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The American Dilemma in Election Administration: How Street Level Bureaucrats Racialize Voting

A dissertation submitted in partial satisfaction
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by

Michael Alan Herndon

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ABSTRACT OF THE DISSERTATION

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by

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Doctor of Philosophy in Political Science
University of California, Los Angeles, 2026
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Problem: The COVID-19 pandemic has ushered in a new reliance on non-traditional voting methods, as over one third of voters utilized vote-by-mail (VBM) in the 2024 general election. While this sweeping transition has increased convenience for many voters, it has opened a door for another form of voter suppression: ballot rejection via signature discrepancy. In the 2024 general election, over 580,000 VBM ballots were rejected nationwide - with the most popular reason being a signature discrepancy. Importantly, these ballot rejections are not randomly distributed and are instead felt unequally by racial minorities. VBM ballot rejections are an important component to election outcomes, yet the processes leading to these types of rejections has yet to be empirically scrutinized.

Methodology: My dissertation investigates disproportionate ballot rejection through two approaches. First, I conduct an observational analysis using detailed voter data from California and Washington to measure gaps in rejection rates across counties, demographic groups, and elections. Unlike prior studies that examine single contests, I track ballot rejection over time. Second, I use survey experiments to test psychological mechanisms that can explain why certain groups face higher rejection risk and offer insight into what interventions election administrators might employ to reduce these disparities.

Results: The results of my observational analysis show that non-White voters see their ballots rejected up to four times as often as White voters, but that this relationship is

largely driven by age and the fact that non-White voters tend to be younger on average. My survey experiments find that the average lay-person is more likely to accept White signatures and reject non-White signatures while holding all else equal (e.g. authenticity, penmanship, etc.) and that racial attitudes influence the process of signature verification even when controlling for partisanship, age, and other demographic factors.

Conclusions: My dissertation underscores 1) the theoretical importance of understanding election administration as a bureaucracy that is vulnerable to biased decision-making, 2) the existence of important demographic and regional disparities in vote-by-mail ballot rejection rates, and 3) the practical need for reforms that ensure election systems are not undermined by bias or discrimination, especially in VBM signature review which entails the most ambiguity and subjectivity.

The dissertation of Michael Alan Herndon is approved.

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Dedicated to my family, who has always supported me.

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Publications

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CHAPTER 1

Introduction

When Gunnar Myrdal and his team of researchers published *An American Dilemma: The Negro Problem and Modern Democracy*, the central theme was that American values of freedom, equality, and justice were at direct odds with how society treated Black people across multiple arenas, including elections (Myrdal, 1996). At the time, White primaries, poll taxes, and unfairly imposed literacy tests were operating alongside a myriad of other institutional biases in housing, education, etc. to stymie Black political participation and relegate them to a permanent underclass. More than eighty years later, Black political power has since broadened, but racial inequality at the ballot box still persists. Felony disenfranchisement laws dating back to Jim Crow are still in effect, racial gerrymandering continues to dilute the voting power of minority communities, and bureaucratic devices that disproportionately deny minority voters remain widespread. While the passage of the Voting Rights Act (VRA) in 1965 was supposed to level the playing field and remove racist barriers to voting, research has gone to great lengths to show that modern devices of disenfranchisement are all still able to disenfranchise voters along racial lines while operating within the law, especially in a post-*Shelby* world (Morris and Miller, 2024), and now a post-*Callais* world. In other words, vote suppression tactics and devices continue to evolve alongside the legal landscape, reinforcing the racial inequality at the heart of Myrdal's *American Dilemma*.

Building on the legacy of evolving vote suppression, this dissertation turns to a context that is often overlooked in discussions of disenfranchisement: voting by mail (VBM). While VBM is widely seen as a reform that expands access to the ballot, particularly for marginalized communities (Bonica et al., 2021), it is not immune to the racialized patterns of exclusion that Myrdal identified decades ago. Rather than relying on overt barriers like

literacy tests or poll taxes, modern VBM election systems hinge on opaque, discretionary processes such as signature verification to disenfranchise hundreds of thousands of voters each election cycle under the guise of neutral fraud prevention.

As a result of this widespread disenfranchisement, the process of VBM ballot rejection has received intense legal scrutiny in recent years. In 2018, the ACLU sued to stop Georgia counties from rejecting VBM ballots over signature mismatches without notifying voters or giving them an opportunity to "cure" their ballots *(Georgia Muslim Voter Project v. Kemp)*. In 2022, civil rights groups in Pennsylvania challenged the policy of invalidating ballots for missing or incorrect handwritten dates on return envelopes—a practice that has disenfranchised thousands of eligible voters since the rule took effect in 2020 *(Pennsylvania State Conference of the NAACP v. Schmidt)*. And in Washington, the UCLA Voting Rights Project joined other plaintiffs in challenging the signature matching process in three counties, arguing that the lack of uniform standards, training, and oversight led to the disproportionate ballot rejection of Latino voters, depriving them of equal protection under the United States Constitution *(Reyes et al. v. Chilton et al.)*. These are just a few of the high-profile lawsuits that have brought VBM ballot rejection into the national spotlight and together, they help illustrate the rise of new and evolving bureaucratic VBM procedures being implemented to erect barriers to the ballot.

Despite these growing legal challenges, social science research has been slow to systematically investigate VBM ballot rejection as a vote suppression tactic. To date, most research on voter suppression focuses on barriers to in-person voting like strict photo ID enforcement and poll closures (Curiel and Clark, 2021; Hajnal, Lajevardi, and Nielson, 2017; Barreto et al., 2019; Barreto, Sanchez, and Walker, 2022; Barreto, Nuño, and Sanchez, 2009), but the bureaucracy surrounding VBM ballot rejection remains understudied. Little is known about how election officials implement and enforce VBM procedures, how personal biases may shape those decisions, and how such discretionary behavior contributes to inequalities in VBM ballot rejection.

What is known, however, is troubling. The United States rejects more than 500,000 mail ballots in every general election (U.S. Election Assistance Commission, 2025). This

high volume of rejection is more than enough to sway the outcome of specific races. In 2024, Adam Gray defeated John Duarte by just 187 votes in California's 13th Congressional District, a race in which election officials identified more than 6,000 ballots rejected for missing or non-matching signatures (Joseph, 2025). This is just one example, but every election year, hundreds of federal, state, and local races get decided by just a small handful of votes. In 2016 alone, more than 340 state office elections were decided by fewer than 500 votes (Mears and Geiger, 2024). This troubling reality makes VBM ballot rejection a crucial aspect of election administration simply for the fact that it can be the difference between winning and losing – and often is in close races!

This problem grows worse because according to conservative estimates, more than eighty percent of rejected ballots are mistakenly deemed invalid and actually belong to eligible voters (Street, 2024), especially non-White voters, young voters, and voters living in certain counties (Baringer, Herron, and Smith, 2020; Allard et al., 2023; Shino, Suttmann-Lea, and Smith, 2022; Cottrell, Herron, and Smith, 2021) which is the problem that I examine in this dissertation.

I draw on original experimental and observational data to examine how frontline election officials exercise judgment in ways that disproportionately harm minority voters. In doing so, this project 1) expands the literature on voting rights to also include barriers to voting by mail, 2) develops a theory of racialized bureaucratic discretion as an important mechanism behind demographic gaps in ballot rejection, ultimately linking micro-level behavior of election officials to macro-level patterns of racial exclusion, and 3) tests this theory using a variety of observational and experimental research designs.

While there are many facets of the VBM process that can introduce bias, this dissertation pays special attention to signature verification because of its widespread use and subjective nature. A growing body of research has already found evidence of non-White and young voters being disproportionately likely to have their signature rejected, but these studies have lacked a research design to identify the root cause of these disparities (Shino, Suttmann-Lea, and Smith, 2022; Baringer, Herron, and Smith, 2020; Cottrell, Herron, and Smith, 2021; Allard et al., 2023). This is concerning because hundreds of millions of VBM

signatures are adjudicated each election cycle and if key mechanisms behind the rejection process remain under-theorized, no progress can be made on closing rejection gaps described in past research. Before delving into my theory of racialized bureaucratic discretion in VBM, I first offer a brief history of absentee voting in the United States.

1.1 History of Vote-By-Mail in the United States

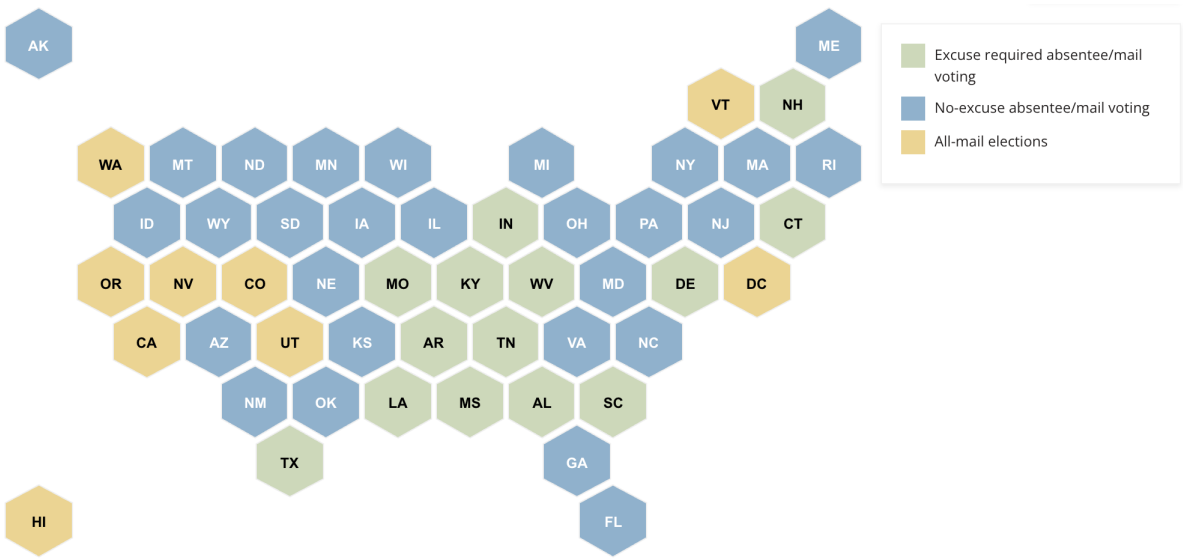
The Cambridge English dictionary defines absentee voting as: "the system or action of sending votes or a vote by mail or by using the internet, rather than being physically present to vote at an election" (Cambridge Advanced Learner's Dictionary & Thesaurus, 2026). In this dissertation I use absentee voting, voting-by-mail, and postal voting interchangeably considering that the only way to vote absentee in the United States is through the mail/postal services. The history of absentee voting in the United States is very much rooted in extending the franchise to uniformed soldiers and goes back to the revolutionary war when, in 1775, soldiers from Hollis, New Hampshire voted absentee (Seitz-Wald, 2020). The first state to legalize absentee voting was Pennsylvania in 1813 to allow its residents fighting in the War of 1812 to vote-by-mail if they were stationed more than two miles from their home (National Association of Letter Carriers, 2024). During the civil war, absentee voting became more widespread and Abraham Lincoln pushed for states in the Union to allow their soldiers to vote-by-mail, resulting in approximately 150,000 Union soldiers voting in the 1864 presidential election. By World War II, every U.S. state allowed its soldiers to vote-by-mail and in the 1944 presidential election absentee ballots from soldiers fighting oversees represented seven percent of the total electorate.

In addition to soldiers being given the option to vote absentee, this privilege was also initially extended to railroad workers and other tradesmen who were required to travel as a part of their occupation. This pool of qualified voters has slowly expanded over time in certain states, especially on the West Coast where today, voters are automatically mailed a ballot before election day and voting-by-mail is the default method of participation.

The modern expansion of absentee voting beyond soldiers and traveling workers was

driven largely by federal legislative intervention. The National Voter Registration Act of 1993 (NVRA), also known as the Motor Voter Act, required state governments to offer simplified voter registration processes for any eligible person who applied for or renewed a driver's license. Section 6 of the NVRA also allows voter registration applicants to submit their voter registration forms by mail. Ten years later, the contested 2000 presidential election prompted Congress to pass the Help America Vote Act of 2002 (HAVA). HAVA set uniform requirements for the administration of federal elections, mandating that states update their voting machines, establish provisional ballot systems for voters whose eligibility was challenged at the polls, and make voting more accessible for voters with disabilities. Together, these two bipartisan congressional reforms created a certain degree of federal oversight into how elections were conducted by states, but considerable variation still exists, and there is a full spectrum of VBM accessibility across the country as seen in Figure 1.1 below. States either conduct all-mail elections, offer VBM without a reason or "excuse" needed to qualify, or offer VBM but only with a valid excuse. Valid excuse types range from state to state, but common examples are being away from home during election day, illness, being above a certain age threshold, or due to a qualifying religious belief/practice.

Figure 1.1: VBM Regimes (National Conference of State Legislatures, 2026)



1.2 VBM Ballot Rejection as a Partisan and Racial Dilemma

Looking closely at Figure 1.1, it would appear that VBM is a partisan issue, with all-mail elections tending to be in Democrat-led states and VBM restrictions tending to be in Republican-led states. However, this partisan divide is a relatively recent phenomenon driven largely by the politics of the 2020 election. Prior to 2020, VBM enjoyed broad bipartisan support, with some Republican states leading the way. Arizona is perhaps the clearest example: Republicans helped make Arizona an early VBM innovator in 1991, enacting one of the first laws in the country permitting voters to send in a mail ballot without an excuse, and then doubled down in 2007 by setting up a permanent early voting list that automatically mailed ballots to registered voters. In 2020 more than 80 percent of the state's Republican voters were on the early voting list (Fifield, 2022). After Donald Trump lost in 2020, there was a swift reversal. Public opinion on fraud, especially VBM fraud quickly became a polarized partisan issue with Republicans having less confidence in election results than Democrats. Arizona Republicans quickly reversed course on VBM and filed court challenges, passed restrictive legislation, and even called for the wholesale elimination of early voting in general. Arizona's trajectory illustrates a broader national pattern in which VBM shifted from a technocratic issue to a partisan one.

The irony of VBM's partisan transformation is that neither Democrats nor Republicans gain an advantage when absentee voting becomes available. Thompson et al. (2020) and Yoder et al. (2021) both find that absentee voting does not increase either party's turnout or vote share, and instead acts like a rising tide that boosts overall turnout by about two percent. In other words, the Republican reversal on VBM has not been driven by evidence of Republican harm, but rather "leader motivated behavior" driven by Republican elites (McKee, Shino, and Smith, 2026).

But partisanship is not the whole story. I argue that the more consequential divide in VBM is a racial one. At the heart of people's beliefs about illegal voting and anti-fraud measures like signature verification, proof of citizenship, etc. are their racial attitudes and who they believe is most likely to perpetuate fraud (Wilson and Brewer, 2013; Banks and

Hicks, 2016; Appleby and Federico, 2018; Udani and Kimball, 2018; Chouhy, Lehmann, and Singer, 2023; Udani, Manion, and Kimball, 2024). People with negative stereotypes of minority voters are also likely to typify them as "usual suspects" of certain racialized crimes like welfare fraud, murder, and as of recently, illegal voting (Mancini et al., 2015; Abrajano and Hajnal, 2017; Ramirez and Peterson, 2020; Udani, Manion, and Kimball, 2024). This typification of welfare queens, murderers, and illegal voters as mostly non-White people is fueled by political rhetoric, media, and a popular culture that reinforces a wide variety of racial stereotypes. It is no surprise then, that this relationship extends to the crime of voter fraud and that recent increases in racialized rhetoric about illegal voting has led people to link VBM fraud with minorities and particularly non-White immigrants (Smith, 2017).

The link between racial attitudes and beliefs about voter fraud matters for ballot rejection specifically because certain ballot rejection polices and policy practitioners can plausibly become motivated by racial considerations. For example, requiring documentary proof of citizenship as a fraud prevention policy is inextricably linked to race and racism given the fact that the goalposts of American "citizenship" are very directly linked to who qualifies as "White" (Devos and Banaji, 2005; Masuoka and Junn, 2013). Furthermore, the election workers validating voter eligibility based on signatures, photo ID, address, etc. are also prone to having implicit or even explicit stereotypes about voters and voter fraud, similar to how other street-level bureaucrats have biases about their clients (Lipsky, 2010). These biases can then influence their decisions when determining voter eligibility, especially when these decisions are made rapidly, subjectively, and with discretion, as is the case in VBM signature verification. It is in this polarized and racialized political landscape that the problem of unequal VBM ballot rejection must be understood. In the next section I further define VBM ballot rejection and explain how the process is especially vulnerable to biased bureaucratic decision-making, which go on to create unfair "gaps" in ballot rejection between different classes of voters.

1.3 Ballot Rejection and Democratic Harm: The Tension Between Fraud Prevention and Lost Votes

Leading elections scholar Charles Stewart III defines a lost vote using a thought experiment: What if a voter does all that is asked of them, such as completing an application to receive a mailed ballot, correctly filling out and returning the ballot, including the attachment of any additional verifying information such as a handwritten signature, but due to administrative issues their vote does not get counted (Stewart III, 2020)? This definition of lost votes is useful because all votes that fall under this umbrella represent a democratic harm. That is to say, lost votes are not the product of voter error or fraud, but of administrative failures that the voter had no power to prevent or remedy. This is directly at odds with the foundational democratic principle that every eligible citizen who participates in an election is entitled to have their vote counted as intended (Dahl, 2020). When ballots are systematically and unequally lost through administrative failure, the constitutional promise of "one person, one vote" is violated and democratic representation is threatened.

In VBM, there are six quantities that make up lost votes. They are displayed below in Table 1.1. Because of the wide-ranging definition of what qualifies as a lost vote compared to the sub-category of rejected ballots, there are typically more lost votes than there are rejected ballots in a given election. For example, in Pennsylvania's 2022 general election, it is estimated that there were at least 47 percent more lost votes than rejected mail ballots (Meredith et al., 2024).

Table 1.1: Causes of Lost Mail Votes (adopted from (Stewart III, 2020))

Cause	Description
1	Requests for mail ballots not received by election authorities
2	Absentee ballot requests unfulfilled by election authorities
3	Absentee ballots transmitted by election authorities not received by the voter
4	Absentee ballots returned by the voter but not received by election authorities
5	Returned absentee ballots rejected by election authorities
6	Tabulated mail ballots that fail to record the voter's choice (residual votes)

The first, third, and fourth causes for lost votes all involve the performance of the

U.S. Postal Service (USPS). These quantities include applications for absentee ballots, or absentee ballots themselves that are not successfully delivered by the USPS. The USPS has been an increasingly important actor in the political battles surrounding VBM. For example, in 2020 there was a multi state coalition of attorneys general that secured a federal court order blocking Trump-directed postal service changes that threatened to slow down mail delivery in the lead-up to the 2020 presidential election (California Attorney General's Office, 2020). As another example, in California's November 2025 election, mail-in ballot rejections quadrupled compared to the prior year, driven by a new postal policy that delayed the postmarking of ballots in rural counties more than 50 miles from a processing center (Mock, 2026). Most recently, President Trump signed an executive order directing the USPS to restrict mail ballot distribution to federally approved voter lists, a move that elevates the USPS to be a federal chokepoint in the mail voting pipeline, with the authority to determine which voters receive a ballot at all (Lopez, 2026)

The second, fifth, and sixth quantities in Table 1.1 represents absentee ballot applications and absentee ballots that are lost by elections offices themselves. The second quantity represented absentee ballot applications that never get processed by the elections office leading to voters not receiving their VBM ballot. The sixth quantity represented administrative errors in tabulation such as "hanging chads" that result in voters not having their vote recorded. Finally, and at the center of this dissertation, the fifth cause of lost votes is returned absentee ballots that are rejected by election authorities.

Table 1.2 outlines the national breakdown of reasons why absentee ballots were rejected in the 2024 presidential election. While a non-matching or incomplete signature was far and away the most common reason for a VBM ballot to be rejected, there are a variety of other reasons of note. Late ballots, missing witness signatures, unsealed envelopes, and unofficial envelopes, or "naked ballots" (Hopkins et al., 2022), all contribute to VBM ballot rejection according to the U.S. Election Assistance Commission and all represent "lost votes" under Stewart's definition. I should note that some election administrators do not always consider late-arriving ballots as "rejected", but in this dissertation I do classify them as rejected, within the broader classification of lost votes.

Non-matching and incomplete signatures are of particular interest not only because of how comparatively common they are as a rejection reason, but also because of the subjective nature of signature verification, the discretion that election officials wield in reviewing signatures, and the amount of local variation that exists in signature verification procedures/practices. In the next section I describe the rationale and justification for VBM signature verification and outline how these aforementioned features create a recipe for racialized bureaucratic discretion.

Table 1.2: Reasons for Mail Ballot Rejection in 2024 General Election (U.S. Election Assistance Commission, 2025)

Reason	**Percentage of Rejected Mail Ballots**
Ballot envelope had a non-matching or incomplete signature	40.7%
Other reason not listed	18.1%
Ballot was not received on time/missed the deadline	17.8%
Voter already cast another ballot that was accepted	11.1%
Ballot envelope did not have a voter signature	10.0%
Ballot envelope did not have a witness signature	5.6%
Voter did not provide the required documentation (e.g., identification, affidavit, statement)	4.4%
Ballot was not placed in a required secrecy envelope	3.7%
Voter was not eligible to cast a ballot in the jurisdiction	3.4%
Envelope was not sealed	2.0%
Voter was deceased	1.5%
Ballot was missing from the envelope	1.1%
Returned ballot envelope did not have required postmark	0.9%
Ballot was returned in an unofficial envelope	0.4%
No resident address was on the envelope	0.2%
Multiple ballots were returned in one envelope	0.2%

1.4 VBM Signature Verification as a Blunt Instrument Against Fraud

To understand how VBM ballot signatures are reviewed/verified it is helpful to first take a step back and understand the motivation behind such a process. In other words, why do we have a system of voting that requires election officials to adjudicate signature authenticity for the vote to count? The simplest answer is that signature verification addresses people's fear of fraud. Between one quarter and one third of Americans believe that voter fraud occurs frequently (Wilson and Brewer, 2013; Stewart, Ansolabehere, and Persily, 2016) and half of Americans are fearful of non-citizen voting (Dorn, 2024). People's signatures are considered to be a "behaviometric" that is unique only to them and difficult to impersonate/forge.

Thus, by requiring voters to include a copy of their signature with their VBM ballot, election workers are able to cross-reference each voter's ballot signature with a known copy of it from the registration process and distinguish authentic eligible voters from fraudulent illegal voters – at least in theory.

However, the reality is that the process is imperfect and there are hundreds of thousands of wrongly rejected valid signatures each election cycle (Street, 2024) and an exceedingly small amount of fraud being detected, or 1 in 1.7 million ballots cast according to one estimate (McReynolds and Stewart, 2020). Still though, one could argue that the low incidence of voter fraud in this country simply means that anti-fraud measures like signature verification are working. In the context of voter protections, Justice Ruth Bader Ginsburg famously said that abandoning voting rights protections while they are still working is "like throwing away your umbrella in a rainstorm because you are not getting wet". Some might similarly argue that discarding or minimizing anti-fraud measures while they are still working is similarly foolish. However, in my version of this analogy, where the umbrella represents things like witness mandates, proof of citizenship, and signature verification, the umbrella is also very large and burdensome to carry for certain people. It may protect you from the rain, but it also tires your arm, crowds the sidewalk, and occasionally bumps you and others because it is so unwieldy. This unintended collateral damage represents lost votes and specifically rejected ballots that were discarded because of a clunky system designed to protect against fraud.

What's more is that in most American elections, it is not raining. Decades of investigation have failed to uncover evidence of mail ballot fraud at anything approaching a scale that could alter an electoral outcome (Minnite, 2011; Ahlquist, Mayer, and Jackman, 2014; Christensen and Schultz, 2014; Ansolabehere, Luks, and Schaffner, 2015; Cottrell, Herron, and Westwood, 2018). This does not mean the umbrella should be discarded entirely though. There is nothing foolish about carrying protection against a threat that, while unlikely, is not impossible. A world without any ballot security measures would be its own kind of recklessness. But there is an important difference between carrying an excessively large, harmful umbrella and packing a light rain jacket when it works just as well. The question this dis-

sertation asks is not whether anti-fraud measures have their place. They do. The question is one of proportionality: whether the tools states have chosen are calibrated to the actual incidence of fraud, or whether they are so blunt and so burdensome that they routinely harm the very voters they were designed to protect. A raincoat or smaller umbrella that is less burdensome may be more appropriate and by this I mean reforming VBM ballot processing to be as streamlined and voter-friendly as possible. Signature verification does not have to be abandoned entirely, but states should pair such requirements with administrative remedies that give voters a meaningful opportunity to correct errors before their ballot is lost permanently. For example, in Pennsylvania, certain counties automatically re-mail voters a replacement ballot if their initial ballot gets rejected. This small administrative reform is associated with a roughly 25 percentage point increase in the likelihood that a voter with a deficient ballot ultimately has their vote counted (Morse, Meredith, and Stark, 2026).

1.4.1 Signature Verification as Speedbumps on the Highway

The previous analogy of umbrellas and rain had not considered that some voters could be disproportionately affected by restrictive VBM policies like signature verification. This has long been the case though (Barreto, Nuño, and Sanchez, 2009; Barreto et al., 2019; Barreto, Sanchez, and Walker, 2022), and to illustrate the problem this presents, I offer the following analogy.

Voting is like driving on a highway. The threat of an accident always lurks in the background, and traffic engineers address it as best they can through signage, lane markings, and enforceable speed limits. Election administrators operate similarly, deploying procedural checks to prevent and deter fraud. But not all checks are equally appropriate for their environment. Requiring a voter to print their name and date on a ballot envelope is like requiring a driver to carry a license — a reasonable, minimally burdensome condition that most people can satisfy without difficulty. Requiring signature verification, by contrast, is like installing speed bumps on a highway: a blunt instrument transplanted into the wrong setting that slows legitimate travelers far more than it does stop reckless ones.

The analogy extends further. If the state insists on speed bumps, it must at minimum ensure that all drivers encounter them equally. A system in which newer cars, or certain color cars, or cars from certain zip codes are given access to an express lane while everyone else navigates the bumps is not an equitable security measure. It is a two-tiered road. Yet this is precisely what the evidence on ballot rejection suggests: certain groups of voters are disproportionately burdened by administrative requirements like signature verification, not because they are more likely to commit fraud, but because they are treated differently by the administrative state due to biases, stereotypes and preconceived notions about voter eligibility. The speed bumps, in other words, are not placed randomly. They are concentrated on certain roads and disproportionately affect certain drivers. In the next section I explain the exact mechanisms in VBM signature verification that facilitate inequities in ballot rejection.

1.5 The Unsavory Mechanics of VBM Signature Verification

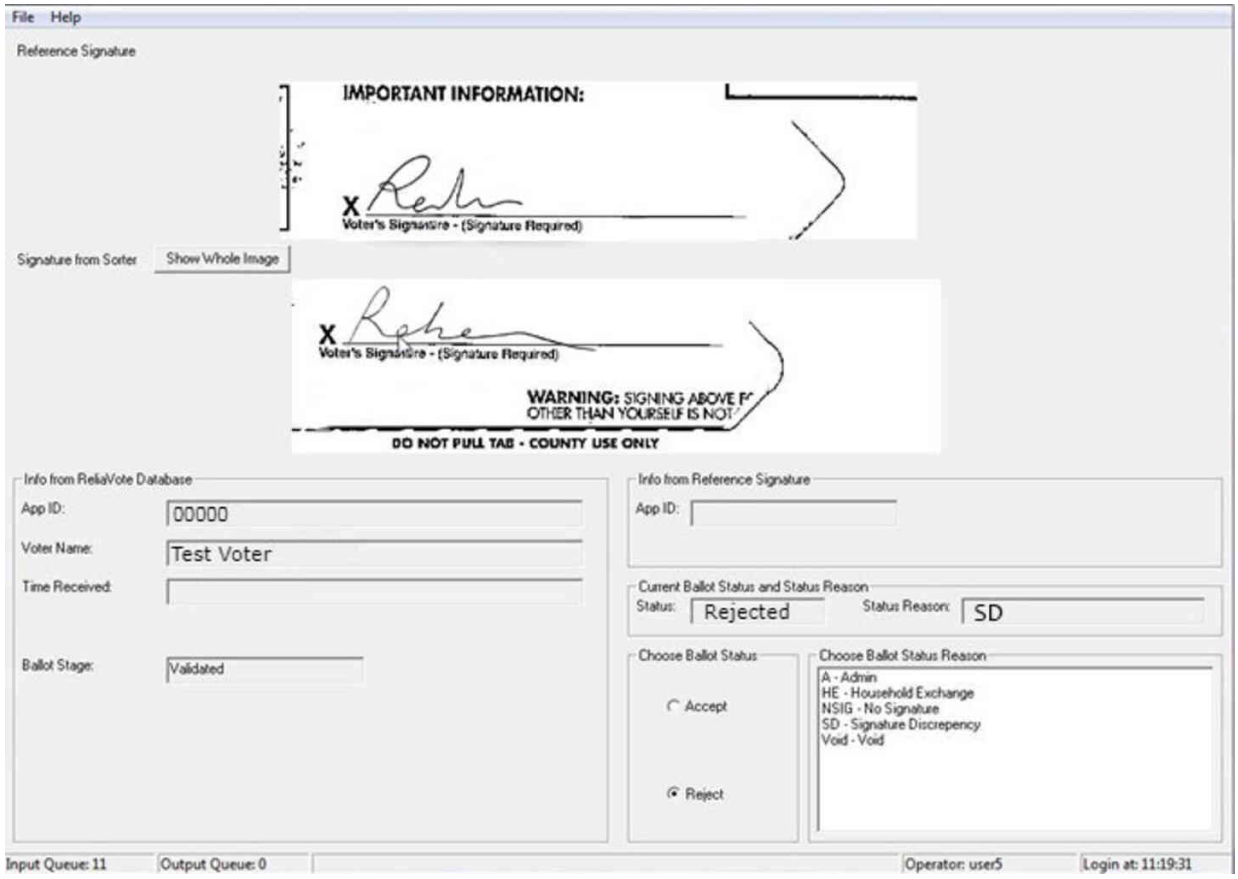
The process of VBM signature verification has been described as "witchcraft" and as more of an art than an exact science (Graham, 2020). It has earned this characterization in part because it is not uncommon for two different handwriting experts to disagree on the validity of a signature pair – let alone two election workers who at most receive a few hours of training before election day (e.g., Florida; Shino and Smith, 2026). While states and counties do provide guidance to their workers, this guidance amounts to little compared to the years of experience that professional forensic handwriting experts have. Still though, jurisdictions across the country continue to rely on this method, albeit there is a great degree of variation both across and within states in terms of the amount of people that are involved, the training they receive, the guidance and technology that are provided, the time that is allotted, and the amount of oversight and accountability there is.

In many jurisdictions the process actually starts with an automatic signature verification system (ASV) that utilizes machine learning and computer vision to quickly scan signatures and detect irregularities. ASV technologies are especially common in highly-populated and well-resourced counties that can afford to purchase a license and the necessary hardware

(Bonner, 2025; Poukish, 2026). These algorithms are proprietary and little is known about how they are trained, how accurate they are, and if they can introduce bias. While more research to this end is certainly overdue, the focus of this dissertation is on the human stage of review which is what comes next.

If an ASV algorithm flags a ballot signature as not being sufficiently close enough in resemblance to the known comparison signature on file, the next stage is for a human worker to intervene and provide their own judgment. Figure 1.2 below shows an example of an interface that election workers are viewing when validating questioned signatures.

Figure 1.2: Example of Signature Verification Interface in Jefferson Country, Colorado (Buchanan and Parlapiano, 2020)



In the example, the worker has access to very little information about the voter except for images of their signature and their printed name. Knowing a voter's name, whether via a legible signature or printed name, is central to my theory of racialized bureaucratic bias

in signature verification because names serve as powerful signals of people's backgrounds. Names carry with them connotations of a person's gender, race, age, and sometimes even religion (Gaddis, 2017; Crabtree and Chykina, 2018; Crabtree et al., 2023). Because names are one of the few stimuli that election workers have access to when adjudicating VBM ballots, it is not unreasonable to believe that workers are reacting to them either implicitly or explicitly. After all, countless studies have found that when bureaucrats are evaluating people on paper, a name alone is enough to prompt discriminatory behavior and influence the decision making process in asylum cases (Emeriau, 2023), hiring practices (Bertrand and Mullainathan, 2004), housing (Hanson and Hawley, 2011), constituent responsiveness (Butler and Broockman, 2011), law enforcement (Grogger and Ridgeway, 2006), criminal proceedings (Kang et al., 2011), and a host of other administrative realms.

To help illustrate how personal biases can influence bureaucratic decisions, consider what happens when the racial signal available to police officers becomes unavailable. The "veil of darkness" is a research design originally developed by Grogger and Ridgeway 2006 that exploits the fact that police officers are less able to determine a driver's race after sunset than during the day. If racial bias is driving stop decisions, Black drivers should comprise a smaller share of stopped drivers after dark, when their race is harder to perceive — and a larger share during daylight, when it is not. Applying this logic to nearly 100 million traffic stops across the United States and by exploiting daylight savings time as a natural experiment, (Pierson et al., 2020) find exactly this pattern . Moreover, using a threshold test of search decisions, they find that the evidentiary bar for searching Black and Hispanic drivers is systematically lower than that for White drivers — even though those searches are no more likely to yield contraband. The lesson from these papers on traffic stops and vehicle searches is that when a client's race is obscured, treatment from the street-level bureaucrat equalizes. Put differently, when racial signals are available, police officers respond to them, as opposed to driving behavior which should be the sole factor. Election workers reviewing ballot signatures alongside a voter's printed name are operating in precisely the same kind of environment — one in which a racial signal is present, discretion is broad, training is minimal, and accountability is low.

Another unsavory mechanic of VBM signature verification is that the process is done under time constraints. In many states it is official practice to not start signature verification of mailed ballots until election day (National Conference of State Legislatures, 2026). Then, on election day, hundreds of thousands or even millions of returned absentee ballots need to be validated and tabulated as soon as possible. This pressure to certify an election as quickly as possible has been amplified by Donald Trump and his allies who claim fraud is more likely to occur when the process gets delayed. This leads to many counties having their election workers reviewing absentee ballots past midnight. North Carolina Board of Elections Director Karen Brinson Bell has said that in her state, "many county board members and staff will be working more than 24 hours straight" (Bonner, 2025). The large task load that election workers face in validating thousands of ballots combined with burdensome time restraints are a recipe automatic, intuitive judgments—what Kahneman (2013) refers to as "System 1" thinking—driven by emotions, implicit biases, and heuristics rather than reasoned analysis. These cognitive shortcuts can further increase the likelihood of biased decision-making, especially in contexts where racial or ethnic cues are present as is the case in signature verification.

Finally, a third mechanic of VBM signature verification that is important to consider for my argument of racialized bureaucratic discretion has to do with hiring and staffing. Surveys of election officials reveals that the make up of this workforce is overwhelmingly White with one study finding that 95 percent of local election officials—such as county clerks and commissioners—identify as White (Gronke et al., 2024). According to representative bureaucracy theory, the demographic characteristics of public officials can influence their decisions in ways that reflect the interests and perspectives of their own social group Selden (2015).In the context of signature verification, a predominantly White election workforce may bring a shared set of cognitive biases that disproportionately affect non-White voters. Research across various areas of public administration supports this claim, showing that unrepresentative bureaucracies are more likely to create discriminatory barriers and engage in disparate treatment of racial and ethnic minorities Keiser, Mueser, and Choi (2004). Taken together—the subjectivity of the task, the time constraints under which it is performed, and

the demographic homogeneity of those performing it—there is a strong reason to believe that both implicit and explicit biases can shape how signatures are evaluated.

1.5.1 Existing Guardrails Against Bias

Nonetheless, counties and states have certain guardrails in place. One guardrail is requiring multiple people and multiple layers of review before a signature can be rejected. For example, California state law stipulates that at least two election workers have to both agree before a signature can get rejected. In Washington, a three member Canvassing Review Board is responsible for rejecting VBM ballot signatures. And in Texas, Signature Verification Committees are comprised of at minimum five members. Condorcet Jury Theorem suggests that multi-reviewer requirements should improve the accuracy of rejection decisions, since the probability that a majority reaches the correct verdict increases with the number of independent voters in the group (Condorcet, 1785; Black, 2011). However, the theorem's assumptions regarding independent and unbiased judgment may not hold in practice, given that reviewers undergo the same training, can hold the same biases, and talk to each other when reviewing signatures.

Another guardrail is ballot curing. In California and other states, courts have ruled that jurisdictions cannot disqualify a voter's ballot without notifying them (e.g. *La Follete v. Padilla*). Past research indicates that county cure rates in California can vary from 20 to 60 percent for a typical election (Janover and Westphal, 2020, see Figure 11), but in competitive elections where campaigns invest heavily in securing cured ballots, rates as high as 86 percent have been reported (Ehisen, 2025). This means that for every rejected ballot that appears in the official record, there is likely another voter who was initially rejected but was able to navigate the administrative hurdles of ballot curing successfully resulting in their vote counting. The voters who cannot or do not complete this process are the ones who remain uncounted and are considered "lost votes".

The final guardrail I'll mention here is pre-processing which is the practice of allowing election officials to begin verifying signatures and preparing mail ballots for tabulation before

Election Day itself. When workers have days or weeks rather than hours to evaluate a questioned signature, they are far less likely to resort to the kind of rushed, intuitive judgment that Kahneman's System 1 framework predicts will produce biased outcomes. Pre-processing also gives election officials more time to identify deficient ballots and notify voters early enough to cure them (Morse, Meredith, and Stark, 2026). By contrast, more restrictive states like Mississippi, Pennsylvania, and Alabama only permit processing to begin on Election Day itself — precisely the conditions under which time pressure is highest, cognitive load is greatest, and the risk of biased discretionary judgment is most acute.

While these guardrails represent meaningful attempts to check the discretion of individual signature reviewers, they are unevenly adopted and in many states entirely absent. The result is a patchwork system in which the likelihood of a rejected ballot depends less on the legitimacy of the voter's signature and more on the particularities of the local bureaucratic process and those that administer it – people who, however well-intentioned, bring to their work the same unconscious biases, cognitive shortcuts, and racial preconceptions that research has consistently shown to shape discretionary judgment across every domain of public administration. The United States is not alone in facing hurdles to VBM though, and a brief survey of how other countries have approached the tension between ballot security and voter access offers useful context.

1.6 Voting by Mail and Ballot Rejection in an International Context

When thinking about VBM in the international context it is important to first distinguish out-of-country VBM to in-country VBM. Out-of-country VBM refers to citizens who are living abroad and have the option to vote-by-mail in their home country's elections. In the United States this is covered by the Uniformed and Overseas Citizens Absentee Voting Act (UOCAVA) which was enacted by Congress in 1986. UOCAVA requires U.S. states and territories to provide eligible citizens living abroad the ability to register and cast absentee ballots in federal elections. Some states go further and allow Americans living abroad to also

vote in state and local elections. Internationally, out-of-country voting is quite common, and according to the International Institute for Democracy and Electoral Assistance (IDEA), 115 countries have legal provisions which allow their electors to cast a vote from abroad (Ellis et al., 2007).

In-country postal voting on the other hand refers to the process whereby citizens residing inside their home country are permitted to vote-by-mail. This is more rare than out-of-country voting, but is becoming more popular in the wake of COVID-19. According to IDEA, as of 2025, 32 countries offer some form of in-country voting for their citizens. Only eleven countries allow in-country VBM for any reason.[1] An additional 21 countries allow in-country postal voting under special conditions. [2]

Thus, it is fair to say that the United States is not unique in offering no-excuse absentee voting, or universal vote-by-mail to its citizens. In Switzerland, for example, registered voters in all cantons are automatically mailed a ballot that can be returned via the post service. This system of in-country VBM goes back decades and although in-person polling places are still available, more than 90 percent of Swiss voters vote through the mail (Luechinger, Rosinger, and Stutzer, 2007; Nyhuis et al., 2025).

Switzerland is, of course, just one case, and there is substantial international variation in how countries implement VBM. Like the United States, other countries that permit postal voting must balance concerns about voter fraud with the burdens that identity-verification procedures like voter ID, signature verification, or proof of citizenship requirements can impose on voters (e.g. the SAVE Act). Nyhuis et al. (2025) offer an excellent review of this variation in European countries, and relevant to this dissertation, also provide an overview of the different VBM identification requirements across Europe (see Table 1.3). Just like across U.S. states, European countries differ in the ways that they verify the identities of

[1]Canada, Germany, Iceland, Republic of Korea, Liechtenstein, Luxembourg, New Zealand, Poland, Switzerland, United Kingdom

[2]Australia, Austria, Bangladesh, Bhutan, Fiji, France, Greece, India, Ireland, Japan, Lithuania, Malaysia, Marshall Islands, Federated States of Micronesia, Netherlands, Pakistan, Palau, Papua New Guinea, Slovenia, Spain, Zimbabwe

VBM voters. In some countries like Austria and Switzerland, voters are required to provide a signature with their ballot, but this signature is not actually verified. This is similar to Connecticut, Delaware, and the District of Columbia that have voters sign an oath under the penalty of perjury, but said signature is not actually "verified" by election workers in the sense that it is not compared against a known signature on file. Instead, workers are simply checking for completion or evidence of tampering(National Conference of State Legislatures, 2026).

What stands out is that in the European countries studied by Nyhuis et al. (2025), only the United Kingdom employs signature verification in a way that resembles processes seen in high-volume VBM states like California and Colorado. That is to say, in the United Kingdom, election workers examine the resemblance of two signatures to verify authenticity. More specifically, "Unless a waiver has been granted the Returning Officer (RO) will reject a postal voting statement if a signature and/or date of birth is missing, or if a signature and/or date of birth does not match that previously provided by the elector and held on record" (The Electoral Commission, 2026). Like in the United States, election officials in the UK are also provided with signature verification guidance in the form of a ten page manual that includes a decision-making tree to help workers accept and reject signature pairs (The Forensic Science Service, 2026). Still the process of VBM signature verification inevitably results in ballot rejection and in the 2024 parliamentary general election 2.2 percent of returned postal votes, or 168,000 ballots, were ultimately rejected and did not count (The Electoral Commission, 2024). This level of ballot rejection is consistent with previous studies in Germany (2.5 percent) (Nyhuis, 2021; Nyhuis, Harmening, and Swalve, 2024). More research is still needed on the ballot rejection rates for other countries that have in-country VBM.

Besides using signature verification, some countries such as Netherlands and Portugal require VBM voters to include ID numbers or a copy of their ID to verify their identity. This is similar to U.S. states like Georgia and New Mexico that require voters to include their drivers license number or last four numbers of their social security to verify their identity. Another handful of European countries require voters to write the date on their ballot. This is similar to Pennsylvania, which requires voters to hand-write the date on their mail

ballot return envelope — a requirement that resulted in over 10,000 ballots being rejected for missing or incorrect dates in the 2022 midterm elections Selzer (2024). In conclusion, European countries, and indeed the rest of the world, are experimenting with

While this dissertation focuses primarily on the United States, the international context outlined above is nonetheless relevant. Many of the countries that currently offer in-country VBM are relatively new to the practice and are actively working to improve their processes. The tradeoffs between ballot security and voter access that this dissertation examines are not unique to the United States, and findings about how signature verification affects ballot rejection and voter participation may offer useful lessons for election administrators and policymakers in other countries navigating similar challenges.

Table 1.3: VBM Identity Verification in Europe (adapted from Nyhuis et al. (2025))

	Signature	*Date*	*Name*	*Date of birth*	*Address*	*ID number*	*Copy of ID*	*Additional measures*	±
Austria	Yes	—	—	—	—	—	—		+
Belgium	Yes	—	Yes	Yes	Yes	—	—		∼
Finland	Yes	Yes	Yes	Yes[a]	Yes	Yes[a]	—	Two witnesses	−
Germany	Yes	Yes	—	—	—	—	—		+
Italy	—	—	—	—	—	—	—		+
Latvia	—	—	Yes	—	—	Yes	—		−
Lithuania	—	—	—	—	—	—	—		+
Luxembourg	—	—	—	—	—	—	—		+
Netherlands	Yes	Yes	—	—	—	—	Yes		−
Norway	Yes	Yes	Yes	—	Yes	Yes	—		−
Poland	Yes	—	Yes	—	—	Yes	—		−
Portugal	—	—	—	—	—	—	Yes		−
Romania	Yes	Yes	—	—	—	—	—		+
Slovakia	—	—	—	—	—	—	—		+
Spain	—	—	—	—	—	—	—	Personal submission	−
Sweden	Yes	—	Yes	—	—	Yes	—	Two witnesses	−
Switzerland	Yes	—	—	—	—	—	—		+
United Kingdom	Yes	—	—	Yes	—	—	—	Signature verification	+

[a]Voters have to provide either their date of birth or their ID number.

1.7 Dissertation Outline

The remainder of this dissertation proceeds as follows: Chapter 2 is an observational analysis of California ballot rejection over the past 10 years including an in-depth analysis of the 2022 general election. Using the 2022 statewide voter file I examine ballot rejection patterns across

various rejection reasons and demographic cleavages including county of residence, gender, race, and age. In this chapter I unveil significant county variation in ballot rejection rates, even when comparing counties of similar size and resources. Furthermore, I find that the gulf in ballot rejection between younger votes under 30 years of age and older voters over 65 years of age is larger than any other demographic gulf including that of White vs non-White voters and male vs female voters.

In Chapter 3 I share a two part study of ballot rejection in Washington state. The first part of the study is an observational analysis of ballots rejected for being too late and for non-matching signatures among voters with White names and Hispanic names. I find that voters with White names are less likely to submit late ballots and less likely to have a non-matching signature compared to voters with Hispanic names, but that this racial gap in rejection is considerably larger for signature rejection than it is for late rejection. Because the process of signature verification is more subjective and discretionary than late rejection, and because voters with Hispanic names are disproportionally more likely to be affected by signature rejection than late rejection compared to White voters, I argue that Washington's racial gap in ballot rejection is at least partly fueled by administrative-side biases at the signature verification stage. The second part of this chapter uses a signature-matching experiment to provide evidence that at the individual level, racial biases can and do affect the process of signature verification, at least among an online sample of registered voters in Washington state.

In Chapter 4 I offer a more experimental evidence of racial bias affecting signature verification, but with a slightly different design and using White vs. Black names as experimental stimuli as opposed to White vs. Hispanic names as was the case in Chapter 3. In this study, I survey nearly 800 White undergraduate students from across the country and just like in Chapter 3, I ask them to accept or reject a series of racialized signature pairs. I find that among my sample, signature evaluators with high levels of White ethnocentrism are more likely to accept White appearing signatures and reject non-White signatures all else equal. This finding is consistent with new research finding that partisan attitudes can similarly affect people's likelihoods to accept or reject VBM ballot signatures (Shino and

Smith, 2026).

Finally, in my conclusion I summarize my empirical findings across chapters and return to the central argument of this dissertation: that ballot rejection in the United States is not a neutral administrative process, but one shaped by structural inequalities and individual-level biases that disadvantage young and non-White voters. I close with a discussion of potential reforms and what implications biased ballot rejection have for the legitimacy of elections with VBM regimes.

CHAPTER 2

Analyzing VBM Ballot Rejection in California's 2022 General Election

California has been at the forefront of expanding access to vote-by-mail (VBM) for decades. In 1978, California became the first state in the nation to allow voters to request an absentee ballot without having to provide any excuse, a reform that set the stage for a gradual transformation of how voters in this country cast their ballots. In 2002, the California Elections Code was amended to allow any voter to apply for permanent absentee status, further expanding access to mail voting. However, while these reforms increased voter access for many, they also brought about a new problem: VBM ballot rejection. In the November 2016 election alone, over 45,000 ballots in California were discarded without notice to voters because election officials determined that the signature on the mailed ballot envelope did not match the one on file (e.g. signature from registration). The practice of not informing voters that their ballot was rejected prompted the ACLU of Northern California to file *La Follette v. Padilla* against Secretary of State Alex Padilla, arguing that voters were entitled to notice and an opportunity to fix their ballots before their votes were discarded. In 2018, the court sided with the plaintiffs and issued an order requiring California election officials to notify voters of any signature concerns and give them a chance to cure the problem before their ballot was rejected, establishing the legal foundation for California's ballot curing process.

Despite this legal victory, the underlying process of VBM signature verification remains problematic due to its inherent subjectivity and the fact that many voters are still unable to cure their ballots even when notified due to the extra administrative steps that ballot curing requires. The stakes of this problem grew considerably when, in response to the COVID-19 pandemic, California counties mailed ballots to all active registered voters for the November

2020 election, a process that became permanent in September 2021 when Governor Newsom signed Assembly Bill 37 into law. What had once been an administrative problem affecting a subset of voters who voluntarily opted for VBM quickly became a statewide issue with implications for all Californians. The scale of ballot rejection in California is now unmatched by any other state in the country (California has more than 100,000 rejected ballots each general election), making it imperative for election practitioners and scholars alike to fully understand the administrative burden of ballot rejection and whether it is evenly distributed across the electorate. This chapter takes up that call and examines the extent to which VBM ballot rejection in California is distributed evenly across voters of different counties, genders, races, and ages. To accomplish this, I rely on official vote data from the California Secretary of State's Office and for each county, calculate ballot rejection rates among key demographic groups using their self-reported information provided in the registration process. This approach is consistent with past research (Barreto et al., 2024) and allows me to hone in on gender gaps, racial gaps, and age gaps when it comes to voting and ballot rejection at a statewide level and also county level. Examining county variation for ballot rejection is crucial because counties in California are granted considerable discretion in administering each of their own VBM regimes (Janover and Westphal, 2020). This variation is useful from a scientific perspective because it allows researchers to treat counties as comparative cases, identifying which administrative environments are associated with higher or lower rates of rejection and giving insight into the exact practices that are more likely to exacerbate or mitigate inequities in ballot rejection. Using this approach, I ultimately find that across the state, male and female voters are equally likely to experience ballot rejection but non-White voters are more likely than White voters to experience rejection across all rejection categories, consistent with past research (Baringer, Herron, and Smith, 2020; Cottrell, Herron, and Smith, 2021; Shino, Suttmann-Lea, and Smith, 2022; Allard et al., 2023). The racial gap in signature verification specifically is largest between White voters and Latino voters. For late voting and undeliverable ballots, the largest racial gap is between White and Black voters.

I also examine age gaps, and find that across the board, younger voters are more likely to experience ballot rejection compared to older voters and that this gulf grows in

size the larger the age gap is. At its most extreme, voters under the age of 25 are more than ten times as likely to have an invalid signature or late ballot compared to voters older than 65 in more than a handful of medium to large California counties. While I do not control for voter experience in this chapter as others have (Cottrell, Herron, and Smith, 2021; Shino, Suttmann-Lea, and Smith, 2022), the results still suggest that age disparities in ballot rejection are larger than racial disparities – at least in the state of California. The results also highlight significant variation across California's 58 counties, even across similarly sized counties, suggesting that more work is needed to understand how local technocratic differences in county VBM regimes can impact ballot rejection rates generally and for specific groups.

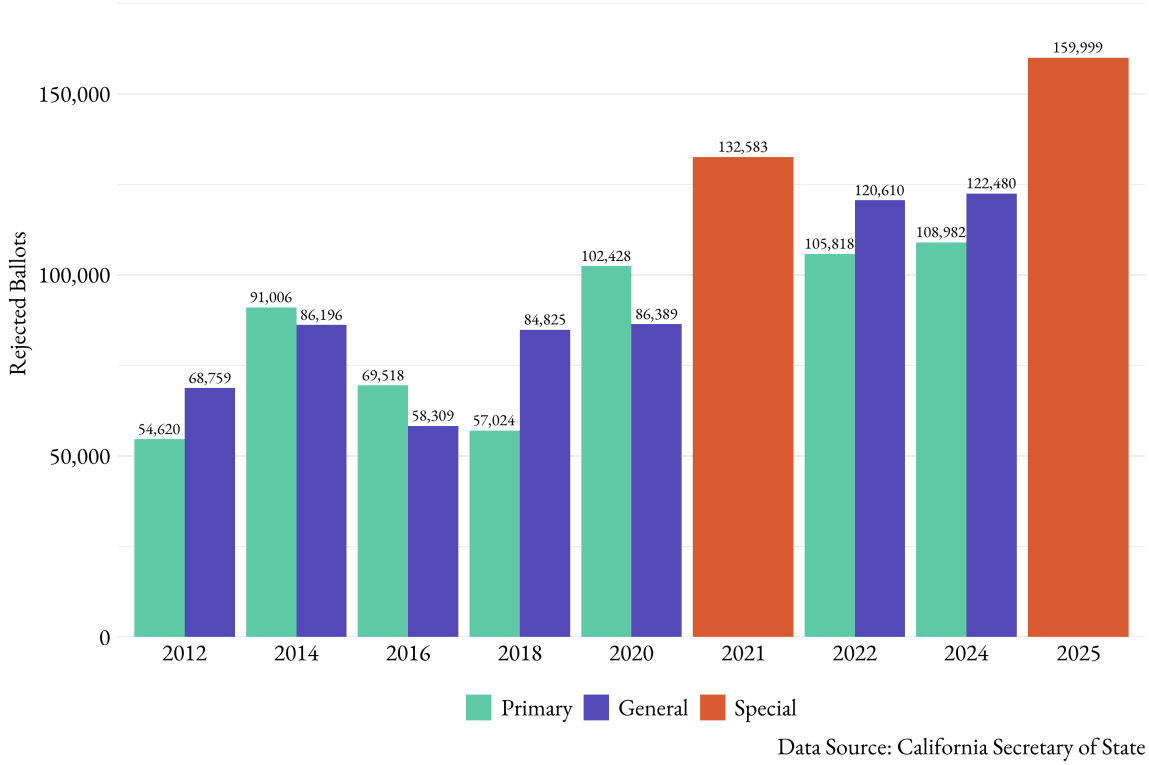
2.1 Volume of VBM Ballot Rejection in California

Before beginning any distributional analysis of VBM ballot rejection, it is worth first understanding the scope of the problem at hand. Figures 2.1 and 2.2 display the total number of rejected VBM ballots and the rejection rate, respectively, across California elections from 2012 to 2025. In the 14 year period displayed below, 1,509,546 ballots were returned but ultimately not counted (California Secretary of State, 2025). Normatively, it is preferable if no eligible voter who makes a good faith effort to participate has their ballot rejected. In other words, these 1,509,546 instances of "lost votes" are regrettable and avoidable cases of democratic harm (Stewart III, 2020). While some rejections — such as those resulting from ballots returned past the legal deadline — reflect voter-side procedural violations, others, such as signature mismatches, raise harder questions about whether the administrative burden placed on voters is compatible with the normative goal of broad and equitable electoral participation (Dahl, 2020).

The scale of this burden is typically under reported by official canvassing reports, which capture only ballots that were ultimately uncounted and not the far larger number that were initially rejected before being successfully cured. Past research indicates that county cure rates in California can vary from 20 to 60 percent for a typical election (Janover and

Westphal, 2020, see Figure 11), but in competitive elections where campaigns invest heavily in securing cured ballots, rates as high as 86 percent have been reported (Ehisen, 2025). This means that for every rejected ballot that appears in the official record, there is likely another voter who was initially rejected but was able to navigate the administrative hurdles of ballot curing successfully resulting in their vote counting. The voters who cannot or do not complete this process are the ones who remain uncounted and represent "lost votes".

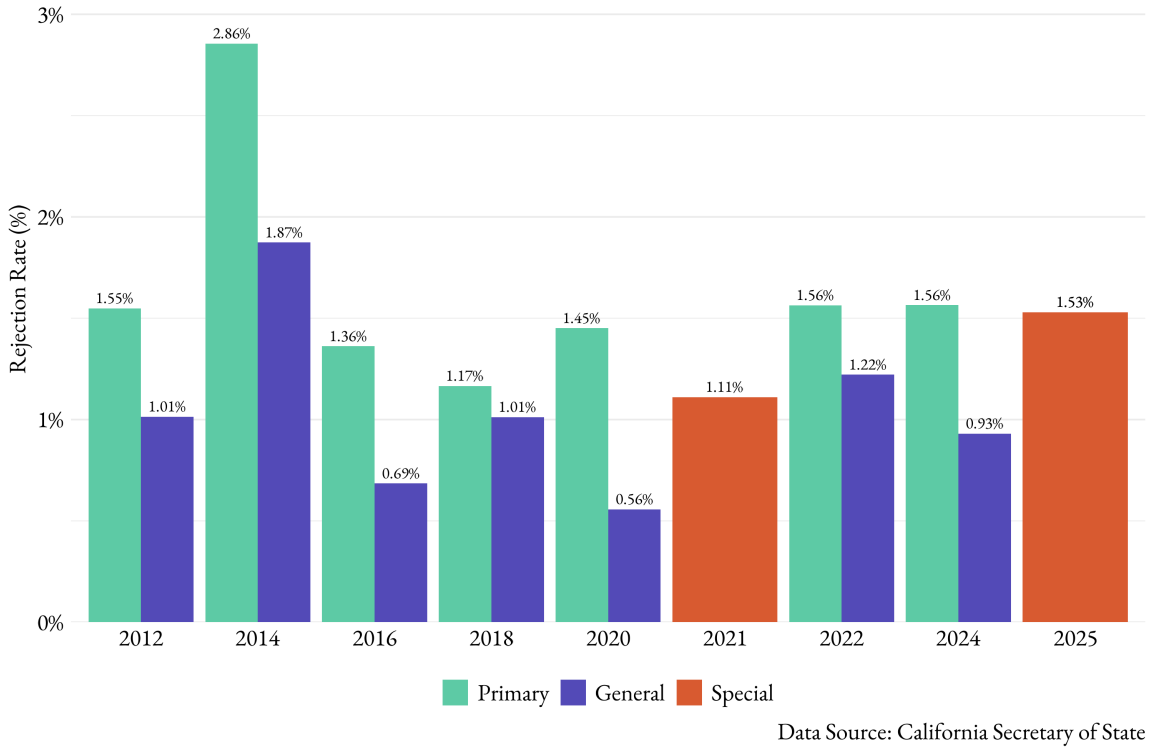
Figure 2.1: California Total Ballot Rejection



Finally, it is also worth noting that primary and general election ballots typically contain votes for 20 to 30 separate federal, state, and local races. A single rejected ballot therefore represents not just one lost vote, but potentially 20 to 30, compounding the impact of rejection on democratic participation. This matters because elections are increasingly competitive, and margins of victory are often smaller than the number of rejected ballots in the same race. In 2024, for instance, Adam Gray defeated John Duarte by just 187 votes in California's 13th Congressional District. That same year, Derek Tran defeated

Michelle Steele by only 653 votes in the 45th Congressional District. Both of these races had thousands of rejected ballots that could have easily swayed the outcome one way or the other, raising serious questions about whether the outcomes of these races reflect the true preferences of the electorate. Put differently, because it is not uncommon for there to be more rejected ballots in an election than the margin of victory, ballot rejection needs to be perfectly random for it not to affect the results – this is the test that is at the center of this chapter.

Figure 2.2: California Ballot Rejection Rates



Moving to Figure 2.2 which visualizes overall rates of ballot rejection, several patterns are worth noting. First, rejection rates are consistently higher in primary elections than in general elections across nearly every election cycle examined. Second, rejection rates since 2020 have remained relatively stable with primary and special elections hovering around 1.5 percent and general elections ranging from .56 to 1.22 percent. When comparing California's statewide rejection rates to other states with universal VBM, California appears average. For

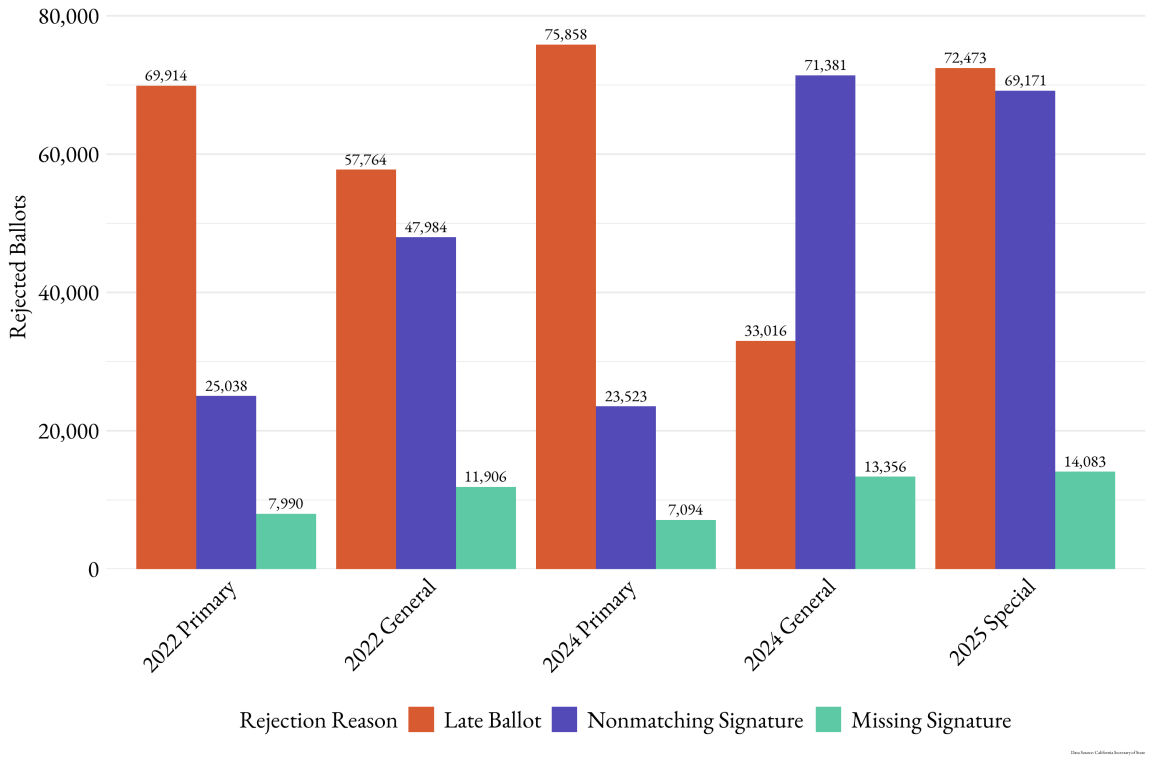
example, in the 2022 general election where California rejected 1.22 percent of mailed ballots, Colorado, Oregon and Washington rejected 1.03, 1.29, and 1.22 percent of ballots respectively (Lopez, 2023). However, these statewide averages could very well be masking important county-level variation in ballot rejection. In the next section I explore this possibility and also break down the three main reasons for ballot rejection.

2.2 Reasons for Ballot Rejection and County Variation

Since 2022 the California Secretary of State's Office has released ballot rejection reason reports which outline ballot rejection rates for specific rejection reasons for each county. Across all of these reports since 2022, the top three reasons for a ballot being rejected are non-matching signatures, arriving past the deadline, and missing signatures. In Figure 2.3, I visualize ballot rejection totals across these three main reasons for 2022, 2024, and 2025. While late ballot rejection is consistently more prevalent than signature rejection in all but one election, what is striking is that non-matching signature rejection in the past two statewide elections is remarkably higher than the 2024 primary, 2022 general, and 2022 primary elections.

To get a closer look at how counties differ in signature rejection and late ballot rejection, I hone in on seven highly-populated counties from different regions of California: Fresno, Orange, San Francisco, Ventura, Los Angeles, Riverside, and Santa Clara in Figure 2.4. Because each of these counties account for hundreds of thousands of mailed ballots each election cycle, even small variations in their signature rejection rates account for tens of thousands of rejected ballots. For example, Los Angeles had a signature rejection rate of .36 percent in 2025 while Fresno had a signature rejection rate of 2 percent in the same election. If Los Angeles rejected signatures at the rate that Fresno did in 2025, ballots rejected for non-matching signatures would increase from 7,959 to 43,130 in Los Angeles county. This hypothetical situation illustrates why county variation in signature rejection is so important. It is clear from the data that large urban counties like San Francisco, Santa Clara, and Los Angeles are able to keep signature rejection below half of one percent whereas other, similar

Figure 2.3: California Ballot Rejection by Reason

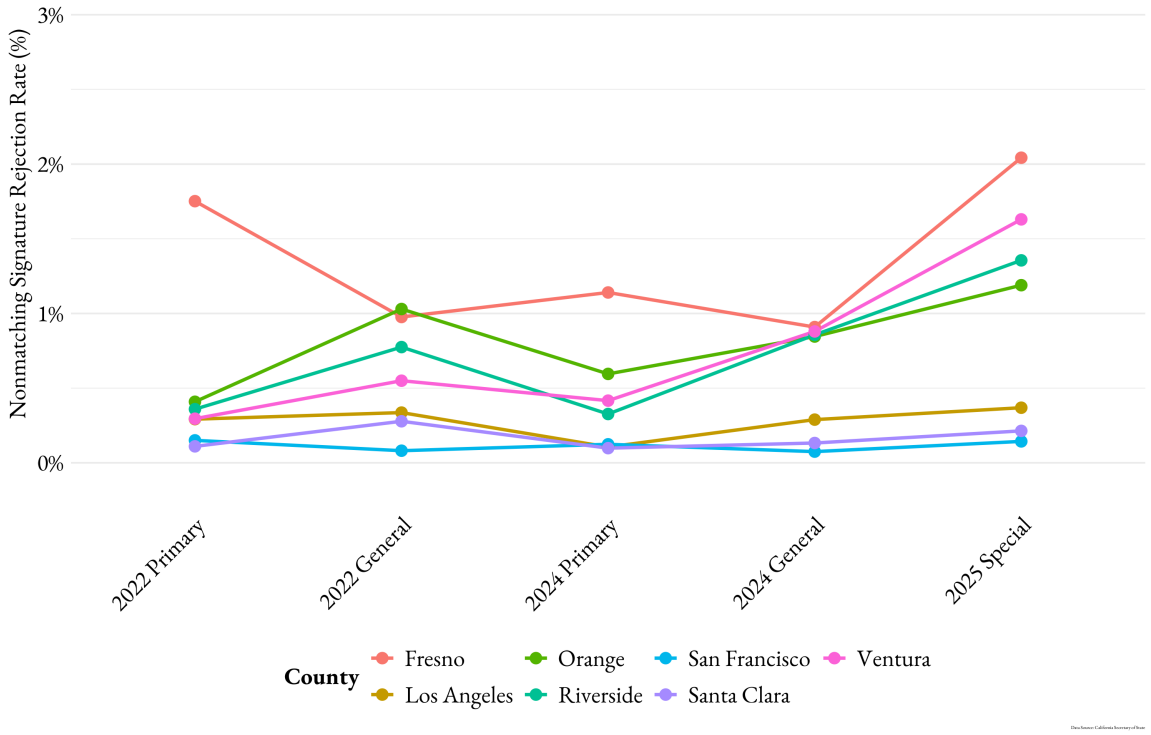


sized counties consistently reject signatures anywhere between two to eight times a higher rate.

Besides significant county differences in signature rejection within a given election, there is also variation in county trends over time. In San Francisco, Santa Clara, and Los Angeles, signature rejection rates are almost a flat line hovering around .3 percent. Meanwhile, Orange, Ventura, and Riverside counties have signature rejection rates that appear to increase in unison whereas Fresno county diverges multiple times.

This pattern of significant county-level variation in signature rejection is consistent with past research not only in California (Janover and Westphal, 2020) but also in other states such as Florida (Baringer, Herron, and Smith, 2020), Georgia (Shino, Suttmann-Lea, and Smith, 2022), and Washington (Office of the Washington State Auditor, 2020). Existing research has thus far been unable to pin down what exactly causes this non-uniformity but have noted that despite state standards for signature verification, "there is considerable

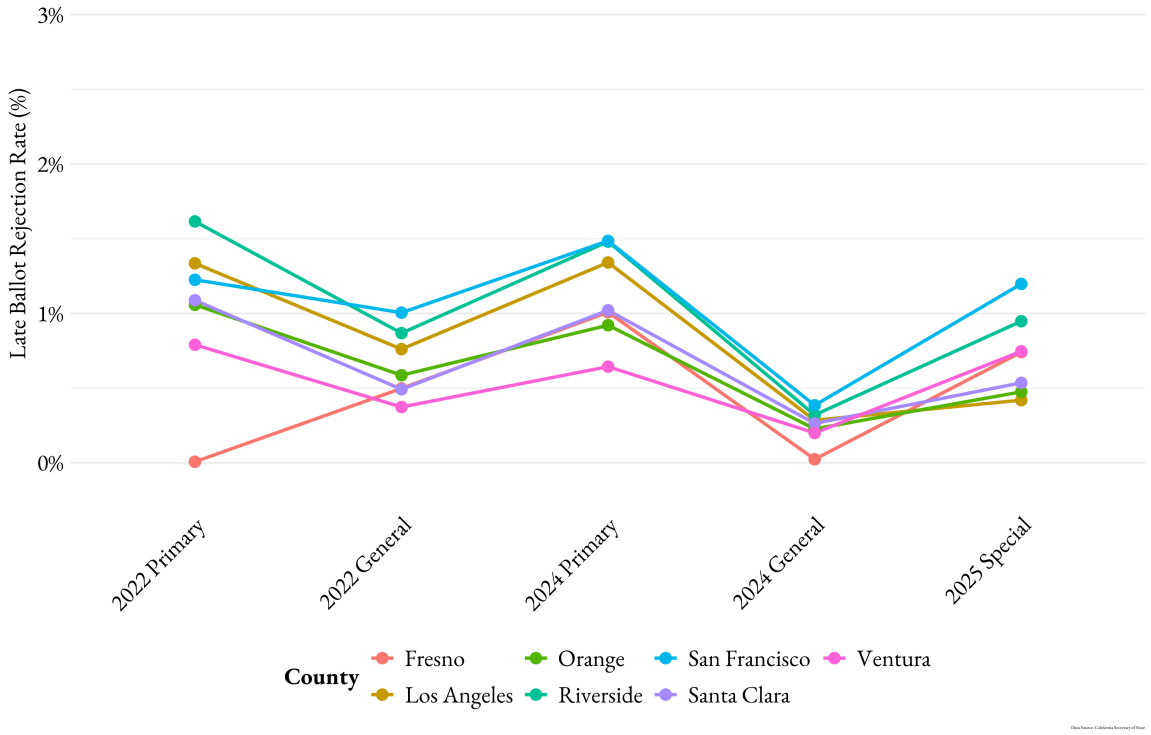
Figure 2.4: Signature Rejection Rates Over Time in Select Counties



variation from county to county in the processing of VBM ballots and in the procedures used by [Supervisors of Elections] to inform voters to enable them to correct flawed returned VBM ballots with a cure affidavit" (Smith, 2021, p. 8).

Unlike signature rejection rates which vary differently over time depending on the county, late rejection rates, as visualized in Figure 2.5, appear to be much more uniform over time across all the counties sampled. Still though, county level differences persist within elections. For example, in the 2024 primary election, San Francisco rejected about 1.5 percent of returned ballots for being late whereas in that same election Ventura only rejected .6 percent of returned ballots for being late. There are two possible explanations for this pattern. The first is that there are voter-side differences between San Francisco and Ventura that make voters in one county more/less likely to submit their ballot in a timely manner. The second possible explanation is that there are administrative-side differences between counties that result in county differences in late ballot rejection. I explore these

Figure 2.5: Late Rejection Rates Over Time in Select Counties



competing explanations further in Chapters 3 and 4.

2.3 Theory of Gender, Racial, and Age Based Differences in California Ballot Rejection

While county differences in VBM ballot rejection are important on their own, so too are demographic differences. Not all voters interact with the administrative requirements of VBM in the same way, and there are strong theoretical reasons to expect that the burden of ballot rejection falls unevenly across social groups. Importantly, these demographic disparities are not independent of the county-level variation documented above. The administrative choices that counties make — from how aggressively they recruit multilingual election workers, to how much they invest in voter outreach to younger or minority communities — may affect some demographic groups more than others. A county that hires Spanish-speaking signature

verifiers, for instance, may produce lower Hispanic rejection rates because its administrative infrastructure is better calibrated to serve Hispanic voters. This interaction between place and demography is part of what makes county-level analysis so valuable: it allows me to identify not just whether demographic gaps exist, but also where local administrative choices are closing or widening them. The sections below develop theoretical expectations for gender, racial, and age gaps in ballot rejection before presenting empirical evidence.

2.3.1 Gender-Related Expectations For VBM Ballot Rejection

Beginning with gender, there is little theoretical reason to expect any meaningful differences in ballot rejection between male and female voters. In the modern era, gender is not strongly associated with systemic disadvantages that drive ballot rejection. Both male and female voters have comparable rates of prior voting experience and are evenly dispersed geographically, making it unlikely that one group would systematically struggle more with the mechanical requirements of VBM than the other. That said, the history of women's participation in American elections is not without its barriers. Women were formally excluded from the franchise until the ratification of the Nineteenth Amendment in 1920, and Black women faced continued suppression in many parts of the country well into the twentieth century (Jones, 2020). While these historical exclusions are unlikely to manifest directly in modern VBM regimes, they are a reminder that administrative barriers to voting have historically been aimed at women and that the absence of a gap does not mean the absence of a historical problem worth monitoring.

Looking forward, there is even reason to believe that emerging voter registration requirements could reintroduce gender-based disparities in ballot access. Proposals requiring voters to provide proof of citizenship documentation at the time of registration — such as a birth certificate or passport — could disproportionately burden women, who are significantly more likely than men to have a legal name that differs from the one appearing on their birth certificate due to marriage (Kim, 2025). While these requirements are not yet in effect in California, they represent a plausible mechanism through which gender could become a more

salient predictor of ballot rejection in the future. For now, some research has found small gender gaps in ballot rejection, with male voters being slightly more likely to have their ballots rejected (Shino, Suttmann-Lea, and Smith, 2022), and so gender is worth examining even if large differences are not expected. Thus, I hypothesize that:

Hypothesis 1. *In California's 2022 general election, there were no meaningful differences in ballot rejection between male and female voters.*

2.3.2 Race-Related Expectations For VBM Ballot Rejection

Race, by contrast, provides much stronger theoretical grounds for expecting disparities in ballot rejection. A long line of research has documented that racial minorities face higher administrative burdens in the electoral process generally (Barreto, Sanchez, and Walker, 2022; Keyssar, 2009; Morris and Miller, 2024), and VBM specifically (Baringer, Herron, and Smith, 2020; Shino, Suttmann-Lea, and Smith, 2022; Cottrell, Herron, and Smith, 2021; Allard et al., 2023). Whether racial gaps in ballot rejection are due to voter-side deficiencies (e.g. language or cultural barriers), or administrative- and campaign- side biases like a lack of voter education and mobilization (Verba, Schlozman, and Brady, 1995; Hero et al., 2000; Wong, 2008; Bedolla and Michelson, 2012), is an open question, and in this chapter one that I am agnostic to. However, because I have data related to ballot deliverability, I offer a brief theoretical account of racial gaps in undeliverable ballots specifically. Remember, according to Charles Stewart, undeliverable ballots can occur because the USPS either cannot deliver ballots from county offices to voters, or return them from voters to county offices and both represent distinct types of "lost votes" (Stewart III, 2020). Undeliverable ballot rates are no doubt tied to the residential mobility of voters, but as of late, the USPS has an increasing amount of discretionary power under the Trump administration (Mock, 2026; Lopez, 2026). Still though my main theoretical focus is that of non-White residential mobility. Decades of scholarship have shown that, due to systemic racism, non-White voters are more likely to be residentially mobile than White voters (Pager and Shepherd, 2008; Ross and Turner, 2005; Rugh, 2015; Desmond and Gershenson, 2017) and that this mobility affects VBM

participation. Thus, my second hypothesis is that:

Hypothesis 2. *Non-White voters were more likely than White voters to have their ballots rejected in the 2022 general election across all rejection reasons including undeliverable ballots.*

2.3.3 Age-Related Expectations For VBM Ballot Rejection

Age is the final demographic dimension that I examine in this chapter and there are several theoretical grounds to believe that younger voters are more likely to experience ballot rejection than older voters. First, on the administrative side, young voters are less likely to receive voter outreach or be mobilized compared to older voters due in part to their low propensity to vote – a sort of positive reinforcement loop that racial minority voters also face (Wong, 2008; Michelson, 2005; Green, 2004). This matters for ballot rejection because older voters are most likely to be the target of voter outreach, education, and curing efforts due to their high voting propensity. Young voters are then left by the wayside in this regard and thus bound to be less equipped to navigate the administrative hurdles of VBM.

Second, like non-White voters, young voters are also more likely to be residentially mobile (Wolfinger and Rosenstone, 1980; Squire, Wolfinger, and Glass, 1987; Highton and Wolfinger, 2001; Nickerson, 2006). This mobility makes it more difficult for USPS workers attempting to deliver VBM ballots. In the year 2000, voters aged 20-29 were twice as likely to have moved in the past year compared to all other age groups (Nickerson, 2006). This level of mobility is likely to create an age gap in the deliverability of VBM ballots, resulting in more lost votes from young voters compared to older voters.

Third, young voters are also more likely to lack experience in voting, and this past experience is an important predictor of future VBM participation (Cottrell, Herron, and Smith, 2021). For instance, because signature verification is widely used by VBM regimes across the country to verify voters' identities and young voters have less experience in producing a consistent signature, there is further reason to believe that young voters are more likely to experience ballot rejection compared to older voters.

Beyond just experience in producing a valid signature, younger voters also lack experience in navigating the broader procedural requirements of VBM such as knowing when ballot return deadlines are or how to cure their ballot if something goes wrong. This procedural unfamiliarity compounds the signature problem: a young voter who misses the return deadline, forgets to sign the envelope, or simply does not know that their ballot was flagged for a signature mismatch and that they have the right to cure it, faces multiple pathways to rejection that more experienced voters have learned to avoid. Older voters, having cast ballots across multiple election cycles, have internalized these procedural requirements through repeated practice, making errors less likely. However, experience is not the whole story when it comes to age gaps in VBM ballot rejection, Cottrell, Herron, and Smith (2021) show that even when controlling for experience with VBM, voters aged 18-30 were more likely to have their on-time ballots be rejected than all other age groups in Florida's 2016, 2018, and 2020 general elections. Furthermore, Baringer, Herron, and Smith (2020) find that rejection rates for voters aged 18–21 reached 3.9 and 5.4 percent in 2016 and 2018 respectively, roughly eight times greater than those of the oldest cohort in both years. Thus, I hypothesize that:

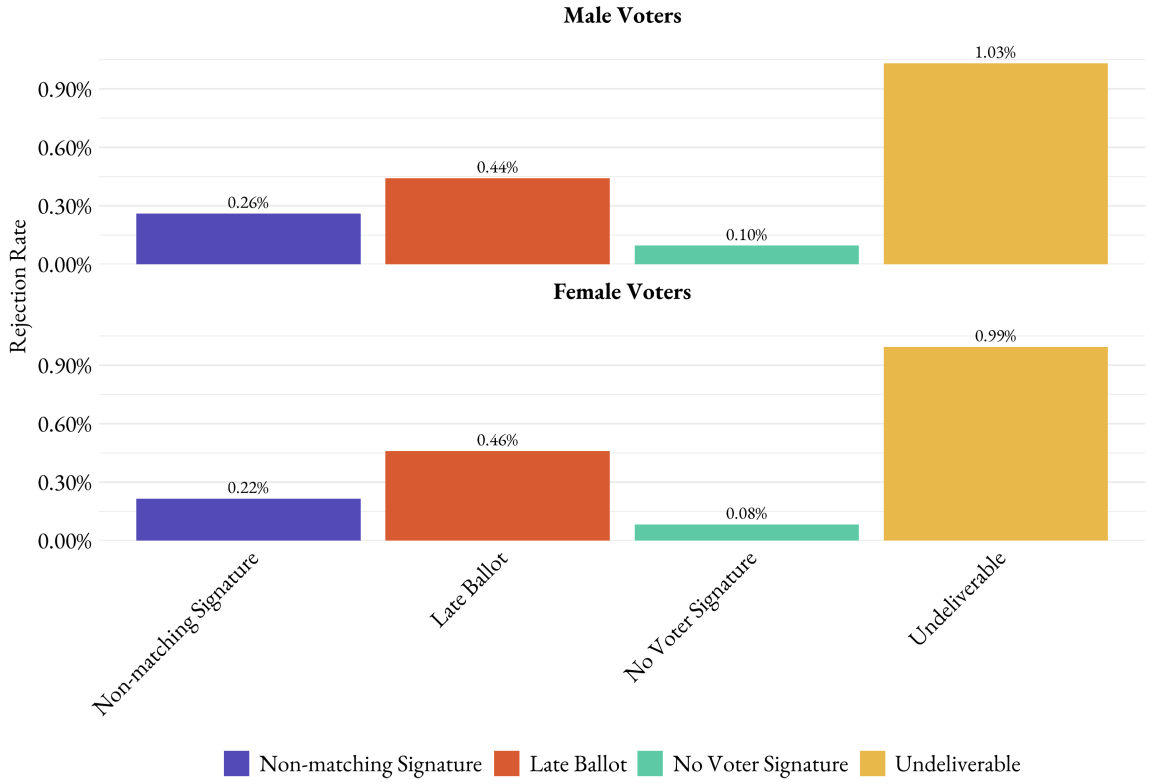
Hypothesis 3. *Younger voters were more likely than older voters to have their ballots rejected across all rejection categories, with the largest gaps expected between voters under 25 and those over 65.*

2.4 Results: Rejected Ballots by Gender in 2022 General Election

I begin my analysis with gender because, despite being a meaningful demographic divide in many arenas of social and political life, it has little influence on a voter's likelihood of having their ballot rejected. This makes gender a good starting point because it demonstrates that election administrators are capable of treating voters with meaningful demographic differences equitably, with male and female voters experiencing ballot rejection at broadly comparable rates as illustrated below in Figures 2.6 and 2.7. This sets a useful benchmark against which the disparities documented in subsequent sections can be evaluated.

Figure 2.6 presents statewide rejection rates for self-reported male and female voters

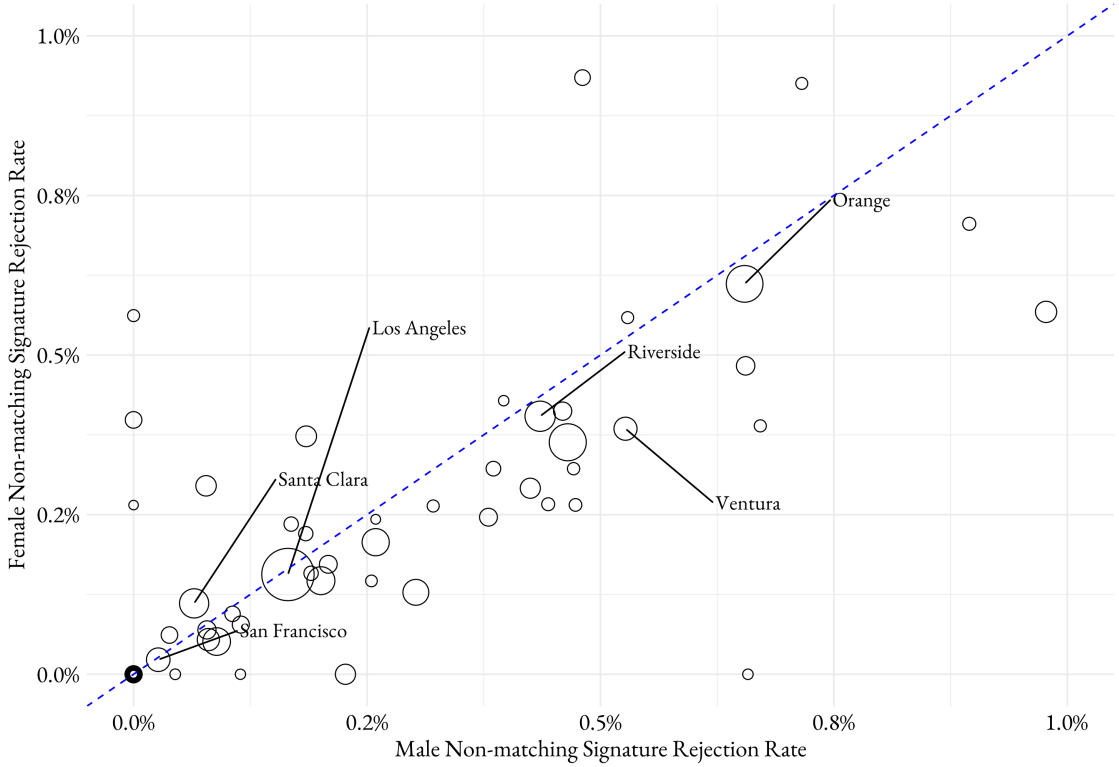
Figure 2.6: VBM Ballot Rejection Rates by Reason and Gender



across four rejection reasons: non-matching signature, late ballot, missing signature, and undeliverable ballot. Because I have access to more detailed rejection data for the 2022 general election than for other elections in this period, I am able to incorporate undeliverability as an additional rejection category. The Secretary of State's detailed voter file includes more granular rejection reasons than those reported in statewide canvassing summaries, one of which is an undeliverable ballot. While this differs somewhat from the other three categories, which all involve a voter physically returning a completed ballot, I include undeliverable ballots in this analysis for three reasons. First, an undeliverable ballot is an administrative failure that prevents an eligible voter from participating entirely, making it as much a disenfranchisement outcome as any other rejection type. Second, the rate of undeliverable ballots is high enough to warrant serious attention, and understanding which voters are most affected is an important part of the broader story this chapter tells. Third, President Donald Trump announced an executive order on March 31st titled "Ensuring Citizenship Verification and

Integrity in Federal Elections," directing the U.S. Postal Service to only deliver VBM ballots to voters on approved lists curated by the White House. While this is an unprecedented move that will be challenged in the courts, some states may decide to comply with the order, resulting in millions of voters not receiving their ballot from the USPS because of being flagged as "ineligible" according to a dubiously curated list from the federal government. In short, the 2026 midterms are likely to see record levels of undeliverable ballots not just because of voter-side address problems but also because of USPS guidance to purposefully not deliver to certain voters, making it important for elections offices to report undeliverable ballot rates. While some research on postal delivery disruptions exist (Herron and Smith, 2021), this is the first study to examine undeliverable ballots generally, or among subgroups of voters.

Figure 2.7: VBM Signature Rejection Rates by Reason and Gender in 2022 General Election



In Figure 2.7 I illustrate gender differences in signature rejections across individual counties in California in the 2022 general election. Each county is represented by an open

circle whose size is proportional to the total number of votes cast. The x-axis represents male signature rejection and the y-axis represents female signature rejection rate. The dashed blue line is drawn at 45 degrees and represent gender parity in signature rejection. In other words, the closer that a county is to the dashed blue line, the closer they are to gender parity in signature rejection. Besides a handful of small outlier counties, it is clear that most counties are clustered along this line of parity, albeit slightly below it indicating that male voters in counties like Ventura are slightly more likely to have their VBM signature rejected compared to female voters perhaps suggesting that female penmanship is rewarded and male penmanship punished by signature reviewers. Overall though, gender has very little influence on a persons likelihood to have their ballot rejected both statewide and among individual counties, confirming *Hypothesis 1.* Normatively, this is a desired outcome. If ballot rejection is unavoidable, then it should at least be distributed evenly across genders so that one gender is not systematically advantaged at another's expense. In the next section I apply the same test for different racial groups and uncover a much different pattern.

2.5 Results: Rejected Ballots by Reason and Race in 2022 General Election

Analyzing racial patterns in California ballot rejection is complicated by the fact that voters in the state are not required to self-identify their race when registering to vote. This distinguishes California from states covered under Section 5 of the Voting Rights Act, such as Florida and Georgia, where racial data on voters is more readily available and has been studied more extensively (Baringer, Herron, and Smith, 2020; Shino, Suttmann-Lea, and Smith, 2022). This shortcoming is evident in multiple grant-sponsored reports of California VBM patterns from the California Voter Foundation, Public Policy Institute of California, and USC's Center for Inclusive Democracy where ballot rejection is only parsed along gender, age, county, or language preference (Romero, 2014, 2020, 2021).

This missing data represents a significant gap in our understanding of how ballot rejection burdens are distributed across racial groups in one of the most racially diverse electorates

in the country. The gap is particularly consequential given the long history of racially discriminatory barriers to voting in the United States and the legislative efforts designed to address them. The federal Voting Rights Act of 1965 established race as a legally protected class in the context of electoral participation, recognizing that administrative practices — even ostensibly neutral ones — can have disparate racial impacts that undermine the promise of equal political representation. The California Voting Rights Act of 2001 extended these protections further, reflecting a state-level commitment to ensuring that no group of voters faces disproportionate barriers to participation on the basis of race or ethnicity. Against this backdrop, the absence of racial data in California's voter registration system makes it difficult to assess whether the state's ballot rejection practices are consistent with these legal and normative commitments — a gap this analysis seeks to partially address.

One way that scholars have overcome this barrier is through the use of ethnic name lists, which measure the association between first, last, and middle names and racial or ethnic group membership (Asian Americans Advancing Justice, 2017). However, name lists are limiting in several important respects. They tend to perform poorly for multiracial individuals and for groups whose names do not follow recognizable ethnic patterns, and they provide only a binary or categorical classification rather than a probability distribution across racial groups. These limitations have led researchers to adopt more sophisticated probabilistic approaches, most notably Bayesian Improved Surname Geocoding (BISG), which combines surname data with census-based geolocation information to generate race probability estimates for individual voters. BISG has been validated extensively in the political science and public health literatures and is now widely regarded as the most reliable method for inferring race in administrative datasets that do not collect this information directly (Imai, Olivella, and Rosenman, 2022).

In this analysis, I use BISG probabilities generated from the `wru` package in R, which takes each voter's surname and census tract of residence as inputs and returns a vector of probabilities representing the likelihood that the voter belongs to each of five racial or ethnic categories: white, Black, Hispanic, Asian, and other. Rather than assigning each voter a single racial category based on the highest probability — an approach that would introduce

measurement error and obscure uncertainty — I retain the full probability vector and use each voter's probability of belonging to a given group as a fractional weight in my calculations. This means that a voter estimated to be 70 percent likely to be Hispanic and 20 percent likely to be white contributes 0.70 to the Hispanic rejection count and 0.20 to the white rejection count for any given rejection outcome. Aggregating these fractional weights across all voters within a county produces weighted estimates of the number of ballots rejected for each racial group, which can then be divided by the weighted total population of that group to produce a rejection rate. This approach has the advantage of preserving uncertainty in individual-level racial classification while still producing reliable group-level estimates, and it is consistent with best practices in the ecological inference and survey weighting literatures.

2.5.1 Formal Estimation Procedure

The intuition described above can be stated formally as follows. Let i index individual voters, j index counties, and r index racial groups where $r \in \{w, b, h, a, o\}$ denotes White, Black, Hispanic, Asian, and Other respectively.

For each voter i, the BISG procedure uses the voter's surname and census tract of residence to return a probability vector:

$$\mathbf{p}_i = (p_{i,w},\ p_{i,b},\ p_{i,h},\ p_{i,a},\ p_{i,o}) \tag{2.1}$$

where $p_{i,r}$ is the posterior probability that voter i belongs to racial group r, and the probabilities sum to one across all groups:

$$\sum_r p_{i,r} = 1 \tag{2.2}$$

Let $Y_i \in \{0, 1\}$ be a binary indicator equal to 1 if voter i's ballot was rejected for a given reason and 0 otherwise, observed directly from the California Secretary of State's official voter file. The weighted number of rejected ballots attributable to racial group r in county j is then:

$$\hat{R}_{r,j} = \sum_{i \in j} p_{i,r} \cdot Y_i \tag{2.3}$$

and the weighted number of voters belonging to group r in county j is:

$$\hat{N}_{r,j} = \sum_{i \in j} p_{i,r} \tag{2.4}$$

The estimated rejection rate for racial group r in county j is the ratio of these two quantities:

$$\rho_{r,j} = \frac{\hat{R}_{r,j}}{\hat{N}_{r,j}} = \frac{\sum_{i \in j} p_{i,r} \cdot Y_i}{\sum_{i \in j} p_{i,r}} \tag{2.5}$$

This is simply a probability-weighted mean of the rejection indicator Y_i, where each voter's contribution to group r's rejection rate is proportional to their posterior probability of belonging to that group. Finally, the statewide rejection rate for group r is obtained by aggregating the weighted counts across all $J = 58$ counties before dividing, rather than averaging the county-level rates directly:

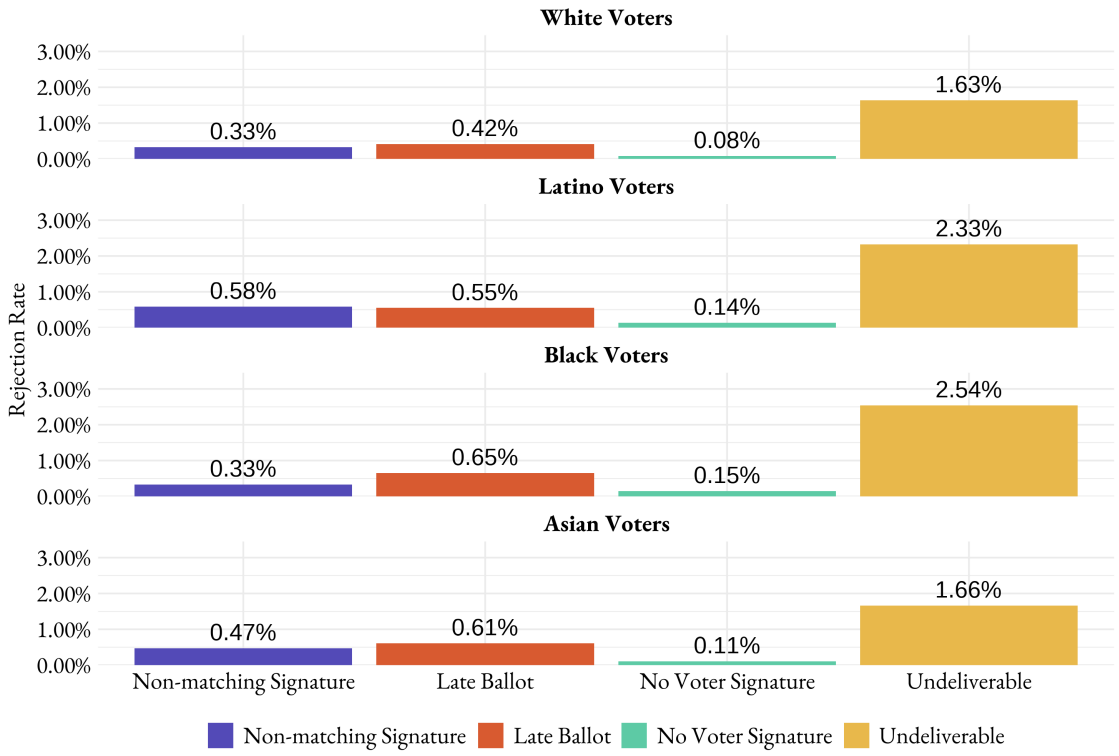
$$\rho_r = \frac{\sum_{j=1}^{J} \hat{R}_{r,j}}{\sum_{j=1}^{J} \hat{N}_{r,j}} = \frac{\sum_i p_{i,r} \cdot Y_i}{\sum_i p_{i,r}} \tag{2.6}$$

This aggregation strategy ensures that more populous counties contribute proportionally more to the statewide estimate, which is the appropriate weighting scheme for producing a population-representative rejection rate. The results that follow report $\rho_{r,j}$ at the county level and ρ_r at the statewide level for each rejection reason and racial group.

2.5.2 Hispanic vs. White Ballot Rejection

Turning to the results, Figure 2.8 presents rejection rates across the four main ballot rejection reasons for White, Latino, Black, and Asian voters in the 2022 General Election. Perhaps unsurprisingly, White voters had the lowest — or tied for the lowest — rejection

Figure 2.8: VBM Ballot Rejection Rates by Reason and Race in 2022 General Election



rates across all four categories. Looking at non-matching signatures specifically, Latino and Asian voters both experienced comparatively higher rejection rates than White and Black voters, who were tied at 0.33 percent. Late ballot and missing signature rejections were more comparable across racial groups, though White voters remained slightly advantaged. The starkest disparities appear in undeliverable ballot rates: White and Asian voters had undeliverable rates of 1.63 and 1.66 percent respectively, while Latino and Black voters faced rates of 2.33 and 2.54 percent respectively — a gap of nearly a full percentage point.

Figure 2.9: Latino vs. White VBM Ballot Rejection Rates by Reason in 2022 General Election

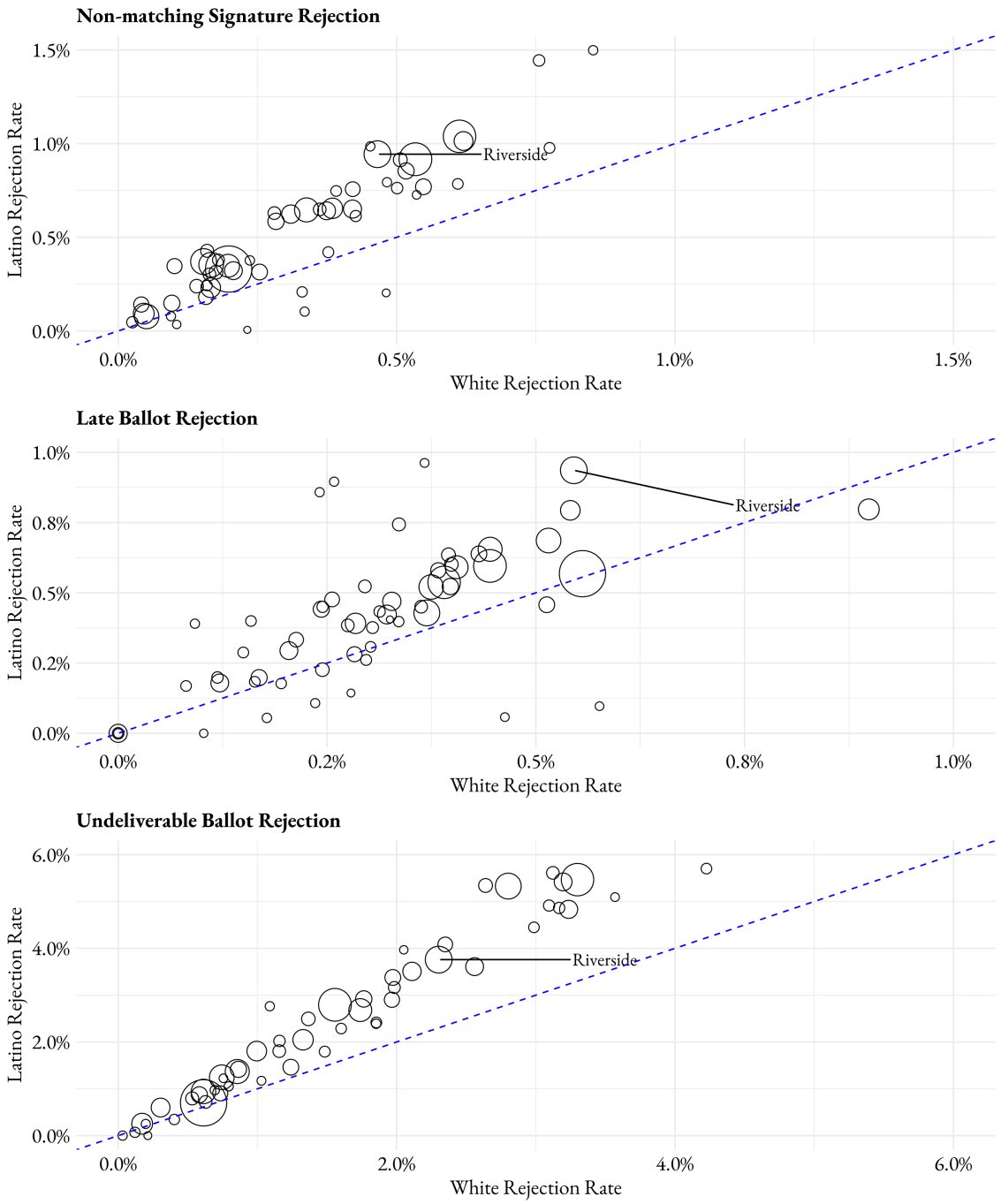


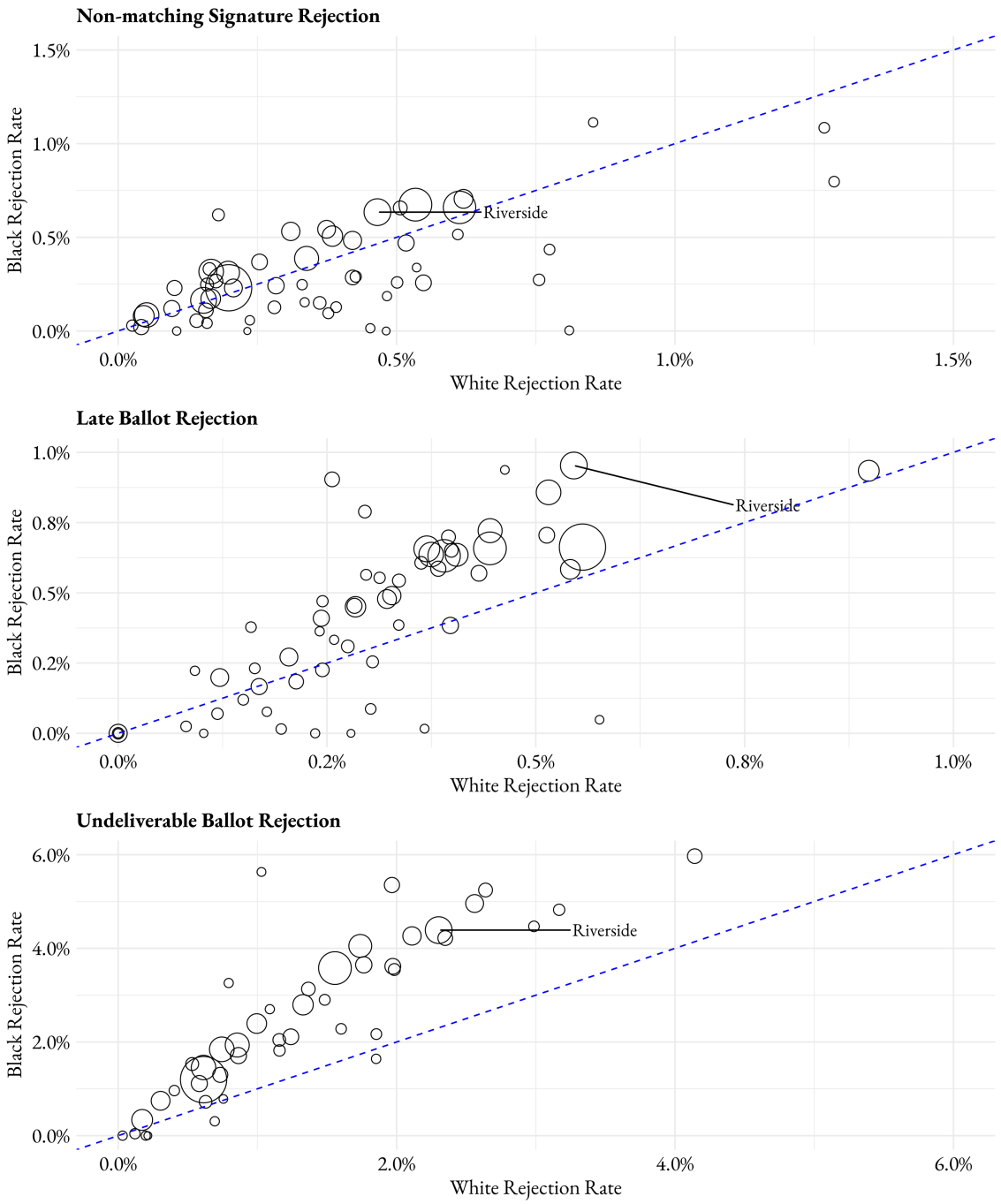
Figure 2.9 examines county-level variation in ballot rejection for White and Latino voters across three rejection reasons: non-matching signatures, late ballots, and undeliverable

ballots. Across all three categories, Latino voters are consistently more likely to have their ballots rejected than White voters, with nearly every county falling above the 45-degree line of rejection parity. Looking at Riverside County as an illustrative example, approximately 0.9 percent of Latino voters were rejected for a non-matching signature compared to roughly 0.4 percent of White voters — a disparity of more than two to one. The second row, depicting late ballot rejection, shows counties clustering closer to the line of parity, though Latino voters remain slightly more likely to return their ballot late than White voters across nearly every county. The starkest disparities appear in the third row, which displays undeliverable ballot rejection rates. In Riverside County, for instance, roughly 3.9 percent of Latino voters had undeliverable ballots compared to only 2.2 percent of White voters. In a county where over 1.2 million residents identify as Latino, this disparity translates to tens of thousands of Latino voters who were precluded from casting a ballot entirely — not because they failed to participate, but because the administrative system failed to reach them. Figures 2.10 and 2.11 in the next two sections show these same 3-panel illustrations of non-matching signatures, late ballots, and undeliverable ballots for Black voters and Asian American voters respectively.

2.5.3 Black vs. White Ballot Rejection

As seen in the first panel of Figure 2.10, Black voters and White voters are about equally likely to have their ballots be rejected for non-matching signatures. While certain counties like Riverside have high levels of White signature rejection (.4 percent), Black signature rejection is about equally high (.52 percent). Late ballot rejection and undeliverable ballots display more racial inequality, with Black voters in nearly all counties being more likely to return their ballots late or have an undeliverable ballot compared to White voters.

Figure 2.10: Black vs. White VBM Ballot Rejection Rates by Reason in 2022 General Election

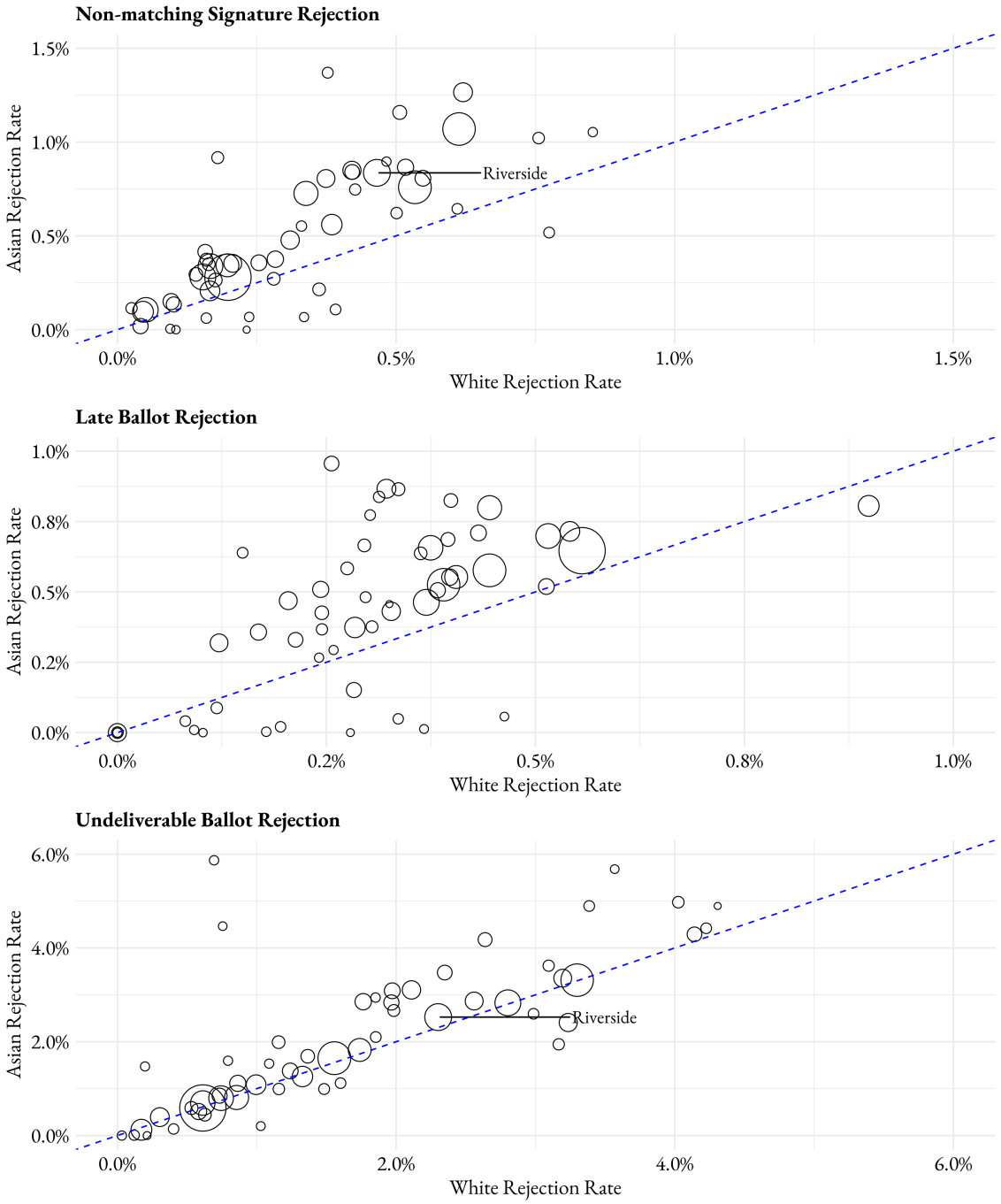


2.5.4 Asian vs. White Ballot Rejection

Asian voters, like Latino voters, appear considerably more likely to experience ballot rejection compared to White voters, except for a cluster of counties that includes Los Angeles in the bottom left corner of the top panel in Figure 2.11. Other counties in this cluster include San Francisco and Sacramento. Juxtaposing this cluster are counties like Riverside that have around .5 percent signature rejection and are clustered at the top right. The county variation is nothing if not noticeable and speaks to the theory that local differences in signature matching policies are impacting signature rejection rates for White and non-White differentially. In the second panel, Asian voters also appear to be disproportionately likely to return a mail ballot, but unlike Black and Hispanic voters, are about equally likely to have an undeliverable ballot as White voters.

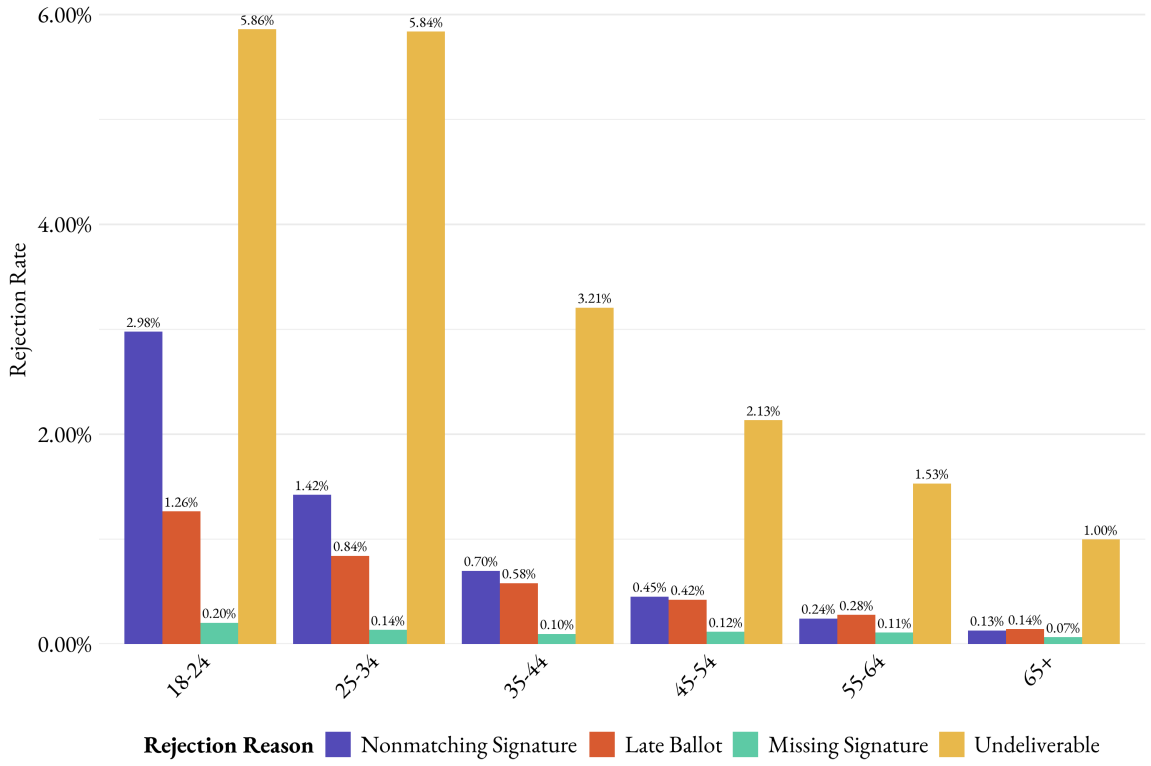
It is difficult to say with certainty what is driving the racial disparities illustrated in Figures 2.9, 2.10, and 2.11, but as discussed earlier, several plausible explanations present themselves, including residential mobility, language barriers, and differential access to information about ballot procedures. As the analysis that follows will demonstrate, however, age emerges as a particularly powerful predictor of ballot rejection — and given that non White voters in California are younger on average than White voters, a substantial portion of the racial disparities documented here may reflect age-based patterns of rejection.

Figure 2.11: Asian vs. White VBM Ballot Rejection Rates by Reason in 2022 General Election



2.6 Results: Rejected Ballots by Reason and Age in 2022 General Election

Figure 2.12: Overall Ballot Rejection Rates by Reason and Age in 2022 General Election



I begin my analysis of the "youth penalty" in ballot rejection by sharing Figure 2.12, a bar graph displaying ballot rejection rates for six different age groups: 18–24, 25–34, 35–44, 45–54, 55–64, and 65+. Moving from left to right and starting with non-matching signatures, it is immediately clear that age plays a significant role in ballot rejection. This is especially evident among 18–24-year-olds, who are approximately 3 percent likely to have their signature rejected. This number halves at the next age group (25–34) and steadily decreases as voters get older, reaching a rate of 0.13 percent among voters older than 65. This stands in sharp contrast to the findings of (Shino, Suttmann-Lea, and Smith, 2022), who found "no statistically significant differences in the [on-time] rejection rate of eighteen- to twenty-two-year-olds compared with those VBM voters who were sixty years old or older."

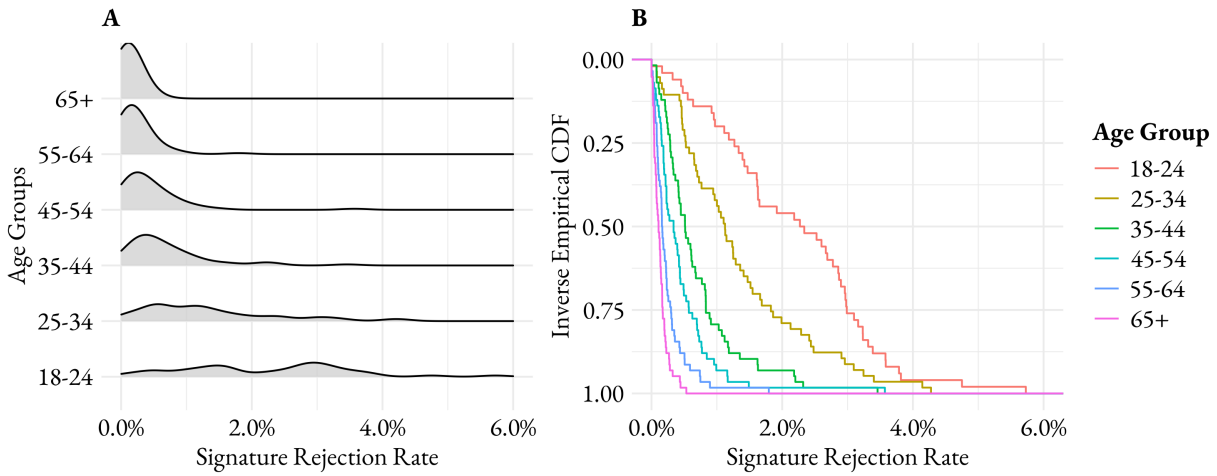
Late rejection rates also decrease steadily with age, as represented by the red bars in 2.12. 1.26 percent of voters aged 18-24 had their votes rejected for returning a late ballot whereas only 0.14 percent of voters above 65 years in age returned a late ballot. This finding is more consistent with past research on ballot rejection. For instance, (Shino, Suttmann-Lea, and Smith, 2022) find that "older voters age sixty or older were 5.8 percentage points less likely to have their ballot rejected for being late compared with eighteen- to twenty-two-year-olds". Missing signatures make up a very small fraction of rejected ballots, but are also highest among younger voters and lowest among older voters. Finally, looking at my fourth category in Figure 2.12, undeliverable ballots, there is another concerning trend of young voters being disproportionately affected. In the first two age categories, voters are nearly six percent likely to having an undeliverable ballot and having their vote "lost" (Stewart III, 2020). This rate decreases with age, and one percent of voters above the age of 65 have undeliverable ballots.

2.6.1 Distribution of Ballot Rejection Rates by Age

I visualize age-based distributions for these different ballot rejection reasons in Figures 2.13, 2.14, and 2.15 which each show kernel density and inverse cumulative distribution functions for signature rejection, late ballots, and undeliverable ballots respectively. Beginning with Figure 2.13, I provide a dual perspective on how signature rejection rates vary by age across the sampled California counties. Panel A presents the Kernel Density of these rates, which illustrates the "shape" of the rejection distribution for each group. For voters aged 65+, the density is tightly clustered near zero, indicating that nearly all counties achieve consistently low rejection rates for seniors. In contrast, the density for the 18–24 age group is both shifted significantly to the right and much "flatter," suggesting that not only are rejection rates higher for young voters, but there is also much greater variance in how different counties handle their signatures.

Panel B further clarifies this relationship using an Inverse Empirical Cumulative Distribution Function (CDF). In this visualization, each "step" in the lines represents an individual

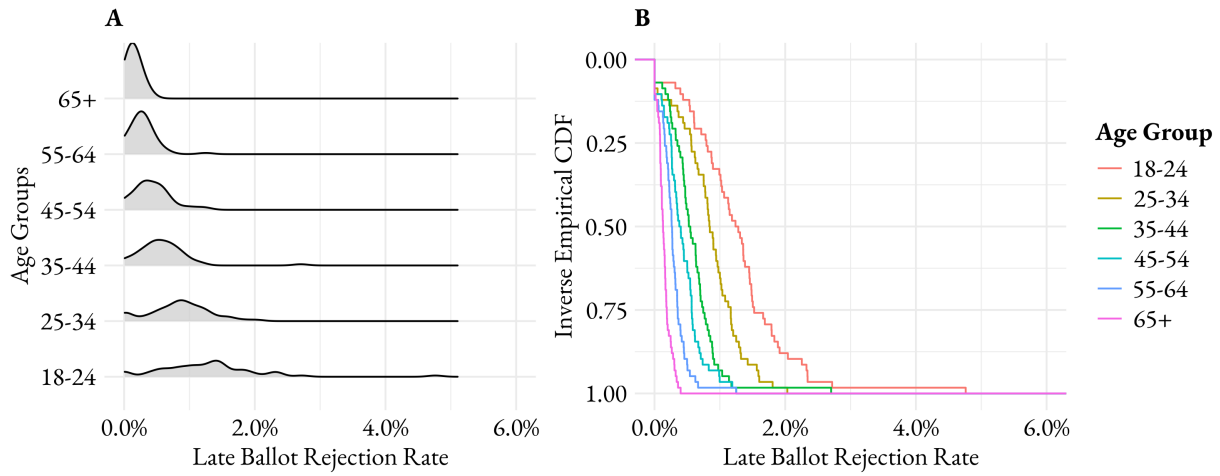
Figure 2.13: Signature Rejection Kernel Density and Inverse Empirical Cumulative Distribution Function (CDF) by Age Group



county's observation. The y-axis represents the proportion of counties, while the x-axis indicates the signature rejection rate. The 18–24 cohort (the red line) first-order stochastically dominates all other age groups. Because the red line remains strictly to the right of all other curves, we can conclude that: At any given threshold of rejection, a higher percentage of counties experience that rate for young voters under 25 than for any other age group. For example, while nearly 100 percent of counties have a rejection rate below 1 percent for the 65+ cohort (pink line), fewer than 25 percent of counties achieve that same low rate for voters aged 18–24. For the reader's convenience, I also include a county heat map that displays signature rejection rates for voters under 25 years old and over 65 years old in the the appendix as Figure A.1.

Next, Figure 2.14 applies the same distributional analysis to late ballot rejections. In Panel A, the kernel density plots show a similar rightward shift for younger cohorts, though the distributions for all age groups are more tightly clustered than they were for signature rejections. While the 18–24 group remains the most likely to have ballots rejected for lateness, the peak of their density is closer to the other cohorts, suggesting that the age-based disparity in mail-timing is slightly less pronounced than the disparity in signature matching.

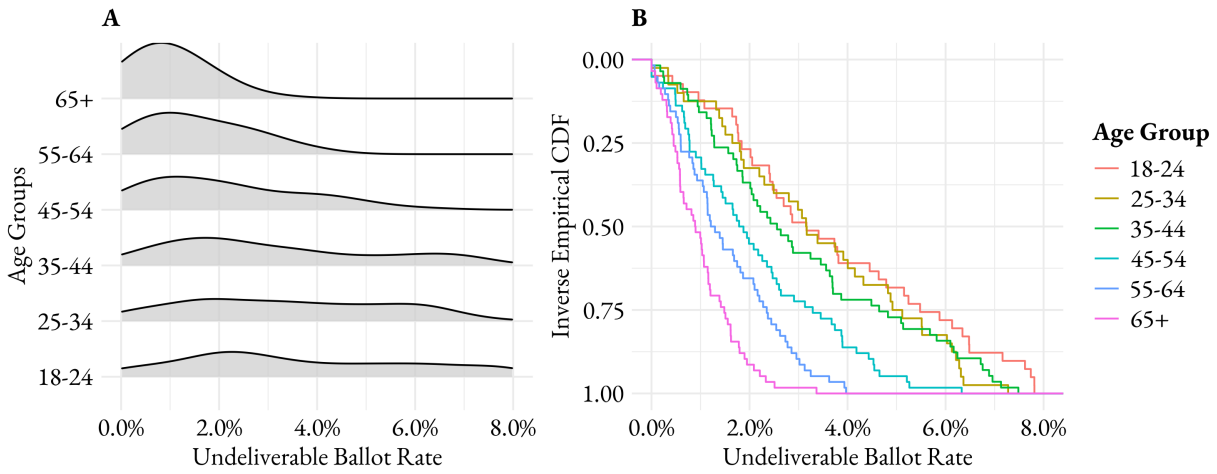
Figure 2.14: Late Rejection Kernel Density and Inverse Empirical Cumulative Distribution Function (CDF) by Age Group



Panel B illustrates this through the inverse empirical CDF. Once again, each step represents one of the 58 California counties, tracking the cumulative probability of rejection rates across the state. The 18–24 cohort again first-order stochastically dominates the other groups, as the red line remains the rightmost boundary of the plot. In comparing Figures 2.13 and 2.14 it is clear that the "spread" between the youngest (18–24) and oldest (65+) voters is narrower for late arrivals. For instance, at the 1.0 percent rejection threshold in Panel B of Figure 2.14, there is a smaller vertical distance between the age curves than seen previously in Figure 2.13. This suggests that while young voters are consistently more likely to return ballots late across nearly all counties, the age gap for signature rejection is significantly more severe than the age gap for late ballot rejection.

Finally, Figure 2.15 illustrates the distribution of undeliverable ballot rates across California counties. Unlike the previous measures of rejection, the undeliverable rate shows a high degree of convergence among the younger cohorts. In Panel A, the kernel density plots for the 18–24, 25–34, and 35–44 age groups all exhibit broad, overlapping distributions with observations situated much further to the right than the older cohorts. This suggests that the administrative friction leading to undeliverable mail affects voters under 45 in a relatively similar manner.

Figure 2.15: Undeliverable Ballot Kernel Density and Inverse Empirical Cumulative Distribution Function (CDF) by Age Group



In Panel B, the inverse empirical CDF confirms that voters aged 18-24 and 25-34 are similarly affected by undeliverable ballots as the "staircase" lines for these groups are frequently intertwined. By contrast, the 65+ group (pink line) remains a distinct outlier in the opposite direction. Furthermore, the gap between the 65+ cohort and the 55–64 cohort is much larger here than in the late rejection analysis. This suggests that the specific hurdle of ballot deliverability is where the generational divide is most bifurcated between "seniors" and "everyone else."

While this distributional analysis confirms that age is a powerful predictor of ballot rejection and deliverability across California counties, it does not rule out the possibility that the youth penalty is concentrated within specific racial groups. Given that both age and race are known correlates of voting barriers, it is possible that the aggregate age gaps I observe are being disproportionately driven by the experiences of voters of color. To isolate the independent effect of age, I dis aggregate the data further in the next section.

2.6.2 Youth Penalty in Ballot Rejection Among White Voters

In this section, I present a series of three-panel scatter plots illustrating signature rejections, late ballots, and undeliverable ballots. To further isolate the impact of age, I disaggregate the

data by race, comparing rejection rates for voters under 25 and those over 65 within each racial category. This approach allows me to control for racial variation while specifically measuring the youth penalty. By examining White, Hispanic, Black, and Asian voters separately, I can determine if the age-based disparities identified in the previous section are a universal phenomenon or if they are driven by the experiences of a specific racial subgroup. If a consistent age gap persists across all four racial categories, it provides compelling evidence that age-related barriers to mail-in voting function independently of race. Figures 2.16, 2.17, 2.18, and 2.19, display these quantities for White, Hispanic, Black, and Asian voters respectively. I also include tables of ballot rejection by age and race for non-matching signatures, late ballots, and undeliverable ballots in the appendix as Tables A.1, A.2, and A.3.

Figure 2.16: White Ballot Rejection Rates by Reason and Age in 2022 General Election

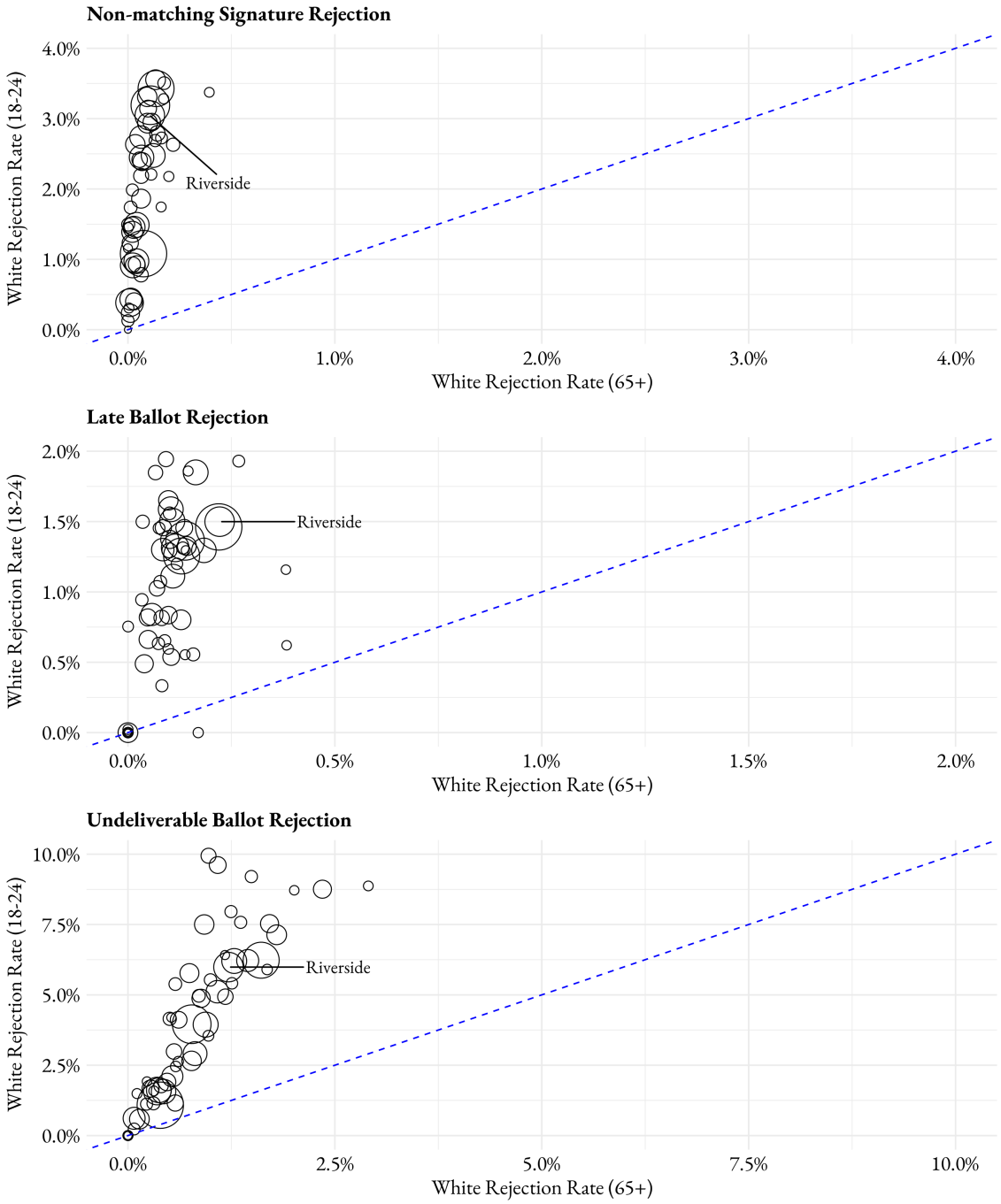


Figure 2.16 shows that among White voters in California, the age gap in ballot rejection between voters older than 65 and younger than 25 is severe. Starting with the top panel and using Riverside as an illustrative example, 3.3 percent of White voters under 25 had their

signature rejected. This number does not include those voters that were initially rejected but went on to cure. By comparison, only .1 percent of White voters older than 65 had their signatures rejected. This means that in Riverside county, White voters under 25 were 29 times more likely to have their signature rejected compared to White voters over 65 years of age.

The second panel, which displays late ballot rejection tells a similar story. 1.6 percent of White voters under 25 had their ballot rejected for arriving late, while only .2 percent of White voters over 65 experienced late ballot rejection – a ratio of 8. Finally, in the third panel, undeliverable ballots are also unevenly distributed across age, though the differences are not as wide compared to signature rejection and late ballot rejection. For example, in Riverside county, 6.5 percent of White voters under 25 years old had an undeliverable ballot according to the Secretary of State's records. By contrast, only 1.3 percent of White voters over 65 years old had an undeliverable ballot – a ratio of 5.

2.6.3 Youth Penalty in Ballot Rejection Among Hispanic Voters

Figure 2.17: Hispanic Ballot Rejection Rates by Reason and Age in 2022 General Election

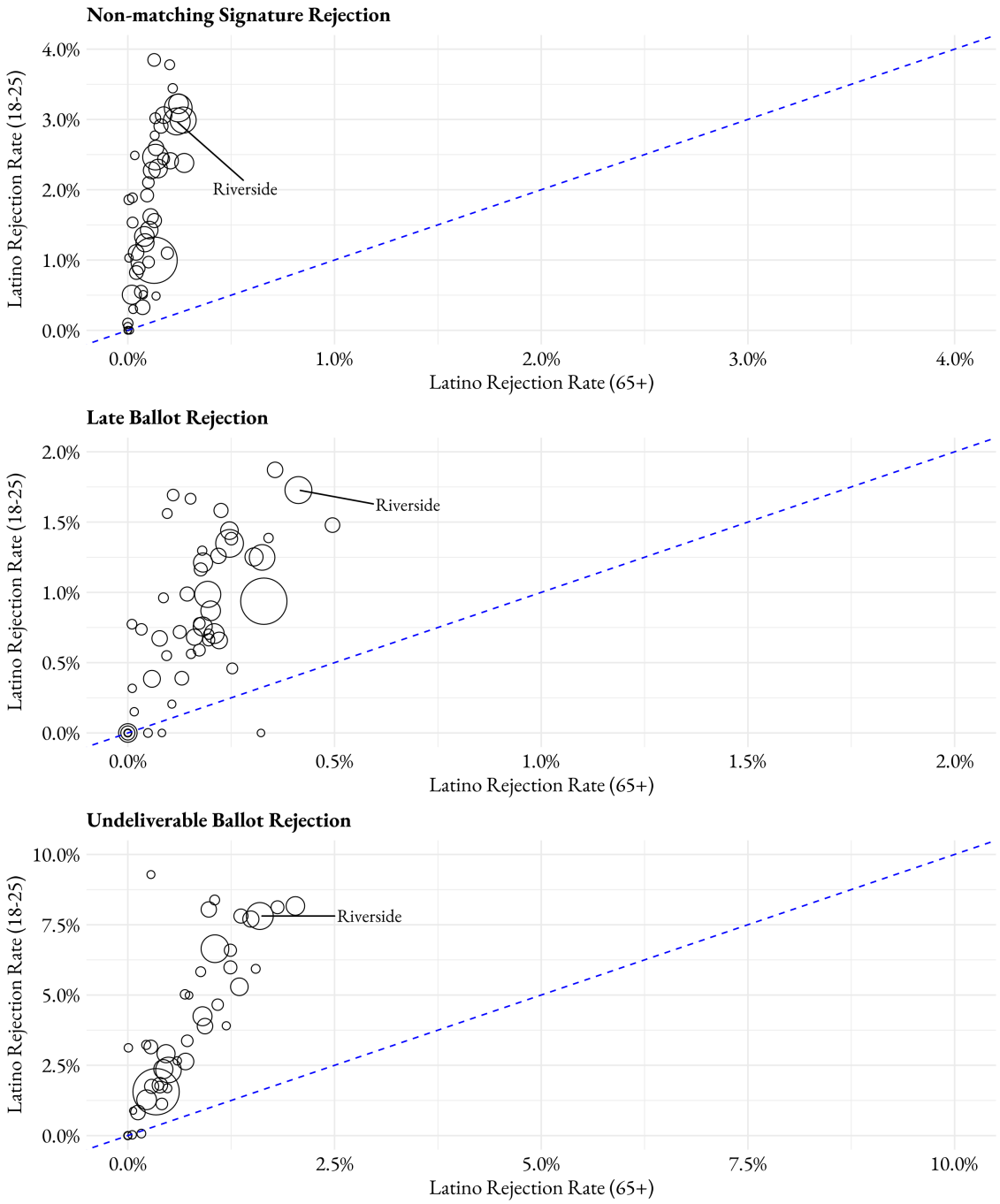


Figure 2.17 demonstrates that the youth penalty is equally pronounced among Hispanic voters in California. The top panel, which tracks non-matching signature rejections, shows

a dramatic concentration of data points in the upper-left quadrant, indicating that in many counties, younger Hispanic voters face significantly higher rejection probabilities than their older counterparts. In Riverside County, for example, 3.0 percent of Hispanic voters under 25 had their signatures rejected, compared to just 0.2 percent for those over 65—a 15-fold disparity.

The second panel illustrates late ballot rejection rates. While the ratios here are less extreme than signature rejections, the age gap remains robust. In Riverside, Hispanic voters under 25 experienced a late rejection rate of roughly 1.7 percent, while voters over 65 saw a rate of only 0.4 percent. I should note that there is some clustering at exactly 0 percent late rejection in the bottom left quadrant. The data provided by the California Secretary of State's Office reports Plumas, Kern, Imperial, Del Norte, Alpine, and Modoc counties as all having 0 ballots rejected for being late. This seems highly unlikely and I believe it is a clerical/reporting error.

The third panel of 2.17 displays undeliverable ballot rates and shows a similar youth penalty that White voters faced, especially in certain counties. In Riverside County, roughly 7.5 percent of Hispanic voters under 25 were marked as having undeliverable ballots. By contrast, only 1.3 percent of Hispanic voters over 65 experienced the same issue. The resulting ratio of approximately 5-to-1 confirms that residential mobility or administrative friction in mail delivery disproportionately affects younger Hispanic voters compared to older Hispanic voters. Collectively, these three panels suggest that for Hispanic voters in California, mail-in voting represents a tiered system of access where age is a primary determinant of whether a ballot is successfully cast and counted.

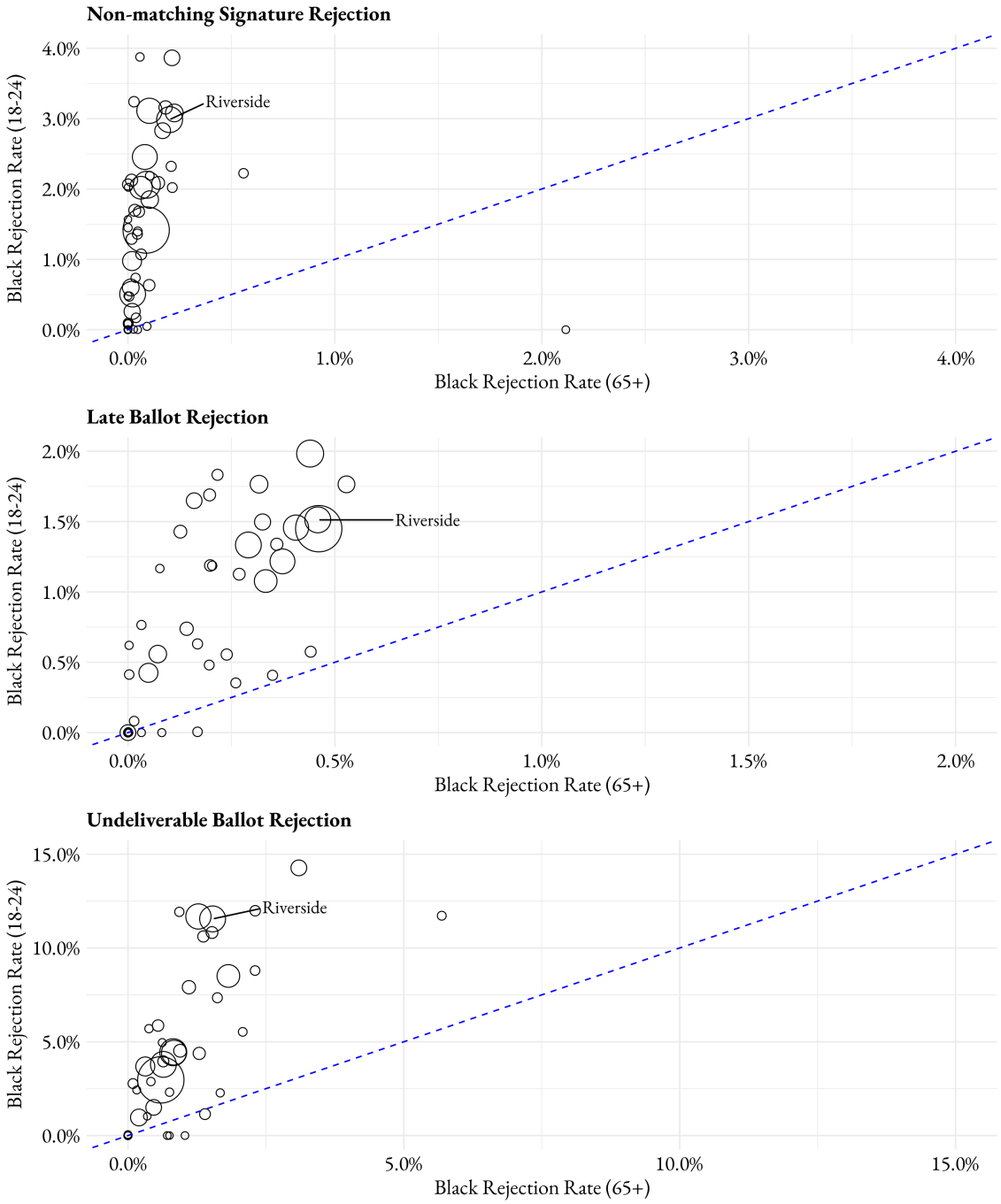
2.6.4 Youth Penalty in Ballot Rejection Among Black Voters

The pattern of age-based inequality continues with Black voters, as illustrated in Figure 2.18. In the top panel, there is a vertical clustering of counties. In Riverside County, for instance, Black voters under 25 faced a signature rejection rate of approximately three percent, while the rate for Black voters over 65 was near zero. This mirrors the high ratios observed

previously, suggesting that signature verification creates a consistent barrier for young Black voters across the state.

The second panel, representing late ballot rejections, shows a greater degree of county variation but there is still a clear age hierarchy. In Riverside, young Black voters were roughly three times more likely to have a ballot rejected for lateness (1.5 percent) compared to senior voters over 65 years old (0.5 percent). In the third panel, undeliverable ballots among young Black voters is also disproportionately common compared to older Black voters, with several counties reporting that more than ten percent of Black voters between 18 and 24 having an undeliverable ballot. By contrast, Black voters over 65 rarely see undeliverable rates above 3 percent. This is a good time to take pause and reflect on what it means for more than 1 in ten voters to never receive their ballot in a VBM regime such as California's whose default method of participation is postal voting. This high barrier to voting that young Black voters in Riverside and other high-rejecting counties face is no doubt a threat to democracy and represents a harmful administrative speed bump that is unequally affecting a protected class of voters.

Figure 2.18: Black Ballot Rejection Rates by Reason and Age in 2022 General Election

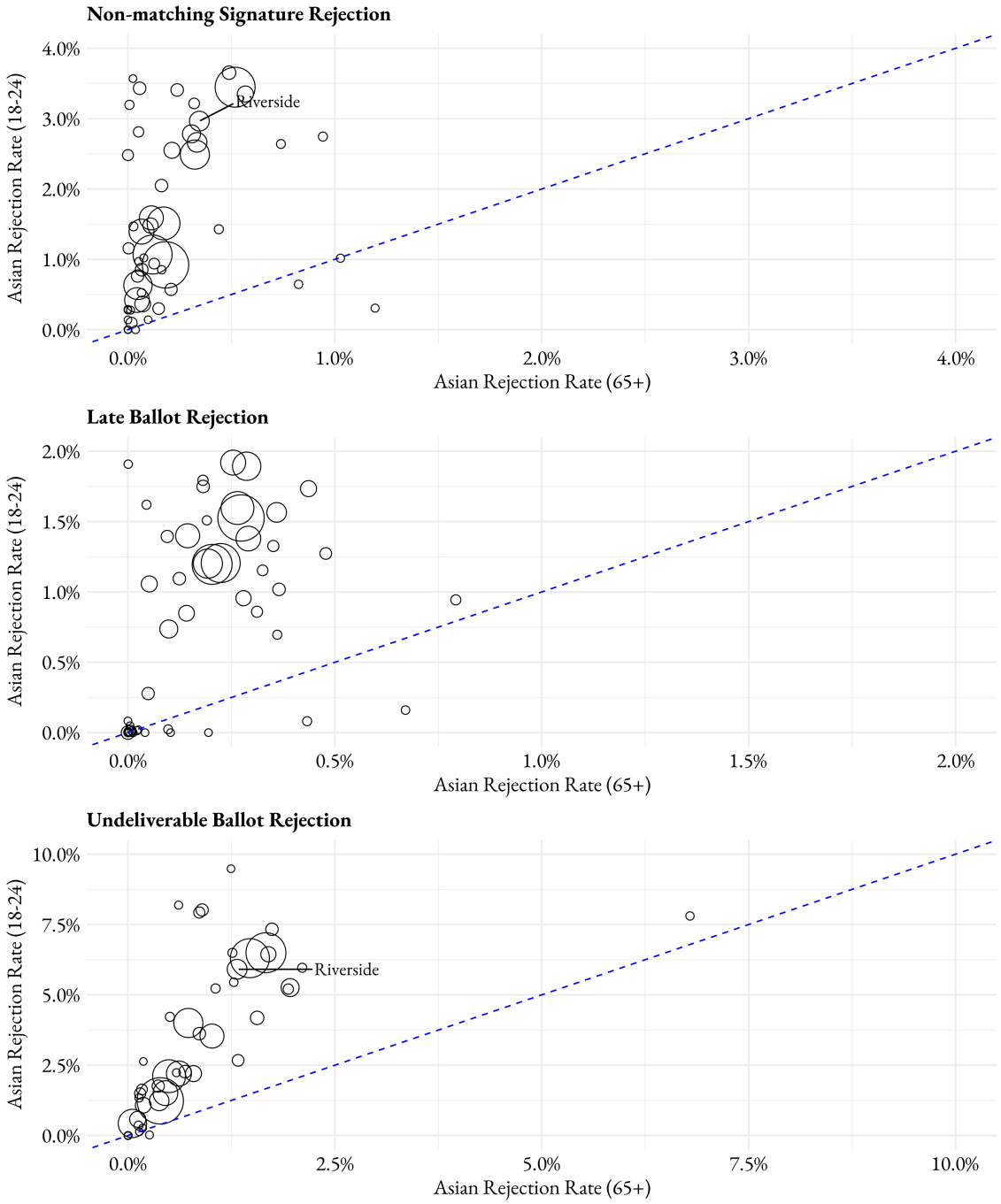


2.6.5 Youth Penalty in Ballot Rejection Among Asian Voters

Finally, the results for Asian voters, displayed in Figure 2.19, confirm that the youth penalty is a cross-racial phenomenon in California's vote-by-mail system. The first panel reveals a familiar vertical distribution, with the vast majority of counties clustered along a vertical line. In Riverside County, roughly 3 percent of Asian voters under 25 had their ballots rejected for non-matching signatures. In contrast, Asian voters over 65 in the same county experienced a signature rejection rate of only 0.4 percent—an 8-fold disparity.

The second panel illustrates that late ballot rejections also disproportionately impact younger Asian voters. While the absolute percentages are lower than signature rejections, the relative gap remains significant. The third panel, tracking undeliverable ballots, shows a similar pattern. For Asian voters under 25 in Riverside, the undeliverable rate was approximately 6.0 percent, whereas for those over 65, it was approximately 1.8 percent. While this 3-to-1 ratio is slightly narrower than the ratios observed in the Black and Hispanic cohorts, it still represents a substantial age discrepancy and youth penalty to VBM.

Figure 2.19: Asian Ballot Rejection Rates by Reason and Age in 2022 General Election



Across all four racial groups examined, the empirical evidence is consistent: the youth penalty is not driven by the experiences of a single racial subgroup. Instead, young voters are universally impacted by signature rejection, late ballot rejection, and undeliverable ballots

across all racial groups. These findings provide broad support for Hypothesis 3, which predicted that younger voters would face higher rejection across all categories.

While I demonstrate a robust age gap in ballot rejection, it is important to note that this analysis does not explicitly control for voter experience as others have done (Cottrell, Herron, and Smith, 2021; Shino, Suttmann-Lea, and Smith, 2022). It is possible that the disparities observed here are confounded by a "novice voter" effect, where the procedural unfamiliarity of first-time or infrequent voters mirrors the patterns attributed to age. If the youth penalty is primarily a function of experience, then the administrative burdens identified in this chapter may not be inherent to young voters themselves, but rather to any voter navigating the complexities of the vote-by-mail system for the first time. However, even if experience is the underlying driver, the fact remains that in California, this burden is overwhelmingly concentrated among the state's youngest residents.

2.7 Discussion: The Unequal Weight of Administrative Burdens

The findings presented in this chapter reveal a tiered system of disenfranchisement within California's vote-by-mail (VBM) regime. While the state has successfully achieved gender parity in ballot rejection—proving that equitable administrative outcomes are possible—the same cannot be said for race and age. The "youth penalty" identified here is dangerously high and represents a harm to democracy.

A central contribution of this analysis is the discovery that the age gap in ballot rejection is remarkably resilient to racial control. By disaggregating the data within racial cohorts, this study demonstrates that being a young voter in California carries an inherent risk of rejection regardless of one's racial or ethnic identity. Whether examining White, Hispanic, Black, or Asian voters, the probability of rejection strictly decreases as a voter moves from the 18–24 bracket toward the 65+ cohort. However, one limitation of this study is that I do not control for voter experience. Thus, it is unclear if a voter's young age or lack of experience is driving high rejection rates. Another important takeaway is that the racial gaps in ballot rejection that I observe in California can partially be explained by the fact

that non-White voters are younger on average than White voters. Given that the age effects I observe are much larger than the race effects, and that Asian, Black, and Hispanic voters are all younger on average than White voters in California, it follows that at least part of the reason that non-White voters are being rejected at higher rates than White voters is due to the confounding effect of age and/or inexperience voting which is closely correlated with age.

Furthermore, the wide variation across California's 58 counties indicates that "place" matters as much as "person." The fact that some counties maintain signature rejection rates near 0.3 percent while others exceed 2.0 percent implies that ballot rejection is not an inevitable consequence of VBM, but a policy choice. High-rejection counties may be utilizing stricter verification software, providing less rigorous training to staff, or failing to invest in the robust curing processes mandated by *La Follette v. Padilla*.

These findings suggest that the "opportunity to cure" is not a panacea. While curing provides a legal safety net, it places the onus of correcting administrative errors back onto the voter. For a 20-year-old student, being sent a notification of a signature mismatch assumes a level of stability that may not exist; a notice mailed to a previous address effectively results in disenfranchisement by default. Moreover, the "cure gap" is likely to mirror the rejection gap, as the same demographic groups facing higher rejection rates often have the fewest resources to navigate the secondary bureaucracy of verifying their identity after the fact. To achieve a truly equitable VBM system, California must look beyond simply allowing everyone to vote by mail. It must address the structural reasons why a 20-year-old's signature is 15 to 30 times more likely to be discarded than their grandfather's. Without standardizing county-level verification practices and accounting for the residential mobility of younger voters, the state risks trading the traditional barriers of the polling place for a new set of barriers affecting voters after the fact, and in some states without any notice.

CHAPTER 3

Bureaucratic Bias or Voter-Side Factors? Testing Competing Explanations for Racial Gaps in Vote-By-Mail Ballot Signature Rejections*

While voting eligibility has evolved throughout American history, a consistent pattern remains: White[1] voters have often received preferential treatment from lawmakers and election administrators. During the Jim Crow era, for example, White voters were shielded from voting restrictions through mechanisms like White primaries and grandfather clauses, which exempted them from literacy tests, poll taxes, and understanding requirements. These barriers—commonly referred to as "administrative burdens" (Herd et al., 2023; Moynihan, Herd, and Harvey, 2015)—were systematically imposed on marginalized groups to suppress their political participation. Central to this process were local election administrators exercising tremendous discretion in their enforcement of voting laws and applying them along racial lines, essentially determining voter eligibility on a case-by-case basis with race being the determining factor. This racial profiling was crucial to the maintenance of White political dominance in the South (Keele, Cubbison, and White, 2021; Key, 1984; Kousser, 1974). After the passage of the Voting Rights Act, blatantly discriminatory policies were phased out, but a certain degree of racialized bureaucratic discretion in elections has persisted and is making a resurgence in some states, especially in areas with localized racial resentment Morris and Shapiro (2024). The controversial SAVE Act, if signed into law, would unleash local election

* A version of this chapter is published as an article in *Political Research Quarterly*: Herndon, Oskooii, and Rios (2026).

administrations to make even more discretionary decisions on citizenship. Many of these decisions will come down to determinations of the authenticity of signatures in registration forms, USPS-delivered mail ballots, and citizenship through the verification of passports and birth certificates.

In the current vote-by-mail process, a voter's identity must be verified as a safeguard against fraud, and in most states, this is accomplished through signature verification. The justification for using signatures is that they function as a behavioral biometric—believed to be unique to each individual—thereby making large-scale fraud more difficult to execute Hameed et al. (2021). However, a core concern with this method is that the individuals tasked with verifying signatures are granted substantial discretion, often making subjective, case-by-case judgments with limited oversight. These decisions are frequently made under pressure and, in many cases, without formal training Page and Pitts (2009). The process has been described as "witchcraft" Graham (2020), and "ripe for error" Lau and Nelson (2020), though artificial intelligence is rapidly changing the landscape with many counties embracing more efficient, though perhaps more problematic computer vision AI tools, like those often used for facial recognition Grother, Ngan, and Hanaoka (2019). Each year, tens of thousands of eligible voters have their mail ballots rejected due to perceived signature mismatches. In some states, these voters are not notified and are given no opportunity to correct—or "cure"—their ballots, resulting in their effective disenfranchisement without notice Meredith and Kronenberg (2023). Moreover, research suggests that more than 80 percent of rejected ballot signatures are mistakenly deemed invalid Street (2024). In Washington State alone, which conducts its elections entirely via mail, this error rate translates to over 100,000 wrongly rejected ballots between 2019 and 2024.

The implications of these errors are especially significant in close elections, where the number of rejected ballots can easily exceed the margin of victory. For example, the 2004 Washington gubernatorial election was decided by just 133 votes. When the ballot rejection process is uneven or biased, it means that thousands of voters face systemic barriers to participation. Such disparities not only undermine core democratic values of political equality Dahl (2007) but may also violate the Equal Protection Clause of the Constitution

and provisions of the Voting Rights Act.

A growing body of evidence demonstrates that signature rejection disproportionately affects racial minorities, young voters, and newly registered voters Asian Americans Advancing Justice (2017); Baringer, Herron, and Smith (2020); Cottrell, Herron, and Smith (2021); Shino, Suttmann-Lea, and Smith (2022). While previous studies have identified unequal rejection patterns, few have been able to test the underlying drivers of this inequality. In practice, jurisdictions often deflect responsibility by attributing rejection disparities to voter-side factors—such as language proficiency or cultural barriers—rather than scrutinizing the subjectivity of their own verification processes. These explanations are frequently offered without compelling empirical evidence. For example, in its 2022 audit of ballot rejection, the Washington State Auditor attributed racial disparities to "...language or cultural barriers that increase the likelihood of ballot rejections" (Office of the Washington State Auditor 2022, 20), even while acknowledging that signature verification is "inherently subjective... [and that] even experienced reviewers can come to different conclusions" (p 16).

The subjectivity of signature verification has led some researchers to propose an alternative explanation: administrative bias. For example, Baringer et al. (2020) suggest that "the discretion of local election officials or county canvassing boards may result in unequal treatment of VBM ballots due to implicit biases" (p 295), pointing to evidence of such bias in other administrative realms. This perspective aligns with the broader literature on street level bureaucrats Lipsky (2010); Maynard-Moody and Musheno (2000), which emphasizes that frontline public servants often bring their own social identities and cognitive predispositions to their work. These predispositions can shape decision-making—particularly when tasks involve subjectivity and discretion, as is the case with signature verification—making them vulnerable to bias motivated reasoning Fazio (1990); Payne (2005); Sherman et al. (2008). In this study, I present a research design that allows me to more precisely test the two dominant explanations for racial and ethnic disparities in ballot rejection: voter-side factors versus administrative bias.

Given the United States' long-standing and ongoing history of racialized bureaucratic discretion adversely affecting minority communities, I argue that biased decision-making,

whether implicit or explicit, by election workers is the most convincing explanation for the racial disparities observed in vote-by-mail (VBM) signature rejection. I evaluate this claim through two complementary studies conducted in the state of Washington focusing on Latino and White signatures (for replication materials, visit https://dataverse.harvard.edu/dataverse/vbm/).

3.0.1 Washington as a Case Study

I focus on Washington State as a case study for both theoretical and practical reasons. Theoretically, Washington is often seen as a model of universal vote-by-mail (VBM), with policies and infrastructure that other states have emulated, particularly during the rapid VBM expansion in the COVID-19 pandemic (O'Sullivan 2020). Washington has a tiered system of signature review where frontline election workers make initial determinations, and if a signature is deemed inconsistent, a second round of review is required before making a final determination and "only the canvassing review board can reject a voter's ballot based on an invalid signature" (see Washington Administrative Code 434-261-051). This tiered system of review is like that of Arizona, California, and Colorado and is recommended by the Election Assistance Commission (EAC) and the Cybersecurity and Infrastructure Security Agency (Arizona Revised Statutes 2025, § 16-550.01; California Code of Regulations 2025, Title 2, § 20960; Colorado Revised Statutes 2025, § 31-10- 910.3; U.S. Election Assistance Commission 2020).

The training that Washington signature reviewers receive is also typical of other VBM states. Washington, along with Arizona,California, and Colorado, have published signature verification training materials that instruct reviewers to assess both broad and detailed handwriting characteristics—such as slant, spacing, stroke endings, and pen lifts, while providing examples of each. Signature reviewers in these states are required to attend training. In Washington, this training is mandated at least once every two years. In Colorado and Florida training is required every election (Colorado Secretary of State 2023; Florida Statutes 2023, § 102.014). Of course, the consistency of implementation and compliance with these

training protocols can vary across states and even between counties within the same state.

3.0.2 Chapter Outline

In Study 1, I conduct a statewide audit of rejected ballots with special attention to each of the nine central Washington counties with sizable Latino populations: Adams, Benton, Chelan, Douglas, Franklin, Grant, Okanogan, Walla Walla, and Yakima. My audit focused on two distinct reasons for ballot rejection: (1) signature mismatch and (2) late ballot submission. If Hispanic[2] voters were simply more prone to errors or lacked knowledge about vote-by-mail (VBM) procedures—a common voter-side explanation—I would expect to see similar rejection disparities across both categories. However, if the disparity or gap between late submission and signature mismatch rejection rates is larger for Hispanic voters than for non-Hispanic White voters, it suggests that administrative discretion—rather than voter behavior—is the most plausible reason behind signature mismatch disparities between Hispanic and White voters.

This analytic approach aligns with prior research. For example, Baringer, Herron, and Smith (2020), in their study of Florida, distinguished between ballots rejected for being submitted too late and those rejected due to signature-related reasons. They found no statistically significant differences between Hispanic and non-Hispanic voters in late ballot rejections but did observe significantly higher rejection rates for Hispanic voters in the signature mismatch category. The authors attribute this pattern, in part, to potential bias in the discretionary judgments of election officials. My analysis of Washington yields a similar pattern: minimal differences in rejection rates for late ballots, but large and statistically significant disparities in rejections due to signature mismatch. These findings suggest that it is not a lack of voter knowledge or care that drives rejection disparities. Rather, Hispanic voters appear to face heightened scrutiny during the signature verification process, consistent with the presence of bias among election officials.

In Study 2, I extend my analysis with an online survey designed to neutralize any voter-related explanations for differential ballot rejection. I recruited a sample of 1,797

Washingtonians and asked them to evaluate 24 signature pairs—each consisting of a handwritten and digital signature—and decide whether to "accept" or "reject" each pair due to potential signature mismatch. Unbeknownst to them, however, all signature pairs were valid in that both signatures in a pair were produced by the same individual. The 24 pairs were also created by 24 different, randomly selected volunteers.

Crucially, volunteers were randomly assigned to sign either a Latino-coded or White-coded name, ensuring that the racialized name associated with each signature pair was not systematically linked to the actual racial or ethnic background of the signer. This eliminates the possibility that cultural, linguistic, or demographic differences in handwriting could explain any observed disparities in rejection rates. Overall, all signature pairs were comparable in quality, validity, and background—differing only by the Latino- or White-coded name printed above them. As such, any systematic difference in rejection rates can be attributed to evaluator bias.

The remainder of this article is organized as follows. I begin with a discussion of ballot rejection. I then argue that racialized bureaucratic discretion plays a central role in the signature verification process and offers the most compelling explanation for the observed racial disparities in ballot rejection. In Study 1, I conduct an audit of signature mismatch and late ballot rejection rates in Washington. In Study 2, I introduce a research design that neutralizes "cultural" or voter-side factors, effectively isolating evaluator bias as the primary explanation for racial differences in signature rejection. I conclude with a discussion of potential reforms and directions for future research.

3.1 Overview of VBM Ballot Rejection

Biased ballot rejection patterns have only recently emerged as a focus of scholarly inquiry, largely spurred by the widespread adoption of VBM during the 2020 election in response to the COVID-19 pandemic (see Appendix, p. 138 for a broader discussion of VBM procedures and political context). As a result, research remains limited to a small number of states, though the findings are consistent: racial disparities in ballot rejection are well doc-

umented. In Georgia, for example, Asian, Latino, and Black voters were significantly more likely than White voters to have their on-time ballots rejected in the 2018 general election Shino, Suttmann-Lea, and Smith (2022). Similar racial disparities have been documented in Florida between 2016 and 2020, even after controlling for individual-level differences in voting experience Cottrell, Herron, and Smith (2021). These studies offer important insights and have laid the groundwork for further inquiry into the causes of unequal ballot rejection. Building on their contributions, I aim to advance research designs that help further isolate the underlying factors contributing to these disparities. For instance, Shino, Suttmann-Lea, and Smith (2022) call for future research that can "more directly explore possible causal mechanisms that explain the disproportionate likelihood of rejection of VBM ballots" (p. 240). Similarly, Allard et al. (2023) recommend that "greater attention should be paid to process-based and structural causes of race and ethnic disparities in ballot rejections" (p. 31). My study builds on prior research by focusing on the role of racialized bureaucratic discretion in the signature verification process.

3.2 A Theory of Racialized Bureaucratic Discretion

Bureaucratic discretion and racial bias have been extensively studied across various levels of government and international contexts Brierley et al. (2023). However, local election administration in the United States has received relatively limited attention (but see Alvarez and Hall (2006); Ferrer, Geyn, and Thompson (2024)), and individual election workers have been studied even less. As Kimball and Kropf (2006) observed nearly two decades ago, "We are at the beginning stages of our understanding of the behavior of local election officials" (p. 1263). Presently, the key mechanisms underlying local election work—such as VBM ballot rejection—remain insufficiently scrutinized. Research in public administration has long recognized that bureaucrats often base decisions on normative judgments rather than formal rules, procedures, or policies Maynard-Moody and Musheno (2000). Even in the context of elections and constituent services, prior research finds evidence of elected officials engaging in racially discriminatory behavior. For instance, studies have shown that constituent re-

quests for information receive different responses depending on the racial, ethnic, or religious identity of the constituent Butler and Broockman (2011); Lajevardi (2020); White, Nathan, and Faller (2015). Similarly, a growing body of work suggests that the enforcement of voter ID requirements by frontline poll workers may also be racially biased Atkeson et al. (2010, 2014); Smith (2017); Suttmann-Lea (2020).

I argue that election workers responsible for signature verification are particularly susceptible to bias for at least three reasons. First, the process itself is inherently subjective, as acknowledged by administrative officials (e.g., the Washington State Auditor's Office) and previous studies. In the absence of clear, rule-based criteria, election workers may rely on personal judgment that is shaped by implicit or explicit assumptions or stereotypes about handwriting, identity, or voter legitimacy. These subjective assessments can systematically disadvantage certain groups-particularly Asian and Latino voters—who are often stereotyped as foreigners Masuoka and Junn (2013). This bias is partly rooted in the pervasive association of "Whiteness" with "Americanness" Devos and Banaji (2005); Lajevardi and Oskooii (2024) which can result in heightened scrutiny of ballots linked to non-White or non-Anglo names. Second, in addition to the subjective nature of signature verification, the task is often performed under pressure, which limits the opportunity for careful, deliberate processing Fazio (1990). Reports indicate that in many states, election workers are expected to evaluate each signature in as little as 5 seconds Lau and Nelson (2020). Under these constraints, workers are more likely to rely on automatic, intuitive judgments—what Kahneman (2013) refers to as "System 1" thinking—driven by emotions, implicit biases, and heuristics rather than reasoned analysis. These cognitive shortcuts can further increase the likelihood of biased decision-making, especially in contexts where racial or ethnic cues are present.

Third, the demographic composition of election administrators may also contribute to biased decision making. One study found that 95 percent of local election officials—such as county clerks and commissioners—identify as White Adona et al. (2019). According to representative bureaucracy theory, the demographic characteristics of public officials can influence their decisions in ways that reflect the interests and perspectives of their own social group Selden (2015).In the context of signature verification, a predominantly White

election workforce may bring a shared set of cognitive biases that disproportionately affect non-White voters. Research across various areas of public administration supports this claim, showing that unrepresentative bureaucracies are more likely to create discriminatory barriers and engage in disparate treatment of racial and ethnic minorities Keiser, Mueser, and Choi (2004). Taken together—the subjectivity of the task, the time constraints under which it is performed, and the demographic homogeneity of those performing it—there is a strong reason to believe that both implicit and explicit biases can shape how signatures are evaluated. In the following section, I explain how racialized names can further activate these biases and provide fertile ground for discriminatory decision-making.

3.3 Discrimination Based on Names

Election workers often have access to voters' names when reviewing ballot signatures. In Washington specifically, printed names appear on the ballot declaration, within the voter information section reviewed by the Canvassing Review Board, and in the VoteWA system used by evaluators. Even if election workers do not intentionally focus on voter names, many signatures are legible enough to make the voter's identity readily apparent. This presents a significant concern, as names serve as powerful heuristics for inferring a person's race, ethnicity, gender, class, and other demographic characteristics Crabtree et al. (2023). Because names carry such strong racial and ethnic signals, a large body of audit and correspondence studies have demonstrated that names alone are sufficient to elicit racial profiling and discriminatory responses from bureaucrats Bertrand and Mullainathan (2004); Gaddis (2015); Hanson and Hawley (2011). This dynamic has already been documented among election observers. In their analysis of signature verification procedures in California, Janover and Westphal (2020) reported that election observers appeared to challenge ballots based on factors such as surname and party affiliation. While empirical evidence that election workers explicitly engage in this behavior is lacking, I contend that they may implicitly or explicitly respond to the racial and ethnic cues embedded in voters' names and signatures—particularly in light of the structural shortcomings of the signature verification process outlined earlier.

If cultural or informational barriers—such as lower familiarity with voting procedures, language access issues, or organizational challenges—drive racial disparities in ballot rejection, one would expect elevated rejection rates for Latino voters at every stage of the vote-by-mail process. In particular, Latino voters would be more likely than White voters to have their ballots rejected both for signature mismatch (which involves discretionary judgment) and for late submission (a purely procedural check). Crucially, under this scenario, the gap between signature mismatch and late rejection rates would be comparable between White and Hispanic voters. By contrast, if the difference between late-submission and signature-mismatch rejections is significantly larger for Hispanic voters, it would point squarely to factors internal to the administrative review process—namely, implicit or/and explicit bias in how signatures are evaluated. Based on my theoretical priors, I propose the following hypotheses:

H1: Ballots cast by voters with Hispanic surnames are more likely to be rejected for signature mismatch than those cast by voters with non-Hispanic White surnames.

H2: The difference in ballot rejection rates between signature mismatch and late submission is significantly greater for voters with Hispanic surnames than for voters with non-Hispanic White surnames.

To test these hypotheses, I compare rejection rates for signature mismatch and late submission across Hispanic- and White-named ballots. Specifically, I examine whether Hispanic-named ballots, relative to their White counterparts, are disproportionately rejected when discretion is highest (signature mismatch) versus when it is absent (late submission). This design allows me to distinguish disparities arising from voter-side factors from those reflecting evaluator behavior. In Study 2, I extend my analysis by using a design that neutralizes voter-side factors, allowing me to directly assess whether racialized cues influence signature verification outcomes. If evaluator bias is at play, I would observe systematic differences in how participants assess signatures based solely on the racial/ethnic cues embedded in voters' names.

H3: Signature evaluators are more likely to reject Hispanic-named signature pairs relative to White named signature pairs.

3.4 Study 1: Audit of Nine Central Washington Counties

In *Faces of Inequality* (1998), Rodney Hero emphasizes that regions marked by significant ethnic diversity and economic stratification often experience unequal social and political outcomes Hero (2000). Similarly, research on racial threat theory suggests that the growth of Latino populations can generate racial resentment, potentially contributing to more restrictive voting practices Morris (2023). These dynamics make central Washington well-suited for examining disparities in ballot rejections. Located east of the Cascade Mountains—a physical and cultural boundary dividing Washington—Adams, Benton, Chelan, Douglas, Franklin, Grant, Okanogan, Walla Walla, and Yakima counties are each more than 20 percent Hispanic and are the nine most Hispanic counties in the state according to the 2020 U.S. Census.

My data consists of publicly available ballot status reports from six general elections held between November 2019 and November 2024.[3] For each election, the ballot status reports include information on ballots received, accepted, and rejected, along with individual-level voter data. My primary focus is on ballots rejected due to signature mismatches. Specifically, I aim to identify potential disparities in rejection rates based on observable characteristics—most notably, voters' race/ethnicity as inferred from their names.

While Washington requires counties to notify voters and offer an opportunity to cure signature mismatches[4], my data captures only the final status of each ballot (i.e., accepted or rejected), not whether a cure process was initiated or completed. As a result, I am unable to assess whether there were racial or ethnic disparities in who was contacted to fix a mismatched signature or in cure success rates. Future research should examine whether access to and completion of the cure process varies across groups, as disparities in this step could also contribute to unequal ballot rejection outcomes. To classify voters by race and ethnicity, I relied on surname-based methods consistent with established approaches in political science. After classifying voters as Hispanic or White, I filtered the dataset to include only voters whose ballots were rejected due to a signature mismatch or late submission. For each voter category—Hispanic and White— I examined the rates of ballot

rejection by aggregating the following statewide, by region (central Washington), and by county:

- The number of ballots cast.
- The number of total rejected ballots.
- The number of ballots rejected due to signature mismatch.
- The number of ballots rejected due to submission past the election date.

3.5 Results

Table 3.1 presents the total number of ballots cast by White and Hispanic voters, along with signature rejection rates, aggregated at the county level and statewide across all six general elections in my sample.

Table 3.1: Signature Rejection Rates by County

County	White total ballots	Hispanic total ballots	White signature rejection rate	Hispanic signature rejection rate	White–Hispanic signature rejection ratio	p-Value
All counties	12,980,257	707,434	0.46%	1.03%	2.22	0.00
Central WA	1,215,489	160,071	0.31%	0.98%	3.13	0.00
Adams	16,302	5,036	0.70%	3.04%	4.34	0.00
Benton	338,585	25,900	0.34%	1.14%	3.30	0.00
Chelan	152,783	10,640	0.33%	1.18%	3.60	0.00
Douglas	70,497	5,887	0.09%	0.37%	4.05	0.00
Franklin	83,428	23,692	0.41%	1.62%	3.94	0.00
Grant	117,339	15,313	0.50%	1.57%	3.10	0.00
Okanogan	76,619	2,769	0.74%	1.81%	2.44	0.00
Walla Walla	108,042	7,640	0.22%	0.78%	3.58	0.00
Yakima	251,894	63,194	0.09%	0.39%	4.16	0.00

The sixth column, labeled "White–Hispanic Signature Rejection Ratio," uses the signature rejection rate for White voters as the baseline for comparison. A ratio of 1.00 indicates parity in rejection rates between White and Hispanic voters. Ratios below 1.00 indicate that Hispanic voters had lower rejection rates than White voters, while ratios above 1.00 indicate higher rejection rates for Hispanic voters. The final column reports the p-value from a

Table 3.2: Central Washington signature rejection rates, grouped by election (2019–2024 general elections).

Election	White total ballots	Hispanic total ballots	White signature rejection rate	Hispanic signature rejection rate	White–Hispanic signature rejection ratio	p-Value (two-prop Z-test)
All elections	1,215,489	160,071	0.31%	0.98%	3.13	0.00
General Nov 5 2019	147,025	11,719	0.30%	0.71%	2.37	0.00
General Nov 3 2020	287,303	52,383	0.28%	0.99%	3.49	0.00
General Nov 2 2021	149,170	11,405	0.24%	0.63%	2.68	0.00
General Nov 8 2022	224,802	22,964	0.30%	0.79%	2.61	0.00
General Nov 7 2023	131,680	11,737	0.31%	0.95%	3.07	0.00
General Nov 5 2024	275,509	49,863	0.41%	1.22%	2.98	0.00

two-proportion Z-test comparing the signature rejection rates of White and Hispanic voters for each row. In addition to showing results for each individual county, I also report aggregate figures at the statewide level (first row) and for the nine central Washington counties grouped together (second row). In the first row of Table 1, which aggregates data across all counties in Washington State, White voters had a signature rejection rate of 0.46 percent, compared to 1.03 percent for Hispanic voters—yielding a rejection ratio of 2.22. This disparity becomes even more pronounced when focusing on the nine central Washington counties, where the rejection ratio rises to 3.13. At the individual county level, each jurisdiction was at least twice as likely to reject the signatures of Hispanic voters compared to White voters. In Adams, Douglas, and Yakima counties, the disparity exceeds a four-fold difference.

Table 3.2 presents the results grouped by individual election, and the patterns remain consistent. In every election in my sample, the White–Hispanic Signature Rejection Ratio exceeds 2.00, indicating that Hispanic voters were at least twice as likely as White voters to have their ballots rejected due to a signature mismatch. The disparity is most pronounced in the 2020 general election, where the ratio peaks at 3.49. Figure 3.1 visualizes the difference in signature rejection rates between White and Hispanic voters over time, including 95 percent confidence intervals for each observed rate. The results reveal a clear and consistent pattern: Hispanic voters in central Washington experience significantly higher rejection rates due to signature mismatch in every election and county analyzed. In each case, voters with Hispanic surnames are rejected at statistically higher rates than those with non-Hispanic White surnames. These findings support Hypothesis 1.

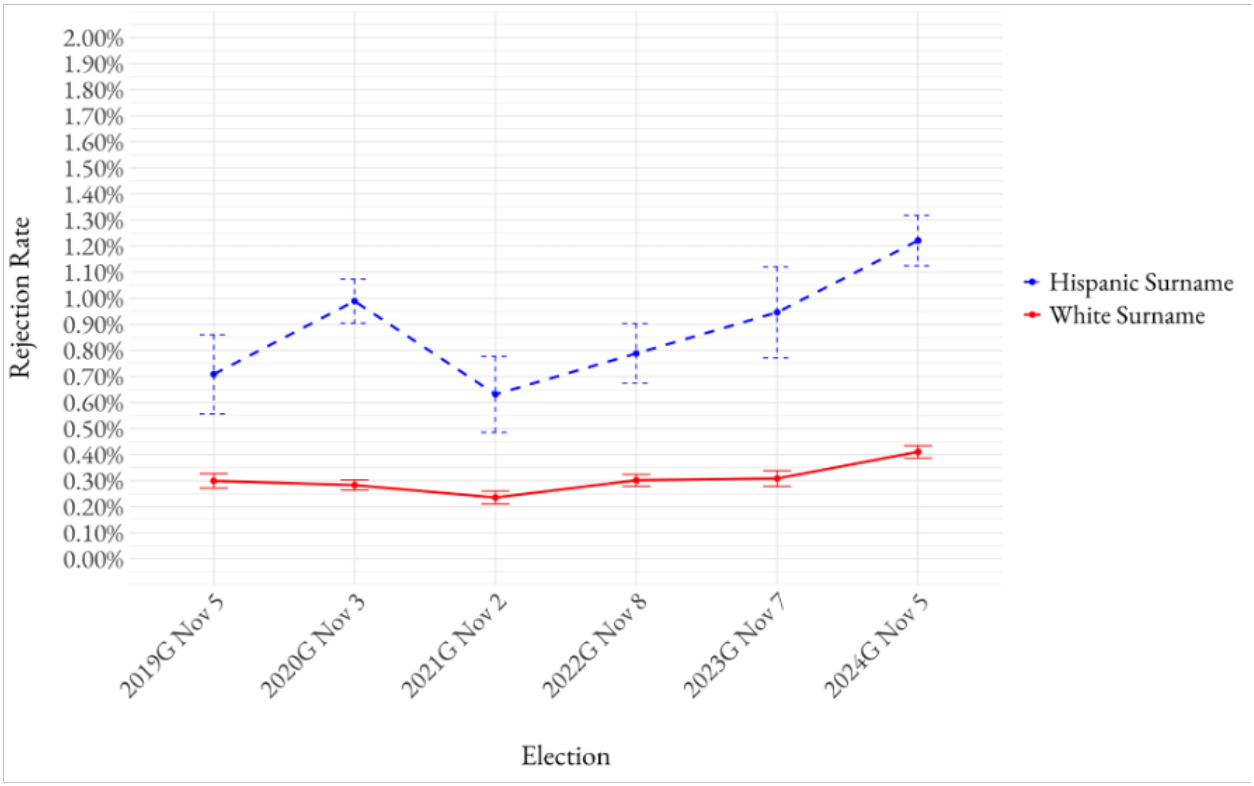


Figure 3.1: Central Washington White and Hispanic signature rejection rates, 2019–2024

3.5.1 Comparing Signature Mismatch to Other Reasons for Rejected Ballots

Electoral jurisdictions such as the State of Washington often attribute racial disparities in ballot rejection rates to voter-side factors, downplaying or dismissing the role of bias by election officials. If voters are to blame, I would expect to see comparable racial disparities in ballots rejected for late submission, which also reflect factors like voter experience or familiarity with vote-by-mail procedures. However, if the disparity is greater in signature mismatch rejections—where administrative discretion is highest—it would instead implicate systemic bias in the evaluation process.

In Table 3.3, I compare late ballot rejection and signature rejection rates for voters with White and Hispanic surnames. Table 3.4 presents the same comparison but restricts the sample to voters whose first and last names are both classified as either White or Hispanic. Using both names may serve as a stronger racial signal than surnames alone. However, using this stricter name-matching criterion reduces my sample size—particularly in counties with

Table 3.3: Ballots rejected as late vs. signature mismatch, grouped by county, last names only (2019–2024 general elections).

County	White Total Ballots	Hispanic Total Ballots	White Late Rejection Rate	White Signature Rejection Rate	White Delta	Hispanic Late Rejection Rate	Hispanic Signature Rejection Rate	Hispanic Delta	White–Hispanic Late Rejection Ratio	White–Hispanic Signature Rejection Ratio	p-value (Two-Prop. Z-test)
All counties	12,980,257	707,434	0.30%	0.47%	0.17%	0.37%	1.03%	0.66%	1.22	2.22	0.00
Central WA	1,215,489	160,071	0.38%	0.31%	-0.07%	0.50%	0.98%	0.48%	1.33	3.13	0.00
Adams	16,302	5,036	0.43%	0.70%	0.27%	0.62%	3.04%	2.42%	1.43	4.34	0.00
Benton	338,585	25,900	0.43%	0.34%	-0.09%	0.37%	1.14%	0.77%	0.84	3.30	0.00
Chelan	152,783	10,640	0.21%	0.33%	0.12%	0.42%	1.17%	0.75%	2.04	3.60	0.00
Douglas	70,497	5,887	0.24%	0.09%	-0.15%	0.32%	0.37%	0.05%	1.32	4.05	0.07
Franklin	83,428	23,692	0.55%	0.41%	-0.14%	0.56%	1.63%	1.07%	1.02	3.94	0.00
Grant	117,339	15,313	0.48%	0.51%	0.03%	0.58%	1.57%	0.99%	1.20	3.10	0.00
Okanogan	76,619	2,769	0.36%	0.74%	0.38%	0.83%	1.81%	0.98%	2.32	2.44	0.05
Walla Walla	108,042	7,640	0.32%	0.22%	-0.10%	0.33%	0.79%	0.46%	1.01	3.58	0.00
Yakima	251,894	63,194	0.36%	0.09%	-0.27%	0.54%	0.39%	-0.15%	1.51	4.16	0.01

Table 3.4: Ballots rejected as late vs. signature mismatch, grouped by county (first and last names), 2019–2024 general elections.

County	White Total Ballots	Hispanic Total Ballots	White Late Rejection Rate	White Signature Rejection Rate	White Delta	Hispanic Late Rejection Rate	Hispanic Signature Rejection Rate	Hispanic Delta	White–Hispanic Late Rejection Ratio	White–Hispanic Signature Rejection Ratio	p-value (Two-Prop. Z-test)
All counties	12,285,291	222,355	0.30%	0.44%	0.14%	0.38%	1.13%	0.75%	1.28	2.55	0.000
Central WA	1,159,502	76,807	0.38%	0.30%	-0.08%	0.50%	1.01%	0.51%	1.33	3.33	0.000
Adams	15,534	2,579	0.44%	0.66%	0.22%	0.58%	3.02%	2.44%	1.31	4.61	0.000
Benton	322,334	9,979	0.43%	0.33%	-0.10%	0.45%	1.31%	0.86%	1.04	3.99	0.000
Chelan	146,718	5,510	0.21%	0.32%	0.11%	0.36%	1.31%	0.95%	1.76	4.08	0.000
Douglas	67,688	3,087	0.24%	0.09%	-0.15%	0.29%	0.32%	0.03%	1.23	3.72	0.199
Franklin	78,852	12,008	0.55%	0.40%	-0.15%	0.51%	1.59%	1.08%	0.92	3.93	0.000
Grant	111,771	7,026	0.48%	0.49%	0.01%	0.61%	1.64%	1.03%	1.29	3.32	0.000
Okanogan	73,040	1,109	0.36%	0.73%	0.37%	0.90%	2.07%	1.17%	2.51	2.85	0.119
Walla Walla	103,166	3,176	0.32%	0.21%	-0.11%	0.32%	0.91%	0.59%	0.98	4.26	0.000
Yakima	240,399	32,333	0.36%	0.09%	-0.27%	0.53%	0.40%	-0.13%	1.49	4.58	0.013

fewer total ballots—which may slightly limit statistical power.

Results in Tables **??** and 3.4 show that the White–Hispanic differences in late ballot rejection rates are negligible compared to disparities in signature mismatch rejection rates. For example, Table **??** shows that in Benton County, voters with a Hispanic surname had their ballots rejected for signature mismatch at a rate 3.3 times higher than White voters. In contrast, Hispanic voters were rejected for late submission at lower rates than their White counterparts across the same elections (ratio of 0.84). In other counties—and when aggregating data for central Washington or the state as a whole—the White–Hispanic late submission rejection ratio ranges from 1.00 to 2.32. This stands in sharp contrast to signature mismatch rejections, where voters with a Hispanic surname were three to four times more likely to have their ballots rejected than voters with a White surname. The results using both first and last names are substantively consistent with those based on surnames alone. These patterns suggest that while voter-side factors may play some role, the weight of the evidence points to discretionary decisions by election officials as the key driver of the racial disparities observed in signature mismatch rejections.

To further assess whether the gap between signature mismatch and late rejection rates differs significantly between White and Hispanic voters, I calculated a delta for each group, defined as the difference between the signature rejection rate and the late rejection rate. For both groups, I computed the standard error of the delta, treating the signature mismatch and late submission rejection rates as independent proportions:

$$SE(\Delta) = \sqrt{\frac{p_{sig}(1-p_{sig})}{n_{sig}} + \frac{p_{late}(1-p_{late})}{n_{late}}} \tag{3.1}$$

I then used a two-sample Z-test for independent estimates to assess whether the deltas differed significantly between the two groups. This approach treats the deltas as independent and approximately normally distributed and does not pool the variances. The Z-score is calculated by dividing the difference between the group deltas by the square root of the sum of their squared standard errors:

$$z = \frac{\Delta_{\text{White}} - \Delta_{\text{Hispanic}}}{\sqrt{SE(\Delta_{\text{White}})^2 + SE(\Delta_{\text{Hispanic}})^2}} \tag{3.2}$$

As shown in Table 3.3, the delta between late submission and signature mismatch rejection rates is consistently larger for voters with Hispanic surnames than for those with White surnames, and this difference is statistically significant at the p ¡ .05 level. For example, at the statewide level, 0.37 percent of ballots cast by voters with Hispanic surnames were rejected for late submission, compared to 1.03 percent rejected for signature mismatch—a delta of 0.66 percentage points. In contrast, 0.30 percent of White surname ballots were rejected for late submission, while 0.47 percent were rejected due to signature mismatch, yielding a delta of just 0.17 percentage points. The evidence shows that the difference between signature mismatch and late submission rejection rates is significantly greater for Hispanic voters than for non-Hispanic White voters.

In some cases—such as in the aggregate of all central Washington counties—the delta for White surname voters is negative, meaning that their ballots were rejected more frequently for late submission than for signature mismatch. I observe substantively similar results when restricting the sample to voters whose first and last names are both classified as either Hispanic or White, as shown in Table 3.4. In Tables B.1 and B.2 of the appendix, I further disaggregate the results by election year for both the surname-only and combined first-and-last-name classifications. Except for odd-year, off-cycle elections—which have substantially lower turnout, particularly among Hispanic voters—I find that the difference between signature mismatch and late submission rejection rates remains significantly greater for Hispanic voters than for non-Hispanic White voters. Moreover, across all elections analyzed, the White–Hispanic odds ratio for signature mismatch rejection is always higher than the corresponding odds ratio for late ballot rejection.

Taken together, the weight of the evidence from Study 1 leads me to adopt Hypothesis 2, which suggests that administrative bias—rather than voter-side factors such as experience or familiarity with VBM procedures—is the most likely explanation for the disproportionately high signature mismatch rejection rates among Hispanic voters compared to their White

counterparts. To further examine the role of evaluator bias, I turn to Study 2, which uses a design that neutralizes any voter-related factors to isolate the relationship between racial cues embedded in names and signature verification decisions.

3.6 Study 2: Signature Evaluation Task

In Study 2, I conducted an online signature evaluation task designed to eliminate voter-related factors and isolate potential bias in the signature verification process. I recruited an online panel of Washington residents and asked participants to evaluate 24 pairs of valid signatures, each paired with either a putatively White- or Hispanic sounding name. The signature pairs were collected from volunteers in the Los Angeles metropolitan area, allowing me to ensure consistency in handwriting quality while testing whether perceived racial or ethnic identity—signaled through names—affects rejection rates.

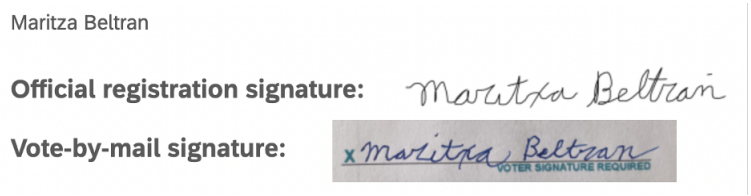
The online signature evaluation study was conducted between October 24 and November 14, 2022, and included 1,797 participants from Washington State.[5] Each participant evaluated 24 pairs of valid signatures, each associated with either a putatively White- or Hispanic sounding name. A key strength of the design is that each signature pair was signed by a single volunteer, ensuring that all differences in rejection rates stem from name based cues rather than variations in handwriting. Importantly, the assignment of White- or Hispanic-coded names to signature pairs was randomized, decoupling signatory identity from racial cues. This design allows me to rule out voter-side explanations and to isolate the role of evaluator bias in any observed disparities by race or ethnicity.

The survey began with a standard informed consent form, followed by a screener to limit participation to Washington State residents. Respondents were asked to select their state of residence, and those who did not select Washington were screened out and thanked for their time.[6]

My decision to recruit Washington residents as evaluators in the online signature study is both reasonable and, to a meaningful extent, externally valid. Like the signature evaluators in Washington's elections, participants in my study do not possess formal expertise in hand-

writing analysis and rely on personal judgment when evaluating signatures. In Washington, election staff responsible for verifying ballot signatures were not required to receive training until a 2023 legal settlement mandated it for select counties (Cohen 2024). As a result, my participant pool does a reasonable job of reflecting the real-world conditions under which many ballot signatures are reviewed: by individuals who rely on subjective assessments without standardized training. To guide participants through the signature evaluation process, the following prompt was presented: "Now imagine that you are an election worker reviewing signatures on mailed ballot envelopes for the upcoming election. For each handwritten signature printed on the mailed envelope, make a comparison against that voter's official registration signature. If you believe the signatures were written by two different people, select 'Reject'. Otherwise, select 'Accept'. Signature pairs will be given to you in sets of 8, beginning with three sets. Please take this exercise seriously." Following the prompt, respondents evaluated 24 signature pairs, presented in sets of eight with short breaks between each set. Each pair consisted of one handwritten signature and one digital signature, similar to the type produced on a digital pad at a driver's licensing office when registering to vote. The order of the signature pairs was randomized, and the voter's printed name was displayed above each signature pair (see Figure 3.2 below for an example).

Figure 3.2: Digital and handwritten signature exemplar.



I included the printed name alongside the signatures to closely replicate real-world conditions. In Washington State, printed names are part of the voter information section on ballot signature pages reviewed by the Canvassing Review Board and are also visible on the mailed ballot declaration and within the VoteWA system used by election workers. To ensure the study reflected the demographic composition of Washington's electorate—where White voters outnumber Hispanic voters, even in central Washington counties—I included

fifteen White-coded names and nine Hispanic-coded names. Although this ratio does not fully mirror the population distribution, I intentionally over sampled Hispanic-coded names to ensure a sufficient number of observations for detecting potential differences in rejection rates between White and Hispanic-coded signatures. Table 3.5 presents the nine Hispanic name combinations, and Table 3.6 lists the fifteen White name combinations used in the study. For more information on how I selected these names, see Appendix section B.4.

Table 3.5: Hispanic Names

Araceli Pacheco	Santiago Cardenas	Jorge Contreras	Maritza Beltran	Esperanza Davila
Luis Esquivel	Nayeli Garcia	Alejandra Gonzalez	Fernando Ochoa	

Table 3.6: White Names

Zachary Petersen	Seth Nielsen	Sara Warner	Kylee Harrison	Macy Goodwin
Luke Koch	Olivia Dickson	Brian Fischer	Penny Cox	Mason Walsh
Annabelle Myers	Madison Conway	Charlie Carlson	Owen Hartman	Robert Donovan

After finalizing the list of Hispanic and White names, I recruited volunteers from diverse racial and ethnic backgrounds to provide both a handwritten and a digital signature for one of the assigned names. The handwritten signature was designed to replicate the type of signature a voter would provide on a physical ballot, while the digital signature mirrored the style typically captured on electronic pads at driver's licensing offices during voter registration. Appendix B.6 in the online supplemental material provides images of each signature pair.

To account for potential confounding variables related to the signer's identity, names were randomly assigned to volunteers from diverse racial and ethnic backgrounds. As a result, Hispanic-coded names were not exclusively signed by Hispanic volunteers, nor were White-coded names signed solely by White volunteers. This ensured that each signature pair was produced by a single individual, decoupling the racial or ethnic background of the signer from the name assigned to the signature. This design choice rules out the possibility that inherent differences in handwriting styles across racial or ethnic groups could explain disparities in rejection rates. By isolating the name cue from the signer's identity, I am therefore able to attribute any observed differences in rejection rates to how evaluators

perceive the racial or ethnic signals embedded in the names—rather than to differences in handwriting quality or style.

To analyze participants' responses, I coded whether each signature pair was accepted or rejected. Accepted signatures were coded as 1 and rejected signatures as 0. To calculate each respondent's Hispanic signature acceptance rate, the scores for the nine Hispanic-coded signature pairs were summed and divided by nine. The same method was applied to the fifteen White-coded signature pairs, yielding a White signature acceptance rate. This resulted in two acceptance rates per participant—one for Hispanic-coded names and one for White-coded names—allowing for a direct comparison of how each respondent evaluated signatures associated with different racial or ethnic name cues.

3.7 Main Analysis and Findings

I begin by examining whether participants, on average, evaluated ballot signatures with Hispanic and White coded names differently. Statistically significant differences in acceptance rates are attributed to bias for several reasons. First, all signature pairs were signed by the same individual, ruling out actual mismatches. Second, signatories from diverse racial and ethnic backgrounds were randomly assigned to either Hispanic- or White-coded names, ensuring that signature characteristics were not systematically linked to racial identity. Third, all signers followed a standardized process—producing one handwritten and one digital signature—ensuring consistency across pairs. Fourth, the order of signatures presented to survey participants was randomized to avoid ordering effects.

In short, the only systematic difference between signature pairs was the racialized name cue embedded in the signatures and displayed above them. If evaluators were unbiased, acceptance rates should not differ significantly across Hispanic and White signature pairs. To test this, I use a paired t test to compare mean acceptance rates for Hispanic- and White-coded signatures. Results are presented in Table 3.7.

As shown in the second and third columns of Table 3.7, study participants accepted about 55–60 percent of the signature pairs they reviewed—well below the acceptance rate

Table 3.7: Paired t test of Hispanic and White signature acceptance rates

Survey Weight	Hispanic Acceptance Rate	White Acceptance Rate	Difference in Acceptance	95% Confidence Interval of Difference	t-Value	p-Value	N
No	55.0%	60.5%	5.5%	4.6%–6.3%	12.90	<.0001	1,797
Yes	56.1%	60.2%	4.1%	2.5%–5.6%	5.24	<.0001	1,797

observed in the administrative records from Study 1. I attribute this gap to natural differences in evaluation context. Real-world election workers handle hundreds or thousands of ballots under a presumption of validity and their decisions can be reviewed or overturned by a canvassing board. In contrast, my participants reviewed a small, isolated set of signature pairs without an explicit instruction to presume validity and made decisions unilaterally. These factors—higher stakes, volume, and procedural safeguards—likely drive the higher acceptance rates seen in practice.

Importantly, despite this lower baseline, the results of the paired t test provide strong evidence against the null hypothesis of no difference in mean acceptance rates between Hispanic- and White-coded signatures. Without using survey weights, Hispanic-coded signatures were accepted at a mean rate of 5.5 percentage points lower than White-coded signatures. This difference is statistically significant, with a t-value of 12.91 and a p-value of ¡ .0001. The 95 percent confidence interval for this difference ranges from 4.6 to 6.3 percentage points. In other words, signatures associated with Hispanic names were, on average, rejected 5.5 percent more often than those associated with White names.

This pattern holds when using survey weights to better reflect Washington's electorate. Under the weighted analysis, the mean acceptance rate for Hispanic-coded signatures was 4.1 percentage points lower than for White-coded signatures, with a 95 percent confidence interval ranging from 2.5 to 5.6 percentage points.

These findings provide strong evidence that racial cues embedded in names influence how evaluators assess signature validity. Despite all signature pairs being objectively valid, participants were significantly more likely to reject ballots associated with Hispanic-coded names. This disparity persists even when adjusting for the demographic composition of

Washington's electorate, reinforcing the conclusion that evaluator bias—rather than voter-side factors—plays the central role in the disproportionate rejection of Hispanic ballot signatures.

3.8 Additional Analysis

I also conducted supplementary analyses to examine whether individual differences in explicitly reported attitudes explain variations in differential acceptance rates. Since my survey cannot disentangle implicit from explicit bias, this analysis offers an initial, exploratory investigation of whether consciously held views relate to rejection patterns as opposed to only implicit biases driving discriminatory behavior. More specifically, I constructed a measure of explicit bias from feeling thermometer ratings of Whites and Immigrants and used it to predict participants' acceptance rates for Hispanic- and White-named signatures. Results indicate that explicit anti-immigrant sentiment is significantly associated with lower acceptance of Hispanic-coded signatures, even after controlling for sociodemographic and political factors. By contrast, explicit bias had no significant effect on the evaluation of White-coded signatures.

These findings suggest that consciously held anti-immigrant attitudes may contribute to the disparate rejection of Hispanic-named signatures, although implicit bias remains the most significant driver of overall disparities. This is in line with recent research finding that pro-Trump biases can similarly affect people's likelihood to accept signatures (Shino and Smith, 2026). Full details of my additional analysis, including model specifications, robustness checks, and figures, are provided in Appendix B.5.

3.9 Conclusion

Consistent with a growing body of research on vote-by-mail ballot rejection, my statewide and county-level audit shows that ballots bearing Hispanic-sounding names are significantly more likely to be rejected for signature mismatch than those bearing White-sounding names.

Importantly, this Hispanic–White gap virtually disappears or was not nearly as pronounced for late-submission rejections—when voter-side factors would be most salient—suggesting that the signature-mismatch disparity arises primarily from discretionary judgment rather than "cultural" or procedural factors related to voters. My online signature evaluation study, which held all voter related characteristics constant, reproduced a similar outcome: participants were far more likely to reject valid signature pairs with Hispanic names. Regression analyses further revealed that individuals with stronger pro-White/ anti-immigrant sentiments were significantly more prone to reject Hispanic-named signatures but showed no corresponding increase in rejecting White-named ones.

These findings point squarely to evaluator bias as a key driver of racial disparities in VBM signature verification. When administrative discretion produces such disparate rejection rates, it undermines the promise of equal participation and erodes trust in electoral institutions. Even well-intentioned bureaucratic procedures, when unchecked, can perpetuate racial inequities in access to the ballot. However, I am not suggesting that signature verification or VBM elections should be discarded. On the contrary, I agree with existing research showing that VBM expands access and increases turnout among historically underrepresented groups compared to in-person elections (Bonica et al., 2021). I simply suggest that even inclusive electoral reforms like universal VBM can contain procedural elements that require scrutiny and improvement. Such improvements can include enhanced training, technology-assisted checks, and expanded curing options to uphold core democratic principles of fairness, accountability, and inclusion. This view is consistent with the recent Vet Voice Foundation v. Hobbs decision, in which the Washington Supreme Court upheld the constitutionality of the state's signature verification system. While the Court affirmed that signature matching is a valid election security measure, it also acknowledged the real impact of ballot rejections and emphasized the importance of procedural safeguards—such as expanded cure opportunities—to protect voters from disenfranchisement.

In light of my findings, jurisdictions may consider adopting automatic signature verification (ASV) technology to reduce the role of human subjectivity. Indeed, Washington explicitly allows for counties to employ ASV so long as the software is approved by the Sec-

retary of State's Office (RCW 29A.40.110), though Pierce County, to my knowledge, is the only jurisdiction that actively uses an ASV system for its signature verification process.

Outside of Washington, several counties across the country have partnered with ASV vendors like BlueCrest and ParaScript to process their mailed ballots more efficiently. However, because of the proprietary nature of ASV tools, little is known about how they are trained and how accurate they are. I therefore caution against viewing ASV as a cure-all. If adopted, ASV systems must be subject to rigorous public auditing similar to that of facial recognition systems Grother, Ngan, and Hanaoka (2019), representativeness testing, and mechanisms to override by trained human reviewers. This is a clear area for future research and is especially important given that ASV technologies "fall outside the scope of federal and state regulations for electronic voting systems" (Janover and Westphal, 2020).

Building on insights from public administration and social psychology, future research should examine interventions that could mitigate or curb biased decision making. For example, studies of police misconduct show that procedural reforms and increased managerial oversight can meaningfully alter behavior (Mummolo, 2018). These same strategies could be adapted for signature evaluators, testing whether standardized workflows, supervisor review, or audit trails reduce disparate outcomes.

Likewise, experiments that manipulate evaluators' cognitive resources—by adjusting review time, task load, or decision aids—could reveal how pressure and limited deliberation exacerbate bias (Fazio, 1990). In the VBM context, increasing time allowances or providing decision-support tools may improve accuracy and equity, but these possibilities remain to be rigorously tested in field settings and across different jurisdictions.

Chapter 3 Endnotes

[1]Although there is a disagreement about whether White should be capitalized, I follow the recommendation of the National Association of Black Journalists as well as scholars of race and racism in capitalizing White to racialize the group and unmask long-standing "racial invisibility" Painter (2020).

[2]I use the terms Hispanic and Latino interchangeably.

[3]I analyzed the following general elections from 2019 to 2025: November 5, 2019; November 3, 2020; November 2, 2021; November 8, 2022; November 7, 2023; November 5, 2024. I focus on these years because of the availability of ballot status reports during this time period on the secretary of state's website: https://www.sos.wa.gov/elections/data-research/election-results-and-voters-pamphlets. I focus on general elections and not primary elections because of the relatively low turnout in primaries, which often results in very few rejected ballots—sometimes only one or two per county—making it difficult to reliably assess patterns in ballot rejection.

[4]WAC 434-261-053

[5]After completing checks for duplicate IPs, potential bots, and responses outside of Washington State, my dataset consists of 1,585 fully completed survey responses from Lucid and 212 responses from Dynata. To keep the sample as representative as possible to the state's Citizen Voting Age (CVAP) population, two steps were taken. First, survey quotas for sex, age, education, income, political partisanship, and ethnicity were imposed. Second, I created standard survey weights using the "survey" and "anesrake" packages. Survey weights were created based on the 2016–2020 5-Year American Community Survey's (ACS) Citizen Voting Age Population estimates for sex, age, education, and race in Washington State. I downloaded ACS data from the United States Census Bureau's Public Use Microdata Sample (PUMS).

[6]To ensure that potential participants were not made aware of the study's target population objectives (i.e., Washington State residents), such details were not shared at any point of the respondent on boarding process.

CHAPTER 4

Does Jamal's Vote Count Less Than James'? An Online Experiment of White Racial Attitudes and Election-Related Signature Rejection*

4.1 Introduction

The COVID-19 pandemic has ushered in a new reliance on non-traditional voting methods, as over 30 percent of voters utilized vote-by-mail (VBM) in the 2024 general election. While this sweeping transition has increased convenience for many voters, it has opened a door for another form of voter suppression: ballot rejection via signature discrepancy. In the 2024 general election, over 580,000 vote-by-mail ballots were rejected nationwide - with the most popular reason being a non-matching or missing signature (U.S. Election Assistance Commission, 2025).

According to existing scholarship and official audits by state agencies, non-White voters are more likely to face VBM signature rejection than White voters (Asian Americans Advancing Justice, 2017; Baringer, Herron, and Smith, 2020; Shino, Suttmann-Lea, and Smith, 2022; Office of the Washington State Auditor, 2020), What can explain this pattern? Is it possible that underlying biases can influence the signature verification process as some have suggested (Herndon, Oskooii, and Rios, 2026; Shino and Smith, 2026)? If so, what role does racial bias play? Various academic studies have shown that fears about fraud and election

* A version of this chapter is under review at *Political Behavior*.

malfeasance are centered on Black, Latino, immigrant and other non-White voters (Bentele and O'Brien, 2013; Morris and Shapiro, 2024; Wilson, Brewer, and Rosenbluth, 2014). In this paper I argue the process of signature verification is similarly affected by racial attitudes and that individuals with high levels of self-reported White ethnocentrism are more likely to accept White signatures and reject non-White signatures, all else equal.

The fear of voter fraud is especially pronounced when it comes to voting-by-mail (VBM) because unlike in-person voting, VBM requires election officials to verify the identity of each voter without that voter being physically present. President Donald Trump and his allies have repeatedly claimed that this aspect of VBM makes it vulnerable to fraud. In the aftermath of California's 2025 special election, White House spokesperson Karoline Leavitt said "They have a universal mail-in voting system, which we know is ripe for fraud, ... fraudulent ballots that are being mailed in, in the names of other people and the names of illegal aliens who shouldn't be voting in American elections" (Rivas, 2025). While these claims have been thoroughly debunked across dozens of studies and court rulings, public anxiety on the issue remains alarmingly high with one survey reporting that more than half of Americans were concerned about non-citizens voting illegally in the leadup to the 2024 presidential election (Dorn, 2024).

Is it possible that these racialized fears of fraud could influence the adjudication of VBM ballot signatures? Like others, I argue that VBM signature verification is inherently subjective and is carried out with great discretion. The process has been described as "witchcraft" and even among professional forensic document examiners, it is not uncommon to disagree on the validity of a signature, especially when doing a one-to-one signature comparison as is often the case in VBM signature verification Fifield and Bassett (2024); Graham (2020). So, among the general public, can people's personal racial biases affect their decision to accept a disputed pair of signatures? Most recently, (Shino and Smith, 2026) found that people's partisanship and political ideology influenced their likelihood of identifying a matching pair of signatures within a modular grid of eight similar signatures. In their results they report that 2020 Trump supporters were 39.4 percent likely to identify a matching pair whereas 2020 non-Trump supporters were 60.6 percent likely to identify a

match among the eight signatures.

Using an experimental approach (Herndon, Oskooii, and Rios, 2026) found that among an online sample of 1,797 Washington residents, respondents accepted 55 percent of Hispanic-appearing signatures and 60.5 percent of White-appearing signatures despite all signatures being valid. Furthermore, they found that the decision to accept Hispanic-appearing signatures was correlated with people's self-reported relative affect for immigrants and White people as measured using 0-100 feeling thermometers. Both of these papers suggest that personal biases can affect signature acceptance decisions among the general public, but more work is still needed. This paper takes an important step forward by using an improved signature randomization scheme that isolates the role of race and racial attitudes in signature verification. In doing so I offer new evidence of the under-explored possibility that racial biases, in addition to partisan or ideological biases, can affect the adjudication of VBM ballot signatures – at least among untrained survey participants.

Utilizing a novel survey experiment that manipulates the racial connotation of a signature through the assignment of racialized and legible names—similar to audit and correspondence studies—I find that White ethnocentrism influences a White signature reviewer's likelihood to accept or reject signatures from White, Black, and Latino voters. Although my sample consists entirely of White undergraduate students, I argue that this makes it harder to detect an effect as undergraduate students are likely more racially liberal and inclusive than the actual population of election workers responsible for reviewing signatures. I focus on White students in particular because multiple large-scale surveys consistently find that the vast majority (between 84-94 percent) of local election officials are White (Adona et al., 2019; Gronke et al., 2024). My student sample is a convenience sample to be sure, but one that does not necessarily threaten the validity of my causal inferences; as (Druckman and Kam, 2011) argue, student samples pose a problem only when the treatment effect is moderated by a variable on which students diverge from the general population. Here, if students are more racially liberal than actual election workers, any racial bias I detect among them likely understates what we would find in the real-world population of signature reviewers who tend to be middle-class, over the age of 60, and White.

The remainder of this article is organized as follows: first, I describe VBM ballot rejection. Next, I introduce my theory of racialized bureaucratic discretion. Third, I introduce my hypotheses and data. Finally, I present my results and conclude with a discussion on equality in election administration and suggestions for future research.

4.2 Discretion in Election Administration

Since even before the days of Jim Crow, there has been discretion in election administration. It has been well documented and well theorized that White poll workers and county clerks relied on racial bias to impose racist literacy tests, poll taxes, and understanding clauses to exclude African Americans from voting (Keele, Cubbison, and White, 2021). After the passage of the Voting Rights Act of 1965, local governments and individual street-level bureaucrats had less latitude to exclude non-white voters and it eventually became accepted that if an eligible voter cast their ballot, the election administration apparatus would equally and fairly process and record the votes free of racial bias. However, research has gone to great lengths to show that modern devices of disenfranchisement like citizenship requirements, photo ID restrictions, racist precinct closures, and gerrymandering are all still able to disenfranchise voters along racial lines while operating within the law, especially in a post-Shelby world (Morris and Miller, 2024).

Currently, the most vulnerable and exploitable area of election administration is VBM. Baringer, Herron, and Smith (2020) write that "this form of voting is uniquely vulnerable to administrative discretion because of the absence of a voter's presence in the VBM verification process". The administrative discretion that these authors are warning about is rooted in research on bureaucratic discretion (Lipsky, 2010; Alvarez and Hall, 2006). In his path-breaking book, Michael Lipsky explains how low-level public servants like election workers are tasked with interpreting and enforcing nuanced government policy on a case-by-case basis while also being overworked and under-resourced. To make their job more manageable, street-level bureaucrats rely on heuristics and the over-simplification of clients which can ultimately result in unfair policy outcomes. Indeed, this phenomenon has already been well-

documented in election-related photo ID enforcement (Atkeson et al., 2014), constituent requests for information (White, Nathan, and Faller, 2015), and on-site signature verification (Suttmann-Lea, 2020). In the next section, I explain how VBM signature verification is also prone to bias.

4.3 Signature Verification as a *Behaviometric*

Signatures are treated as a unique behavioral trait that can be used to verify a person's identity and prevent voter fraud. Unlike physical biometrics such as facial scans, fingerprints, etc., signatures are referred to as behaviometrics because writing a signature is a behavior developed over time rather than a static physical characteristic (Sharma and Elmiligi, 2022). Proponents of signature verification tools describe it as a superior form of fraud prevention because signatures are unique behaviors that are hard to steal or duplicate compared to more traditional biometrics or secret PINs. Signatures are dynamic and unlike a PIN, there isn't a "correct" or "incorrect" signature. However, in 2020 the Superior Court of California noted that a person's signature can vary for several reasons including: "physical disability, injury, a primary language that does not use Roman characters... or simply the passage of time" (*La Follette v. Padilla*, 2018). Research has also been able to connect a person's emotional state to variations in their signature (Marzinotto et al., 2016; Khan et al., 2024).

Forensic Document Examiners (FDEs) are considered experts in determining the authenticity of signatures and spend 2-4 years of full-time training before being accredited and allowed to practice in the United States (American Board of Forensic Document Examiners, 2026). FDEs are paid professionals and often work in crime labs that are equipped with devices that magnify writing and can detect unique, stylized indentations. Therein lies the first challenge for election administration. The election workers tasked to review VBM ballot signatures are far from professional FDEs — not only in experience but also in resources.

Election offices across the country are instead staffed by an army of temporary workers, totaling over 700,000 in 2020 (Election Assistance Commission, 2020). Most of these workers are only being paid for their work on election day. In Texas, counties set their own wages, and

many counties pay between 10 to 14 dollars an hour (DeLaura, 2020). The long hours and low pay of working the polls have made it difficult for local governments to recruit enough poll workers to administer elections. In fact, more than 52 percent of jurisdictions surveyed by the EAC report that recruiting poll workers was either "somewhat" or "very" difficult. Local governments are thus left with few choices in who they can hire to issue, inspect, and transport ballots. As a result, most localities have no educational requirements, do not require a background check, and sometimes allow people as young as sixteen to work the polls (Election Assistance Commission, 2020). One way that governments have been able to circumvent recruitment challenges is through a random "draft" of poll workers similar to jury selection (Beck, 2024). This process does more to guarantee that poll workers are a representative sample of the local population and prevents any single demographic from dominating election administration which is arguably the status quo given that nearly 50 percent of poll workers in 2020 were over the age of sixty (Election Assistance Commission, 2020).

Not all these election workers are responsible for VBM signature verification though, and although some state election codes include clauses on required training sessions, these guidelines can be vague or subject to interpretation. In Washington state for example, it was common practice for several county canvassing review boards responsible for accepting and rejecting signatures to send untrained "designees" to review ballot signatures in their place. It wasn't until a 2023 legal settlement that these counties agreed for their canvassing review boards as well as their designees to be required to attend signature verification and cultural competency training before participating in the signature review process (*Reyes et al. v. Chilton et al.*, 2023). In Florida, online training takes less than two hours to complete (Shino and Smith, 2026). Suffice to say, the local bureaucrats responsible for reviewing VBM signatures are far from perfect.

4.4 Steps to Reject a Signature

There is both intrastate and interstate variation in election-related signature review. In a comprehensive study of VBM signature verification in California, Stanford researchers reported considerable differences in how each county validated signatures and urged the Secretary of State as well as the California legislature to provide standardized guidelines for counties to use (Janover and Westphal, 2020).

While California has since delivered on certain requests for uniform state guidelines on signature verification, considerable variation still exists due to things like jurisdiction size and access to resources (Kimball and Baybeck, 2013). In well-resourced counties, VBM ballot signatures are first reviewed by costly computer vision programs that can compare the signature on each ballot to an internal database of that voter's valid signatures obtained from government interactions (e.g. registration signature, gun license, etc.) This process is called Automatic Signature Verification (ASV) and in California, at least 10 counties partner with a computer vision software vendor to help validate the millions of ballot signatures received on election day (Janover and Westphal, 2020). Because of the proprietary nature of ASV tools, little is known about how they are trained, how accurate they are, or if they are biased. This is a clear area for future research and is especially important given that ASV technologies "fall outside the scope of federal and state regulations for electronic voting systems" (Janover and Westphal, 2020, p. 332). Unlike the field of facial recognition, the National Institute of Standards and Technology has yet to produce standard benchmarks and test data for ASV technologies (Grother, Ngan, and Hanaoka, 2019), though there have been calls in the Senate for baseline federal standards and risk management systems (Norden, 2023).

After ASV (if a county has it), the next step is one or more stages/tiers of human review. In small counties, like Modoc, CA, "two full-time staff members evaluate all voter signatures for each election" (Janover and Westphal, 2020, p. 329). In larger California counties, there are several tiers of review culminating in a final review from a county canvassing board composed of elected officials (e.g. county commissioner).

While the Elections Clause of the U.S. Constitution allows localities to set the "times,

places, and manner" of their elections - including the manner of ballot adjudication/signature verification, these local bureaucratic decisions regarding signature review need to be impartial. This proves challenging because the process is ultimately a culmination of subjective decisions made by street-level bureaucrats. Normatively, decisions on signature rejection should be solely based off of signature characteristics, but as I argue in the next section, the reviewers themselves are an important factor to consider.

4.5 A Theory of Racialized Bureaucratic Discretion

Election workers are often minimally trained, overworked, and under-equipped compared to professional handwriting experts. Combining these circumstances with the subjective standards inherent in signature review is a recipe for cognitive bias to creep into the decision-making process. Cognitive biases can be defined as implicit and/or explicit attitudes and stereotypes about different social groups (Banaji and Greenwald, 2016). Research has shown that these biases can exert a particularly significant influence on decision-making when there is limited motivation and/or opportunity for thoughtful processing and when individuals are relying on subjective standards or heuristics to make judgments (Fazio, 1990; Kang et al., 2011; Payne, 2005; Sherman et al., 2008). These circumstances are typical in VBM signature review as election workers are assigned hundreds of ballots to review in a short time frame. As Page and Pitts (2009) put it, poll work consists of "discretionary decisions, potentially made under time constraints, with little individuating information, and no accountability or incentives for accuracy".

Considering these suboptimal work conditions alongside the recently observed racial gaps in signature rejection raises the question: could the election workers reviewing signatures be racially biased, and could these biases be influencing their decisions to accept and reject certain signatures? In answering this question, I treat those reviewing signatures as "street-level bureaucrats" as defined by Michael Lipsky in his seminal book *Street-Level Bureaucracy* 2010. These types of bureaucrats are granted significant discretionary power in their lines of work and exercise it on a case-by-case basis to fulfill nuanced or even vague

policy goals. These set of circumstances naturally raise concerns about bureaucratic impartiality. The classic example of the dilemma in street-level bureaucrats are police officers abusing their discretionary power in a racially discriminatory fashion (e.g. racist "stop and frisk" policies that target minorities). Election workers have been described as street-level bureaucrats by Lipsky as well as other scholars (Lipsky, 2010; Alvarez and Hall, 2006) and although they have less influence on our daily lives than police officers, teachers, or social workers, they are just as likely to hold racial attitudes that prioritize their own racial/ethnic group over others. Whether or not these attitudes affect their work is an open question.

In this paper, I focus on ethnocentrism as the key racial attitude affecting signature verification because of its broad scope and ease of measurement. The theory that members of a racial or ethnic group are prone to believing their own group to be central and superior to others is called ethnocentrism and has been written about for over a century (Sumner, 2019; Gumplowicz, 1881). Ethnocentrism is a broader concept than racial resentment, which is commonly written about in political science, because it considers in-group and out-group attitudes simultaneously whereas measures of racial resentment are typically only focused on out-group attitudes (Kinder and Sears, 1981; Sears and Henry, 2003). Ethnocentrism has been a constant feature of human civilization and evolutionary theorists have argued that it is a natural phenomenon rooted in biological evolution (Hartshorn, Kaznatcheev, and Shultz, 2012; Van den Berghe, 1999).

4.6 Names as a Visual Stimuli and Racial Signal

How, then, does ethnocentrism manifest in the realm of VBM signature verification? I argue that printed or otherwise legible names on ballot return envelopes are the culprit. Along with signatures, names are one of the only pieces of information presented to reviewers assessing VBM ballots and extensive social science research suggests that names act as powerful heuristics that can signal demographic background (Gaddis, 2015; Gaddis and Ghoshal, 2015; Gaddis, 2017, 2018). For example, research has found that last names such as Hernandez and Gonzalez are frequently and consistently recognized as signaling Hispanic

heritage (Crabtree and Chykina, 2018). Within experimental research designs, it is common to use names to convey race or ethnicity: "Experiments using names to convey race and ethnicity have been used across a variety of disciplines—sociology, economics, political science, psychology, and management— and surpass 250 studies since 2000" (Gaddis, 2018, p. 1). These studies consistently find that when bureaucrats are evaluating people on paper, a name alone is enough to prompt discriminatory behavior and influence the decision making process in asylum cases, hiring practices, housing, constituent responsiveness, law enforcement, criminal proceedings, and a host of other administrative realms (Bertrand and Mullainathan, 2004; Butler and Broockman, 2011; Davis, 1995; Hanson and Hawley, 2011; Kang et al., 2011; Kenthirarajah et al., 2023; Spencer, Logel, and Davies, 2016). VBM signature verification is unlikely to be an exception to this pattern, and in fact, this trend may be especially pronounced due to the unique lack of training, experience, and organizational culture that typically restrains bureaucrats in other settings from abusing their discretionary power.

Thus, I ask: are ballots filled out by ostensibly non White voters perceived differently than ballots submitted by ostensibly White voters? After all, we already know that ballots are not accepted uniformly across racial/ethnic groups and inexperience with voting alone does not account for the racial differences in rejected ballots (Cottrell, Herron, and Smith, 2021), leading me to the following hypotheses:

4.7 Hypotheses

H1a: Signature reviewers with high levels of White ethnocentrism are more likely to accept White appearing signatures, all else equal.

H1b: Signature reviewers with low levels of White ethnocentrism are more likely to accept non-White appearing signatures, all else equal.

4.8 Data

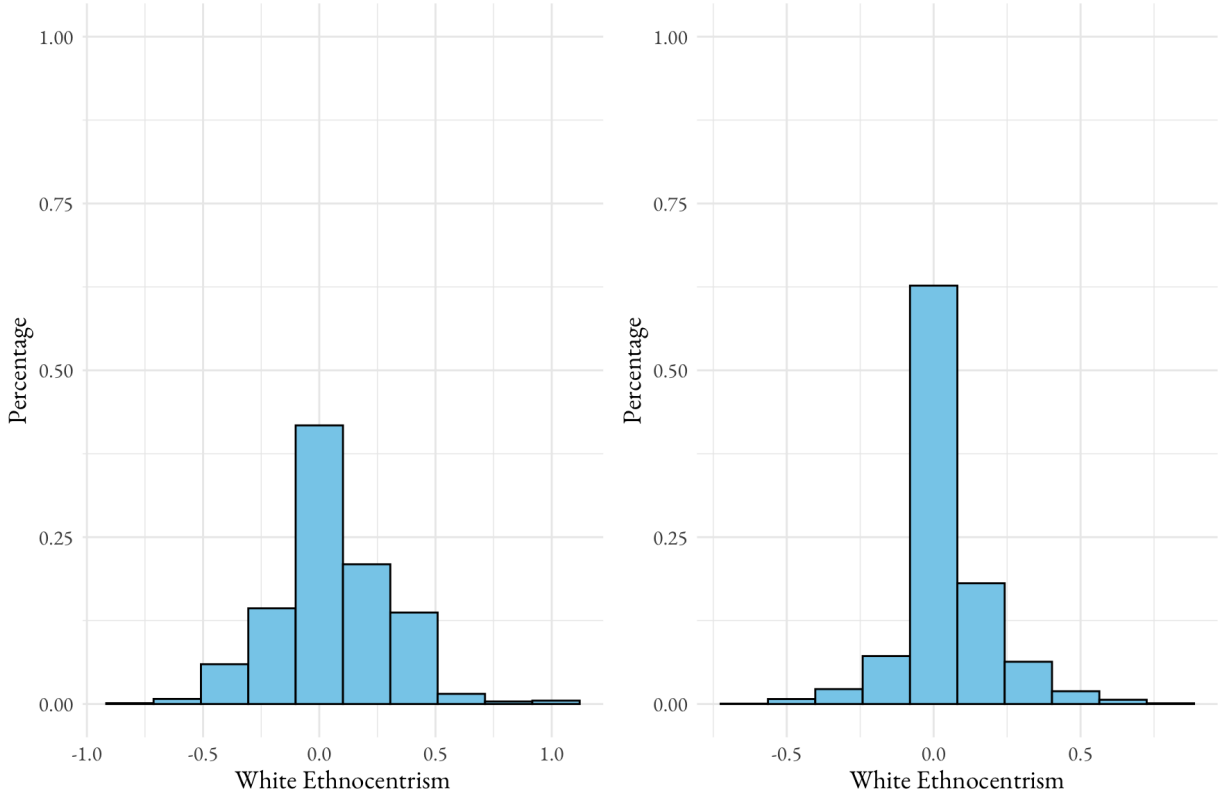
To test these hypotheses, I fielded an original online survey experiment in the Spring of 2024 to 787 White undergraduate students across 4 universities as a part of a collaborative omnibus study.[1] White students are the focus of my study for two main reasons. First, election workers are typically White. In a 2018 survey that included over one thousand local election officials, 86 percent of respondents identified as White (Adona et al., 2019, p. 13). Thus, because my population of interest is overwhelmingly White, my sample includes only self-identifying White respondents. Second, in the context of the United States, White ethnocentrism and White supremacy are especially potent and institutionalized features of American life, leading me to choose White ethnocentrism as my key explanatory variables in H1a and H1b.

While undergraduate students are a convenient population to sample from, they are far from being representative of actual election workers who tend to be older and more conservative on average (Adona et al., 2019). However, this ideological divide should only make it harder to detect an effect since my sample is likely to have warmer feelings towards minorities than the average election worker. At the beginning of the omnibus study, participants were asked feeling thermometer questions that prompted them to rate various social groups on a scale of 0-100 with 100 indicating a warm and positive evaluation and 0 indicating a cold and negative evaluation. As my measure of White ethnocentrism, I take the difference between a respondent's rating of Whites and their average rating of Asians, Latinos, and Blacks. This is the same technique used by other scholars measuring White ethnocentrism Kinder and Kam (2010); Rush et al. (2025), is readily available in most large-scale surveys like the ANES, and has been shown to be robust to concerns about selection bias and priming effects (Tyler and Iyengar, 2024). To better contextualize the distribution of White ethnocentrism in my sample I calculated the same measure using the 2020 ANES and filtered respondents to only include White people over the age of sixty (the typical demographic of election workers).

[1] 368 students from a Midwestern research university, 253 students from a New England research university, 158 students from a west coast research university, and 8 students from a southwest research university. IRB #23-001908

Figure 4.1 visualizes this comparison with the distribution of White ethnocentrism in my sample on the left and among White respondents aged sixty or over in the 2020 American National Election Study on the right (American National Election Studies, 2021).

Figure 4.1: Distribution of White Ethnocentrism in Omnibus (left) and 2020 ANES White Respondents Aged 60+ (right)



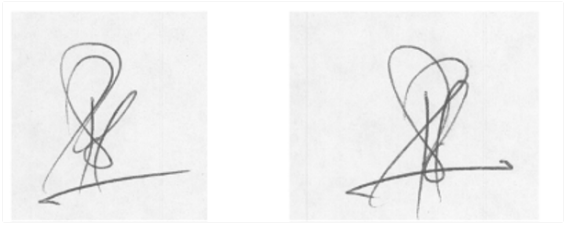
In both samples there is clustering near 0 which reflects a general tendency towards racial agnosticism. Average White ethnocentrism is comparable across the two samples with means of .06 and .04 for my sample and for the ANES sample respectively. Though hard to believe, this suggests that my sample of White undergraduate students have comparable White racial attitudes to the White ANES respondents aged sixty or over, the typical demographic of election workers.

Before starting my experimental module, I first provide participants with a prompt that reads as follows:

"You are about to view a series of signatures from a recent state ballot initiative seeking to expand health care for immigrants. For each signature pair you see, the signature on the left is a voter's known signature on file, obtained in the registration process, the other signature (right) is the one on the ballot initiative. Help a local election administration verify signatures on the ballot initiative. If you think the two signatures were written by two different people, reject the signature pair. Otherwise, accept the pair."

After reading the prompt, participants are then shown four pairs of authentic signatures acquired from the Center of Excellence for Document Analysis and Recognition (CEDAR) at the University of Buffalo.[2] These authentic signatures were originally collected to develop machine-learning based signature verification technologies. The entire dataset includes 24 copies of authentic signatures for 55 different writers, totaling over 1,320 authentic signatures. Figure 4.2 shows each of the four signature pairs that I used in my study.

Figure 4.2: CEDAR Signatures



Signature 1: Shanté Washington/Sydney Walters

Signature 2: Jamal Spencer/James Sullivan

Signature 3: Prudencia Hernandez/Payton Holmes

Signature 4: Josefina Perla Ramirez Rodriguez/Josianne Phoebe Reynolds Ryan

Critically, I only select signature pairs from writers who have illegible signatures so that I can assign them names of my choosing. This is important because my key treatment

[2]https://cedar.buffalo.edu/signature/

is that participants are randomized so that they have a 50 percent chance of seeing a White name printed above the signature pair, indicating that the ballot belongs to a White voter, or seeing a Black/Latino name, indicating that the ballot belongs to a non-White voter. This way, I can keep the signature pair constant while only manipulating its racial connotation via the assignment of an ostensibly White, Black, or Latino name. In selecting names for this study I started by identifying the first letter of each signature and then working backwards to find names that start with that letter. For example, in the fourth signature pair the name clearly begins with a "J" and so I searched for White and Latino names that start with J. While names from a pre-validated list would have been ideal (Crabtree et al., 2023), I was constrained by the fact that I wanted both the White and non-White name for each signature pair to be similar enough so that the signature could ostensibly belong to either name. Thus, I relied on various other sources to draw names from. For first names I relied on two types of sources. First I looked for first names in New York State birth records as provided by the New York State Department of Health because they provide the mother's ethnicity for each birth name. For example, the name "Jamal" was the 57th most popular non-Hispanic Black male name among babies born in 2016. In addition to the New York database I also searched for first names on popular baby naming websites such as babynames.com. For surnames I relied on the U.S. Census' list of frequently occurring surnames (Comenetz, 2010).

This experimental design is very similar to audit and correspondence studies where a company receives resumes or requests that are identical in every way, except for one characteristic. In these types of studies, the difference in levels of invitations for interviews or responses to requests can be attributed to the sole characteristic that was manipulated since all other characteristics are held constant through randomization. For this experiment, the only thing being manipulated is the ethnoracial connotation of the names printed above each signature pair, so any observed differences in signature rejection rates can be attributed to the perceived race of the signature/voter, assuming that these printed names are indeed sending racial signals as intended.

4.9 Results

Before reporting the main results, I first report a brief balance test on party-ID, gender, and mean ethnocentrism in Table 4.1 below to show that randomization worked, and there are roughly an equal amount of self-identified Republicans and Females in my treatment and control group and average ethnocentrism is comparable across groups as well.

Table 4.1: Covariate Balance

Treatment	Total Count	Republican Count	Female Count	Average Ethnocentrism
0	386	101	234	0.0628325
1	400	91	249	0.0550917

Moving to the main results, Table 4.2 on the next page shows the results of seven logistic regressions modeling the likelihood to accept minority signature pairs. As such, my results are presented as adjusted odds-ratios. Columns 1-4 test each of the four signatures individually using logistic regression with a binomial outcome. In columns 5-6, I use an ordered logistic regression with outcomes of 0, 0.5, or 1.0, representing possible acceptance rates for a pool of two signatures. Column 7 is also an ordered logistic regression with outcomes of 0, 0.25, 0.50, 0.75, and 1.0 representing possible acceptance rates from the total set of four signatures. In the appendix, I include the OLS regression analog to these models in Table C.1. As an additional robustness check, I also split White ethnocentrism into Low, Medium, and High terciles to capture non-linearity and present these models in appendix Table C.2. Both of these robustness checks have similar results as those presented in the main text.

Looking at the first row, the odds of accepting Shanté's signature were 21.9 percent higher compared to Sydney's signature. In the second model, Jamal was also preferred to James. In models 3 and 4, Prudencia and Josefina had slightly lower odds of being accepted compared to Payton and Josianne.

Moving to the second row which examines the effect of White ethnocentrism on White

Table 4.2: Adjusted Odds Ratios of Accepting Minority Signatures

	Sydney vs. Shanté	James vs. Jamal	Payton vs. Prudencia	Josianne vs. Josefina	Pooled Blk	Pooled Lat	Pooled Minority
Minority Name (Treatment)	1.219	1.223	0.918	0.940	1.283+	0.921	1.114
	(0.193)	(0.177)	(0.134)	(0.168)	(0.173)	(0.127)	(0.143)
White Ethnocentrism	1.921	2.213+	1.042	0.833	2.161*	0.954	1.606
	(0.853)	(0.918)	(0.432)	(0.419)	(0.805)	(0.370)	(0.573)
Minority Name × White Ethnocentrism	0.133**	0.375+	0.476	0.405	0.202**	0.398+	0.212**
	(0.086)	(0.219)	(0.280)	(0.289)	(0.109)	(0.221)	(0.111)
Num.Obs.	785	787	787	787	785	787	785

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

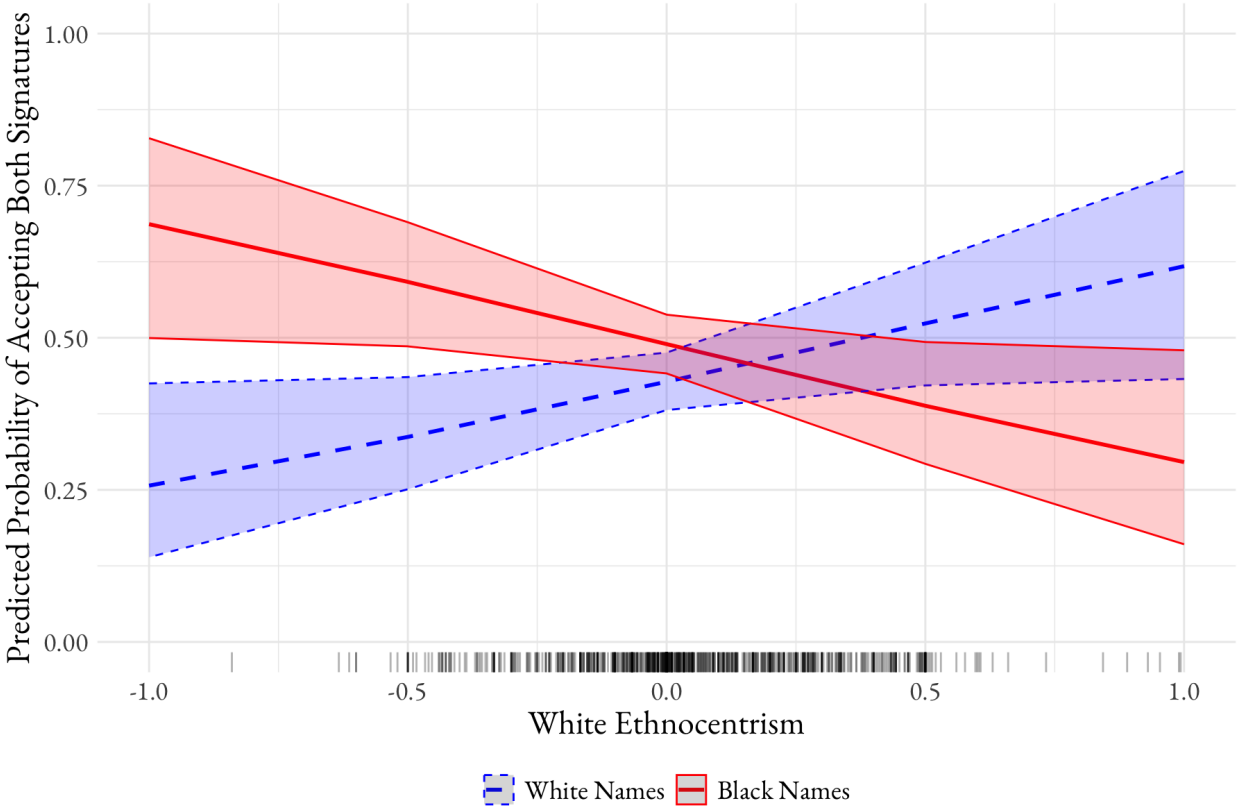
names only (treatment = 0), there is a positive relationship for all names except Josianne in my fourth model. This relationship is most pronounced in my second model, which shows that a one-unit increase in White ethnocentrism (which ranges from -1 to 1) is associated with a 121.3 percent increase in the odds of accepting James' signature. In other words, participants with high levels of self-reported White ethnocentrism are significantly more likely to accept signatures labeled as "James Sullivan" than participants with low levels of White ethnocentrism.

Finally, looking at the third row of Table 4.2 which examines the effect of White ethnocentrism on my treatment group (presented with Black/Brown names rather than White ones), I find that self-reported White ethnocentrists have consistently lower odds of accepting a Black/Brown signature compared to their non-ethnocentric counterparts. Across all four signature pairs, respondents with high levels of White ethnocentrism were less likely to accept the pair, especially when reviewing the two Black names, Shanté and Jamal. When pooling all minority names together in the last column, the relationship between minority signature acceptance and White ethnocentrism reaches statistical significance.

To help visualize these results, I also provide predicted probabilities that combine the two Black signatures, two Latino signatures, and all four signatures in Figures 4.3, 4.4, and 4.5 below. I also provide predicted probabilities for each individual signature in the appendix

in Figure C.1.

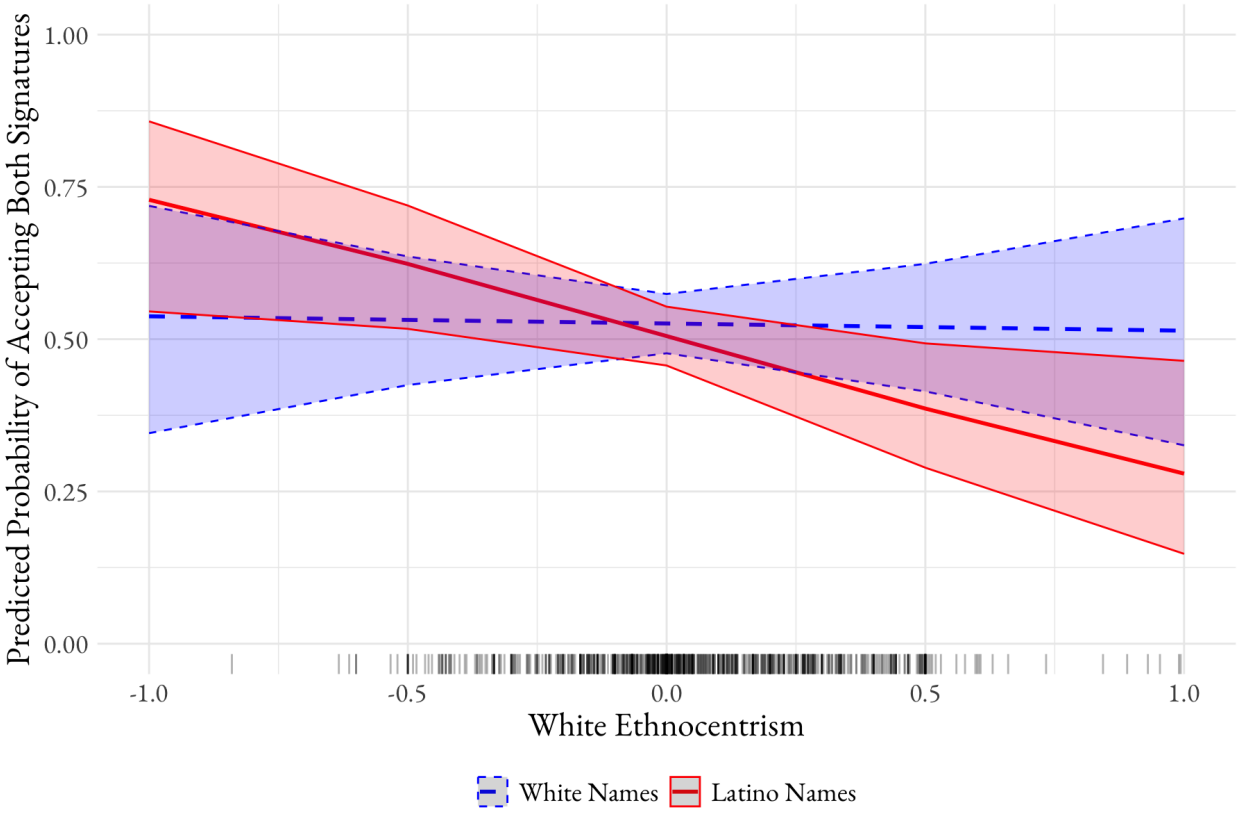
Figure 4.3: Predicted Probabilities of Accepting Both Black Signatures



In these plots, the predicted probability of accepting minority signatures as well as a 95 percent confidence interval are in red. Conversely, the predicted probability of accepting White signatures and a 95 percent confidence interval is in blue. In Figure 4.3, respondents with the lowest possible levels of White ethnocentrism are predicted to accept both Black signatures at a rate of about 73 percent, whereas respondents with the highest possible levels of White ethnocentrism are predicted to accept both signatures at a rate of about 30 percent. In the same plot, the likelihood of accepting White signatures increases as White ethnocentrism increases. The least ethnocentric respondents are predicted to accept both White signatures about 25 percent of the time whereas the most ethnocentric participants are predicted to accept both White signatures about 62 percent of the time.

In Figure 4.4 above, an individual's likelihood to accept both Latino signatures also decreases as they become more ethnocentric. The least ethnocentric participants have a

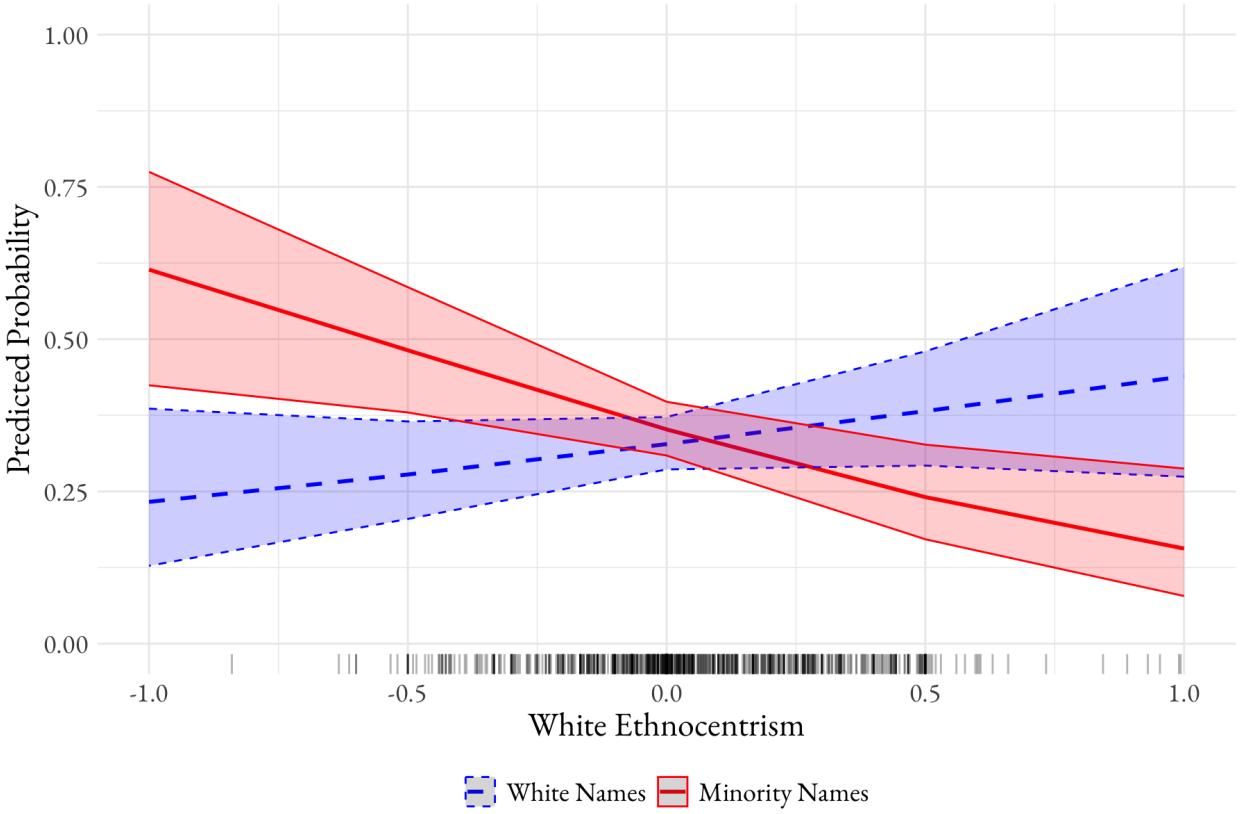
Figure 4.4: Predicted Probabilities of Accepting Both Latino Signatures



74 percent predicted probability of accepting both Latino signatures and this number falls to about 26 percent for the most ethnocentric individuals. The predicted probability of accepting White signatures for these two names remains constant at about 51 percent.

Now looking at Figure 4.5 which combines all signature pairs together, the least ethnocentric respondents on the left side of the plot have a 62 percent predicted probability to accept all minority signatures. This number falls to about 15 percent for the most ethnocentric respondents. Conversely, the least ethnocentric respondents have a 24 percent predicted probability of accepting all White signatures, and this number increases to about 40 percent for the most ethnocentric respondents. It should be noted that I have few observations at the tails of my x-axis, or in other words, few people who are extreme White ethnocentrists and extreme non-ethnocentrists. This means that predictions for these kinds of signature reviewers are more uncertain. Still though, for the middle portion of my sample where most of my observations are (White ethnocentrism -0.5 – 0.5), racial attitudes still appear to be affecting

Figure 4.5: Predicted Probabilities of Accepting All Minority Signatures



minority signature acceptance rates and White signature acceptance rates. It should also be noted that while the average signature acceptance rates reported in this study (between 40 and 60 percent) are consistent with past research (Herndon, Oskooii, and Rios, 2026; Shino and Smith, 2026), they are still far below the acceptance rates of actual VBM ballot signatures which are typically above 95 percent. This could be due to a few reasons. First, because participants lack formal training, they are more likely to be making snap judgments motivated by personal beliefs or lived experiences compared to election officials. Second, because participants know that they are a part of a study, they may assume that fraudulent signatures exist somewhere in the sample, as opposed to real-world contexts where nearly all signature pairs are known to be valid.

To summarize, in the logistic regression models presented here and in the appendix, participants were about equally likely to accept White and non White signatures on average. However, respondents with high levels of self-reported White ethnocentrism were more likely

to accept White names and reject minority names, all else equal, providing support for both H1a and H1b.

This pattern is especially pronounced for my first two signature pairs (Shanté Washington/Sydney Walters and Jamal Spencer/James Sullivan) where ethnocentric participants were especially likely to reject Shanté's signature and accept Sydney and James' signatures. These finding align with the results of the recent performance audit in Washington state where Black voters were found to be the racial group most likely to have their signature rejected (Office of the Washington State Auditor, 2020).

Latino signatures are similarly discriminated against by White ethnocentric respondents in my sample, though the estimated effect of White ethnocentrism is not as precise.

4.10 Conclusion

These research findings have concerning implications for American election administration, especially in localities where voting by mail is popular. Normatively, no one should have their ballot rejected because of a racially biased bureaucratic decision, but this study has demonstrated that the VBM signature verification process could be prone to exactly this problem. Using an experimental design that isolates the effect of race and racial attitudes in signature verification, I find that among White undergraduate signature reviewers, White ethnocentric attitudes are positively associated with White signature acceptance rates and negatively associated with Black/Brown signature acceptance rates. This means that the more a White signature reviewer prefers their in-group to the out-group, the more likely they are to accept White signatures and reject Black/Brown signatures.

While I use a convenience sample rather than actual election workers reviewing real VBM ballots, certain differences between these two groups should make it harder to detect the observed effects. Namely, undergraduate students are generally more liberal than the White retired seniors who typically do election work (Adona et al. 2019). Furthermore, my sample was not under the same heavy cognitive load that actual election workers are under, which research tells us is likely to magnify any implicit biases in the decision-making

process (Fazio 1990). Still, an obvious area for future research is to replicate this study using actual election workers as the sample. Furthermore, while this paper is focused on White ethnocentric attitudes, future research should sample nonwhite respondents to investigate the effects of Black, Latino, and Asian ethnocentrism on signature rejection patterns.

Future research should also investigate potential policy solutions that have been effective in other administrative realms. For example, jurors are often required to complete implicit bias trainings before being allowed to serve.[3] Other potential policy solutions include increased financial incentives, social pressure (White, Laird, and Allen, 2014), and committee structures designed to maximize accurate outcomes. By shedding light on how institutional features of election administration are prone to bureaucratic biases, this research can hopefully aid election administrators in guaranteeing that all votes are counted accurately and fairly.

[3]https://newsroom.courts.ca.gov/news/jury-service-and-fairness-understanding-challenges-implicit-bias

CHAPTER 5

Conclusion

Gunnar Myrdal's book, *An American Dilemma*, highlighted the irony behind the United States' values of freedom and equality existing in parallel with rampant discrimination against Black citizens. He dubbed this contradiction as "An American Dilemma" and even though certain discriminatory policies from Myrdal's time have been outlawed or otherwise phased out (e.g. literacy tests) I have demonstrated that VBM ballot rejection presents a new dilemma where voters are unfairly disenfranchised in what is supposed to be a procedurally neutral electoral system.

Voting by mail was sold to voters as a good-faith reform that would universally expand access to the franchise. In some respects, VBM has delivered on this promise. Millions of Americans with health conditions, work restrictions, or any other challenge to in-person voting on election day are more easily able to participate in VBM regimes. However, this dissertation has shown that behind the convenience of voting by mail lies a bureaucratic machinery that advantages certain voters and disadvantages others. The process of VBM ballot rejection, and signature verification specifically, introduces age and race based penalties to voting that continue an American legacy of a tiered democratic system where some citizens have more access than others.

Across four chapters, I have developed a theory of racialized bureaucratic discretion in VBM election administration, tested it with original observational and experimental data from California and Washington, and traced its consequences for democratic participation. In this concluding chapter, I summarize those findings, reflect on their implications for democracy in this country, and offer policy solutions while suggesting areas for future research.

Chapter 1 introduced the context and theoretical foundations of this project. I argued that VBM ballot rejection represents a new and understudied form of democratic harm. I traced the history of absentee voting in the United States, documented the scale of ballot rejection nationally, and laid out the mechanics of signature verification as a system that is flawed due to its inherent subjectivity and discretion. To illustrate this point I introduced two analogies. First I compared signature verification to carrying an excessively large umbrella on a day where no rain is in the forecast. Signature verification might protect against fraudulent voting, but like the unwieldy umbrella, it might cause more harm than good in the sense that it is more of a burden than a protection, especially since the threat of fraud is nearly non-existent. My second analogy compares VBM signature verification to speed bumps on a highway. I argue that installing speed bumps on a highway to prevent car accidents hurts drivers more than it helps them, and the policy is unfair if certain drivers can take an expressway without speed bumps. Similarly, signature verification to prevent fraud is a blunt instrument that is installed in the wrong setting, and its harms are not distributed equally across voters.

Chapter 2 turned to evidence from California, the largest vote-by-mail state in the country, where I analyzed ballot rejection patterns using the 2022 statewide voter file to estimate rejection rates across gender, race, and age. Several findings stand out. First, gender does not predict ballot rejection in any meaningful way. Male and female voters experience VBM ballot rejection at essentially the same rates across nearly all counties and rejection reasons. This finding serves as a useful benchmark because it establishes that election workers are capable of treating voters evenhandedly across an important social dimension: gender.

The racial findings were more troubling. Across all four rejection categories — non-matching signatures, late ballots, missing signatures, and undeliverable ballots — White voters had the lowest or tied-for-lowest rejection rates. Latino voters faced the largest signature rejection gap relative to White voters and Black voters faced the largest undeliverable and late ballot rejection gap relative to White voters. In some counties, non-White voters were 2-3 times more likely to be rejected for having a non-matching signature, late ballot,

or undeliverable ballot compared to White voters.

The starkest patterns of all, however, were related to age. Voters between 18 and 24 were roughly ten times more likely to have their signature rejected than voters over 65 in many California counties, and this youth penalty was consistent across racial subgroups. Among White voters, Hispanic voters, Black voters, and Asian voters, age was a powerful predictor of ballot rejection for all rejection reasons, but especially signature rejection. While these patterns are concerning, the silver lining is that some counties (e.g. San Francisco, Los Angeles) are able to keep overall ballot rejection low, effectively softening race and age penalties in ballot rejection.

Chapter 3 provided the first direct test of my theory of racialized bureaucratic discretion using data from Washington state. I designed a two-part study to separate voter-side explanations from administrative-side ones. The intuition behind the research design was that if racial gaps in ballot rejection are driven primarily by voter behavior then those gaps should be roughly comparable across rejection reasons. Late ballot rejection and signature rejection should both be higher for Hispanic voters than White voters, and at similar magnitudes. But if administrative bias is playing a role, the gap should be systematically larger for signature rejection, which is more subjective and discretionary, than for late rejection, where ballots are objectively late or on-time.

I ultimately found evidence of an administrative-side explanation for racial gaps in ballot rejection. Voters with Hispanic surnames were disproportionately more likely to have their signatures rejected than their White counterparts, and this gap was considerably larger than the gap observed in late ballot rejection. Because both rejection types involve the same voters navigating the same mail voting process, I argue that administrative biases are at play during the human stage of signature review where workers exercise broad discretion in adjudicating millions of VBM ballot signatures. The second part of Chapter 3 provided experimental corroboration. Among an online sample of Washington State registered voters asked to evaluate signature pairs, participants accepted Hispanic-named signatures at a significantly lower rate than White-named signatures, even though all signatures were equally valid. The only thing that varied between conditions was the name printed above the pair.

Chapter 4 pushed this logic further, using a survey experiment among White undergraduate students across four universities to test whether self-reported White ethnocentrism predicted discriminatory behavior in signature evaluation of Black and Hispanic signature pairs. Like in Chapter 3, participants with high levels of White ethnocentrism were significantly more likely to accept signatures paired with White names and significantly less likely to accept signatures paired with Black or Latino names, all else equal. This pattern was most pronounced for the two Black name pairings (Shanté Washington vs. Sydney Walters; Jamal Spencer vs. James Sullivan), consistent with the auditing evidence from Washington State showing Black voters to be the racial group most affected by signature rejection.

Taken together, these four chapters show that ballot rejection in the United States is not a neutral administrative outcome. Instead, the subjectivity and discretion inherent to signature verification combined with a homogeneous workforce of White election staff, minimal training, time constraints, and lack of standardized procedures across counties create conditions under which individual-level biases of election workers can take hold. These biases translate into discriminatory outcomes in ballot rejection and present a double standard where voters are protected by the Constitution from unfair treatment, but at the same time face unequal barriers to voting based on their race and age. This is the dilemma at the heart of my dissertation.

Unfair ballot rejection matters for democratic legitimacy because it violates the principle of one person one vote. Elections derive their authority from the presumption that every eligible voter who participates will have their vote counted, but when the probability of having a ballot counted is so strongly correlated with a voter's race or age then the social contract of democratic participation is breached. Put simply, 20 year old Latino voters experiencing ballot rejection 20-30 times more often than 65 year old White voters is more than just simple procedural friction, it is a serious democratic problem.

It is also a problem that has the potential to grow worse. Several proposed reforms at the federal and state level have the potential to make ballot rejection even more consequential. First, the executive orders from the Trump administration directing the USPS to restrict ballot delivery to approved lists has the potential to disenfranchise countless eligible

voters who for one reason or another found themselves on this dubious federal list. State-level versions of these lists exist as well and have been found to be inaccurate and wrongly disenfranchise eligible voters (Garber and Wu, 2026).

An upcoming Supreme Court ruling on ballot receipt deadlines could also result in more ballot rejection *(Watson v. RNC)*. If the Court determines that ballots must be received by Election Day rather than postmarked by Election Day, thousands of otherwise valid ballots could be discarded for reasons entirely outside the voter's control. Postal delays, rural mail routes, natural disasters, and administrative backlogs would suddenly become legally relevant to whether a ballot is counted.

5.1 Future Research

This dissertation breaks ground in several respects, but it also has limitations and raises new questions about ballot rejection. The most obvious limitation is external validity. The experimental evidence in Chapters 3 and 4 relies on online samples rather than actual election workers reviewing real ballots. In Chapter 4 I argue that my student sample is likely more racially liberal than typical election workers who tend to be much older, thus making effects harder to detect. Still though, the direct study of election workers is ideal and future research should prioritize replicating these findings using actual election workers as participants to maximize external validity.

A second limitation involves the administrative-side mechanisms I have theorized but not directly observed. For example, while I theorize that time constraints, staff diversity, and training materials all affect ballot rejection decisions, I do not directly test these individual mechanisms. Future research should implement a design that can isolate the effect of these relevant factors on their own. For example, by manipulating the time allotted to signature reviewers but keeping everything else constant, researchers can directly test whether time limitations affect the accuracy or bias in rejection decisions. Likewise, by experimentally manipulating the demographic diversity of signature reviewers and the training material provided to them, researchers can measure the effects of these specific administrative mech-

anisms.

Third, while this project has focused on signature verification as the primary mechanism of racialized ballot rejection, there are other administrative chokepoints in the VBM process that deserve attention. Ballot curing is one such chokepoint. The California and Washington data I examine does not include information on ballot curing, but if the demographic groups most likely to have their ballots initially rejected are also least likely to successfully navigate the cure process then the democratic harms I highlight are understated. Future research on VBM ballot rejection should incorporate ballot curing rates and examine the likelihood of different demographic groups to cure their ballots.

Finally, the role of automatic signature verification (ASV) technology deserves urgent attention. These proprietary machine-learning systems now operate as the first line of review in many counties, and very little is known about how they are trained, how accurate they are, or whether they introduce biases. This is not a speculative concern. The history of facial recognition technology has demonstrated that AI systems can replicate and amplify racial disparities (Buolamwini, 2023). The same scrutiny that scholars and civil society groups have applied to facial recognition should be applied to ASV, and the National Institute of Standards and Technology should develop standard benchmarks for these tools before their adoption becomes even more widespread.

5.2 Suggested Reforms

If this dissertation has a practical ambition, it is to be useful to the election administrators, policymakers, and voting rights advocates who are working to make the VBM process more equitable. My findings point toward several concrete reform directions.

The first reform that my research shows can help close demographic gaps in ballot rejection is standardization. The county-level variation documented in Chapter 2 is not random. Some counties consistently produce signature rejection rates below half of one percent; others exceed two percent in the same election. This variation likely reflects local choices about verification software, training, hiring, and other review procedures. In California, election

practitioners should try and emulate what counties with low rejection rates like Los Angeles, San Francisco, and Sacramento are doing. These counties consistently set the standard for ballot rejection and if the rest of the county followed their lead, less voters would ultimately have their ballots rejected. In other words, these high performing counties are serving as miniature laboratories of democracy and lessons can be drawn from their success.

The second reform is structural and has to do with who is doing the work of signature review. The fact that 86 to 95 percent of local election officials identify as White (Adona et al., 2019) is concerning from a structural standpoint because a lack of racial diversity can affect outcomes. According to representative bureaucracy theory, an election workforce that is demographically representative of the communities it serves is more likely to produce equitable outcomes (Selden, 2015). Thus, recruiting a more representative poll worker corps, including through mechanisms like random draft systems similar to jury selection (as is the case in Nebraska), is a structural reform that can address the lack of diversity in the election workforce.

Third, and perhaps most immediately actionable, is the expansion and improvement of ballot curing. Research on automatic ballot curing is promising. For example, one study has found that automatically mailing replacement ballots to voters whose initial ballot is rejected is associated with a roughly 25 percentage point increase in the likelihood that a deficient ballot ultimately gets counted (Morse, Meredith, and Stark, 2026). That is a large effect and is achieved with a relatively simple administrative reform. Counties should pair this automatic mailing of replacement ballots with outreach via phone, email, and postal mail explaining the steps of ballot curing.

Finally, policymakers should look beyond signature verification entirely and ask whether it is the right tool for the job. Decades of research have failed to find evidence of VBM fraud at anything approaching the scale needed to affect an election outcome. What there is evidence of is signature verification consistently harming real voters, especially non-White and young voters, at rates that can affect election outcomes. Going back to the umbrella analogy from Chapter 1: the umbrella is large, it is burdensome, and it is not raining. That does not mean election security measures should be abandoned. It means they should be proportion-

ate. More straightforward identity verification systems such as simply printing your name and date of birth as is done in many European countries, deserve serious consideration as alternatives to signature verification.

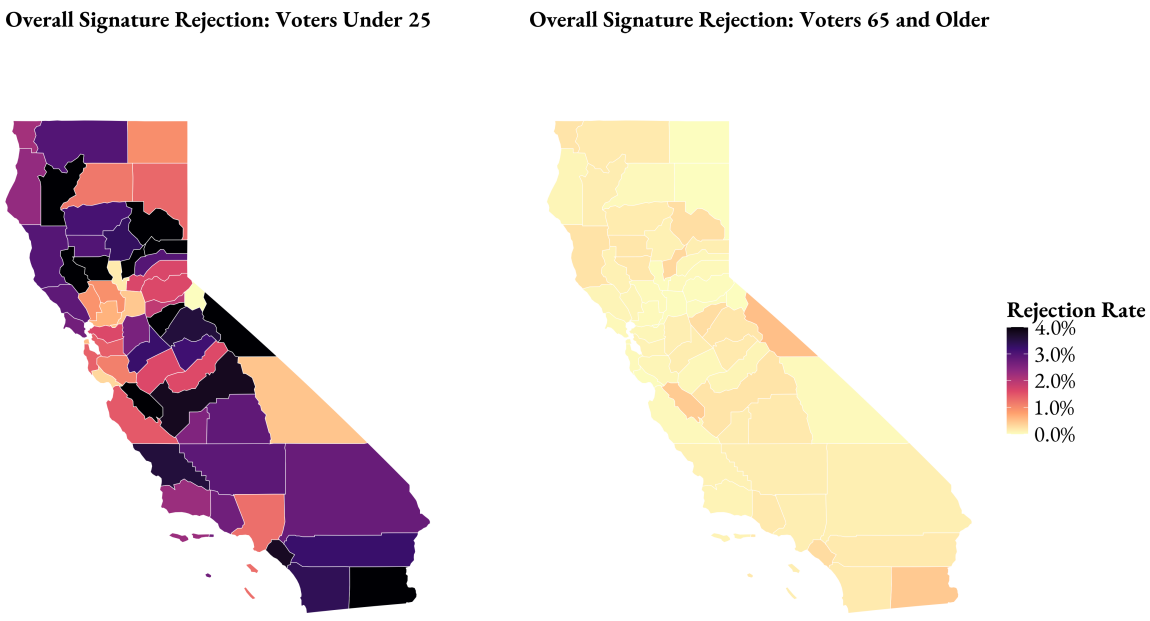
APPENDIX A

Appendix to Chapter 2

A.1 Geographic Distribution of Signature Rejection

The following heat map illustrates the geographic variation in signature rejection rates across the counties analyzed in Chapter 2 for both younger voters under 25 and older voters over 65 years old. As discussed in the main text, while state-level averages provide a broad overview, the localized nature of ballot processing leads to significant variation in how signature matching is applied.

Figure A.1: Age Heat Maps in 2022 General Election



A.2 Age Penalty For Ballot Rejection By County

Tables A.1, A.2, and A.3 show the rejection rates among voters aged 18-24 and 65+ for non-matching signatures, late ballots, and undeliverable ballots respectively. White voters, Black voters, Latino voters, and Asian voters are denoted as W, B, L, and A.

Table A.1: Signature Non-Matching Rejection Rates by County, Age Group, and Race, 2022 California General Election

	Age 18–24				**Age 65+**			
County	W	B	L	A	W	B	L	A
Alameda	0.0104	0.0206	0.0141	0.0164	0.0004	0.0009	0.0009	0.0018
Alpine	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Amador	0.0210	0.0005	0.0033	0.0097	0.0002	0.0009	0.0003	0.0005
Butte	0.0320	0.0447	0.0318	0.0509	0.0010	0.0001	0.0013	0.0023
Calaveras	0.0693	0.0460	0.0585	0.0104	0.0028	0.0038	0.0017	0.0108
Colusa	0.0755	0.0009	0.0685	0.0014	0.0022	0.0000	0.0021	0.0000
Contra Costa	0.0159	0.0202	0.0154	0.0168	0.0004	0.0006	0.0011	0.0012
Del Norte	0.0247	0.0000	0.0055	0.0000	0.0022	0.0005	0.0009	0.0004
El Dorado	0.0156	0.0017	0.0165	0.0263	0.0002	0.0004	0.0002	0.0000
Fresno	0.0404	0.0386	0.0378	0.0369	0.0014	0.0021	0.0027	0.0060
Glenn	0.0184	0.0000	0.0455	0.0982	0.0017	0.0003	0.0038	0.0003
Humboldt	0.0248	0.0074	0.0224	0.0161	0.0007	0.0004	0.0002	0.0003
Imperial	0.0346	0.0140	0.0516	0.0089	0.0041	0.0005	0.0047	0.0016
Inyo	0.0035	0.0000	0.0116	0.0000	0.0001	0.0000	0.0001	0.0000
Kern	0.0324	0.0283	0.0252	0.0386	0.0010	0.0017	0.0016	0.0052
Kings	0.0233	0.0232	0.0269	0.0586	0.0012	0.0021	0.0018	0.0005
Lake	0.0599	0.0219	0.0554	0.0890	0.0010	0.0011	0.0013	0.0002

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Table A.1 – continued from previous page

	Age 18–24				Age 65+)			
County	W	B	L	A	W	B	L	A
Lassen	0.0150	0.0000	0.0005	0.0029	0.0000	0.0000	0.0000	0.0000
Los Angeles	0.0130	0.0142	0.0128	0.0109	0.0009	0.0009	0.0015	0.0020
Madera	0.0190	0.0528	0.0122	0.0152	0.0001	0.0000	0.0020	0.0046
Marin	0.0276	0.0107	0.0226	0.0353	0.0004	0.0006	0.0011	0.0006
Mariposa	0.0328	0.0486	0.0049	0.0014	0.0017	0.0002	0.0014	0.0010
Mendocino	0.0269	0.0388	0.0398	0.0065	0.0022	0.0006	0.0021	0.0083
Merced	0.0159	0.0206	0.0172	0.0120	0.0000	0.0000	0.0014	0.0000
Modoc	0.0130	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mono	0.1028	0.0000	0.0621	0.0357	0.0046	0.0000	0.0147	0.0002
Monterey	0.0129	0.0063	0.0176	0.0079	0.0001	0.0010	0.0012	0.0005
Napa	0.0080	0.0202	0.0102	0.0099	0.0006	0.0021	0.0010	0.0013
Nevada	0.0261	0.0145	0.0634	0.0055	0.0006	0.0000	0.0018	0.0007
Orange	0.0393	0.0308	0.0350	0.0383	0.0015	0.0022	0.0030	0.0057
Placer	0.0158	0.0170	0.0210	0.0155	0.0003	0.0003	0.0010	0.0012
Plumas	0.0702	0.0000	0.0546	0.1415	0.0022	0.0212	0.0034	0.0008
Riverside	0.0331	0.0299	0.0325	0.0316	0.0011	0.0020	0.0025	0.0037
Sacramento	0.0041	0.0051	0.0055	0.0044	0.0001	0.0002	0.0002	0.0004

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Table A.1 – continued from previous page

	Age 18–24				Age 65+)			
County	W	B	L	A	W	B	L	A
San Benito	0.0715	0.0786	0.0881	0.0266	0.0038	0.0012	0.0049	0.0077
San Bernardino	0.0280	0.0245	0.0282	0.0288	0.0007	0.0008	0.0015	0.0036
San Diego	0.0349	0.0311	0.0357	0.0272	0.0011	0.0010	0.0026	0.0034
San Francisco	0.0049	0.0060	0.0039	0.0069	0.0002	0.0001	0.0008	0.0005
San Joaquin	0.0259	0.0185	0.0249	0.0294	0.0007	0.0011	0.0012	0.0032
San Luis Obispo	0.0352	0.0136	0.0409	0.0343	0.0010	0.0005	0.0013	0.0033
San Mateo	0.0146	0.0212	0.0122	0.0147	0.0002	0.0002	0.0004	0.0007
Santa Barbara	0.0217	0.0168	0.0297	0.0079	0.0007	0.0005	0.0015	0.0022
Santa Clara	0.0096	0.0026	0.0147	0.0113	0.0002	0.0002	0.0008	0.0012
Santa Cruz	0.0026	0.0009	0.0062	0.0011	0.0001	0.0000	0.0007	0.0002
Shasta	0.0109	0.0047	0.0214	0.0335	0.0005	0.0001	0.0001	0.0001
Sierra	0.0499	—	0.0000	0.9721	0.0016	0.0000	0.0001	0.0000
Siskiyou	0.0309	0.0715	0.0287	0.0031	0.0018	0.0007	0.0004	0.0001
Solano	0.0048	0.0098	0.0096	0.0040	0.0003	0.0002	0.0005	0.0008
Sonoma	0.0286	0.0434	0.0310	0.0214	0.0007	0.0007	0.0017	0.0017
Stanislaus	0.0316	0.0209	0.0332	0.0360	0.0012	0.0015	0.0018	0.0025
Sutter	0.0013	0.0008	0.0010	0.0031	0.0000	0.0000	0.0000	0.0015

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Table A.1 – continued from previous page

	Age 18–24				Age 65+)			
County	W	B	L	A	W	B	L	A
Tehama	0.0307	0.0048	0.0376	0.0105	0.0015	0.0000	0.0025	0.0009
Trinity	0.0685	0.0157	0.1347	0.0028	0.0016	0.0000	0.0000	0.0000
Tulare	0.0308	0.0324	0.0269	0.0311	0.0016	0.0003	0.0023	0.0006
Tuolumne	0.0365	0.0202	0.0281	0.0031	0.0018	0.0000	0.0013	0.0120
Ventura	0.0271	0.0316	0.0265	0.0276	0.0013	0.0018	0.0029	0.0023
Yolo	0.0099	0.0129	0.0097	0.0095	0.0003	0.0002	0.0006	0.0007
Yuba	0.0875	0.0222	0.0857	0.0288	0.0024	0.0056	0.0060	0.0098

W = White, B = Black, L = Latino, A = Asian. Values are raw ballot rejection rates. --- = no data.

Table A.2: Late Ballot Rejection Rates by County, Age Group, and Race, 2022 California General Election

	Young (18–24)				Old (65+)			
County	W	B	L	A	W	B	L	A
Alameda	0.0198	0.0198	0.0142	0.0172	0.0017	0.0044	0.0032	0.0028
Alpine	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Amador	0.0035	0.0000	0.0000	0.0005	0.0008	0.0000	0.0005	0.0001
Butte	0.0148	0.0041	0.0176	0.0096	0.0014	0.0035	0.0015	0.0079
Calaveras	0.0103	0.0000	0.0227	0.0001	0.0004	0.0000	0.0001	0.0000
Colusa	0.0136	0.0000	0.0290	0.0000	0.0015	0.0000	0.0053	0.0000
Contra Costa	0.0160	0.0108	0.0156	0.0147	0.0011	0.0033	0.0026	0.0015
Del Norte	0.0003	0.0000	0.0353	0.0009	0.0000	0.0000	0.0000	0.0000
El Dorado	0.0070	0.0001	0.0050	0.0001	0.0005	0.0017	0.0026	0.0001
Fresno	0.0091	0.0165	0.0083	0.0191	0.0014	0.0016	0.0023	0.0046
Glenn	0.0058	0.0000	0.0217	0.0000	0.0014	0.0000	0.0024	0.0020
Humboldt	0.0147	0.0253	0.0185	0.0330	0.0011	0.0013	0.0010	0.0011
Imperial	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Inyo	0.0211	0.0000	0.0036	0.1843	0.0016	0.0000	0.0001	0.0002
Kern	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Kings	0.0127	0.0063	0.0065	0.0175	0.0012	0.0017	0.0018	0.0005
Lake	0.0073	0.1151	0.0145	0.0771	0.0010	0.0006	0.0020	0.0003

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Table A.2 – continued from previous page

	Young (18–24)				Old (65+)			
County	W	B	L	A	W	B	L	A
Lassen	0.0062	0.0000	0.0015	0.0000	0.0010	0.0003	0.0002	0.0000
Los Angeles	0.0176	0.0145	0.0121	0.0180	0.0025	0.0046	0.0039	0.0031
Madera	0.0117	0.0008	0.0074	0.0009	0.0008	0.0001	0.0021	0.0045
Marin	0.0287	0.0515	0.0182	0.0180	0.0016	0.0030	0.0012	0.0019
Mariposa	0.0000	0.0000	0.0399	0.0000	0.0017	0.0000	0.0060	0.0004
Mendocino	0.0153	0.0117	0.0101	0.0191	0.0004	0.0008	0.0009	0.0000
Merced	0.0059	0.0183	0.0175	0.0089	0.0017	0.0022	0.0024	0.0032
Modoc	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mono	0.0068	0.0000	0.0021	0.0000	0.0042	0.0246	0.0012	0.0011
Monterey	0.0153	0.0119	0.0073	0.0029	0.0009	0.0020	0.0008	0.0005
Napa	0.0189	0.0048	0.0082	0.0211	0.0007	0.0020	0.0018	0.0002
Nevada	0.0111	0.0300	0.0156	0.0017	0.0007	0.0004	0.0036	0.0070
Orange	0.0144	0.0177	0.0115	0.0133	0.0015	0.0032	0.0022	0.0022
Placer	0.0091	0.0169	0.0079	0.0100	0.0006	0.0020	0.0013	0.0030
Plumas	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Riverside	0.0163	0.0151	0.0189	0.0223	0.0023	0.0046	0.0044	0.0034
Sacramento	0.0140	0.0133	0.0132	0.0145	0.0012	0.0029	0.0019	0.0030

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Table A.2 – continued from previous page

	Young (18–24)				Old (65+)			
County	W	B	L	A	W	B	L	A
San Benito	0.0080	0.0001	0.0081	0.0002	0.0000	0.0000	0.0003	0.0010
San Bernardino	0.0148	0.0122	0.0143	0.0170	0.0020	0.0037	0.0036	0.0039
San Diego	0.0149	0.0146	0.0152	0.0131	0.0015	0.0041	0.0026	0.0021
San Francisco	0.0270	0.0176	0.0176	0.0207	0.0031	0.0053	0.0055	0.0031
San Joaquin	0.0053	0.0056	0.0042	0.0078	0.0004	0.0007	0.0006	0.0010
San Luis Obispo	0.0176	0.0250	0.0259	0.0123	0.0010	0.0007	0.0016	0.0034
San Mateo	0.0258	0.0134	0.0206	0.0202	0.0016	0.0036	0.0038	0.0027
Santa Barbara	0.0154	0.0055	0.0143	0.0176	0.0015	0.0024	0.0023	0.0010
Santa Clara	0.0166	0.0150	0.0096	0.0128	0.0011	0.0033	0.0021	0.0023
Santa Cruz	0.0150	0.0035	0.0131	0.0151	0.0011	0.0026	0.0019	0.0037
Shasta	0.0060	0.0119	0.0063	0.0158	0.0011	0.0020	0.0010	0.0021
Sierra	0.0277	—	0.0000	0.0000	0.0029	0.0000	0.0032	0.0000
Siskiyou	0.0219	0.0062	0.0406	0.0000	0.0030	0.0000	0.0055	0.0002
Solano	0.0097	0.0043	0.0045	0.0093	0.0005	0.0005	0.0015	0.0016
Sonoma	0.0136	0.0113	0.0106	0.0114	0.0009	0.0027	0.0015	0.0013
Stanislaus	0.0089	0.0143	0.0071	0.0107	0.0010	0.0013	0.0023	0.0038
Sutter	0.0137	0.0076	0.0073	0.0130	0.0014	0.0003	0.0020	0.0049

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Table A.2 – continued from previous page

	Young (18–24)				Old (65+)			
County	W	B	L	A	W	B	L	A
Tehama	0.0072	0.0000	0.0061	0.0001	0.0008	0.0008	0.0017	0.0001
Trinity	0.0121	0.0000	0.0000	0.0002	0.0040	0.0000	0.0008	0.0003
Tulare	0.0090	0.0333	0.0076	0.0199	0.0009	0.0051	0.0018	0.0020
Tuolumne	0.0162	0.0000	0.0236	0.0001	0.0010	0.0000	0.0011	0.0002
Ventura	0.0122	0.0074	0.0084	0.0114	0.0012	0.0014	0.0020	0.0005
Yolo	0.0209	0.0057	0.0151	0.0256	0.0010	0.0044	0.0026	0.0021
Yuba	0.0164	0.0041	0.0086	0.0073	0.0008	0.0000	0.0001	0.0038

W = White, B = Black, L = Latino, A = Asian. Values are raw ballot rejection rates. --- = no data.

Table A.3: Undeliverable Ballot Rejection Rates by County, Age Group, and Race, 2022 California General Election

	Young (18–24)				**Old (65+)**			
County	W	B	L	A	W	B	L	A
Alameda	0.0173	0.0444	0.0331	0.0228	0.0039	0.0082	0.0049	0.0053
Alpine	0.1225	0.3275	0.0088	0.6007	0.0157	0.0000	0.0006	0.0000
Amador	0.0118	0.0000	0.0008	0.0002	0.0023	0.0000	0.0017	0.0027
Butte	0.0980	0.1782	0.2105	0.1151	0.0109	0.0157	0.0140	0.0239
Calaveras	0.0604	0.0227	0.0659	0.1428	0.0107	0.0167	0.0169	0.0033
Colusa	0.0441	0.2243	0.0342	0.0014	0.0056	0.0059	0.0024	0.0015
Contra Costa	0.0423	0.0851	0.0572	0.0373	0.0100	0.0182	0.0145	0.0107
Del Norte	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
El Dorado	0.0924	0.2046	0.1516	0.1061	0.0245	0.0276	0.0315	0.0253
Fresno	0.0069	0.0150	0.0149	0.0064	0.0015	0.0047	0.0025	0.0013
Glenn	0.0167	0.0000	0.0183	0.0955	0.0032	0.0103	0.0039	0.0126
Humboldt	0.1130	0.2283	0.1802	0.1189	0.0105	0.0282	0.0134	0.0221
Imperial	0.0911	0.1172	0.1458	0.0816	0.0299	0.0569	0.0335	0.0684
Inyo	0.0170	0.0000	0.0353	0.2126	0.0012	0.0000	0.0001	0.0004
Kern	0.0788	0.1427	0.0893	0.0442	0.0198	0.0310	0.0222	0.0167
Kings	0.0572	0.2310	0.1105	0.0703	0.0133	0.0118	0.0183	0.0136
Lake	0.0846	0.0553	0.1196	0.0824	0.0150	0.0208	0.0186	0.0064

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Table A.3 – continued from previous page

	Young (18–24)				Old (65+)			
County	W	B	L	A	W	B	L	A
Lassen	0.0612	0.0496	0.0268	0.6078	0.0172	0.0062	0.0061	0.0097
Los Angeles	0.0130	0.0297	0.0201	0.0146	0.0045	0.0060	0.0041	0.0044
Madera	0.0543	0.0880	0.0735	0.0450	0.0090	0.0230	0.0130	0.0053
Marin	0.0276	0.0114	0.0363	0.0372	0.0081	0.0140	0.0077	0.0089
Mariposa	0.0263	0.0005	0.0391	0.0027	0.0061	0.0000	0.0120	0.0018
Mendocino	0.0425	0.0288	0.0614	0.0135	0.0052	0.0042	0.0091	0.0014
Merced	0.0122	0.0395	0.0193	0.0156	0.0032	0.0064	0.0031	0.0015
Modoc	0.0722	0.7159	0.2938	0.1346	0.0124	0.0004	0.0122	0.0247
Mono	0.0958	0.0103	0.1633	0.4528	0.0218	0.0035	0.0381	0.0493
Monterey	0.0121	0.0586	0.0198	0.0181	0.0059	0.0055	0.0041	0.0038
Napa	0.0182	0.0277	0.0118	0.0172	0.0041	0.0009	0.0042	0.0017
Nevada	0.0323	0.0570	0.0564	0.0575	0.0058	0.0038	0.0073	0.0134
Orange	0.0717	0.1635	0.1253	0.0725	0.0182	0.0277	0.0229	0.0182
Placer	0.0674	0.1606	0.0891	0.0685	0.0155	0.0191	0.0195	0.0180
Plumas	0.0246	0.0000	0.0928	0.6505	0.0058	0.0071	0.0028	0.0012
Riverside	0.0650	0.1155	0.0853	0.0631	0.0129	0.0153	0.0172	0.0140
Sacramento	0.0170	0.0379	0.0259	0.0159	0.0037	0.0064	0.0044	0.0046

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Table A.3 – continued from previous page

	Young (18–24)				Old (65+)			
County	W	B	L	A	W	B	L	A
San Benito	0.0376	0.0231	0.0512	0.0205	0.0102	0.0075	0.0114	0.0013
San Bernardino	0.0179	0.0442	0.0268	0.0133	0.0048	0.0083	0.0054	0.0041
San Diego	0.0433	0.1168	0.0750	0.0438	0.0082	0.0128	0.0113	0.0077
San Francisco	0.0069	0.0096	0.0098	0.0047	0.0008	0.0020	0.0014	0.0006
San Joaquin	0.0817	0.2080	0.1206	0.0556	0.0184	0.0445	0.0231	0.0206
San Luis Obispo	0.0801	0.1752	0.1080	0.1257	0.0097	0.0145	0.0132	0.0122
San Mateo	0.0225	0.0438	0.0429	0.0232	0.0056	0.0129	0.0099	0.0064
Santa Barbara	0.0675	0.1061	0.0916	0.1013	0.0079	0.0137	0.0105	0.0095
Santa Clara	0.0653	0.1791	0.1188	0.0672	0.0134	0.0270	0.0216	0.0154
Santa Cruz	0.0536	0.0735	0.0675	0.0901	0.0094	0.0162	0.0132	0.0090
Shasta	0.0467	0.1192	0.0965	0.0548	0.0066	0.0093	0.0117	0.0115
Sierra	0.0000	—	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Siskiyou	0.0026	0.0000	0.0003	0.0000	0.0008	0.0000	0.0006	0.0000
Solano	0.0202	0.0368	0.0368	0.0119	0.0031	0.0031	0.0031	0.0020
Sonoma	0.0536	0.1082	0.0834	0.0766	0.0111	0.0152	0.0142	0.0179
Stanislaus	0.0204	0.0452	0.0286	0.0240	0.0050	0.0095	0.0073	0.0071
Sutter	0.0829	0.1623	0.1143	0.0273	0.0129	0.0124	0.0154	0.0144

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Table A.3 – continued from previous page

	Young (18–24)				Old (65+)			
County	W	B	L	A	W	B	L	A
Tehama	0.1050	0.1531	0.2310	0.2402	0.0166	0.0310	0.0260	0.0164
Trinity	0.0201	0.0000	0.0503	0.0264	0.0024	0.0075	0.0076	0.0020
Tulare	0.0544	0.1198	0.0858	0.0576	0.0129	0.0231	0.0165	0.0213
Tuolumne	0.0560	0.0243	0.0171	0.0224	0.0059	0.0016	0.0049	0.0059
Ventura	0.0318	0.0791	0.0472	0.0238	0.0088	0.0111	0.0098	0.0085
Yolo	0.1352	0.2592	0.2124	0.2377	0.0170	0.0220	0.0274	0.0182
Yuba	0.1170	0.2067	0.1291	0.0626	0.0166	0.0251	0.0202	0.0219

W = White, B = Black, L = Latino, A = Asian. Values are raw ballot rejection rates. --- = no data.

APPENDIX B

Appendix to Chapter 3

B.1 Supplementary Tables to Study 1

Table B.1: Ballots Rejected as Late vs. Signature Mismatch, Grouped by Election, Last Names Only (2019–2024 General Elections)

Election	White Total Ballots	Hispanic Total Ballots	White Late Rejection Rate	White Signature Rejection Rate	White Delta	Hispanic Late Rejection Rate	Hispanic Signature Rejection Rate	Hispanic Delta	White–Hispanic Late Rejection Ratio	White–Hispanic Signature Rejection Ratio	p-value (Two-Prop. Z-test)
All Elections	1,215,489	160,071	0.38%	0.31%	**-0.07%**	0.50%	0.98%	**0.48%**	1.33	3.13	0.00
General Nov 5 2019	147,025	11,719	1.00%	0.30%	**-0.70%**	1.89%	0.71%	**-1.18%**	1.88	2.37	0.00
General Nov 3 2020	287,303	52,383	0.06%	0.28%	**0.22%**	0.15%	0.99%	**0.84%**	2.57	3.49	0.00
General Nov 2 2021	149,170	11,405	0.89%	0.24%	**-0.65%**	1.42%	0.63%	**-0.79%**	1.60	2.68	0.31
General Nov 8 2022	224,802	22,964	0.22%	0.30%	**0.08%**	0.50%	0.79%	**0.29%**	2.22	2.61	0.01
General Nov 7 2023	131,680	11,737	0.60%	0.31%	**-0.29%**	1.10%	0.95%	**-0.15%**	1.83	3.07	0.30
General Nov 5 2024	275,509	49,863	0.12%	0.41%	**0.29%**	0.20%	1.22%	**1.02%**	1.68	2.98	0.00

Table B.2: Ballots Rejected as Late vs. Signature Mismatch, Grouped by Election, First and Last Name (2019–2024 General Elections)

Election	White Total Ballots	Hispanic Total Ballots	White Late Rejection Rate	White Signature Rejection Rate	White Delta	Hispanic Late Rejection Rate	Hispanic Signature Rejection Rate	Hispanic Delta	White–Hispanic Late Rejection Ratio	White–Hispanic Signature Rejection Ratio	p-value (Two-Delta Z-test)
All Elections	1,159,502	76,807	0.38%	0.30%	**-0.08%**	0.50%	1.01%	**0.51%**	1.33	3.33	0.000
General Nov 5 2019	140,984	5,611	1.00%	0.29%	**-0.71%**	2.08%	0.69%	**-1.39%**	2.08	2.36	0.002
General Nov 3 2020	273,227	26,010	0.06%	0.27%	**0.21%**	0.14%	1.06%	**0.92%**	2.42	3.88	0.000
General Nov 2 2021	142,981	5,158	0.89%	0.23%	**-0.66%**	1.44%	0.60%	**-0.84%**	1.62	2.64	0.386
General Nov 8 2022	214,885	10,547	0.22%	0.29%	**0.07%**	0.50%	0.77%	**0.27%**	2.27	2.64	0.076
General Nov 7 2023	126,184	5,507	0.59%	0.31%	**-0.28%**	1.00%	0.91%	**-0.09%**	1.69	2.97	0.298
General Nov 5 2024	261,241	23,974	0.11%	0.39%	**0.28%**	0.20%	1.26%	**1.06%**	1.81	3.20	0.000

B.2 Discussion of VBM Procedures and Political Context

Nationally, the use of vote-by-mail (VBM) has grown significantly in both scale and political salience. Approximately 32 percent of voters cast their ballots by mail in 2022, up from just 12 percent in 2002. However, the implementation of VBM remains highly decentralized. In some states, VBM procedures are standardized across all counties, while in others, counties retain substantial autonomy and employ a wide range of technologies, policies, and administrative practices (U. S. Government Accountability Office, 2001, see Figure 36). Signature verification is no exception. Both across and within states, procedures governing signature verification vary widely in terms of training requirements, technology used, matching criteria, and curing opportunities National Conference of State Legislatures (2025).

In recent years, VBM has become increasingly politicized, particularly within Republican political discourse. President Donald Trump and other Republican leaders have repeatedly claimed—without evidence—that VBM enables widespread voter fraud, including illegal voting by non-citizens, which they argue disproportionately benefits Democrats. In 2020, Trump even encouraged his supporters to vote twice—once in person and once by mail—to counteract what he described as fraudulent Democratic votes Saul and Corasaniti (2020). This rhetoric has contributed to growing public distrust of VBM, especially among Republican voters. By 2024, a national survey found that more than half of Americans expressed concern about non-citizens voting illegally Dorn (2024).

Despite heightened political rhetoric around illegal voting, extensive research has consistently debunked claims of widespread voter fraud, particularly in relation to vote-by-mail Cottrell, Herron, and Westwood (2018). Nonetheless, one consequence of this persistent narrative has been increased scrutiny of the VBM ballot rejection process, which is intended to identify and discard ballots suspected of being cast fraudulently. In most states, voters who cast ballots by mail are required to provide a signature on the ballot return envelope. This signature is then used by election officials to verify the voter's identity and determine whether the ballot should be counted (e.g. Washington Administrative Code 434-261-051).

Yet this process raises important concerns about subjectivity and discretion. As the

Washington State Auditor acknowledged, "...deciding whether a signature matches is inherently subjective and requires some level of human judgment" (Office of the Washington State Auditor 2022, p. 16). This acknowledgment prompts a critical question: to what extent is the signature verification process vulnerable to bias?

B.3 Classifying White and Hispanic Voters

For my analysis, I extracted the last names of voters from each ballot status report and matched them against the name dictionaries provided by the wru R package Rosenman, Olivella, and Imai (2023). These dictionaries are built using the race and ethnicity distributions derived from voter files in six Southern states—Alabama, Florida, Georgia, Louisiana, North Carolina, and South Carolina—where self-reported race is collected.

Using these data sources, I identified voters with White and Hispanic-origin surnames, categorizing them as White or Hispanic when their predicted probability of being White or Hispanic exceeded that of any other racial group, an estimation strategy that is consistent with previous research that derives race using names (e.g. Grumbach and Sahn (2020)). Given the focus of my study, voters are categorized into two distinct groups: (1) those with a Hispanic surname and (2) those with a White surname. Therefore, surnames with the highest probabilities of Asian, Black, and Other race are not included in my analysis. As a robustness check, I also conducted additional analyses using a stricter classification scheme in which both the first and last names had to yield the highest predicted probability of being either Hispanic or White.

B.4 Selecting White and Hispanic Names for Study 2

I drew on multiple sources to select names that reliably signal Hispanic and White backgrounds, following established methodologies used in name evaluation studies Crabtree et al. (2023); Gaddis (2015). For surnames, I utilized the 2010 U.S. Census' frequently occurring surname list, which ranks the most common surnames by racial and ethnic group Comenetz

(2010). For instance, the surname "Contreras" ranked among the top 1,000 most common surnames in 2010 and was associated with Hispanic individuals 94.6 percent of the time. For first names, I consulted baby naming sites (e.g., Baby Center and Baby Name Guide) alongside birth data from the New York State Department of Health. These sources are commonly used in social science research as they provide data on name popularity and racial/ethnic associations. For example, in New York State, "Jorge" was the 73rd most common first name among male children born to Hispanic mothers in 2019. Using these reference points, I constructed voter identities pairing commonly Hispanic or White first names with corresponding surnames to signal racial or ethnic backgrounds in my signature evaluation study.

B.5 Additional Analysis on Explicit Attitudes and Signature Rejection

The main analysis of Study 2 demonstrates that evaluators exhibited bias by rejecting Hispanic-coded signatures at higher rates than White-coded signatures—each pair being identical except for the racialized name cue. In this additional analysis, my aim is not to reconfirm that core finding but to explore whether individual differences in explicitly reported attitudes help explain some of the variation in differential acceptance rates. Because my survey cannot disentangle implicit from explicit bias, this step offers an initial, exploratory investigation of whether consciously held views relate to rejection patterns. If I find no evidence that a measure of explicit bias explains any of the variation in acceptance rates, then the disparities I have found are likely attributed primarily to implicit biases.

After completing the signature evaluation process, participants answered standard demographic and political questions, including sex, age, education, household income, partisanship, and political ideology. More importantly, I included a standard feeling thermometer (FT) question, which I used to construct an explicit bias measure. Studies have used FT questions to examine explicit negative sentiment toward a variety of social or political groups ranging from partisans (Iyengar and Krupenkin, 2018), Black Americans (Burke et al., 2017), Muslims (Lajevardi and Abrajano, 2019), and Latinos/Hispanics (Valentino, Brader, and

Jardina, 2013), to immigrants (Reny and Manzano, 2016).

Building on this research, I constructed an explicit bias measure by subtracting respondents' feeling-thermometer rating for "Immigrants" from their rating for "Whites"—the former category often conflated with Hispanic identity and perceived non-citizenship (and thus potential fraud), and the latter synonymous with Americanness and full voting rights. By measuring attitudes toward "Immigrants" rather than Latinos or Hispanics, I capture a broader anti-immigrant sentiment that may be especially potent in the context of vote-by-mail signature review, where racialized names can trigger associations with undocumented status and concerns about electoral integrity. Consistent with previous research, Whites were rated more favorably than Immigrants in my sample (e.g., (Sides and Gross, 2013)): the mean FT score for Whites was 64, compared to 55 for Immigrants. I employ a relative rating approach—subtracting one thermometer score from the other—to control for individual differences in scale use and emphasize intergroup comparison (Rush et al., 2025; Valentino, Brader, and Jardina, 2013).

I ran OLS regressions predicting each respondent's Hispanic and White signature acceptance rates from their explicit bias score, controlling for demographic and political covariates. All models use survey weights based on the 2016–2020 ACS CVAP estimates for sex, age, education, and race in Washington State. Unweighted estimates yield essentially the same conclusions regarding the effect of explicit bias on both Hispanic and White signature acceptance rates. Variable definitions and coding are provided in Table B.3 below and I report weighted and unweighted results in Table B.4 and B.5 respectively.

Table B.3: Explanation of Variables Used in Regression Analysis

Variable	Description
Explicit Bias	Feeling thermometer 0-100 rating of immigrants subtracted from 0-100 rating of white people.
Female	Respondent's self-reported gender. Respondents who listed their gender as "Female" were coded as 1. All other responses were coded as 0.

Variable	Description
Age	Respondent's self-reported age. Ages 19-29 were coded as 0; 30-39 as 1; 40-49 as 2; 50-59 as 3; 60-69 as 4; and 70+ as 5.
Education	Respondent's self-reported education. High school graduate/GED and below was coded as 0; some college/2-year degree was coded as 1; 4-year degree was coded as 2; and post-graduate degree was coded as 3.
Income	Respondent's self-reported income. $29,999 and below were coded as 0; $30,000-$59,000 was coded as 1; $60,000-$89,000 was coded as 2; $90,000-$149,999 was coded as 3; and income above $150,000 was coded as 4.
White	Respondent's self-reported race/ethnicity. Options were white; Hispanic or Latino; Black or African American; and Asian. Respondents who listed their race/ethnicity as white were coded as 1. All other responses were coded as 0.
Republican	Respondent's self-reported partisanship. Options were "Republican", "Democrat", "Independent", and "Other party." Respondents who selected "Republican" were coded as 1. All other responses were coded as 0.
Independent	Respondent's self-reported partisanship. Options were "Republican", "Democrat", "Independent", and "Other party." Respondents who selected "Independent" or "Other party" were coded as 1. All other responses were coded as 0.

Variable	Description
Democrat	Respondent's self-reported partisanship. Options were "Republican", "Democrat", "Independent", and "Other Party." Respondents who selected "Democrat" were coded as 1. All other responses were coded as 0.
Ideology (Lib-Con)	Respondent's self-reported political ideology. "Very Liberal" was coded as 0; "Somewhat Liberal" was coded as 1; "Moderate" and "None of these" were coded as 2; "Somewhat Conservative" was coded as 3; and "Very Conservative" was coded as 4.
Central Washington	Respondent's self-reported county of residence. Coded as 1 if the respondent resided in one of the nine Central Washington counties, otherwise coded as 0.

Table B.4: Explicit Bias (Immigrants) and Hispanic Signature Acceptance (Weighted)

	Dependent variable:	
	Hispanic Signature Acceptance	
	(1)	(2)
Explicit Bias	-0.096^{**} $(-0.162, -0.030)$	-0.075^{*} $(-0.143, -0.007)$
Female	0.063^{***} $(0.039, 0.087)$	0.064^{***} $(0.039, 0.088)$
Age	-0.126^{***} $(-0.171, -0.082)$	-0.121^{***} $(-0.166, -0.077)$
Education	0.035 $(-0.002, 0.072)$	0.021 $(-0.017, 0.059)$
Income	0.025 $(-0.013, 0.063)$	0.034 $(-0.005, 0.072)$
White	0.004 $(-0.031, 0.038)$	0.008 $(-0.028, 0.043)$
Central WA	0.010 $(-0.017, 0.038)$	0.012 $(-0.015, 0.040)$
Republican		-0.001 $(-0.035, 0.033)$
Independent		-0.006 $(-0.033, 0.022)$
Ideology (Lib-Con)		-0.087^{***} $(-0.133, -0.041)$
Constant	0.606^{***} $(0.566, 0.645)$	0.636^{***} $(0.593, 0.678)$
Observations	1,797	1,797
Residual Std. Error	0.241 (df = 1789)	0.240 (df = 1786)
F Statistic	13.768^{***} (df = 7; 1789)	11.476^{***} (df = 10; 1786)
Note:		***p < .001; **p < .01; *p < .05

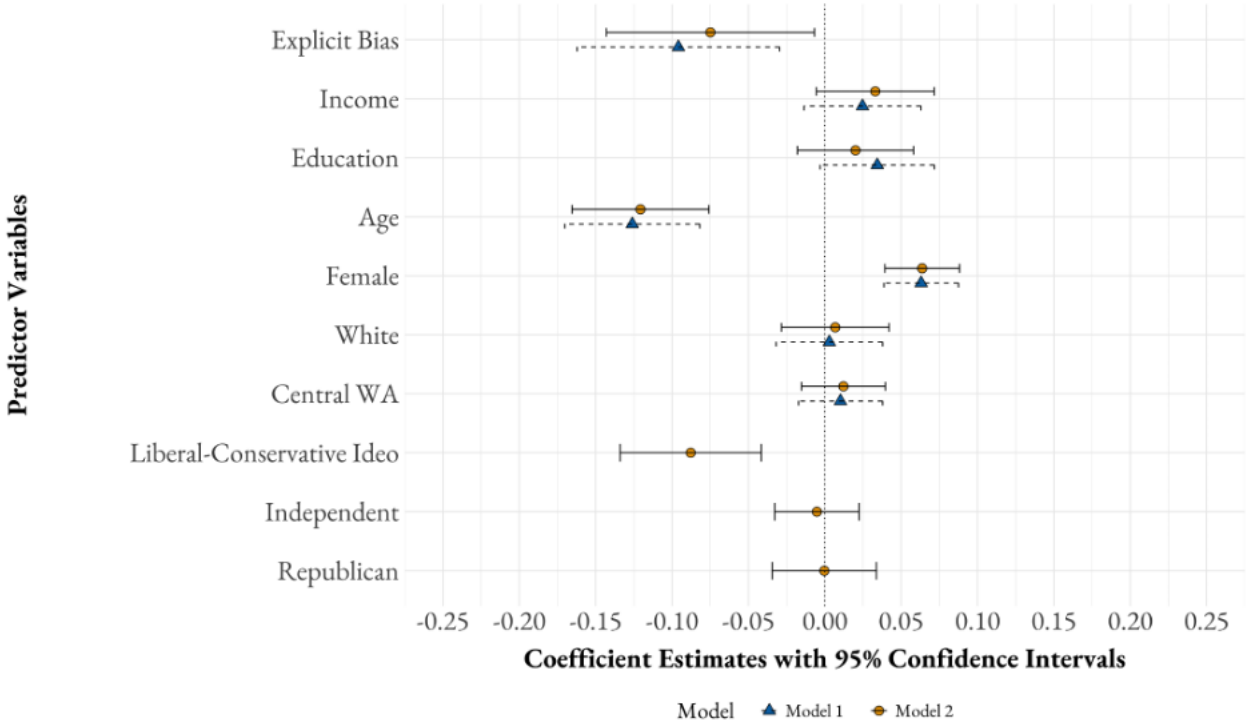
Table B.5: Explicit Bias (Immigrants) and Hispanic and White Signature Acceptance (Unweighted)

	Dependent variable:	
	Hispanic Signature Acceptance	White Signature Acceptance
	(1)	(2)
Explicit Bias	-0.077^{*} $(-0.152, -0.002)$	-0.037 $(-0.100, 0.025)$
Female	0.065^{***} $(0.041, 0.089)$	0.045^{***} $(0.025, 0.065)$
Age	-0.095^{***} $(-0.131, -0.058)$	-0.147^{***} $(-0.178, -0.116)$
Education	0.049^{*} $(0.008, 0.090)$	0.040^{*} $(0.006, 0.075)$
Income	0.039 $(-0.001, 0.079)$	0.049^{**} $(0.015, 0.083)$
White	-0.008 $(-0.040, 0.025)$	0.010 $(-0.017, 0.037)$
Central WA	-0.002 $(-0.030, 0.027)$	-0.014 $(-0.037, 0.010)$
Republican	-0.055^{**} $(-0.090, -0.021)$	-0.043^{**} $(-0.072, -0.014)$
Independent	-0.070^{***} $(-0.100, -0.040)$	-0.063^{***} $(-0.088, -0.037)$
Ideology (Lib-Con)	-0.038 $(-0.084, 0.008)$	-0.006 $(-0.045, 0.033)$
Constant	0.626^{***} $(0.577, 0.674)$	0.657^{***} $(0.616, 0.698)$
Observations	1,797	1,797
Residual Std. Error (df = 1786)	0.245	0.205
F Statistic (df = 10; 1786)	16.677^{***}	21.394^{***}
Note:		***p < .001; **p < .01; *p < .05

To facilitate the interpretation of results and comparison of effect sizes across model coefficients I rescaled each variable to range from 0 to 1. Figure B.1 reports coefficients with 95 percent confidence intervals for OLS models reported in Table B.4 in which respondents' Hispanic signature acceptance rates were regressed on their explicit bias score. Statistically significant coefficients are indicated according to common conventions (i.e., $p < 0.05$, $p < 0.01$, and $p < 0.001$). Since all variables were normalized to range from 0 to 1, the model coefficients indicate how much the mean acceptance rate of Hispanic signatures changes with a discrete change in each predictor variable. In other words, the coefficients represent the change in the mean acceptance rate of Hispanic signatures when a variable (e.g., explicit bias) increases from its minimum value (0) to its maximum value (1).

In a model controlling for sociodemographic characteristics, explicit bias is significantly negatively associated with the acceptance of Hispanic-coded signatures ($p < 0.01$). Specifically, a one-unit increase in the bias measure corresponds to a 9.6 percentage-point drop in the mean Hispanic signature acceptance rate, indicating that evaluators with higher anti-

Figure B.1: Association between Explicit Bias and Hispanic Signature Evaluations



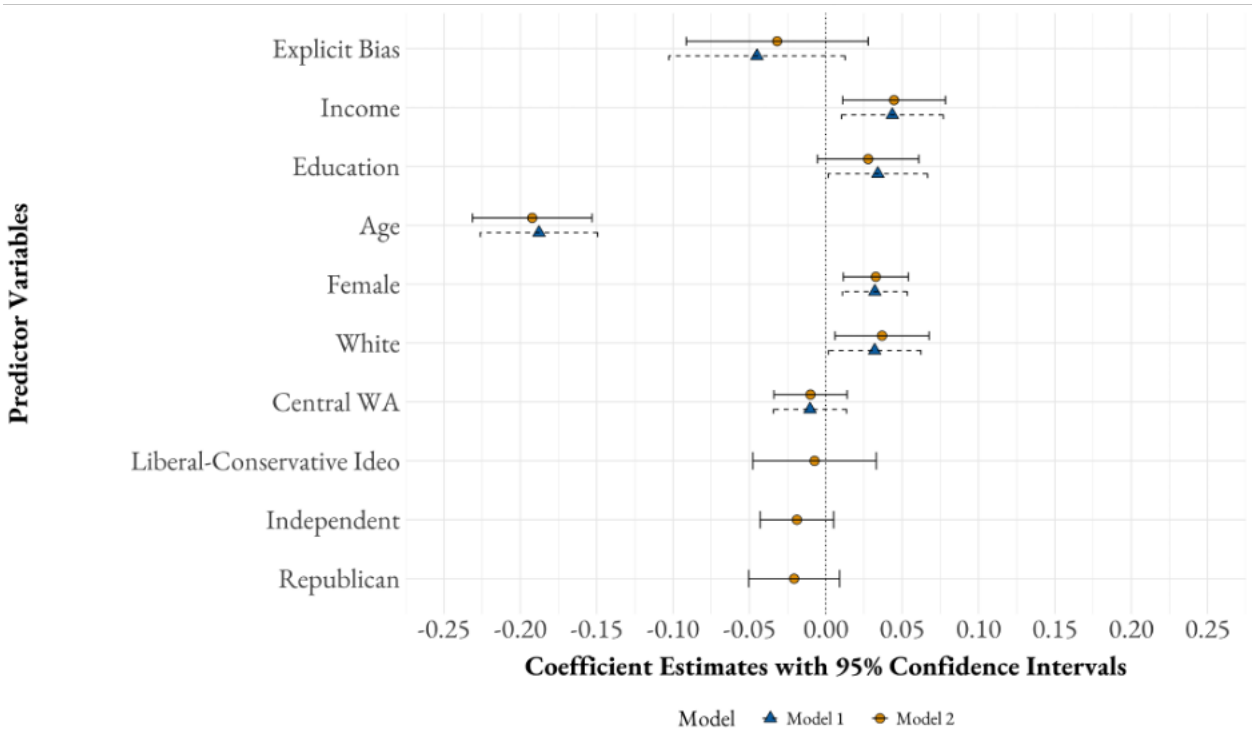
immigrant sentiment are notably less likely to accept ballots bearing Hispanic names.

Figure B.1 also presents a second specification that adds controls for respondents' self-reported partisan affiliation (Democrats as the reference category) and political ideology (from "very liberal" to "very conservative"). Even with these additional covariates, explicit bias remains a significant predictor—reducing the mean Hispanic signature acceptance rate by 7.5 percentage points—demonstrating that the relationship is not driven by partisan or ideological differences.

To verify that explicit bias was not merely capturing a general propensity to reject signatures, I regressed White signature acceptance rates on the same bias measure. As shown in Figure B.2 (and B.6), the estimated effect of explicit bias on White signature acceptance is roughly half the size of its effect on Hispanic acceptance—and it is not statistically significant. In other words, anti-immigrant sentiment predicts lower acceptance of Hispanic-named signatures but does not translate into higher rejection of White-named signatures. I also repeated this analysis using the Hispanic feeling thermometer as the explicit bias measure

(see Tables B.7, B.8, and B.9) and found no significant relationship between Hispanic-specific sentiments and signature rejection rates for either name group.

Figure B.2: Association between Explicit Bias and White Signature Evaluations



In sum, my supplementary analysis suggests that explicit bias—as measured by the Immigrants feeling thermometer—helps explain some of the variation in rejection rates for Hispanic-coded signatures. By contrast, a comparable measure focused specifically on Hispanics did not produce significant effects. This discrepancy likely arises because the Immigrants thermometer captures a broader threat perception—including concerns about non-citizen voting—that is more directly activated by racialized name cues in the signature review context. While this finding does not alter my primary conclusion that evaluator bias—rather than voter-side factors—explains the documented disparity, it provides preliminary evidence that consciously held anti-immigrant attitudes, rather than general negative sentiment toward Hispanics, may contribute to individual differences in rejection decisions alongside implicit biases my study could not capture.

Table B.6: Explicit Bias (Immigrants) and White Signature Acceptance (Weighted)

	Dependent variable:	
	White Signature Acceptance	
	(1)	(2)
Explicit Bias	-0.045 $(-0.103, 0.012)$	-0.032 $(-0.091, 0.028)$
Female	0.032^{**} $(0.011, 0.053)$	0.033^{**} $(0.011, 0.054)$
Age	-0.188^{***} $(-0.226, -0.150)$	-0.192^{***} $(-0.232, -0.153)$
Education	0.034^{*} $(0.002, 0.067)$	0.028 $(-0.005, 0.061)$
Income	0.044^{*} $(0.011, 0.077)$	0.045^{**} $(0.011, 0.079)$
White	0.032^{*} $(0.002, 0.063)$	0.037^{*} $(0.006, 0.068)$
Central WA	-0.010 $(-0.034, 0.014)$	-0.010 $(-0.034, 0.014)$
Republican		-0.021 $(-0.051, 0.009)$
Independent		-0.019 $(-0.043, 0.005)$
Ideology (Lib-Con)		-0.007 $(-0.047, 0.033)$
Constant	0.653^{***} $(0.618, 0.688)$	0.662^{***} $(0.624, 0.699)$
Observations	1,797	1,797
Residual Std. Error	0.210 (df = 1789)	0.209 (df = 1786)
F Statistic	21.482^{***} (df = 7; 1789)	15.482^{***} (df = 10; 1786)
Note:		***p < .001; **p < .01; *p < .05

Table B.7: Explicit Bias (Hispanics) and Hispanic Signature Acceptance (Weighted)

	Dependent variable:	
	Hispanic Signature Acceptance	
	(1)	(2)
Explicit Bias (Hispanic FT)	-0.004 $(-0.076, 0.067)$	0.019 $(-0.055, 0.092)$
Female	0.064^{***} $(0.039, 0.088)$	0.064^{***} $(0.039, 0.088)$
Age	-0.135^{***} $(-0.179, -0.091)$	-0.131^{***} $(-0.175, -0.086)$
Education	0.040^{*} $(0.002, 0.077)$	0.023 $(-0.015, 0.061)$
Income	0.020 $(-0.018, 0.059)$	0.029 $(-0.009, 0.068)$
White	-0.002 $(-0.037, 0.033)$	0.005 $(-0.030, 0.040)$
Central WA	0.011 $(-0.017, 0.038)$	0.013 $(-0.015, 0.040)$
Republican		-0.010 $(-0.044, 0.024)$
Independent		-0.008 $(-0.036, 0.019)$
Ideology (Lib-Con)		-0.089^{***} $(-0.136, -0.043)$
Constant	0.564^{***} $(0.524, 0.605)$	0.598^{***} $(0.554, 0.642)$
Observations	1,797	1,797
Residual Std. Error	0.241 (df = 1789)	0.240 (df = 1786)
F Statistic	12.561^{***} (df = 7; 1789)	11.008^{***} (df = 10; 1786)
Note:		***p < .001; **p < .01; *p < .05

Table B.8: Explicit Bias (Hispanics) and White Signature Acceptance (Weighted)

	Dependent variable:	
	White Signature Acceptance	
	(1)	(2)
Explicit Bias (Hispanic FT)	−0.030 (−0.093, 0.032)	−0.017 (−0.081, 0.047)
Female	0.032** (0.011, 0.054)	0.033** (0.012, 0.054)
Age	−0.190*** (−0.228, −0.152)	−0.195*** (−0.233, −0.156)
Education	0.036* (0.003, 0.068)	0.028 (−0.005, 0.062)
Income	0.043* (0.010, 0.077)	0.045** (0.011, 0.078)
White	0.031* (0.001, 0.061)	0.036* (0.006, 0.067)
Central WA	−0.010 (−0.034, 0.013)	−0.010 (−0.034, 0.014)
Republican		−0.023 (−0.052, 0.007)
Independent		−0.020 (−0.044, 0.004)
Ideology (Lib-Con)		−0.008 (−0.048, 0.032)
Constant	0.646*** (0.610, 0.681)	0.655*** (0.617, 0.694)
Observations	1,797	1,797
Residual Std. Error	0.210 (df = 1789)	0.210 (df = 1786)
F Statistic	21.257*** (df = 7; 1789)	15.390*** (df = 10; 1786)
Note:		***p < .001; **p < .01; *p < .05

Table B.9: Explicit Bias (Hispanic) and Hispanic and White Signature Acceptance (Unweighted)

	Dependent variable:	
	Hispanic Signature Acceptance	White Signature Acceptance
	(1)	(2)
Explicit Bias (Hispanic FT)	0.011 (−0.070, 0.092)	0.020 (−0.048, 0.088)
Female	0.063*** (0.039, 0.087)	0.044*** (0.024, 0.064)
Age	−0.099*** (−0.136, −0.062)	−0.149*** (−0.180, −0.119)
Education	0.049* (0.008, 0.091)	0.040* (0.006, 0.074)
Income	0.035 (−0.005, 0.076)	0.046** (0.012, 0.080)
White	−0.012 (−0.045, 0.020)	0.007 (−0.020, 0.034)
Central WA	−0.003 (−0.031, 0.026)	−0.014 (−0.038, 0.010)
Republican	−0.062*** (−0.096, −0.028)	−0.047** (−0.075, −0.018)
Independent	−0.071*** (−0.101, −0.041)	−0.063*** (−0.088, −0.038)
Ideology (Lib-Con)	−0.046* (−0.093, −0.0001)	−0.011 (−0.050, 0.028)
Constant	0.593*** (0.543, 0.643)	0.635*** (0.593, 0.677)
Observations	1,797	1,797
Residual Std. Error (df = 1786)	0.245	0.205
F Statistic (df = 10; 1786)	16.242***	21.280***
Note:		***p < .001; **p < .01; *p < .05

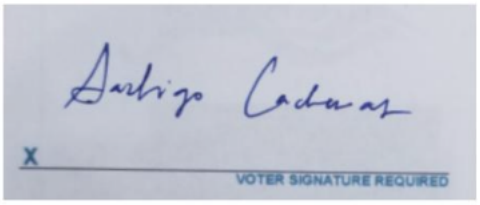
B.6 Signature Stimuli Used in Survey Experiment

To create the handwritten signatures, volunteers were instructed to sign one of the pre-generated names on a printed sheet using a blue or black pen. For the digital signatures, the same volunteers signed the identical name using a phone touchscreen, replicating the style of signatures commonly captured on electronic pads at driver's licensing offices. Names were randomly assigned to a different volunteer, ensuring that the racial or ethnic background of the signer was not systematically linked to the assigned name. Volunteers were also asked to maintain consistency between the handwritten and digital signatures, as their submissions would be used in a signature verification study.

Figure B.3: Signature Stimuli Used in Survey Experiment

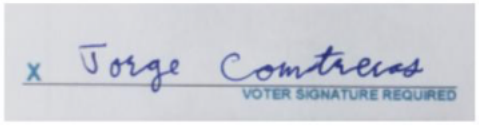
Santiago Cárdenas

Official registration signature: 

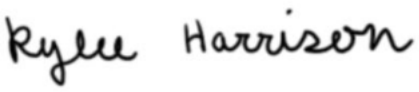
Vote-by-mail signature: 

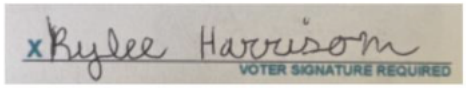
Jorge Contreras

Official registration signature: 

Vote-by-mail signature: 

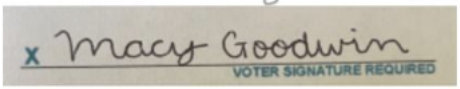
Kylee Harrison

Official registration signature: 

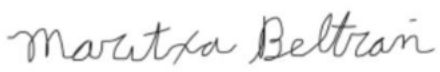
Vote-by-mail signature: 

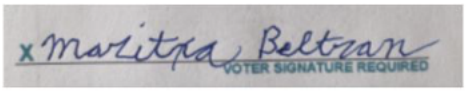
Macy Goodwin

Official registration signature: 

Vote-by-mail signature: 

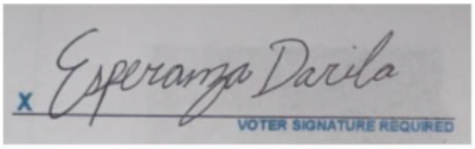
Maritza Beltran

Official registration signature: 

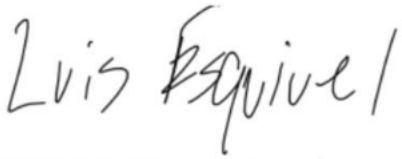
Vote-by-mail signature: 

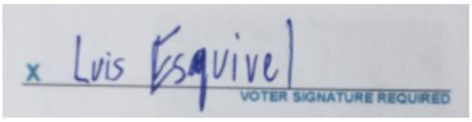
Esperanza Davila

Official registration signature: 

Vote-by-mail signature: 

Luis Esquivel

Official registration signature: 

Vote-by-mail signature: 

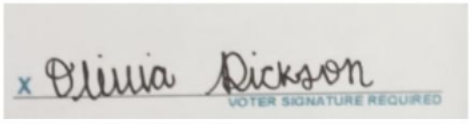
Luke Koch

Official registration signature: 

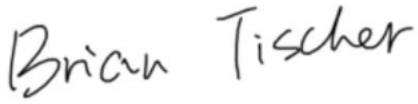
Vote-by-mail signature: 

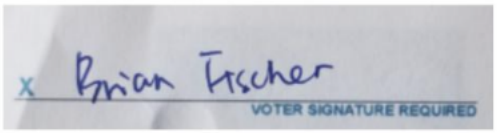
Olivia Dickson

Official registration signature: 

Vote-by-mail signature: 

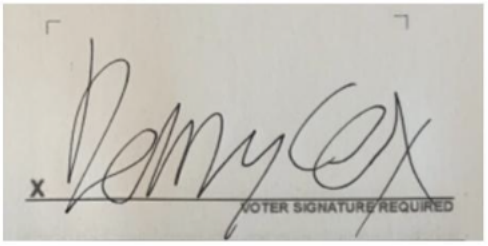
Brian Fischer

Official registration signature: 

Vote-by-mail signature: 

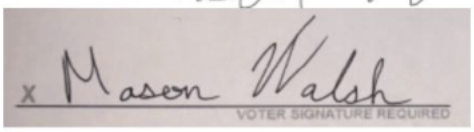
Penny Cox

Official registration signature: 

Vote-by-mail signature: 

Mason Walsh

Official registration signature: 

Vote-by-mail signature: 

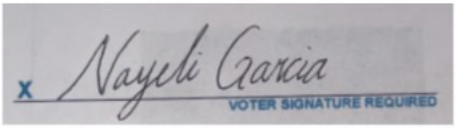
Annabelle Myers

Official registration signature: 

Vote-by-mail signature: 

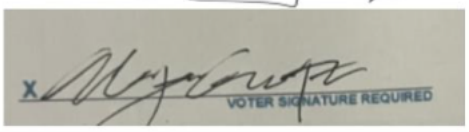
Nayeli Garcia

Official registration signature: 

Vote-by-mail signature: 

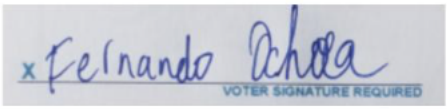
Alejandra Gonzalez

Official registration signature: 

Vote-by-mail signature: 

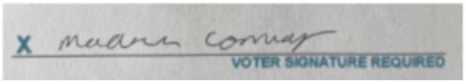
Fernando Ochoa

Official registration signature: 

Vote-by-mail signature: 

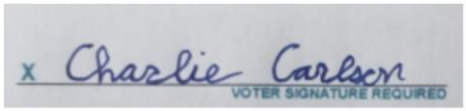
Madison Conway

Official registration signature: 

Vote-by-mail signature: 

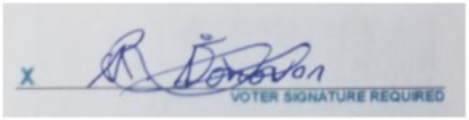
Charlie Carlson

Official registration signature: 

Vote-by-mail signature: 

Robert Donovan

Official registration signature: 

Vote-by-mail signature: 

APPENDIX C

Appendix to Chapter 4

C.1 OLS Regression Table

In Table C.1 below, I use ordinary least squares regression in place of logistic regression to test the effect of treatment (a minority name being displayed as opposed to a White name) on the likelihood of accepting the signature pair. Substantively, the results of these OLS regressions mirror those of the logistic regressions. The top row reflects the treatment effect while holding White ethnocentrism at its mean.

Figure C.1: Predicted Probability of Accepting Individual Signatures

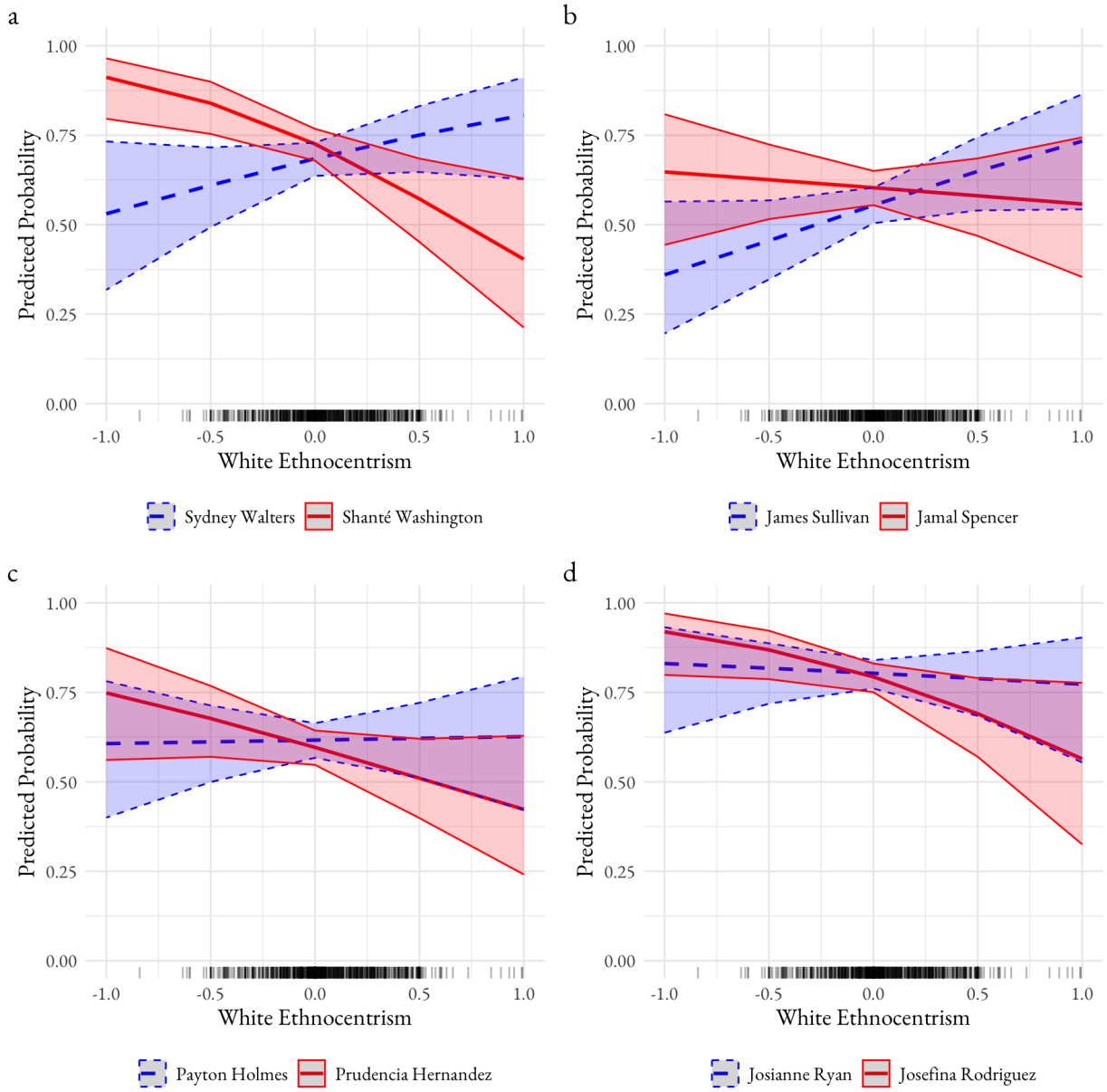


Table C.1: Multivariate OLS Regression Models of Accepting Minority Signatures

	Sydney vs. Shanté	James vs. Jamal	Payton vs. Prudencia	Josianne vs. Josefina	Pooled Black Names	Pooled Latino Names	Pooled Minority Names
Minority Name (Treatment)	0.037	0.050	−0.021	−0.013	0.085	−0.034	0.050
	(0.032)	(0.035)	(0.035)	(0.029)	(0.053)	(0.049)	(0.086)
White Ethnocentrism	0.138	0.193+	0.010	−0.029	0.331*	−0.019	0.311
	(0.091)	(0.099)	(0.098)	(0.081)	(0.150)	(0.137)	(0.241)
Minority Name x White Ethnocentrism	−0.405**	−0.237+	−0.177	−0.148	−0.648**	−0.325+	−0.966**
	(0.130)	(0.141)	(0.139)	(0.115)	(0.213)	(0.194)	(0.342)
Num.Obs.	785	787	787	787	785	787	785
R2	0.015	0.008	0.004	0.006	0.015	0.009	0.012

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

C.2 Ethnocentrism as Low, Medium, and High

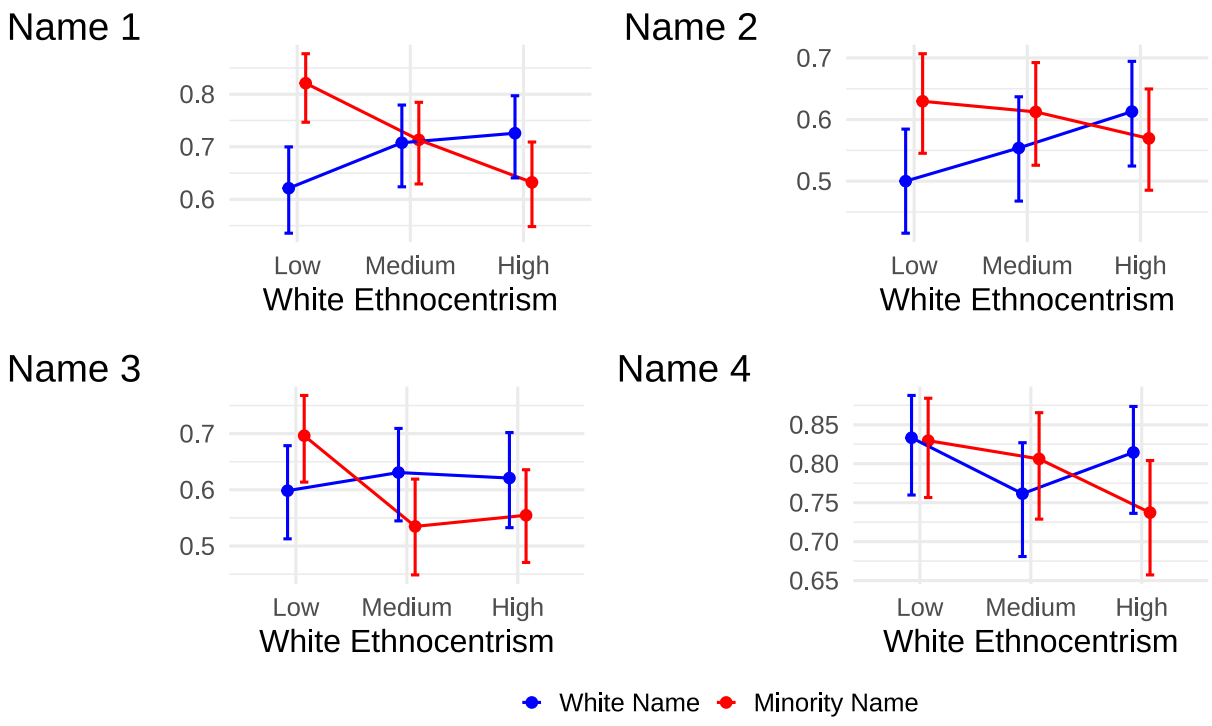
In Table C.2 below, I split White ethnocentrism into equal terciles of low, medium, and high. I use low ethnocentrism as the reference category, meaning that in the top row, odds ratios of accepting signatures at this low tercile are displayed. This means that respondents who have low levels of White ethnocentrism are on average more likely to accept Sydney, James, and Payton over Shanté, Jamal, and Prudencia. In the last row, the interaction effect represents going from low to high levels of White ethnocentrism. Similar to the main results, going from low to high levels of White ethnocentrism corresponds to a significant decrease in the odds of accepting non-White signatures, especially for the ostensibly Black names. On the next page I visualize these results in Figure C.2.

Table C.2: Logistic Regression Models of Accepting Minority Signatures

	Sydney vs. Shanté	James vs. Jamal	Payton vs. Prudencia	Josianne vs. Josefina	Pooled Black Names	Pooled Latino Names	Pooled Minority Names
Minority Name (Treatment)	2.795***	1.700*	1.538+	0.974	2.342***	1.339	1.938**
	(0.805)	(0.424)	(0.397)	(0.319)	(0.543)	(0.319)	(0.423)
White Ethnocentrism	1.614+	1.583+	1.099	0.878	1.674*	1.021	1.397
	(0.435)	(0.401)	(0.282)	(0.289)	(0.384)	(0.244)	(0.307)
Minority Name x White Ethnocentrism	0.233***	0.491*	0.494+	0.656	0.311***	0.519+	0.348***
	(0.092)	(0.174)	(0.179)	(0.292)	(0.102)	(0.175)	(0.109)
Num.Obs.	785	787	787	787	785	787	785

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

Figure C.2: Predicted Probabilities of Accepting Minority Signatures Using White Ethnocentrism Terciles



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