levels

In addition to Council Tax collection rates, two other variables of interest were studied: borough recycling rates and individual political interest levels. An examination of borough-level recycling rates suggested that PB led to minimal changes (less than a 0.02% increase) across all post-treatment periods, with none of these results indicating statistical significance, as shown in Appendix C, Table C.4. This result may be due to the nature of the incentive offered by Tameside. As mentioned in the literature review, financial incentives are more consistent at improving recycling rates than non-financial incentives (Viscusi et al., 2011). The recycling incentives in Tameside were geared more toward providing community-level benefits rather than individual financial gain, which may have reduced their effectiveness for the taxpayers. Additionally, Li et al. (2021) found that non-financial incentives were most effective when taxpayers had a strong emotional connection with the community. In the case of Tameside, it is possible that the citizens did not feel a strong connection to the community-level improvements, which would have reduced the effectiveness of the incentive.

The third outcome variable, political interest level (*pol_int*), was analyzed using DiD

regressions, with variations in post-treatment times to allow data analysis of the short-term, mid-term, and long-term results. These models estimated the impact of the treatment on individual taxpayers' levels of political interest. The full results of this model are included in Appendix C, Table C.7. The results indicate that PB had a positive and statistically significant effect on political interest in the treatment area compared to control areas and that this effect appears to increase over time. In the first post-treatment period, PB is associated with a 0.0777-point increase in political interest on a 5-point scale relative to the control group. During the second post-treatment period, this effect increases to 0.1483 points and then reaches 0.1904 points during the final time period. All three estimates were statistically significant, suggesting that PB consistently contributed to slightly higher levels of political interest among the residents living in Tameside. This aligns with findings in the literature that highlight the positive relationship between PB and civic engagement (Lamberton, 2013; Donovan et al., 2009).

4.5.3 Limitations and Challenges in Evaluating Participatory Budgeting

The design and implementation of PB programs vary quite a bit in scale, scope, and goal. Some initiatives, like that in Porto Alegre, are at a national level and allocate up to 20% of the municipal budget, giving the citizens substantial and visible influence over large-scale programs. In contrast, PB in Tameside was much smaller, with only limited financial resources and a goal that was more focused on community-level projects than on broader social programs.

Measuring the long-term impacts of PB can also be difficult due to data availability constraints at the individual level, especially in terms of tax compliance rates. Research has demonstrated that the success of PB is highly dependent on citizen involvement. The

more actively citizens participate, the greater the positive impact on tax compliance and civic trust. However, participation rates in PB tend to decline over time (Schugurensky and Mook, 2024). In small-scale PB projects, citizens may participate only to secure funding for a specific project and then lose interest once their project is complete. This raises additional questions on how well PB promotes sustained citizen engagement versus serving as a tool to fund small projects. This aligns with critiques in the UK stating that PB in the UK has been somewhat tokenistic, as only small portions of local budgets are subject to citizen participation (Lerner, 2011). Government fairness may also impact the success of PB. For example, if a particular political party has a strong influence over the budgeting process in a constituency, PB may be perceived as symbolic rather than representing a genuine desire by the government to truly engage citizens in the budgeting process.

The size of the area in which PB was implemented may also have led to challenges. Large-scale national-level programs like those in Brazil and South Korea have demonstrated more measurable outcomes than small-scale local PB initiatives like the one in Tameside (Harkins and Escobar, 2015; Williams et al., 2019). Although participatory budgeting can create opportunities for citizen participation, active participation in PB decision-making remains relatively low at both the local and country levels, leaving ample opportunities for future research on participatory budgeting, its benefits, and the measures of its success.

The results of this study suggest that participatory budgeting (PB) may have made small contributions to improving tax compliance rates, but only in the first years following implementation. However, these improvements experienced a statistically significant decline after the program ended. A possible explanation for the post-treatment decline is that stopping the PB initiatives represented a breakdown in the perceived social

contract between citizens and local government. These results suggest that when opportunities for civic engagement are introduced and then withdrawn, citizens may become less willing to comply with tax obligations.

4.6 Conclusion

This study highlights some of the challenges involved in analyzing the primary research question: What are the effects of participatory budgeting (PB) on citizens' tax compliance rates? The results related to this main question demonstrated that although PB may have a small positive effect initially, the long-term effects were significantly negative. However, it is unclear if those negative effects were due to the implementation of PB or due to the removal of the process by the local government.

This study provides several key insights into the application of the synthetic control method and the analysis of small datasets. One significant challenge was the need to analyze data at the area level, which substantially reduced the number of observations and limited the software's ability to detect nuanced differences between boroughs. Potential solutions to address this limitation include increasing the sample size by including additional boroughs with PB or gathering data at the individual level. However, obtaining individual-level data on tax compliance remains a persistent challenge, as most respondents are unwilling to provide honest answers about their compliance behavior, even in anonymous survey settings.

Given the observed impacts of PB on political interest at the individual level, future research could examine whether the effects of PB vary depending on the political party in control of local governance. Further studies might also explore whether PB's influence on tax compliance is stronger in areas where local leaders have greater incentives

to respond to citizen input. Additionally, research could investigate how different demographic groups engage in PB to assess whether certain groups within communities are under or overrepresented in collective decision-making processes.

This study provides a key indication that civic engagement processes such as PB lead to greater political interest. The improvements in engagement and interest may need to be sustained for several years before notable improvements are seen in tax compliance.

Chapter 5

Conclusion

Tax compliance is more than a lofty goal for local and national governments. A fully compliant society promotes perceptions of fairness, contributing to high morale and well-funded public services. If tax compliance can provide governments and societies with these non-financial and financial benefits, it is economically rational for policymakers to find ways to strengthen compliance. Tax compliance in many developed countries is considered voluntary, giving taxpayers a choice of how to behave. This economic behavior can be influenced by social norms, leadership, or invitations to participate in civic engagement. One possible way to encourage compliance is to identify and influence what citizens view as 'normal' tax behavior. Secondly, governments can encourage political leaders who directly or indirectly promote tax morale. Thirdly, policymakers can create and sustain additional civic engagement opportunities for citizens to become more involved in how their local governments are run.

This thesis used determinants from the four categories of tax compliance identified in Fisher's tax compliance model. Studying taxpayer norms provided a deeper understanding of demographic variations and noncompliance opportunities. The gender of political leaders provided a way to study gender dynamics and perceptions of fairness in tax compliance. Finally, civic engagement processes such as participatory budgeting

provided an opportunity to examine how tax system structures can influence taxpayer behavior. Studying different aspects of the tax compliance framework in each of the research chapters reflects the real-world complexity of tax compliance.

This thesis contributes to the literature on tax morale and compliance by offering empirical evidence on factors that have positive and negative impacts on taxpayer behavior. Each chapter provides a unique examination of a determinant of tax compliance, which may motivate additional research on taxpayer decision-making. Additional non-financial factors such as fairness, visibility, gender roles, and civic engagement tools may be strong determinants of tax morale and compliance, and may help governments understand how these determinants affect taxpayer behavior.

Tax compliance is one of the strongest foundations for efficient provision of public services, yet reducing the tax gap is often overlooked as a way to increase revenues. Each of the preceding chapters provides insights into ways to reduce this gap. Understanding how citizens view tax compliance norms may lead to targeted messaging campaigns to improve or shift these perceptions. Investigating gender quotas or other mechanisms to support diversity in leadership may enhance public trust and the sense of fairness. Inviting and encouraging citizen participation in public budgeting or other civic engagement activities may strengthen political interest, understanding, and compliant behavior.

Using structured techniques, policymakers can begin framing tax compliance as a utility-maximizing choice, using factors that go beyond financial motivations alone. Approaching tax compliance from several different angles, such as social, political, and structural, can provide new insights into how governments can encourage a fully compliant society. Understanding the different angles can provide a more complete and behavior-focused picture of how to improve citizens' tax behavior.

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Chapter A

Appendix Content from Chapter 2: The Effects of Demographics on Tax Compliance Norms: Evidence from a US Vignette Experiment

A.1 Tables

Table A.1: Survey Items and Variable Constructs

Survey Item	Variable	Information	Research Validation
Dependent Variables			
1-7	desc_norm_comply	Respondent's beliefs about compliance using descriptive norms.	Measured by behavioral estimates when descriptive norms are unobservable (Krieger, 2016). The scale originally had 7 items ($\alpha = 0.832$), final scale (5 items) $\alpha = 0.902$.

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Table A.1 continued

Survey Item	Variable	Information	Research Validation
8-21	inj_norm_comply	Respondent's beliefs about compliance using injunctive norms.	Measured using Likert scale ratings of approval perceptions (Krieger, 2016). Final scale (14 items) $\alpha = 0.987$.
22	attn_check	Attention check question with an obvious correct answer.	Common in social science research for scale validity (Berinsky et al., 2014; Bowling et al., 2016).
23-26	persnorm_comp	Respondent's beliefs about compliance using personal moral reasoning.	Personal norms affect behavior in unobserved settings (Kornhauser, 2007). High moral reasoning leads to higher compliance (Trivedi et al., 2003).
Explanatory and Control Variables			
	vig_gender	Dummy: 1 if Dana is Male, else 0.	Randomly Generated
	vig_incsource	Dummy: 1 if company-employed, 2 if both self- and company-employed, else 0 (self-employed only).	Randomly Generated
	vig_inclevel	Dummy: 1 if middle income, 2 if high income, else 0 (low income).	Randomly Generated
	vig_ref	Dummy: 1 if Dana is a good friend, 2 if a close family member, else 0 (a coworker).	Randomly Generated

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Table A.1 continued

Survey Item	Variable	Information	Research Validation
27-29	benefit	Perception of Dana's financial, social, and emotional benefits of non-compliance.	Final scale (14 items) $\alpha = 0.769$.
30-32	cost	Perception of Dana's financial, social, and emotional costs of non-compliance.	Final scale (14 items) $\alpha = 0.751$.
33	Sdb_SDE	Social Desirability Bias (SDB): Self-Deceptive Enhancement (SDE).	From The Balanced Inventory of Desirable Responding (Paulhus, 1991).
34	Sdb_IM	Social Desirability Bias (SDB): Impression Management (IM).	From The Balanced Inventory of Desirable Responding (Paulhus, 1991).
35-38	tax_knowledge	Perceptions of tax compliance risks, measured by audits and fines knowledge. • If previously audited = 3.5, else 0 • Likely discovered: 7 (high) to 1 (low) • Perceived audit rate (0-100%) scored 7 (most knowledge) to 0 (least knowledge).	Final scale (14 items) $\alpha = 0.765$.
39(a-f)	respondent_risky	Personal, financial, and social risk-taking behavior.	Risk behavior as a predictor of compliance (Stasson & Fishbein, 1990).

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Table A.1 continued

Survey Item	Variable	Information	Research Validation
40(a-c)	tax_risk	Perceptions of tax non-compliance risks (audits and fines).	Final scale (14 items) $\alpha = 0.765$.
41-49	Tax Demographics	Personal tax characteristics of Respondent	
50-62	Personal Demographics	Standard demographics collected from respondents.	Based on demographic questions used in the latest US Census.
	Sex, Gender	Sexual orientation and gender identity.	Based on *Updates on Terminology of Sexual Orientation and Gender Identity Survey Measures** (Morgan et al., 2020).*
	Race, Ethnicity	Race and ethnicity based on US Census standards.	Census Bureau's *Improvements to the 2020 Census Race and Hispanic Origin Question Designs* (Marks et al., 2021).
	Occupational Category	Respondent's occupation category.	Based on *BLS Occupational Employment listing* (2022).

Table A.2: Demographic Characteristics of Respondents (N = 438)

Variable	Value	Number	Percent
Sex			
	Male	226	51.4
	Female	211	48.0
	Intersex	0	0.0

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Table A.2 continued

Variable	Value	Number	Percent
	Not Listed	1	0.5
Gender Identity			
	Woman	221	50.2
	Man	228	51.8
	Non-binary	9	2.0
	Genderqueer	9	2.0
	A gender identity not listed	7	1.6
Age			
	18-24	12	2.7
	25-34	175	39.8
	35-44	125	28.4
	45-54	60	13.6
	55-64	45	10.2
	65-74	19	4.3
	75-84	1	0.2
	85 or older	1	0.2
Race			
	White	377	85.7
	Black or African American	29	6.6
	American Indian or Alaska Native	16	3.6
	Asian	47	10.7
	Native Hawaiian or Pacific Islander	9	2.0
	A race not listed here	13	2.9
Hispanic			
	Yes	92	20.9
	No	346	78.6
Education			
	Less than a high school diploma	1	0.2

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Table A.2 continued

Variable	Value	Number	Percent
	High school degree or equivalent (e.g. GED)	16	3.6
	Some college, no degree	11	2.5
	Associate degree (e.g. AA, AS)	17	3.9
	Bachelor's degree (e.g. BA, BS)	275	62.5
	Master's degree (e.g. MA, MS, MEd)	113	25.7
	Doctorate or professional degree (e.g. MD, DDS, PhD)	4	0.9
Income Source: Employment Status			
	Full Time	353	80.6
	Part Time	32	7.3
	Self-Employed	34	7.7
	Unemployed and looking for work	7	1.6
	Retired	9	2.0
	Unable to work	2	0.5
Income Level			
	Less than $25,000	24	5.5
	$25,000 - $49,999	136	30.9
	$50,000 - $99,999	186	42.3
	$100,000 - $199,999	71	16.1
	$200,000 or more	19	4.3
Household Size			
	1 person	50	11.4
	2 people	62	14.8
	3 people	132	30.0
	4 people	155	35.2
	5 people	31	7.0
	6 or more people	5	1.2

Table A.3: Respondents' Tax Filing Characteristics (N = 438)

Variable	Category	Number	Percent
Who Files			
	Self	237	53.9
	Spouse/partner	88	20.0
	Parents/guardian	36	8.2
	Paid Preparer	65	14.8
	Other	12	2.7
Claimed as Dependent or Spouse?			
	Dependent	159	36.1
	Spouse/partner	119	27.0
	Neither	146	33.5
	Other	14	3.1
Earned $600 or More Last Year			
	Yes	412	93.6
	No	21	4.8
	Other	5	1.1
Will Earn $600 or More This Year			
	Yes	412	93.6
	No	21	4.8
	Other	5	1.1
Filing Status Last Year			
	Single	104	23.7
	Married Filing Jointly	250	57.1
	Married Filing Separately	41	9.3
	Head of Household	21	4.8

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Table A.3 continued

Variable	Category	Number	Percent
	Qualified Surviving Spouse	5	1.1
	Other / Did not file	17	3.9
Income Source: Forms Received Last Year			
	W-2	224	50.9
	1099 NEC	130	29.5
	1099 MISC	166	37.7
	1099 - other	130	29.5
	None of the above	58	13.1
Percentage of Income Reported by 3rd Party Last Year			
	100%	143	32.5
	60-99%	134	30.5
	30-59%	111	25.2
	1-29%	31	7.0
	0%	11	2.5
	Other	8	1.8
Hired Paid or Volunteer Tax Preparer Last Year			
	Yes	272	61.8
	No	128	29.1
	Other / Did not file	38	8.6
Used Tax Preparation Software Last Year			
	Yes	330	51.4
	No	73	48.0
	Other / Did not file	35	8.0

Table A.4: Descriptive Statistics of Key Variables

Variable	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Dependent Variables					
Descriptive Compliance Norms	438	4.157	1.263	2.429	7.143
Injunctive Compliance Norms	438	3.544	2.071	0	7.0
Independent Variables: Vignette Character					
Gender	438	Male (45.0%), Female (55.0%)			
Income Level	438	Low (32.4%), Middle (34.7%), High (32.9%)			
Income Source	438	Company-Employed (34.9%), Both (31.5%), Self-Employed (33.6%)			
Independent Variables: Respondent					
Gender	438	Male (51.6%), Female (48.2%)			
Income Level	438	Low (30.1%), Middle (48.4%), High (3.2%)			
Income Source	438	Company-Employed (48.63%), Both (10.96%), Self-Employed (40.4%)			
Age	438	18-24 (3.0%), 25-44 (71.6%), 45-64 (20.7%), 65+ (4.6%)			
Education	438	High School or less (3.5%), Some College (68.1%), Graduate Degree (28.2%)			
Perceived Evasion Benefit	438	4.664	1.470	1.0	7.0
Perceived Evasion Cost	438	5.044	1.259	1.0	7.0
Social Desirability: SDE	438	4.760	1.718	1.0	7.0
Social Desirability: IM	438	5.484	1.548	1.0	7.0
Personal Risk Level	438	3.216	1.445	1.0	6.0
Tax Risk Level	438	4.216	0.880	1.0	6.0

Table A.5: Respondents' Beliefs about Tax Compliance Norms by type of Norm and Character Demographics.

	Compliance Using Descriptive Norms			Compliance Using Injunctive Norms		
	Mean	**Std. Dev.**	**Std. Err.**	**Mean**	**Std. Dev.**	**Std. Err.**
Character Gender						
Female	4.27	1.34	0.09	3.69	2.10	0.14
Male	4.02	1.15	0.08	3.34	2.03	0.14
Character Income Level						
Low Income	4.14	1.27	0.11	3.53	1.99	0.17
Middle Income	4.30	1.35	0.11	3.61	2.12	0.17
High Income	4.01	1.15	0.10	3.48	2.10	0.18
Character Income Source						
Company-employed	4.16	1.29	0.10	3.54	2.08	0.17
Both Comp.& Self	4.14	1.33	0.11	3.61	2.13	0.18
Self-employed	4.17	1.18	0.10	3.49	2.02	0.17

A.2 Full Survey Instrument

Tax Behavior Survey

Consent Form

This study is being conducted by researchers from the University of Reading, UK and has been approved by the University's Research Ethics Committee. The data collected in this survey will be used for research only and will not be used for commercial purposes. All responses are anonymous. This survey and the data collected are GDPR compliant.

Purpose of the Study

The purpose of this research study is to gather data on factors that may influence the tax behavior of individuals in the United States. If you agree to be in this study, you will complete an online survey. The survey includes questions about tax filing and payment behavior and should take you between 10-15 minutes.

Procedures

This study will ask you to read through a hypothetical scenario and then complete a set of questions related to the scenario. This study will also ask you to complete a variety of socio-demographic questions.

Potential Risks

This procedure has no known risks greater than those of ordinary daily life.

Potential Benefits

Other than the monetary compensation offered at the beginning of this survey, we do not expect you to directly benefit from being in this study. However, your participation may help us to learn more about tax compliance behavior. We hope the knowledge gained from this study will benefit others in the future.

Confidentiality

The survey is anonymous and no one will be able to link your responses back to you. Your responses to the survey will not be linked to your computer, email address, or other electronic identifiers. Please do not include your name or other information that could be used to identify you in your survey responses.

Information collected for this study will be published and possibly presented at academic or scientific meetings. Although you cannot skip questions, you can indicate "Refuse to answer" for any questions that you do not want to answer.

Being in this study is up to you. You can stop at any point up until you submit the survey, but you will need to complete all parts of the survey in order to be eligible for compensation. After you submit the survey, we cannot remove your responses because we will not know which responses came from you. All analyses of the data will be averaged across all the participants, so your individual responses will never be specifically analyzed.

For questions or concerns regarding participation or payment, or to request a summary of research findings, please contact:

- **Research Manager:** Portia Benson (p.benson@pgr.reading.ac.uk)
- **Faculty Supervisor:** Steven Bosworth (s.bosworth@reading.ac.uk)

Agreement: The nature and purpose of this research have been sufficiently explained, and I agree to participate in this study. I understand that I am free to withdraw at any time without incurring any penalty.

Please click below to indicate consent:

[ ] I fully understand the contents of this consent form and agree

to participate in this study. I also agree not to disclose the details of the study to other parties.

When you are ready, click "Next" to proceed.

Eligibility Verification

This survey is only intended for people over the age of 18 who are currently living and working in the United States and who earn at least $600 or more per year. Do you meet all of these criteria?

1 Yes

0 No

2 Not sure, probably not

Note: Participants who selected 'No' or 'Not Sure' were automatically directed to the following message:

We're sorry. You do not meet the qualifications for this survey. We sincerely thank you and appreciate your time, dedication, and continued participation in our online surveys.

Scenario 1

In this survey, you will be presented with a short hypothetical scenario. There are no "right" or "wrong" opinion answers, so please state your opinion as honestly as possible.

Scenario Description

In the US, most companies provide workers with wage reporting forms (W-2s) for tax purposes. Self-employed workers receive cash, personal checks, or credit card payments directly from their clients/customers and do not receive a W-2, although they might receive an alternative wage reporting form (1099) for all or some of the income.

For the purposes of this survey, workers can be employed in three ways:

1. Employed by a company only
2. Self-employed only
3. A combination of both self-employed and employed by a company

All workers can lower their tax liability by claiming tax deductions. These deductions could be legally based on situations such as charitable giving, retirement contributions, capital losses, qualified business, medical and educational expenses, etc. Deductions can be calculated by the taxpayer and stated legally, or they can be overstated (illegally).

Survey Vignette:

> Dana is a **GENDER** living and working in the United States and **EMPLOYMENT TYPE**. Dana's pre-tax income from all sources last year was **INCOME LEVEL**. Now, imagine that Dana is a member of **REFERENCE GROUP**. Based on the amount of income Dana earned last year, Dana will need to file an individual income tax return to report income, calculate taxes owed, and make any necessary payments.

Randomized Variables:

- **Gender:** Male, Female
- **Employment Type:** Self-employed, Employed by a company, Both self-employed and company-employed
- **Income Level:** Low ($46,000), Middle ($85,000), High ($170,000)
- **Reference Group:** Family, Close friends, Coworker

Survey Questions

Responses to Scenario: ***(Beliefs using Descriptive Norms)***
After the random assignment of variables within the vignette, the static vignette continued to be displayed at the top of each section to support respondent memory of the scenario.

1. How likely is it that Dana will file a tax return this year based on the work performed last year?
   (a) Extremely unlikely
   (b) Moderately unlikely
   (c) Slightly unlikely
   (d) Neither likely nor unlikely
   (e) Slightly likely
   (f) Moderately likely
   (g) Extremely likely
   (h) Refuse to answer
2. How likely is it that Dana will underreport income received last year?
   (a) Extremely unlikely
   (b) Moderately unlikely
   (c) Slightly unlikely
   (d) Neither likely nor unlikely
   (e) Slightly likely
   (f) Moderately likely
   (g) Extremely likely
   (h) Refuse to answer
3. How likely is it that Dana will overstate deductions taken last year?
   (a) Extremely unlikely
   (b) Moderately unlikely
   (c) Slightly unlikely
   (d) Neither likely nor unlikely
   (e) Slightly likely
   (f) Moderately likely

(g) Extremely likely

(h) Refuse to answer

4. How likely is it that Dana will declare 100% of his/her annual income and tax liability to the government?

   (a) Extremely unlikely

   (b) Moderately unlikely

   (c) Slightly unlikely

   (d) Neither likely nor unlikely

   (e) Slightly likely

   (f) Moderately likely

   (g) Extremely likely

   (h) Refuse to answer

Using the options below, please rate your agreement with the following statements.

5. I believe people like Dana will underreport their income.

   (a) Strongly agree

   (b) Agree

   (c) Somewhat agree

   (d) Neither agree nor disagree

   (e) Somewhat disagree

   (f) Disagree

   (g) Strongly disagree

   (h) Refuse to answer

6. I believe people like Dana will overstate their deductions.

   (a) Strongly agree

   (b) Agree

   (c) Somewhat agree

   (d) Neither agree nor disagree

   (e) Somewhat disagree

   (f) Disagree

   (g) Strongly disagree

   (h) Refuse to answer

7. I believe people like Dana will fail to file an income tax return.
   (a) Strongly agree
   (b) Agree
   (c) Somewhat agree
   (d) Neither agree nor disagree
   (e) Somewhat disagree
   (f) Disagree
   (g) Strongly disagree
   (h) Refuse to answer

Responses to Scenario: ***(Beliefs using Injunctive Norms)***
Static vignette displayed.

If you were Dana, how appropriate would your family consider the actions listed below?

8. Failing to file a required tax return.
   (a) Extremely inappropriate
   (b) Moderately inappropriate
   (c) Slightly inappropriate
   (d) Neither appropriate nor inappropriate
   (e) Slightly appropriate
   (f) Moderately appropriate
   (g) Extremely appropriate
   (h) Refuse to answer
9. Underreporting income.
   (a) Extremely inappropriate
   (b) Moderately inappropriate
   (c) Slightly inappropriate
   (d) Neither appropriate nor inappropriate
   (e) Slightly appropriate
   (f) Moderately appropriate
   (g) Extremely appropriate
   (h) Refuse to answer

10. Overstating deductions.

    (a) Extremely inappropriate
    (b) Moderately inappropriate
    (c) Slightly inappropriate
    (d) Neither appropriate nor inappropriate
    (e) Slightly appropriate
    (f) Moderately appropriate
    (g) Extremely appropriate
    (h) Refuse to answer

If you were Dana, how appropriate would your co-workers consider the actions listed below?

11. Failing to file a required tax return.

    (a) Extremely inappropriate
    (b) Moderately inappropriate
    (c) Slightly inappropriate
    (d) Neither appropriate nor inappropriate
    (e) Slightly appropriate
    (f) Moderately appropriate
    (g) Extremely appropriate
    (h) Refuse to answer

12. Underreporting income.

    (a) Extremely inappropriate
    (b) Moderately inappropriate
    (c) Slightly inappropriate
    (d) Neither appropriate nor inappropriate
    (e) Slightly appropriate
    (f) Moderately appropriate
    (g) Extremely appropriate
    (h) Refuse to answer

13. Overstating deductions.

    (a) Extremely inappropriate

(b) Moderately inappropriate
(c) Slightly inappropriate
(d) Neither appropriate nor inappropriate
(e) Slightly appropriate
(f) Moderately appropriate
(g) Extremely appropriate
(h) Refuse to answer

If you were Dana, how appropriate would your close friends consider the actions listed below?

14. Failing to file a required tax return.
    (a) Extremely inappropriate
    (b) Moderately inappropriate
    (c) Slightly inappropriate
    (d) Neither appropriate nor inappropriate
    (e) Slightly appropriate
    (f) Moderately appropriate
    (g) Extremely appropriate
    (h) Refuse to answer
15. Underreporting income.
    (a) Extremely inappropriate
    (b) Moderately inappropriate
    (c) Slightly inappropriate
    (d) Neither appropriate nor inappropriate
    (e) Slightly appropriate
    (f) Moderately appropriate
    (g) Extremely appropriate
    (h) Refuse to answer
16. Overstating deductions.
    (a) Extremely inappropriate
    (b) Moderately inappropriate
    (c) Slightly inappropriate

(d) Neither appropriate nor inappropriate
(e) Slightly appropriate
(f) Moderately appropriate
(g) Extremely appropriate
(h) Refuse to answer

How appropriate do you feel the following people would see Dana's failure to report 100% of his/her income?

17. Dana's family.

(a) Extremely inappropriate
(b) Moderately inappropriate
(c) Slightly inappropriate
(d) Neither appropriate nor inappropriate
(e) Slightly appropriate
(f) Moderately appropriate
(g) Extremely appropriate
(h) Refuse to answer

18. Dana's co-workers.

(a) Extremely inappropriate
(b) Moderately inappropriate
(c) Slightly inappropriate
(d) Neither appropriate nor inappropriate
(e) Slightly appropriate
(f) Moderately appropriate
(g) Extremely appropriate
(h) Refuse to answer

19. Dana's community members.

(a) Extremely inappropriate
(b) Moderately inappropriate
(c) Slightly inappropriate
(d) Neither appropriate nor inappropriate
(e) Slightly appropriate

(f) Moderately appropriate
(g) Extremely appropriate
(h) Refuse to answer

20. Dana's close friends.

(a) Extremely inappropriate
(b) Moderately inappropriate
(c) Slightly inappropriate
(d) Neither appropriate nor inappropriate
(e) Slightly appropriate
(f) Moderately appropriate
(g) Extremely appropriate
(h) Refuse to answer

21. Dana himself/herself.

(a) Extremely inappropriate
(b) Moderately inappropriate
(c) Slightly inappropriate
(d) Neither appropriate nor inappropriate
(e) Slightly appropriate
(f) Moderately appropriate
(g) Extremely appropriate
(h) Refuse to answer

Attention Check

22. Please select 'Strongly agree' from the choices below to show that you are paying attention to this question.

22. Please select 'Strongly agree' from the choices below to show that you are paying attention to this question.

(a) Strongly agree
(b) Agree
(c) Somewhat agree
(d) Neither agree nor disagree
(e) Somewhat disagree

(f) Disagree
(g) Strongly disagree
(h) Refuse to answer

Options for the Attention Check question were shuffled and presented to the respondents in a random order chosen by Qualtrics (Strongly Agree was not always presented first). If 'Strongly Agree', was selected, then participants were allowed to begin the next section. If 'Strongly Agree' was not selected, the survey displayed the following text before exiting. "We're sorry. You did not successfully answer the attention check question so you will be removed from this survey. We sincerely thank you and appreciate your time, dedication, and continued participation in our online surveys."

Scenario Response - *(Respondent Compliance Beliefs)*
Static vignette displayed.

23. If you were in Dana's position, how likely would you be to file a tax return?

(a) Extremely likely
(b) Moderately likely
(c) Slightly likely
(d) Neither likely nor unlikely
(e) Slightly unlikely
(f) Moderately unlikely
(g) Extremely unlikely
(h) Refuse to answer

24. If you were in Dana's position, how likely would you be to understate your income?

(a) Extremely likely
(b) Moderately likely
(c) Slightly likely
(d) Neither likely nor unlikely
(e) Slightly unlikely
(f) Moderately unlikely
(g) Extremely unlikely
(h) Refuse to answer

25. If you were in Dana's position, how likely would you be to overstate your deductions?

    (a) Extremely likely
    (b) Moderately likely
    (c) Slightly likely
    (d) Neither likely nor unlikely
    (e) Slightly unlikely
    (f) Moderately unlikely
    (g) Extremely unlikely
    (h) Refuse to answer

26. If you were in Dana's position, how likely would you be to declare 100% of your income?

    (a) Extremely likely
    (b) Moderately likely
    (c) Slightly likely
    (d) Neither likely nor unlikely
    (e) Slightly unlikely
    (f) Moderately unlikely
    (g) Extremely unlikely
    (h) Refuse to answer

Responses to Scenario: Costs and Benefits

Static vignette displayed.

27. Dana would financially benefit from underreporting income or overstating deductions.

    (a) Strongly disagree
    (b) Disagree
    (c) Somewhat disagree
    (d) Neither agree nor disagree
    (e) Somewhat agree
    (f) Agree
    (g) Strongly agree

(h) Refuse to answer

28. Dana would socially benefit from underreporting income or overstating deductions.

    (a) Strongly disagree
    (b) Disagree
    (c) Somewhat disagree
    (d) Neither agree nor disagree
    (e) Somewhat agree
    (f) Agree
    (g) Strongly agree
    (h) Refuse to answer

29. Dana would emotionally benefit from underreporting income or overstating deductions.

    (a) Strongly disagree
    (b) Disagree
    (c) Somewhat disagree
    (d) Neither agree nor disagree
    (e) Somewhat agree
    (f) Agree
    (g) Strongly agree
    (h) Refuse to answer

30. There would be a financial cost to Dana from underreporting income or overstating deductions.

    (a) Strongly disagree
    (b) Disagree
    (c) Somewhat disagree
    (d) Neither agree nor disagree
    (e) Somewhat agree
    (f) Agree
    (g) Strongly agree
    (h) Refuse to answer

31. There would be a social cost to Dana from underreporting income or overstating deductions.

(a) Strongly disagree
(b) Disagree
(c) Somewhat disagree
(d) Neither agree nor disagree
(e) Somewhat agree
(f) Agree
(g) Strongly agree
(h) Refuse to answer

32. There would be an emotional cost to Dana from underreporting income or overstating deductions.

(a) Strongly disagree
(b) Disagree
(c) Somewhat disagree
(d) Neither agree nor disagree
(e) Somewhat agree
(f) Agree
(g) Strongly agree
(h) Refuse to answer

Social Beliefs

Please select the answer that best describes you or your beliefs.

33. It's all right with me if people happen to dislike me.

(a) Strongly disagree
(b) Disagree
(c) Somewhat disagree
(d) Neither agree nor disagree
(e) Somewhat agree
(f) Agree
(g) Strongly agree
(h) Refuse to answer

34. I never take things that don't belong to me.

(a) Strongly disagree
(b) Disagree
(c) Somewhat disagree
(d) Neither agree nor disagree
(e) Somewhat agree
(f) Agree
(g) Strongly agree
(h) Refuse to answer

Tax and Risk Exposure
Please select the answer that best describes you or your beliefs.

35. Have you ever had your tax returns audited?

    (a) No
    (b) Maybe / Not sure
    (c) Yes
    (d) Refuse to answer

36. How likely do you feel it is that you might be audited within the next 12 months?

    (a) Extremely unlikely
    (b) Moderately unlikely
    (c) Slightly unlikely
    (d) Neither likely nor unlikely
    (e) Slightly likely
    (f) Moderately likely
    (g) Extremely likely
    (h) Refuse to answer

37. If someone were to underreport their income and be selected for an audit, how likely is it that the underreporting would be discovered (caught) during the audit?

    (a) Extremely unlikely
    (b) Moderately unlikely
    (c) Slightly unlikely
    (d) Neither likely nor unlikely

(e) Slightly likely

(f) Moderately likely

(g) Extremely likely

(h) Refuse to answer

38. What percentage of individual income tax returns do you believe are audited each year? Use the sliding scale to select the number between 0 and 100%.

39. Indicate how often you engage in the following activities.

    (a) Recreational risks such as rock climbing or SCUBA diving.

        i. Never
        ii. Less than once a month
        iii. Between 1-3 times per month
        iv. Between 4-15 times per month
        v. More than 15 times per month
        vi. Refuse to answer

    (b) Health risks such as smoking, poor diet, or high alcohol consumption.

        i. Never
        ii. Less than once a month
        iii. Between 1-3 times per month
        iv. Between 4-15 times per month
        v. More than 15 times per month
        vi. Refuse to answer

    (c) Career risks such as quitting a job without another one to go to.

        i. Never
        ii. Less than once a month
        iii. Between 1-3 times per month
        iv. Between 4-15 times per month
        v. More than 15 times per month
        vi. Refuse to answer

    (d) Financial risks such as gambling or risky investments.

        i. Never
        ii. Less than once a month
        iii. Between 1-3 times per month
        iv. Between 4-15 times per month
        v. More than 15 times per month
        vi. Refuse to answer

(e) Safety risks such as fast driving or city cycling without a helmet.
   i. Never
   ii. Less than once a month
   iii. Between 1-3 times per month
   iv. Between 4-15 times per month
   v. More than 15 times per month
   vi. Refuse to answer

(f) Social risks such as standing for election or publicly challenging a rule or decision.
   i. Never
   ii. Less than once a month
   iii. Between 1-3 times per month
   iv. Between 4-15 times per month
   v. More than 15 times per month
   vi. Refuse to answer

40. Using the following scale, rate the riskiness of the following activities.

(a) Failing to file a required tax return.
   i. Not risky
   ii. Not too risky
   iii. Neutral
   iv. Somewhat risky
   v. Risky
   vi. Refuse to answer

(b) Underreporting income on a tax return.
   i. Not risky
   ii. Not too risky
   iii. Neutral
   iv. Somewhat risky
   v. Risky
   vi. Refuse to answer

(c) Over-reporting deductions on a tax return.
   i. Not risky
   ii. Not too risky
   iii. Neutral
   iv. Somewhat risky
   v. Risky

vi. Refuse to answer

Tax Demographics

41. In your household, who is the main person responsible for preparing YOUR income tax return?

    (a) Me. I prepare my tax returns myself
    (b) My spouse / partner
    (c) My parent(s) / guardian(s)
    (d) A paid tax preparer
    (e) Other
    (f) Refuse to answer

42. Did anyone else claim you as part of their U.S. Individual Income Tax return last year?

    (a) Yes, I was claimed as a dependent
    (b) Yes, I was claimed as a spouse / partner
    (c) No
    (d) Not applicable
    (e) Refuse to answer

43. Did you earn more than $600 last year in taxable income?

    (a) Yes
    (b) No
    (c) Not applicable
    (d) Refuse to answer

44. Do you plan on earning more than $600 in taxable income this year?

    (a) Yes
    (b) No
    (c) Not applicable
    (d) Refuse to answer

45. If you filed a U.S. Individual Income Tax Return last year, what did you select for your filing status?

    (a) Single
    (b) Married filing jointly

(c) Married filing separately (MFS)
(d) Head of household (HOH)
(e) Qualifying surviving spouse (QSS)
(f) I was listed as a dependent on a parent/guardian's return
(g) N/A - I did not file at all
(h) N/A - I did not file a U.S. Individual Income Tax Return last year
(i) Refuse to answer

46. Which of the following tax forms did you receive last year? Select all that apply.

(a) W-2
(b) 1099 NEC for Non-employee compensation
(c) 1099 MISC for Miscellaneous compensation
(d) 1099 - all other types (DIV, INT, R)
(e) N/A - I did not receive any W-2 or 1099 forms
(f) Refuse to answer

47. What percentage of your total annual household income received last year was reported to the government by a third party (the payer) using governmental forms such as form W-2 or form 1099?

(a) 100%
(b) 60-99%
(c) 30-59%
(d) 1-29%
(e) 0%
(f) Refuse to answer

48. Did you hire/use a paid or volunteer tax professional to prepare your tax return last year? This could be a preparer such as an H&R Block agent, a CPA, IRS Volunteer, AARP Tax-Aide, or another person/organization.

(a) Yes
(b) No
(c) Unsure
(d) N/A - I did not file
(e) Refuse to answer

49. Did you use a paid or free tax return software package to help you prepare your tax return last year? Examples include TurboTax, TaxSlayer, H&R Block Software, FreeTaxUSA, or CashApp Tax.

(a) Yes
(b) No
(c) Unsure
(d) N/A - I did not file
(e) Refuse to answer

Personal Demographics

50. Birth sex: What sex were you assigned at birth?

    (a) Male
    (b) Female
    (c) Intersex
    (d) A sex not listed here
    (e) Refuse to answer

51. What is your current gender identity? Please select all that apply.

    (a) Woman
    (b) Man
    (c) Non-binary
    (d) Genderqueer
    (e) A gender not listed here
    (f) Refuse to answer

52. How would you describe yourself? Please select all that apply.

    (a) White
    (b) Black or African American
    (c) American Indian or Alaska Native
    (d) Asian
    (e) Native Hawaiian or Pacific Islander
    (f) Some other race not listed here
    (g) Refuse to answer

53. Are you of Hispanic, Latino, or Spanish origin?

    (a) Yes
    (b) No

(c) Refuse to answer

54. Which of the major occupational groups below do you associate with the strongest?

(a) Management Occupations
(b) Business and Financial Operations Occupations
(c) Computer and Mathematical Occupations
(d) Architecture and Engineering Occupations
(e) Life, Physical, and Social Science Occupations
(f) Community and Social Service Occupations
(g) Legal Occupations
(h) Educational Instruction and Library Occupations
(i) Arts, Design, Entertainment, Sports, and Media Occupations
(j) Healthcare Practitioners and Technical Occupations
(k) Healthcare Support Occupations
(l) Protective Service Occupations
(m) Food Preparation and Serving Related Occupations
(n) Building and Grounds Cleaning and Maintenance Occupations
(o) Personal Care and Service Occupations
(p) Sales and Related Occupations
(q) Office and Administrative Support Occupations
(r) Farming, Fishing, and Forestry Occupations
(s) Construction and Extraction Occupations
(t) Installation, Maintenance, and Repair Occupations
(u) Production Occupations
(v) Transportation and Material Moving Occupations
(w) Military Specific Occupations
(x) Other
(y) N/A - Not currently employed
(z) Refuse to answer

55. What is your age?

(a) 18 - 24
(b) 25 - 34
(c) 35 - 44
(d) 45 - 54

(e) 55 - 64
(f) 65 - 74
(g) 75 - 84
(h) 85 or older
(i) Refuse to answer

56. What is the highest degree or level of school you have completed?

(a) Less than a high school diploma
(b) High school degree or equivalent (e.g. GED)
(c) Some college, no degree
(d) Associate degree (e.g. AA, AS)
(e) Bachelor's degree (e.g. BA, BS)
(f) Master's degree (e.g. MA, MS, MEd)
(g) Doctorate or professional degree (e.g. MD, DDS, EdD, PhD)
(h) Refuse to answer

57. What is your marital status?

(a) Single (never married)
(b) Married, or in a domestic partnership
(c) Widowed
(d) Divorced
(e) Separated
(f) Refuse to answer

58. What is your current employment status?

(a) Employed full-time (40 or more hours per week)
(b) Employed part-time (up to 39 hours per week)
(c) Self-employed
(d) Unemployed and currently looking for work
(e) Unemployed, not currently looking for work
(f) Student
(g) Retired
(h) Homemaker
(i) Unable to work
(j) Other

(k) Refuse to answer

59. What was your total household income before taxes last calendar year?

(a) Less than $25,000
(b) $25,000 - $49,999
(c) $50,000 - $99,999
(d) $100,000 - $199,999
(e) $200,000 or more
(f) Refuse to answer

60. Which of the following describes your living status?

(a) Homeowner
(b) Lessee / Renter
(c) Other
(d) Refuse to answer

61. How many people are currently living in your home?

(a) 1 person
(b) 2 people
(c) 3 people
(d) 4 people
(e) 5 people
(f) 6 or more people
(g) Refuse to answer

62. How many children do you have (even if they do not live at home)?

(a) 0
(b) 1
(c) 2-4
(d) 5 or more
(e) Refuse to answer

Thank You!

Please make note of the following ID number. Write it down or copy this number. You will input it through Mechanical Turk to indicate completion of the study.
ID number: _____ (To be provided by system)

Chapter B

Appendix Content from Chapter 3: Political Leader Gender and Tax Morale: Evidence from the UK Elections

B.1 Tables

Table B.1: Summary Statistics

Variable	Description	N	Statistics
Dependent Variables			
pol_cap	Political capability (Avg. of poleff1 and poleff2)	52,574	Mean = 2.787, SD = 0.973, Min = 1, Max = 5
pol_influ	Political influence (Avg. of poleff3 and poleff4)	52,574	Mean = 2.670, SD = 0.903, Min = 1, Max = 5
tax_comp	Tax compliance level if self-employed	3,822	Mean = 4.449, SD = 1.266, Min = 1, Max = 5
Independent and Control Variables			
mp_female	Gender of MP	52,574	26.5% Female, 73.5% Male
mp_gendermatch	Gender match between MP and respondent	52,574	47.5% Match, 52.5% No Match
pm_female	Gender of Prime Minister	52,574	23.1% Female, 76.9% Male
pm_gendermatch	Gender match between PM and respondent	52,574	47.1% Match, 52.9% No Match
resp_female	Gender of the respondent	52,574	55.4% Female, 44.6% Male
mp_party	Political party of MP	52,574	46% Conservative, 33% Labour, 21% Other
pm_party	Political party of PM	52,574	100% Conservative
vote4	Political party of respondent	52,574	45% NA, 19% Conservative, 22% Labour, 14% Other
win_margin_percent	MP's election win margin (%)	52,574	Mean = 0.249, SD = 0.166, Min = 0, Max = 0.771
age_dv	Age of respondent	52,574	Mean = 49.15, SD = 18.478, Min = 15, Max = 103
gross_moinc_decile	Monthly income of respondent	52,574	Mean = 3.000, SD = 1.843, Min = 1, Max = 10
wealth_nonfin_decile	Accumulated non-financial wealth	52,574	Mean = 2.526, SD = 1.927, Min = 1, Max = 10
wealth_fin_decile	Accumulated financial wealth	52,574	Mean = 2.798, SD = 2.454, Min = 1, Max = 10
tax_band	Tax band of respondent	52,574	Mean = 3.042, SD = 1.844, Min = 0, Max = 9
pol_int	Political interest level	52,574	Mean = 3.330, SD = 0.953, Min = 1, Max = 5
crit_mass_percent	% of Female MPs	52,574	Mean = 0.266, SD = 0.054, Min = 0.220, Max = 0.338

Table B.2: Factor Loadings

Variable	Factor 1	Factor 2	Uniqueness
poleff1	0.776	0.075	0.393
poleff2	0.774	0.021	0.400
poleff3	0.016	0.726	0.473
poleff4	0.089	0.728	0.462
tax_comp	0.056	0.001	0.997

Table B.3: Regression Results on the Dependent Variables pol_cap, pol_influ, tax_comp using Three Predictors

	OLS Regression						Fixed Effects Regression					
	Female respondents			Male respondents			Female respondents			Male respondents		
	pol_cap	pol_influ	tax_comp	pol_cap	pol_influ	tax_comp	pol_cap	pol_influ	tax_comp	pol_cap	pol_influ	tax_comp
mp_female	0.024**	0.007	0.011	0.015	0.025**	-0.098**	0.015	0.015	0.129	-0.041	0.010	-0.037
	(0.010)	(0.011)	(0.075)	(0.011)	(0.013)	(0.049)	(0.025)	(0.029)	(0.239)	(0.028)	(0.032)	(0.135)
mp_party	0.000	0.000	-0.004**	-0.000	0.001**	0.001	-0.001	0.000	-0.003	-0.001	0.001	-0.000
	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.005)	(0.001)	(0.001)	(0.004)
mp_partymatch	-0.036***	0.018***	0.009	-0.036***	-0.000	0.009	-0.036***	0.016***	0.011	-0.033***	-0.001	-0.001
	(0.004)	(0.005)	(0.032)	(0.005)	(0.006)	(0.022)	(0.004)	(0.005)	(0.038)	(0.005)	(0.006)	(0.025)
pm_female	-0.017*	0.081***	-0.008	-0.018*	0.049***	0.032	-0.016*	0.082***	-0.036	-0.016	0.047***	0.070
	(0.009)	(0.010)	(0.071)	(0.010)	(0.012)	(0.047)	(0.009)	(0.010)	(0.076)	(0.010)	(0.012)	(0.049)
pm_partymatch	-0.056***	0.204***	0.037	-0.037***	0.135***	0.094	-0.048***	0.200***	0.123	-0.030**	0.131***	0.089
	(0.013)	(0.014)	(0.089)	(0.013)	(0.015)	(0.058)	(0.013)	(0.015)	(0.113)	(0.014)	(0.016)	(0.070)
win_margin_percent	0.099***	-0.060*	-0.339	0.033	-0.005	0.014	0.135*	0.042	0.580	0.125	0.130	0.197
	(0.027)	(0.031)	(0.212)	(0.031)	(0.035)	(0.138)	(0.077)	(0.087)	(0.668)	(0.086)	(0.099)	(0.436)
pol_int	0.582***	0.050***	0.017	0.593***	0.034***	0.041	0.577***	0.047***	-0.067	0.588***	0.030***	0.013
	(0.006)	(0.007)	(0.045)	(0.006)	(0.007)	(0.029)	(0.006)	(0.007)	(0.054)	(0.006)	(0.008)	(0.033)
age_dv	-0.003***	-0.002***	0.006**	-0.001***	-0.001***	0.006***	-0.002***	-0.002***	0.007*	-0.001***	-0.001**	0.011***
	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.004)	(0.000)	(0.000)	(0.002)
qfhigh_dv	-0.001***	-0.001***	-0.002	-0.001***	-0.001***	-0.001	-0.001***	-0.001***	-0.002	-0.001***	-0.001***	-0.002**
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.001)
gross_moinc_decile	0.013***	0.017***	-0.004	0.024***	0.021***	0.010	0.013***	0.018***	-0.002	0.024***	0.022***	0.007
	(0.003)	(0.003)	(0.017)	(0.003)	(0.004)	(0.010)	(0.003)	(0.003)	(0.020)	(0.003)	(0.004)	(0.012)
wealth_nonfin_decile	0.010***	0.007**	-0.007	0.014***	0.009**	0.027**	0.011***	0.009***	0.008	0.015***	0.007*	0.018
	(0.003)	(0.003)	(0.016)	(0.003)	(0.004)	(0.012)	(0.003)	(0.003)	(0.020)	(0.003)	(0.004)	(0.014)
wealth_fin_decile	0.033***	0.062***	0.043	0.063***	0.034***	0.033	0.034***	0.058***	-0.021	0.056***	0.033***	0.008
	(0.010)	(0.011)	(0.073)	(0.011)	(0.012)	(0.045)	(0.010)	(0.011)	(0.085)	(0.011)	(0.013)	(0.051)
tax_band	0.018***	0.025***	0.017	0.026***	0.036***	-0.032**	0.016***	0.028***	0.072**	0.019***	0.035***	-0.013
	(0.003)	(0.004)	(0.023)	(0.004)	(0.004)	(0.015)	(0.004)	(0.004)	(0.034)	(0.004)	(0.005)	(0.022)
Constant	0.845***	2.445***	4.101***	0.927***	2.320***	4.070***	0.846***	2.405***	3.821***	0.941***	2.303***	3.878***
	(0.030)	(0.033)	(0.241)	(0.033)	(0.038)	(0.161)	(0.037)	(0.041)	(0.345)	(0.041)	(0.047)	(0.217)
Observations	29189	29189	1428	23385	23385	2394	29189	29189	1428	23385	23385	2394
R-squared	0.344	0.028	0.013	0.386	0.029	0.016	0.324	0.024	0.020	0.362	0.020	0.023
Constituencies							588	588	462	588	588	533

Note: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Chapter C

Appendix Content from Chapter 4: The Effects of Participatory Budgeting on Local Government Tax Compliance: An Experiment in Greater Manchester

C.1 Tables

Table C.1: Tameside Community Strategy Themes 2009-19

#	Theme and Subthemes
1	**Supportive Tameside** • Support communities to work together • Help people to live independently
2	**Prosperous Tameside** • Improve the economy of the area • Help residents gain new skills or find employment
3	**Learning Tameside** • Help children and young people to do well at school • Help children and young families to have a better life
4	**Attractive Tameside** • Improve the way the borough looks • Promote environmental projects
5	**Safe Tameside** • Reduce burglary, vehicle crime, and robbery, and the harm caused by drugs and alcohol • Reduce violent crime • Improve residents' feelings of safety • Reduce offending
6	**Healthy Tameside** • Support residents to be healthy and live healthier lives

Note: Adapted from (Tameside Strategic Partnership, 2009).

Table C.2: Descriptive Statistics for Treatment and Weighted Control Boroughs

Variable	Description	Obs	Mean	Std. Dev.	Min	Max
Weighted Dependent and Independent Variables						
synthlad_colrate	Council Tax collection rate (%)	22	94.61	0.71	93.41	95.74
synth_recyclert	Recycling rates (%)	22	42.49	7.29	32.29	53.80
post	Time after PB implemented	22	Dummy (1 = After, 0 = Before)			
treatment	Area with PB implemented	22	Dummy (1 = Yes, 0 = No)			
wavename	Survey wave number	22			1	11
year	Year	22			2009	2019
lad_num	Borough identifier (8, 11)	22			8	11
Control Variables						
age	Mean age of respondent	22	38.20	2.71	33.37	44.16
ctband	Mean council tax band	22	2.38	0.35	1.82	2.87
ctpay_behind	Behind on Council Tax	22	-0.06	0.54	-2.29	0.23
edu_attain	Highest education level	22	27.50	6.01	14.96	36.54
gross_moincdecile	Monthly income	22	2.83	0.37	2.24	3.50
houscost_decile	Monthly housing cost	22	5.62	0.36	5.15	6.23
hsownd	Accommodation status	22	2.38	0.20	1.92	2.60
lad_imd	IMD prosperity level	22	30.15	0.74	28.78	31.37
lad_non_2011	Non-white pop. (%)	22	11.67	2.63	9.10	14.23
lad_popdens	Population density	22	2086.82	93.86	1880.66	2228.22
lad_unemp	LAD unemployment rate (%)	22	7.13	2.06	4.09	9.78
nkids	Number of children	22	1.09	0.18	0.65	1.38
npens	Individuals over pension age	22	0.42	0.13	0.25	0.72
pol_int	Political interest level	22	3.28	0.16	3.02	3.59
race	Race	22	1.91	1.32	-0.06	4.05
sex	Gender of respondent	22	1.50	0.01	1.46	1.52
uk_cpi_inf	UK CPIH Annual Rate	22	2.06	0.89	0.40	3.80
uk_unemp	UK Unemployment Rate (%)	22	6.17	1.66	3.80	8.10

Note: Control variables collapsed to the mean per area (2), per year (11).

Table C.3: Descriptive Statistics for Individual-Level Variables: Political Interest

Variable	Description	Obs	Mean	Std. Dev.	Min	Max
Dependent Variables						
pol_int	Respondents' political interest level	2,974	3.26	0.94	1	5
post	Time after PB implemented	2,974	Dummy (1 = After, 0 = Before)			
treatment	Area with PB implemented	2,974	Dummy (1 = Yes, 0 = No)			
wavename	Survey wave number	2,974			1	11
year	Year	2,974			2009	2019
lad_num	Borough identifier (4, 8, 10)	2,974			4	10
Control Variables						
age	Age of respondent	2,974	47.07	18.20	16	92
ctband	Council tax band of residence	2,974	2.20	1.32	1	8
gross_moincdecile	Monthly income of respondent	2,966	2.49	1.36	1	11
houscost1	Monthly housing cost	2,974	332.45	1005.88	0	34,448
nkids	Number of children	2,974	0.65	1.03	0	6
npens	Individuals over pensionable age	2,974	3.26	0.94	1	5
sex	Gender of respondent	2,974	1.55	0.50	1	2
wealth_fin_e	Financial wealth level (decile)	2,974	0.28	0.45	0	1
wealth_non_e	Non-financial wealth level (decile)	2,974	1.78	0.89	1	10

Table C.4: Regression Estimate Results: The Impact of PB on Recycling Rates over Time

	Borough-Level Recycling Rate		
	rec_rate		
	(1)	(2)	(3)
	2012-2014	2012-2017	2012-2019
1.treatment	0.0088	0.0088	0.0088
	(0.0161)	(0.0149)	(0.0145)
1.post	0.0372	0.0874**	0.1068***
	(0.0193)	(0.0293)	(0.0269)
1.treatment × 1.post	0.0055	0.0161	0.0090
	(0.0224)	(0.0415)	(0.0354)
Constant	0.3395***	0.3395***	0.3395***
	(0.0159)	(0.0148)	(0.0144)
Observations	12	18	22
R-squared	0.634	0.469	0.496
Adj. R-squared	0.496	0.355	0.412

Note: Standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table C.5: Council Tax Collection Rate (*lad_colrate*) Correlation Matrix

	lad_colrate	**lad_imd**	**lad_popdens**	**gross_moinc**	**houscost**	**edu_attain**	**age**	**sex**	**lad_2011**	**ctband**
lad_colrate	1.000									
lad_imd	-0.880	1.000								
	(0.000)									
lad_popdens	0.418	-0.699	1.000							
	(0.016)	(0.000)								
gross_moinc	0.584	-0.720	0.562	1.000						
	(0.000)	(0.000)	(0.001)							
houscost	0.202	-0.329	0.504	0.435	1.000					
	(0.259)	(0.062)	(0.003)	(0.011)						
edu_attain	-0.762	0.787	-0.342	-0.795	-0.360	1.000				
	(0.000)	(0.000)	(0.051)	(0.000)	(0.040)					
age	-0.050	-0.290	0.718	0.353	0.087	-0.033	1.000			
	(0.781)	(0.102)	(0.000)	(0.044)	(0.630)	(0.854)				
sex	0.205	-0.001	-0.475	-0.174	-0.180	-0.235	-0.507	1.000		
	(0.252)	(0.995)	(0.005)	(0.332)	(0.317)	(0.187)	(0.003)			
lad_2011	0.134	0.144	-0.800	-0.097	-0.403	-0.232	-0.702	0.641	1.000	
	(0.458)	(0.424)	(0.000)	(0.592)	(0.020)	(0.193)	(0.000)	(0.000)		
ctband	0.896	-0.965	0.553	0.766	0.334	-0.874	0.176	0.143	0.046	1.000
	(0.000)	(0.000)	(0.001)	(0.000)	(0.058)	(0.000)	(0.329)	(0.429)	(0.798)	

Table C.6: Political Interest (*pol_int*) Correlation Matrix

	pol_int	**sex**	**ctband**	**age**	**tenure_dv**	**edu_attain**	**houscost**	**gross_moinc**	**jbsemp**	**jbstat**
pol_int	1.000									
sex	-0.227	1.000								
	(0.000)									
ctband	0.192	-0.005	1.000							
	(0.000)	(0.782)								
age	0.182	-0.055	0.194	1.000						
	(0.000)	(0.005)	(0.000)							
tenure_dv	-0.157	0.052	-0.322	-0.256	1.000					
	(0.000)	(0.007)	(0.000)	(0.000)						
edu_attain	-0.126	0.011	-0.203	0.298	0.040	1.000				
	(0.000)	(0.580)	(0.000)	(0.000)	(0.038)					
houscost	-0.100	0.027	-0.154	-0.443	0.455	-0.164	1.000			
	(0.000)	(0.168)	(0.000)	(0.000)	(0.000)	(0.000)				
gross_moinc	0.091	0.009	0.359	-0.213	-0.134	-0.286	0.272	1.000		
	(0.000)	(0.638)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
jbsemp	-0.039	-0.023	0.034	-0.326	0.037	-0.310	0.345	0.353	1.000	
	(0.043)	(0.235)	(0.079)	(0.000)	(0.056)	(0.000)	(0.000)	(0.000)		
jbstat	0.026	0.008	-0.028	-0.025	0.014	0.030	-0.067	-0.057	-0.270	1.000
	(0.171)	(0.664)	(0.148)	(0.190)	(0.477)	(0.116)	(0.001)	(0.003)	(0.000)	

Table C.7: Treatment Effects on Political Interest Levels

	Political Interest (pol_int) Levels		
	(1)	(2)	(3)
	2012-2014	**2012-2017**	**2012-2019**
1.post	0.1229	0.1405	0.0160
	(0.0806)	(0.0395)	(0.1140)
1.treatment	-0.0165*	-0.0165*	-0.0165*
	(0.0005)	(0.0005)	(0.0005)
1.post × 1.treatment	0.0777*	0.1483*	0.1904*
	(0.0039)	(0.0036)	(0.0041)
2009.year	0.0000	0.0000	0.0000
	(.)	(.)	(.)
2010.year	0.0692	0.0692	0.0692
	(0.0081)	(0.0081)	(0.0081)
2011.year	0.0727	0.0727	0.0727
	(0.0288)	(0.0288)	(0.0288)
2012.year	-0.1332	-0.1784	-0.0704
	(0.1216)	(0.1141)	(0.2089)
2013.year	-0.2022	-0.2489	-0.1418
	(0.1327)	(0.1258)	(0.2210)
2014.year	0.0000	-0.0433	0.0658
	(.)	(0.0085)	(0.0857)
2015.year		0.0785	0.1875
		(0.0162)	(0.1104)
2016.year		0.0401*	0.1502
		(0.0010)	(0.0946)
2017.year		0.0000	0.1073
		(.)	(0.0951)
2018.year			0.0858
			(0.0871)
2019.year			0.0000
			(.)
Constant	3.0931**	3.0931**	3.0931**
	(0.0056)	(0.0056)	(0.0056)
Observations	1689	2261	2427
R-squared	0.004	0.013	0.015
Adj. R-squared	-0.000	0.009	0.010

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table C.8: Council Tax Collection Rate: Actual vs. Synthetic Control

Year	**Actual (Tameside)**	**Synthetic Control**	**Gap (Actual - Synth)**
2009	95.740	95.645	0.095
2010	95.250	95.157	0.093
2011	95.200	95.333	-0.133
2012	95.110	95.296	-0.186
2013	94.210	93.675	0.535
2014	94.040	93.984	0.056
2015	94.167	94.614	-0.447
2016	94.167	94.614	-0.447
2017	93.698	94.753	-1.054
2018	93.406	94.977	-1.571
2019	93.520	94.837	-1.317