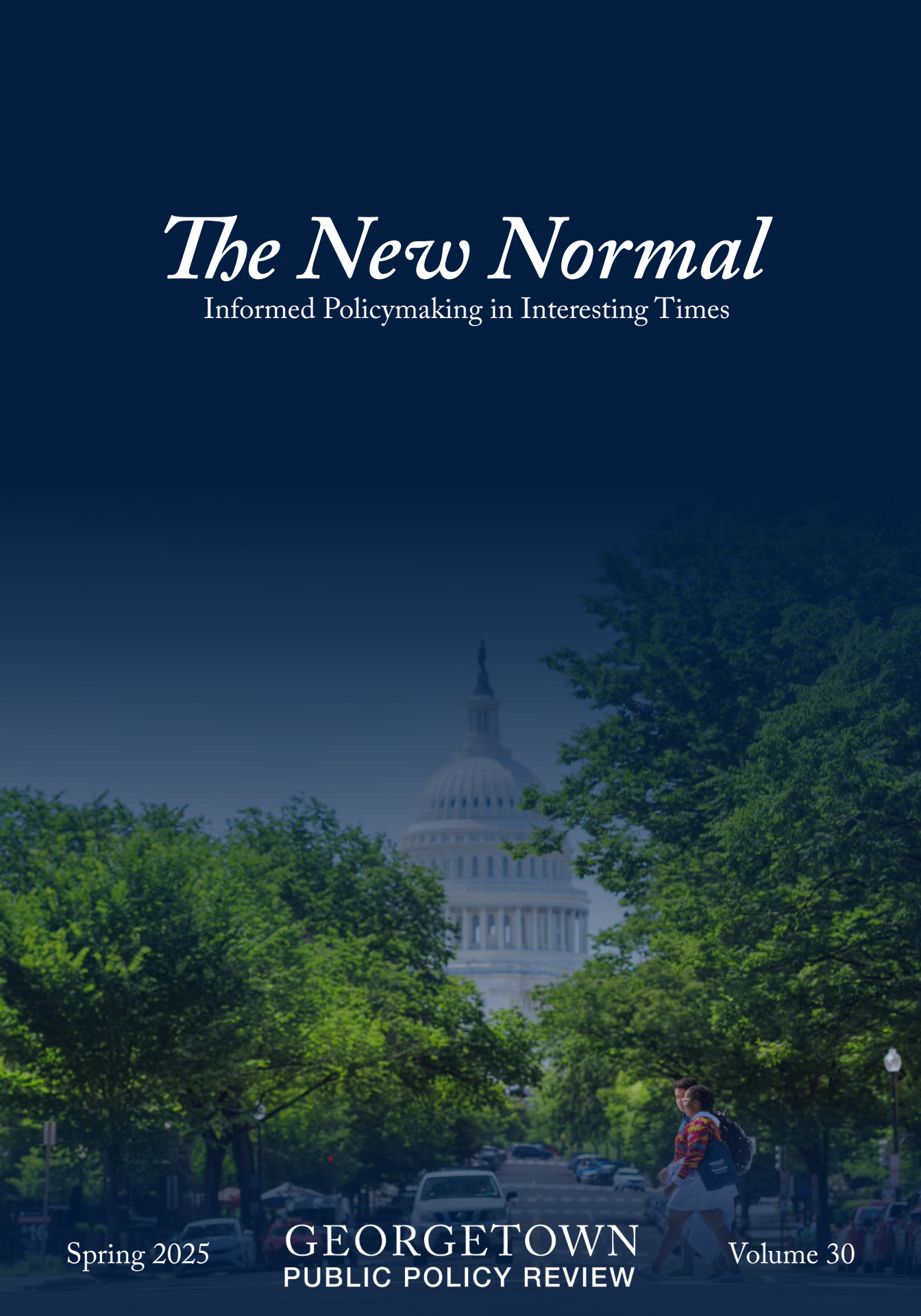
The New Normal

Informed Policymaking in Interesting Times



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EDITORS' REMARKS

"Is this the new normal?" The frequency with which this question seems to have come up in the last several years is dizzying. When the editors of this journal's previous volume, entitled 'A New Policy Frontier: Navigating the Post-Pandemic Landscape,' sent that edition to print, they probably did not expect that the global landscape would be transformed once again before this subsequent edition hit the presses. Since the Georgetown Public Policy Review was founded in 1995, how many 'new normals' have its authors and editors had to contend with?

In the course of shaping this edition, we have been reminded not only of the indispensability of evidence-based methods to understanding a landscape which never sits still, but also of the creativity, curiosity, and devotion of the scholars from all corners with whom we have had the privilege to work once again. The authors represented in this volume are only a small slice of a much larger community of individuals committed to building policy through rigorous and sustained inquiry. This collection of authors focused exhaustively on details which could easily have gone unnoticed—Medicare's utility as a tool for fighting homelessness, the toll of long drives between prisoners and their loved ones, or the micro-level effects of redistricting on electoral turnout, to name only a few. No 'new normal' can retain its foreboding air of mystery under this level of scrutiny.

This may be the new normal—at least, until the next one. At this publication's 30th anniversary, GPPR reminds us that no change is greater than the insight we gain and the relationships we build through working to understand it. Our most heartfelt thanks goes out to our tireless editorial team, our peer reviewers, and our authors. We hope the reader will be as illuminated by reading this volume as we were by preparing it.

John McCabe (MPP '26) and David Stout (MPP '26)
Senior Editors, Spring 2025 Edition
Georgetown Public Policy Review

The Relationship Between Medicaid Expansion and Student Homelessness

A Matched Border-County Pair Analysis[1]

Juliet Hayes[2]

Abstract

In addition to providing health insurance for low-income Americans, Medicaid acts as an effective anti-poverty tool by protecting households against financial shocks and increasing disposable income among its beneficiaries. Previous scholarship has found that these second-order effects extend into the realm of housing stability, revealing a correlation between Medicaid expansion and decreased rates of eviction. No research to date, however, has examined the relationship between Medicaid expansion and a broader range of housing outcomes, such as doubled-up and literal homelessness. This paper contributes to the literature by estimating whether the adoption of Medicaid expansion affects student homelessness at the county level. Using a unique panel dataset and a quasi-experimental border-county analysis design, the results find no significant relationship between Medicaid expansion and student homelessness. However, the results also suggest heterogenous impacts based on county characteristics. Notably, there is evidence of a negative, substantial, and statistically significant relationship between Medicaid expansion and student homelessness in counties where the baseline levels of uninsurance, student homelessness, and rent burden fall at or above the within-sample 75th percentile.

INTRODUCTION

Housing instability is linked to numerous adverse outcomes for children, including diminished physical health, decreased mental well-being, lowered educational achievement, increased food insecurity, and heightened behavioral health challenges (Gubits et al. 2016; Lowell and Hanratty 2022; Burns et al. 2021). Given these detrimental effects, it is alarming to note that during the 2020-21 school year, one of every 45 students enrolled in a public school was unhoused (National Center for Homeless Education 2022). This incidence is even higher among historically underserved student populations, including students of color, emergent multilingual learners, and students with disabilities.

According to Burns et al. (2021), poverty stands out as the most significant predictor

1 This article is substantially based on the author's thesis submitted for her Master's of Public Policy at Georgetown University's McCourt School of Public Policy in May 2024.

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of family homelessness. Therefore, it is imperative for policymakers to establish a strong social safety net with initiatives such as Medicaid to effectively alleviate family poverty. Beyond increasing health care utilization, the expansion of Medicaid under the Affordable Care Act of 2010 (ACA) substantially improved the financial well-being of the individuals who gained coverage (Hu et al. 2018; Kuroki 2020). Theoretically, this is because Medicaid effectuates changes in consumer budget sets, enabling those who gain coverage to allocate their resources to other expenses (including housing costs) and better withstand stochastic shocks (such as those that can lead to housing instability).

In recent years, research has demonstrated these second-order effects of Medicaid expansion on housing security. Findings indicate that the expansion reduces evictions per capita, with some estimates indicating a potential decrease of 2.9 percentage points in evictions per capita (Allen et al. 2019). These estimates likely represent a lower-bound on the prevalence of Medicaid's impact on housing stability, as these studies have relied on measures of legally sanctioned evictions obtained through administrative court records. Notably, extrajudicial evictions, where landlords incentivize or coerce tenants to vacate without seeking court authorization, are up to 5.5 times more prevalent than formal evictions (Gromis and Desmond 2021).

Research on the relationship between health-related expenses and this wider range of housing outcomes is limited, however. To estimate the effect of Medicaid expansion on housing instability beyond formal evictions, this paper evaluates the impact of Medicaid expansion on student homelessness. To isolate the effect of expansion, this analysis compares student homelessness rates in 361 cross-state counties that border each other but have different expansion statuses between 2010 and 2018 (inclusive).

The Department of Education's McKinney Vento Homelessness Act data, which this analysis uses to operationalize the dependent variable, provides a count of students in pre-K through grade 12 in public schools that are experiencing doubled-up homelessness, sheltered homelessness, unsheltered homelessness, or living in temporary accommodations, such as a hotel or motel. By relying on an expanded measure of housing outcomes that can capture instances of forced displacement that official eviction rates might miss, this study can offer a more complete understanding of the effect of Medicaid on housing security.

BACKGROUND

History of Medicaid and its Expansion under the Affordable Care Act

Medicaid has been a vital component of the U.S. healthcare system since it was enacted into law in 1965 under Title XIX of the Social Security Act (Social Security

Office of Retirement and Disability 2015). Before 2014, Medicaid offered health care for parents with dependent children, children, pregnant people, people aged 65 and older, and people with disabilities. States were obligated to provide coverage for people in these categories up to federal minimum income thresholds, with the flexibility to extend coverage to individuals with higher income levels if they chose to do so (Center on Budget and Policy Priorities 2014). In the case of working parents, the federal threshold was established at 25 percent of the Federal Poverty Level (FPL).

Though a number of parameters are set forth by the federal government, states are able to exercise broad discretion in policies related to eligibility, duration and scope of services, and payment. This considerable latitude granted to states in administering the program results in a wide variance in coverage, even between states that are geographically proximate and similar in population size (Social Security Administration 2015).

Under the ACA, eligibility was expanded to all people between the ages of 19 and 65 with incomes up to 138% of the FPL. In 2023, this threshold was equivalent to an annual income of approximately $20,120 for a single adult (American Council on Aging 2023). This expansion of the health care safety net was designed to provide coverage for the nearly 47 million Americans who lacked insurance coverage in 2012, a group particularly vulnerable to negative health outcomes. To finance the program, the ACA specified that the expansion would be fully federally funded at the outset, and that the federal share would gradually decrease until it reached 90 percent in 2020, where the cost sharing would remain fixed (Lyon, Douglas, and Cooke 2014).

Initially, states were mandated to participate in expansion. However, in the 2012 case *National Federation of Independent Business v. Sebelius*, the Supreme Court held that it was unconstitutional for the federal government to withhold funds from states that did not opt into expansion, effectively granting states the authority to decide whether to implement the program or not (Center on Budget and Policy Priorities 2013). In 2014, 25 states elected to not participate in expansion, though a number of these states have opted into the expansion on a rolling basis between 2015 and 2023. As of 2024, 10 states have yet to adopt the expansion, where over a quarter of the U.S. population resides. In these states, the median income limit for Medicaid eligibility for parents with dependent children is set at 38% of the FPL, which amounts to an income of approximately $11,400 for a family of four (U.S. Department of Health and Human Services 2023). Conversely, in expansion states, the lower bound is raised to 138 % of the FPL, or about $38,295 for a family of four.

As of March 2023, Medicaid provided coverage to roughly 86.7 million, including over half of all children (Georgetown University Center for Children and Families 2023). This represented an historic high for the program, whose enrollment numbers grew due to a provision under an early pandemic-era law called the Families First Coronavirus Response Act (Tolbert and Ammula 2023). This law required states to keep beneficiaries continuously enrolled in the program until the end of the public health emergency in exchange for increased federal funding. This continual enrollment component ended on March 31, 2023. While the "unwinding" process was expected to take many states until 2024 to complete, it was projected that 8 to 24 million would lose coverage under Medicaid coverage by June 2024 (Tolbert and Ammula 2023).

As political efforts to fully repeal the ACA have proved unsuccessful, lawmakers opposing the policy have instead pushed for reversing Medicaid expansion (Mazurenko et al. 2018). On average, this would lead to an increase of about $1,000 in medical debt for low-income Americans covered under the expansion (The White House 2023). Considering the policy's political salience and arguably uncertain future, it is crucial to examine the impacts for individuals with low incomes, particularly regarding housing outcomes.

Differing Definitions of Homelessness

The Department of Education utilizes a broader definition of homelessness to identify and support students facing housing instability, in contrast to the narrower criteria employed by the Department of Housing and Urban Development (HUD). HUD defines homelessness as someone who satisfies any of the following conditions (U.S. Department of Housing and Urban Development 2023):

1. Has a primary nighttime residence that is a public or private place not meant for human habitation; or

2. Is living in a publicly or privately operated shelter designated to provide temporary living arrangements (including congregate shelters, transitional housing, and hotels and motels paid for by charitable organizations or by federal, state, or local government programs); or

3. Is exiting an institution where (s)he has resided for 90 days or less and who resided in an emergency shelter or place not meant for human habitation immediately before entering that institution.

In addition to the circumstances described above, the expanded definition used by the Department of Education

includes the following situations (National Center for Homeless Education 2018):

1. Sharing the housing of other persons due to loss of housing, economic hardship, or a similar reason (i.e., "doubled-up")
2. Living in hotels, motels, trailer parks, or camping grounds due to the lack of alternative adequate accommodations
3. Living in substandard housing

The Department of Education's expansive definition encompasses a broader spectrum of housing instability experiences, which is evident from the scope of homelessness reported by each agency. In 2022, HUD identified 98,244 people under the age of 18 experiencing homelessness, while the Department of Education identified 1,204,733 students experiencing homelessness (U.S. Department of Housing and Urban Development 2022; U.S. Department of Education 2023). These estimates are not directly comparable, as the U.S. Department of Education only accounts for students within the public school system, and not all individuals under the age of 18 are enrolled in public schools. Moreover, Department of Education data are captured on a rolling basis throughout the school year, while HUD data are based on a point-in-time count conducted in one 10-day period in January. Nonetheless, these two definitions convey significantly different narratives regarding the extent and patterns of youth homelessness.

The majority of student homelessness is categorized as "doubled-up", accounting for 76% of identified students in the 2021-22 school year (U.S. Department of Education 2023). These data illuminate an experience that is often characterized as the "hidden form of homelessness" (Richard et al. 2019). This has important policy implications, as counts of doubled-up homelessness can provide insights into the complete magnitude of the United States homelessness crisis. Many scholars contend that the experience of homelessness is not a dichotomy (homeless or not homeless), but rather a continuum of experiences (Lee, Tyler, and Wright 2010). In the largest study of homelessness in three decades, authors from the University of California San Francisco found that approximately 60% of those experiencing HUD-defined homelessness (i.e., in a shelter or experiencing unsheltered homelessness) were not on a lease agreement before entering homelessness; rather, many were experiencing doubled-up homelessness or another similarly precarious living situation (Kushel and Moore 2023). By relying on the federal administrative data that captures doubled-up homelessness, this study can help policymakers cultivate an understanding of the multifaceted nature of homelessness – a crucial insight to developing effective

strategies that address the diverse needs of individuals experiencing housing instability.

LITERATURE REVIEW

While much of the existing research on Medicaid has focused on its first order effects, including healthcare utilization, insurance rates, and health outcomes, a growing body of literature examines its secondary socioeconomic effects, such as decreased bankruptcy rates and reduced medical debt (Council of Economic Advisors 2022). These studies have established that Medicaid is a fundamental component of the social safety net for Americans with low incomes (Zewde and Wimer 2019). By alleviating the financial burdens associated with out-of-pocket healthcare costs, families have more disposable income to allocate to other expenses, such as housing. Variation in states' decisions to implement Medicaid expansion, as well as pre-ACA changes in state-level Medicaid eligibility thresholds, have enabled quasi-experimental studies to evaluate these second-order effects. The sections that follow provide an overview of the evidence related to Medicaid expansion's ability to promote better financial outcomes, how economic hardship contributes to homelessness, and Medicaid's impact on housing stability.

Medicaid as an Anti-Poverty Tool

Though Medicaid does not directly provide material resources to low-income households, substantial evidence demonstrates it is one of the most effective anti-poverty programs in the American social safety net (Zewde and Wimer 2019). Using a health-inclusive measure of poverty (which incorporates health insurance needs and benefits in the supplemental poverty measure), one study found that Medicaid reduced health-inclusive poverty by 3.8 percentage points (Remler et al. 2017). This was particularly pronounced for children under the age of 18, at 5.3 percentage points, an effect that was greater than that of all non-health means-tested benefits combined (e.g., Social Security, unemployment insurance, and SNAP).

Some of the strongest evidence for the impacts of Medicaid participation on financial outcomes comes from a landmark study in 2008 that examined Medicaid expansion prior to the ACA. Using a randomized control trial in Oregon, the authors assigned Medicaid coverage through a lottery to a group of uninsured low-income adults who were on the waitlist to receive benefits. This study found a considerable reduction in financial hardship among those receiving Medicaid benefits (Baicker et al. 2013). Another study on the same cohort a year after random assignment found that the out-of-pocket expenses for adults enrolled in Medicaid were reduced by more than a

third, and that these adults were 40 % less likely to skip a bill or borrow money to pay for medical costs (Finkelstein et al 2014). Additionally, catastrophic expenses, defined as any out-of-pocket expenses that surpassed 30% of an individual's income, were almost completely eliminated.

Consistent with these findings, other analyses have found that Medicaid participation is associated with improvements in a variety of financial outcomes, including increasing credit scores and reducing payday loan borrowing, the number of medical bills sent to debt collection, and bankruptcy rates (Breevort et al. 2017; Allen et al. 2017; Hu et al. 2016).

Taken together, these studies offer compelling evidence that underscores the pivotal role of Medicaid in alleviating financial burdens, smoothing household incomes, and reinforcing its critical role in the American social safety net.

Economic Hardship as a Catalyst for Homelessness

Policies aimed at stabilizing and raising household incomes are crucial to consider in a moment with an unprecedented prevalence of rent burden among households.

In 2023, over 49% of renter households were determined to be rent-burdened (meaning they spent over 30% of their income on housing costs), representing an all time high (Joint Center for Housing Studies 2023). Households with children were more likely to be rent-burdened, with over 58% of single-parent headed households experiencing rent burden (Airgood-Obryicki and Hermann 2022).

Rent-burdened households are often very resource constrained; a 2018 study of this population found that almost two-thirds of rent-burdened households had less than $400 cash in their bank accounts (Pew Charitable Trusts 2018). Furthermore, according to the Census Administered Housing Pulse Survey, 18% of all households with children indicated that they had little to no confidence in their ability to make their next rent or mortgage payment on time in 2022 (Annie E. Casey Foundation 2022). This incidence was higher among Black and Hispanic or Latinx households, at 32% and 29%, respectively.

Financial hardship has consistently correlated with homelessness. One study, for example, used longitudinal data from a nationally representative survey of 35,000 people and found that all three types of financial strain analyzed – financial crises and debt, lower income, and unemployment – were significant predictors of homelessness (Elbogen et al. 2022). Moreover, the authors established that 39% of the total effect of severe mental illness on homelessness was attributable to the mediating effect of financial strain.

Health expenses can present a significant financial burden for households experiencing

rent burden. For instance, 20% percent of adults encountered unexpected and sizable out-of-pocket health expenses in 2022, solidifying these costs as a prevalent source of unforeseen financial challenges (Federal Reserve 2022). The median cost ranged from $1,000 to $1,099, a figure considerably higher than the $400 financial buffer reported by rent-burdened households.

Homelessness as an outcome of medical debt, in particular, has only been empirically substantiated in two studies (Cutshaw 2015; Bielenberg 2020). One analysis of a homeless encampment in Seattle found that more than two-thirds of the residents had medical debt, and that this medical debt extended the duration of their homelessness by two years (Bielenberg 2020). Additionally, a 2014 survey on foreclosed households in Maricopa County, Arizona, revealed that approximately 57% of respondents attributed their foreclosure to medical debts (Cutshaw et al. 2015).

Medicaid and Housing Outcomes

In recent years, researchers have sought to determine whether Medicaid impacts housing security, as a number of studies have provided evidence on Medicaid's efficacy in improving financial wellbeing. Some studies, for example, have established that Medicaid expansion is related to a reduction in both eviction proceeding initiations and eviction rates (Zewde et al. 2019; Allen et al. 2019). According to one estimate based on eviction data for 40 states from the Princeton Eviction Lab, Medicaid expansion was associated with a 0.23 percentage point reduction in the eviction judgment rate at the county-level, reducing the average from 2.25 to 2.02 evictions judgments per 100 households (Linde and Egede 2023). Another study examining California's early Medicaid expansion found that it was associated with a 2.9 percentage point decrease in evictions per capita (Allen et al. 2019). Both studies also found heterogeneous treatment effects, with greater reductions in evictions in counties with higher uninsurance and eviction rates pre-expansion. Another study also indicated similar benefits for non-renter households, finding an increase in homeownership rates for lower-income households (Kuroki and Liu 2021).

Anecdotal reports have suggested that healthcare costs have contributed to housing instability, beyond evictions (Gallagher, Gopalan, and Grinstein-Weiss 2019). This was substantiated by a national poll conducted by the Kaiser Family Foundation. The poll revealed that while 1 in 12 Americans with medical debt lost their home to eviction or foreclosure in 2012, a much greater proportion, 1 in 5, were forced to move in with family or friends (Levey et al. 2023). Also referred to as "doubling up," this form of homelessness is associated with numerous adverse consequences related to health, student performance, and

overcrowded living conditions (Gartland 2022).

Contribution to the Literature

While several studies link Medicaid expansion with improved housing outcomes, none have specifically examined how it impacts homelessness. By using nationally-representative data on homelessness among students, this study will contribute an important data point to the literature, enhancing the understanding of Medicaid's second-order benefits, beyond health outcomes.

CONCEPTUAL FRAMEWORK

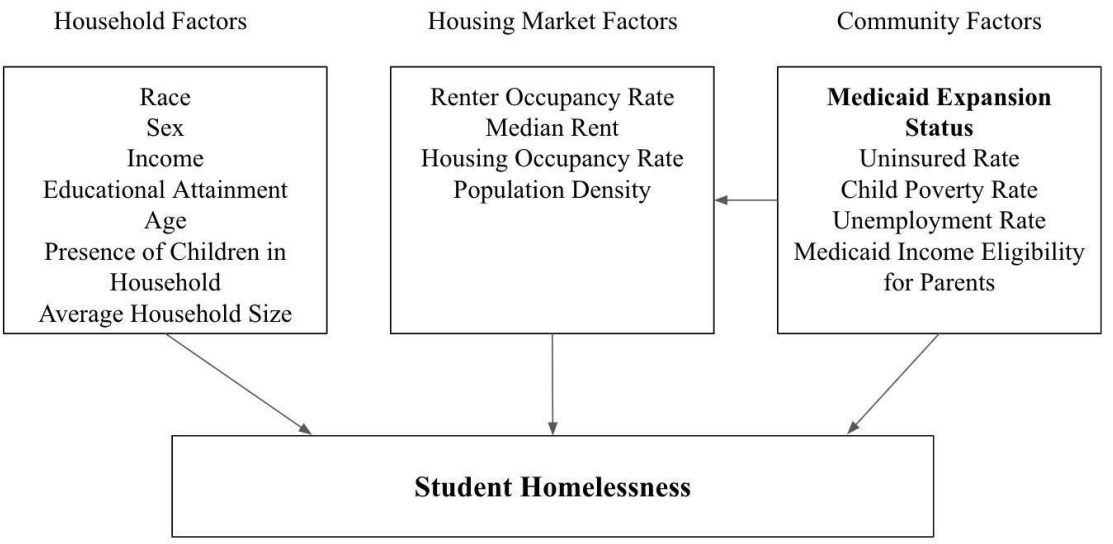
Based on extant literature, this analysis hypothesizes that a state's implementation of Medicaid expansion will be inversely related to student homelessness rates. As discussed above, previous studies establish that Medicaid is associated with increased financial stability of households and expansion decreases evictions at the county level.. Furthermore, because student homelessness data include instances of doubled-up homelessness, the data should capture displacement that takes place outside of formal evictions. As a result, a more substantial relationship is anticipated.

To reduce potential sources of bias in the model, this analysis controls for a range of variables that are plausibly related to Medicaid expansion and rates of homelessness, including housing market factors, community factors, and demographic factors. These variables, illustrated in Figure 1, are discussed in greater detail below.

Housing Market Factors

Extensive academic studies consistently demonstrate that the presence of homelessness in a particular area is primarily

Figure 1: Factors Affecting Student Homelessness



influenced by housing expenses. This finding is supported using many different measures of housing costs, including absolute rent rates, rent burdens, price-to-income ratios, and home prices (Horowitz et al. 2023). In 2020, the U.S. Government Accountability Office determined that when the median rent increased by $100, there was a corresponding 9% rise in the estimated rate of homelessness (GAO 2020).

Variation in homelessness is also attributed to other features of housing markets, such as rental vacancy rates, the proportion of households that are renters (Colburn and Aldern 2022). Population density also affects homelessness, as much of the homeless population in the U.S. is concentrated in urban areas. According to one analysis, about 88% of students experiencing homelessness are in cities, suburbs, and towns (Institute for Children, Poverty, and Homelessness 2019).

Household Level Factors

Demographic factors have also been shown to be correlated with homelessness. Due to historical and ongoing forms of structural racism that limit access to housing and employment opportunities, Black, Indigenous, and other People of Color, experience homelessness at much higher rates than their white counterparts. The starkest disparity exists for Black Americans, who make up 13% of the U.S. population, 37% of individuals experiencing homelessness, and 49% of homeless families with children (National Alliance to End Homelessness 2023). Additionally, gender is correlated with homelessness, as over 84% of families who experience homelessness are female-headed households (Substance Abuse and Mental Health Services Administration 2011). Other household characteristics, such as income, educational attainment, and average household size, are associated with housing instability and homelessness (Urban Institute 2023).

Community-Level Factors

As previously discussed, both Medicaid and homelessness are inextricably linked to poverty. For this reason, community-level financial indicators, including child poverty and unemployment, are also included in the model. This study includes additional controls for the uninsurance rate and the Medicaid income eligibility limits for parents. These factors impact the number of people who lack coverage and, therefore, are more susceptible to experiencing homelessness as a result of health-related financial crises. It is possible these factors also influence the characteristics of a county's housing market, which is indicated in Figure 1.

DATA AND METHODS

This empirical analysis spans eight school years, from School Year 2010-11 to School Year 2017-18, and relies on a unique panel dataset capturing county-level observations constructed using several sources.

The key independent variable is dichotomous and county-specific. It is based on each state's Medicaid expansion status using data from the Kaiser Family Foundation that specify when the implementation started.

Data on the dependent variable, student homelessness, were obtained from the Department of Education's McKinney-Vento dataset, which provides a count of all students identified as homeless at any point throughout the school year. In this dataset, counts are suppressed if the homelessness count is 0, 1, or 2 students in a Local Education Agency (LEA) to prevent identification of these students. To address this missingness, this study uses imputes one (the median value), for these counties.

The McKinney-Vento data are provided at the Local Education Agency level. An LEA is "a public board of education or other public authority within a state that maintains administrative control of public elementary or secondary schools in a city, county, township, school district, or other political subdivision of a state." Because this is a smaller geographical unit than counties, and counties often contain more than one LEA, this study utilizes the National Center for Education Statistics' LEA to County crosswalk file to aggregate rates of student homelessness to the county level.

The rate of student homelessness uses the Non-fiscal Common Core of Data (also administered by the Department of Education) to obtain total annual enrollment for each LEA, which is also aggregated to the county level. For all control variables, the model uses American Community Survey 5-year estimates produced by the U.S. Census Bureau. These include vectors of time varying household, community, and housing market variables.

The main identification strategy is based on a matched border-county pair analysis, using data from the U.S. Census Bureau's County Adjacency File. The sample is restricted to counties that have the opposite Medicaid expansion status as their bordering county. This technique allows for precise isolation of the effect of expansion, as it minimizes differences in counties due to spatial heterogeneity, including things like culture, regional market trends, demographic characteristics, and proximity to major markets (Holcombe and Lacombe 2004; Peng and Guo 2019; Sen and Deleire 2018). In total, the sample contains 361 unique counties, which includes student homelessness rates from 1,584 school districts. The sample spans 27 different states and the District of Columbia.

To estimate the effect of Medicaid expansion on student homelessness, a two-way fixed effects model is employed to control for time-invariant county characteristics that are

unobserved and remain fixed over time, as well as time-varied effects that apply across all states. Utilizing two-way fixed effects will reduce any bias that these factors might engender. The model used in the empirical analysis is as follows:

$$Student\ Homelessness_{cy} = \beta_0 + \beta_1 (Medicaid\ Expansion_{cy}) + \beta_2 H_{cy} + \beta_3 M_{cy} + \beta_4 C_{cy} + \alpha_1 + \alpha_2 + \epsilon_{cy}$$

Where $Student\ Homelessness_{cy}$ is the outcome of interest for county c in year y, $Medicaid\ Expansion_{cy}$ is a binary indicator that equals one for counties in a state with Medicaid expansion, M_{cy} is a vector of time-varying household variables, H_{cy} is a vector of time-varying housing market variables, C_{cy} is a vector of time-varying community variables, α_1 are the county fixed effects, α_2 are the time fixed effects, and ε_{cy} is the error term.

Table 1 describes the variables' operation and the sources from which the data were derived

DESCRIPTIVE STATISTICS

Table 2 provides descriptive statistics for the key independent and dependent variables in the analysis, as well as the housing market, household-level, and community-level covariates. The analytic sample consists of 2,888 county-year observations and is weighted by the average population of county residents during the period of analysis (SY 2010-11 to SY 2017-18). During this time, 16 of the 28 states adopted expansion, which amounts to 182 out of 361 counties (50.4%) in the sample and 648 (22.45%) of the county-year observations. Across the county-year observations in the analysis, an average of 22.2 students per every 1,000 enrolled in a county were identified as experiencing homelessness.

Table 3 displays disaggregated descriptive statistics based on expansion status of the counties in the sample at baseline, SY 2012-13, which was the year before expansion was adopted. This disaggregation reveals that, on average, counties situated in states that implemented expansion have 6.7 more students experiencing homelessness per every 1,000 students enrolled in the county.

Beyond this, Table 3 reveals no statistically significant differences in many of the key variables identified. The two exceptions are the proportion of children under 18 and average household size. This finding is important, as a border-pair analysis should theoretically result in county pairs that are largely similar in population characteristics and economic conditions. In other words, the "treatment" counties are similar to the "control" counties in the sample, with the exception of the variable of interest, Medicaid expansion. This also provides suggestive evidence that the counties are likely to be similar on unobserved characteristics not captured by control variables, time period fixed effects, and county fixed effects.

Table 1. Definition of Variables and Identification of Data Sources

Variable	Description	Source
Student Homelessness (Dependent Variable)	A continuous variable measuring the number of homeless students in a county.	McKinney Vento Act Data
Medicaid Expansion (Key Independent Variable)	A binary variable indicating whether a county is in a state that has implemented Medicaid expansion.	Kaiser Family Foundation
Medicaid Income Eligibility Threshold for Parents	A continuous variable reflecting income eligibility limits for coverage at the state level, calculated as a percentage of the Federal Poverty Level.	Kaiser Family Foundation
Total Population	A continuous variable measuring the number of residents in a county.	American Community Survey (2010-2014 and 2015-2019 5-year estimates)
Unemployment	A continuous variable indicating the unemployment rate of individuals aged 16 and older in the labor force in a county.	American Community Survey (2010-14 and 2015-19, 5-year estimates)
Housing Vacancy	A continuous variable indicating the percentage of housing units that are vacant in a county.	American Community Survey (2010-14 and 2015-19, 5-year estimates)
Rent Burden	A continuous variable indicating the Median Gross Rent as a Percentage of Median Household Income in a county.	American Community Survey (2010-14 and 2015-19, 5-year estimates)
Race	A series of continuous variables indicating the percentage of different racial groups in a county, including: White, Black, Asian, American Indian/ Alaska Native, other, and two or more races.	American Community Survey (2010-14 and 2015-19, 5-year estimates)
Educational Attainment	A series of continuous variables indicating the percentage of people (25+) with various educational attainment levels in a county, including: less than high school, high school graduate, some college, bachelor's degree, and master's degree in a county.	American Community Survey (2010-14 and 2015-19, 5-year estimates)
Uninsurance Rate	A continuous variable indicating the percentage of the population without health insurance in a county.	American Community Survey (2010-14 and 2015-19, 5-year estimates)
Population Density	A continuous variable indicating the number of residents per square mile in a county.	American Community Survey (2010-14 and 2015-19, 5-year estimates)

Variable	Description	Source
Female	A continuous variable indicating the percentage of the population that is female in a county.	American Community Survey (2010-14 and 2015-19, 5-year estimates)
Renter	A continuous variable indicating the percentage of the renter-occupied housing units in a county.	American Community Survey (2010-14 and 2015-19, 5-year estimates)
Household Size	A continuous variable indicating the average household size in a county.	American Community Survey (2010-14 and 2015-19, 5-year estimates)
Median Gross Rent	A continuous variable indicating the median housing cost expenses for renters, which includes contract rent plus the estimated average monthly cost of utilities in a county.	American Community Survey (2010-14 and 2015-19, 5-year estimates)

Table 2. Descriptive Statistics (Overall Sample) n=2,888

All dollar figures have been adjusted for inflation and are expressed in 2018 dollars.

Variable	Mean	SD	Min	Max
Key Independent Variable				
Medicaid Expansion	0.2	0.4	0	1
Key Dependent Variable				
Student Homelessness Rate (# of Students Experiencing Homelessness Per Every 1,000 Students)	22.2	21.7	0	396.3
Housing Market Factors				
Rent Burden (Ratio of Average Monthly Rent to Average Household Income)	29.5	3.2	12.5	46.1
Population Density (Per Square Mile/100)	1,054.2	2143.1	0.1	11,196.4
Vacant Units (%)	12.0	8.38	3.4	88.3
Renter-Occupied Units	33.6	8.5	10.0	63.6
Median Rent	$1,194	$466	$305	$2,259
Household-Level Factors				
Median Income	$74,684	$30,666	$23,556	$159,004
Female	50.6	1.4	31.5	54.2
Race				
White Alone	72.4	21.1	11.7	100
Black Alone	15.7	19.2	0	87.4
American Indian and Alaska Native Alone	1.7	6.8	0	83.7
Asian Alone	3.8	5.2	0	19.0
Native Hawaiian or Pacific Islander Alone	0.1	0.3	0	4.2
Other Race Alone	3.4	3.4	0	27.3
Two or more Races	2.8	1.4	0	15.7
Educational Attainment				
Less than High School Graduate	12.8	5.7	3.3	46.8
High School Graduate or More	87.2	5.8	53.1	96.8
Some College	59.5	12.5	21.5	85.9
Bachelor's or more	30.6	15.4	0	74.6
Community-Level Factors				
Medicaid Income Eligibility for Parents (% FPL)	70.7	47.5	16	221
Child Poverty Rate	20.6	10.7	0	72.6
Total Population	368,910	377,831	102	1,143,529
Uninsurance Rate	12.4	5.3	1.7	41.6
Unemployment Rate	4.4	1.6	0	16.8
Average Household Size	2.7	0.3	1.9	3.9
*** p<0.01, ** p<0.05, * p<0.1				

Note. Results are weighted by the average population of county residents during the period of analysis (SY 2010-11 to SY 2017-18).

Table 3. Descriptive Statistics Disaggregated by Expansion Status n=361

All dollar figures have been adjusted for inflation and are expressed in 2018 dollars.

	Counties in Non-Expansion States Mean *n = 179*	**Counties in Expansion States** Mean *n = 182*	**Difference**	**Robust Standard Error**
Key Dependent Variable				
Student Homelessness Rate (# of Student Experiencing Homelessness Per Every 1,000 Students)	20.6	27.3	6.7**	3.8
Housing Market Factors				
Rent Burden (Ratio of Average Monthly Rent to Average Household Income)	29.5	30.4	0.9	0.6
Population Density (Population Per Square Mile/100)	932.9	1,121.3	188.3	676.3
Vacant Units (%)	11.6	12.4	0.8	1.6
Renter-Occupied Units (%)	32.6	34.0	1.5	2.1
Median Rent	$1,189	$1,263	-25.1	166.0
Household-Level Factors				
Median Income	$75,864	$70,822	-5,402	10,276
Female (%)	50.5	50.8	0.2	0.3
Race				
White Alone (%)	74.8	71.1	-3.6	6.4
Black Alone (%)	13.8	17.5	3.7	6.0
American Indian or Alaska Native Alone (%)	1.1	2.2	1.1	0.8
Asian Alone (%)	4.2	3.0	-1.2	2.0
Native Hawaiian or Pacific Islander Alone (%)	0.1	0.1	0	0.1
Other Race Alone (%)	3.3	3.3	0.1	0.9
Two or more Races (%)	2.7	2.6	-0.1	0.3
Educational Attainment				
Less than High School Graduate (%)	13.5	13.4	-0.1	1.4
High School Graduate or More (%)	86.5	86.6	0.1	1.4
Some College (%)	59.3	57.9	-1.3	3.5
Bachelor's or more (%)	30.2	29.4	-0.7	4.9
Community-Level Factors				
Medicaid Income Eligibility for Parents (% FPL)	56.0	82.4	26.4	21.7

	Counties in Non-Expansion States Mean *n = 179*	**Counties in Expansion States** Mean *n = 182*	**Difference**	**Robust Standard Error**
Child Poverty Rate	21.1	21.5	0.4	2.9
Uninsurance Rate	15.5	13.9	-1.6	1.3
Unemployment Rate	4.9	5.5	0.6	0.4
Total Population	400,558	338,234	-62,323	137,083
Average Household Size	2.7	2.6	-0.1**	0.1
*** p<0.01, ** p<0.05, * p<0.1				

Note. Results are weighted by the average population of county residents during the period of analysis (SY 2010-11 to SY 2017-18).

EMPIRICAL RESULTS

The regression results are displayed in Tables 4 and 5, with Table 4 summarizing the main regression results and Table 5 providing subgroup results. Table 4 includes four models, described as follows. Model (1) estimates the bivariate correlation between the key independent variable, Medicaid expansion, and the dependent variable, which is the difference in student homelessness rates between an expansion county and its paired adjacent non-expansion county. Model (2) introduces time-varying controls that encompass differences in housing market factors, community factors, and demographic factors at the county level. Model (3) includes county fixed effects, while Model (4) includes year fixed effects. These year fixed effects control for unobserved characteristics that remain fixed over time but vary between counties, as well as characteristics that are time-varying but affect counties in a uniform manner. In Table 5, the analysis uses the fully specified Model (4) and interaction terms between the key independent variable and some of the covariates to test for heterogeneity of Medicaid expansion based on county characteristics. Each regression across the eight models is weighted by the mean county population over the period of analysis, and robust standard errors clustered at the county level are reported beneath each coefficient in parentheses. For each model, the rate of student homelessness is lagged by two years to ensure that the temporal precedence condition of causality is met.

Main Regression Results

Contrary to the initial hypothesis, the results of Table 4 suggest a positive relationship between Medicaid expansion and rates of student homelessness, though this association fails to meet conventional levels of significance once county and year fixed effects are introduced. The simple bivariate regression estimated in Model (1) indicates

that Medicaid expansion is associated with an increase of 7.3 students on average experiencing homelessness for every 1,000 enrolled, and that this relationship is highly statistically significant. The addition of time-varying controls has a minimal impact on the statistical significance, though the magnitude of this relationship increases slightly to 10.2 students experiencing homelessness for every 1,000 enrolled. However, once county and year fixed effects are incorporated in Models (3) and (4), the coefficient no longer retains its statistical significance, and the magnitude of the relationship is drastically moderated. Specifically, in the fully specified Model (4), Medicaid expansion is associated with an increase of 0.2 students experiencing homelessness for every 1,000 enrolled, holding the other factors included in the analysis constant.

Subgroup Analysis

Models (5) through (9) integrate interaction terms into the fully specified model to assess the potential heterogeneous effects Medicaid expansion has according to a subset of county characteristics. To conduct this subgroup analysis, the following variables are dichotomized based on whether counties fell at or above the within-sample 75th percentile: uninsurance at baseline, child poverty at baseline, rent burden at baseline, homelessness at baseline, and the share of the non-white population.3 Though the results of Table 4 largely refute the initial hypothesis, if the mechanism posited was correct and expansion provides a financial buffer that protects families from housing instability, then it is possible that counties that exhibit characteristics that would strengthen this channel would see varied effects of expansion.

Model (5) provides suggestive evidence for this supposition. Though expansion may be associated with an (insignificant) increase of 0.2 students for every 1,000 enrolled, in counties with a high proportion of uninsured people at baseline, this relationship becomes negative, significant, and greater in magnitude. Specifically, Medicaid expansion in these counties is associated with a decrease of 2.1 students experiencing homelessness for every 1,000 enrolled. This suggests that Medicaid expansion is more closely related to student homelessness in counties where the uninsurance rate was higher.

This is consistent with a prior analysis of expansion and evictions, which finds that Medicaid expansion resulted in a larger decrease in the eviction rate for those counties with higher shares of uninsured people (Allen et al., 2019).

Model (6) offers further evidence that this is the case, as counties that are the most rent-burdened also have a negative and highly statistically significant association with Medicaid expansion. Moreover, the magnitude of this relationship is similar,

3 An interaction term was also created for counties with the highest proportion of Black residents, However, this interaction term remained insignificant across all specifications, so I omitted these results

with these counties exhibiting a decrease of 5.8 in the student homelessness rate.

Model (7), the model that includes a child poverty interaction term, may provide conflicting evidence for this theory, though the estimate it produces does not approach conventional levels of significance. This contradicts a prior study of Medicaid expansion and evictions, which estimates that counties with a higher proportion of economically vulnerable individuals will experience a greater reduction in eviction rates (Linde and Egede 2023). Models (8) and (9), which explore differences in the impact of Medicaid expansion in counties based on high proportions of people of color and high levels of pre-expansion student homelessness, respectively, produce similarly insignificant coefficients.

Overall, these findings provide mixed evidence as to whether Medicaid expansion impacts student homelessness. Among the statistically significant interactions explored,

Medicaid expansion decreases student homelessness by about 2 to 4 students for every 1,000 enrolled, a moderate reduction of about 8 to 25 percent relative to the mean.

Alternative Specifications

The above analysis examines the relationship between Medicaid expansion and a two-year lagged student homelessness variable, based on the assumption that policy uptake and the resulting shift in consumer budgets will result in any effect of expansion being delayed. However, it is possible that varying the lag will illustrate nuances in the dynamic of this relationship (i.e. if the effect is most pronounced in the expansion year, but that effect eventually diminishes as time from expansion increases). Table 6 reports the results of the interaction specifications with contemporaneous student homelessness rates, while Table 7 reports these results with student homelessness rates lagged by one year.[4] These two tables are truncated for ease of readability, but full tables with time-varying county controls can be found in Appendix 1.

Models (7) and (8), which interact Medicaid expansion with dichotomous "high child poverty" and "high non-white population share" variables, remain insignificant with the contemporaneous and one-year lag for student homelessness. In Model (5), which estimates the effect of expansion counties with high levels of baseline uninsurance, the relationship between expansion and student homelessness is still negative, though the magnitude of the relationship is smaller than when the two-year lag is introduced. The relationship is also not significant, with a p-value of 0.63 for the contemporaneous student homelessness rate and 0.26 for the one-year lag, before it becomes significant in the two-year lag model. Similarly, in Model (6) which accounts for counties with high

4 These variations were also tested in lagged student homelessness using the fully-specified Model (4), though the Medicaid variable remained insignificant, so results in this section have been omitted.

levels of rent burden, the magnitude of the relationship is smaller and less significant than with the two-year lag (though it remains significant at the 0.1 level).

Model (9), which accounts for differences based on pre-expansion levels of homelessness, reveals the most divergent results based on the lag used. Though this interaction was insignificant when relying on a two-year lag, evaluating the contemporaneous model reveals that expansion is associated with a decrease of 7.2 students experiencing homelessness. This represents the largest magnitude in any of the interaction terms across all specifications and is highly statistically significant. As discussed in the descriptive statistics section, the weighted average of student homelessness is 22.6 students per 1,000 enrolled, so this would represent a decrease of approximately 30% relative to the mean. When the one-year lag is introduced, though the relationship still meets conventional levels of significance with a p-value of 0.09, the relationship is significantly moderated. This model suggests that expansion is only associated with a decrease of 3.1 students experiencing homelessness. These estimates are noteworthy, because they imply that the relationship between student homelessness and expansion is most immediate in counties that have high levels of homelessness.

Turning now to a discussion of the limitations of the analysis, there are several different theories as to why these results contradict the initial hypothesis and some of the extant literature on Medicaid expansion and housing stability, and the policy implications of these results.

Table 4: Regression Results for the Effect of Medicaid on Student Homelessness Among US Counties Bordering States With and Without Medicaid Expansion, 2010-18

Dependent Variable: Student Homelessness Rate (lagged by two years)	(1) Bivariate	(2) Multivariate	(3) County Fixed Effects	(4) County and Year Fixed Effects
Key Independent Variable: Medicaid Expansion	7.302***	10.201***	-0.148	0.209
	(1.944)	(1.589)	(1.114)	(1.184)
Time Varying County-Level Controls				
Medicaid Income Eligibility for Parents (% of FPL)		-0.040**	0.020	0.015
		(0.016)	(0.014)	(0.014)
Population Density (Population Per Square Mile/100)		0.495***	0.167	0.175
		(0.074)	(0.408)	(0.397)
% Renter Occupied		0.072	0.157	0.189
		(0.139)	(0.285)	(0.288)
% Vacant Units		0.095	0.698**	0.722**
		(0.069)	(0.338)	(0.351)
Median Gross Rent		0.003	0.015	0.015
		(0.006)	(0.011)	(0.011)
% Female		0.666**	0.116	0.080
		(0.330)	(1.156)	(1.167)
% Black of African-American		-0.181***	-0.139	-0.016
		(0.041)	(0.903)	(0.875)
% American Indian or Alaskan Native		0.142	2.731**	2.925**
		(0.117)	(1.260)	(1.250)
% Asian		-0.076	-0.114	0.159
		(0.229)	(1.353)	(1.443)
% Native Hawaiian or other Pacific Islander		1.663	4.163	4.421
		(1.139)	(4.762)	(4.765)
% Some Other Race		-1.291***	0.058	0.066
		(0.171)	(0.270)	(0.271)
% Two or More Races		0.474	1.497	1.658*
		(0.392)	(0.981)	(0.983)
% Uninsured		-0.232	-0.144	-0.222
		(0.166)	(0.276)	(0.281)
Child Poverty Rate		-0.115	-0.129	-0.130
		(0.110)	(0.158)	(0.158)

Table 4: Regression Results for the Effect of Medicaid on Student Homelessness Among US Counties Bordering States With and Without Medicaid Expansion, 2010-18

Dependent Variable: Student Homelessness Rate (lagged by two years)	(1) Bivariate	(2) Multivariate	(3) County Fixed Effects	(4) County and Year Fixed Effects
Median Household Income		0.020	0.574***	0.590***
(Thousands)		(0.113)	(0.197)	(0.198)
% Unemployed		0.810*	0.342	0.258
		(0.422)	(0.586)	(0.604)
Average Household Size		-1.868	-8.411	-8.113
		(3.783)	(9.733)	(9.571)
% High School Grad		-1.082***	-0.655	-0.647
		(0.261)	(0.438)	(0.437)
% Some College or Associate Degree		1.134***	0.386	0.405
		(0.161)	(0.344)	(0.347)
% Bachelor's Degree or Higher		-1.230***	-0.583	-0.539
		(0.153)	(0.517)	(0.518)
Rent Burden (Ratio of Average Monthly Rent to Average Household Income)		1.105***	0.544***	0.545***
		(0.199)	(0.204)	(0.204)
Constant	19.137***	18.401	-8.002	-15.591
	(0.743)	(29.984)	(76.721)	(74.171)
County FE	No	No	Yes	Yes
Year FE	No	No	No	Yes
R^2	0.030	0.234	0.059	0.070
Number of Observations	2,161	2,161	2,161	2,161

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

Table 5: Subgroup Analysis for the Effect of Medicaid on Student Homelessness Among U.S. Counties Bordering States With and Without Medicaid Expansion, 2010-18

Dependent Variable: Student Homelessness Rate (two-year lag)	(5) High Uninsurance	(6) High Rent Burden	(7) High Child Poverty	(8) High Non-White Population	(9) High Homelessness
Key Independent Variable:	1.218	1.908	0.343	0.261	-0.339
Medicaid Expansion	(1.092)	(1.348)	(1.208)	(1.199)	(1.201)
Interactions					
High Uninsurance	7.328***				
(³ 75th Percentile)	(2.670)				
High Uninsurance *	-5.221*				
Medicaid	(2.771)				
High Rent Burden		-0.907			
(³ 75th Percentile)		(1.144)			
High Rent Burden *		-4.976***			
Medicaid		(1.635)			
High Child Poverty			4.110**		
(³ 75th Percentile)			(2.014)		
High Child Poverty *			-1.557		
Medicaid			(2.299)		
High Non-White Population				-5.605	
(³ 75th Percentile)				(4.408)	
High Non-White				1.082	
Population * Medicaid				(2.261)	
High Student Homelessness					4.709**
(³ 75th Percentile)					(2.342)
High Homelessness					1.638
(³ 75th Percentile)					(2.208)

Dependent Variable: Student Homelessness Rate (two-year lag)	(5) High Uninsurance	(6) High Rent Burden	(7) High Child Poverty	(8) High Non-White Population	(9) High Homelessness
Key Independent Variable:	1.218	1.908	0.343	0.261	-0.339
Medicaid Expansion	(1.092)	(1.348)	(1.208)	(1.199)	(1.201)
Time-Varying Controls					
Medicaid Income Eligibility for Parents (% of FPL)	0.019	0.011	0.015	0.014	0.014
	(0.014)	(0.015)	(0.014)	(0.014)	(0.014)
Population Density (Population per Square Mile/100)	0.172	-0.154	0.147	0.137	-0.155
	(0.371)	(0.343)	(0.391)	(0.395)	(0.426)
% Renter Occupied	0.124	0.190	0.191	0.217	0.230
	(0.284)	(0.283)	(0.289)	(0.289)	(0.278)
% Vacant Units	0.691**	0.777**	0.644*	0.700**	0.635*
	(0.346)	(0.337)	(0.360)	(0.349)	(0.336)
Median Gross Rent	0.012	0.022*	0.014	0.015	0.009
	(0.011)	(0.012)	(0.012)	(0.011)	(0.013)
% Female	0.327	0.543	0.013	-0.056	-0.122
	(1.172)	(1.141)	(1.180)	(1.155)	(1.116)
% Black of African-American	-0.018	-0.338	-0.013	-0.076	-0.032
	(0.819)	(0.856)	(0.879)	(0.877)	(0.804)
% American Indian or Alaskan Native	2.469**	2.775**	2.767**	2.757**	2.636**
	(1.160)	(1.239)	(1.253)	(1.293)	(1.220)
% Asian	0.369	0.098	0.168	0.232	0.518
	(1.326)	(1.459)	(1.430)	(1.453)	(1.326)
% Native Hawaiian or other Pacific Islander	3.575	3.157	4.115	4.318	3.662
	(4.373)	(4.814)	(4.623)	(4.863)	(4.290)
% Some Other Race	-0.024	0.244	0.071	0.062	0.204
	(0.268)	(0.226)	(0.276)	(0.270)	(0.252)
% Two or More Races	1.556	1.677*	1.675*	1.490	1.459
	(0.988)	(0.943)	(0.979)	(1.003)	(0.925)
% Uninsured	-0.099	-0.213	-0.245	-0.210	-0.113
	(0.277)	(0.269)	(0.282)	(0.277)	(0.270)
Child Poverty Rate	-0.079	-0.112	-0.100	-0.160	-0.101
	(0.153)	(0.149)	(0.164)	(0.157)	(0.161)

Dependent Variable: Student Homelessness Rate (two-year lag)	(5) High Uninsurance	(6) High Rent Burden	(7) High Child Poverty	(8) High Non-White Population	(9) High Homelessness
Key Independent Variable:					
Medicaid Expansion	1.218	1.908	0.343	0.261	-0.339
	(1.092)	(1.348)	(1.208)	(1.199)	(1.201)
Median Household Income (thousands)	0.596***	0.543***	0.601***	0.586***	0.552***
	(0.197)	(0.190)	(0.199)	(0.199)	(0.183)
% Unemployed	0.216	0.270	0.321	0.270	0.306
	(0.563)	(0.607)	(0.605)	(0.606)	(0.593)
Average Household Size	-9.153	-11.309	-6.803	-8.590	-6.803
	(9.327)	(9.147)	(9.714)	(9.652)	(9.504)
% High School Grad	-0.715	-0.561	-0.677	-0.582	-0.610
	(0.443)	(0.431)	(0.440)	(0.433)	(0.438)
% Some College or Associates Degree	0.389	0.207	0.413	0.338	0.280
	(0.340)	(0.327)	(0.351)	(0.354)	(0.365)
% Bachelor's Degree or Higher	-0.503	-0.289	-0.480	-0.412	-0.323
	(0.511)	(0.483)	(0.512)	(0.518)	(0.584)
Rent Burden (Ratio of Average Monthly Rent to Average Household Income)	0.545***	0.695***	0.556***	0.579***	0.554***
	(0.202)	(0.220)	(0.205)	(0.209)	(0.203)
Constant`	-16.835	-36.204	-15.236	-11.508	-1.758
	(71.486)	(72.223)	(74.783)	(74.369)	(69.868)
County FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
R!	0.094	0.082	0.074	0.073	0.085
Number of observations	2161	2161	2161	2161	2161

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

Note. Results are weighted by the average population of county residents during the period of analysis (SY 2010-11 to SY 2017-18).

Table 6: Alternative Specification Results: No Lag

Dependent Variable: Student Homelessness Rate (no lag)	(10) High Uninsurance	(11) High Rent Burden	(12) High Child Poverty	(13) High Non-White Population	(14) High Homelessness
Key Independent Variable: Medicaid Expansion	-2.570	-1.457	-2.721	-2.500	-0.640
	(1.888)	(1.767)	(1.878)	(1.830)	(1.693)
Interactions					
High Uninsurance	-1.156				
(³ 75th Percentile)	(2.020)				
High Uninsurance *	-1.801				
Medicaid	(3.584)				
High Rent Burden		-3.306			
(³ 75th Percentile)		(2.121)			
High Rent Burden *		-3.306			
Medicaid		(2.121)			
High Child Poverty			0.437		
(³ 75th Percentile)			(2.138)		
High Child Poverty *			2.917		
Medicaid			(3.104)		
High Non-White Population				-4.178	
(³ 75th Percentile)				(3.409)	
High Non-White				0.966	
Population * Medicaid				(2.331)	
High Student Homelessness					1.124***
(³ 75th Percentile)					(0.207)
High Student					-8.575***
Homelessness* Medicaid					(2.725)

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

Note. Results are weighted by the average population of county residents during the period of analysis (SY 2010-2011 to SY 2017-2018).

Table 7. Alternative Specification Results: One Year Lag

Dependent Variable: Student Homelessness Rate (one year lag)	(15) High Uninsurance	(16) High Rent Burden	(17) High Child Poverty	(18) High Non-White Population	(19) High Homelessness
Key Independent Variable:					
Medicaid Expansion	0.223	0.558	-0.359	-0.182	0.339
	(1.386)	(1.617)	(1.407)	(1.409)	(1.472)
Interactions					
High Uninsurance	1.803				
(³ 75th Percentile)	(2.015)				
High Uninsurance *	-3.610				
Medicaid	(3.178)				
High Rent Burden		-1.242			
(³ 75th Percentile)		(1.271)			
High Rent Burden *		-3.066			
Medicaid		(1.873)			
High Child Poverty			0.997		
(³ 75th Percentile)			(1.773)		
High Child Poverty *			1.988		
Medicaid			(2.524)		
High Non-White Population				-6.176	
(³ 75th Percentile)				(4.052)	
High Non-White				1.548	
Population * Medicaid				(2.801)	
High Student Homelessness					6.354***
(³ 75th Percentile)					(1.750)
High Student					-3.207*
Homelessness *Medicaid					(1.817)

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

Note. Results are weighted by the average population of county residents during the period of analysis (SY 2010-11 to SY 2017-18).

DISCUSSION

The results indicate that in the aggregate, there is no evidence that the effect of Medicaid expansion on student homelessness is statistically significantly different from 0. However, the results also indicate heterogeneity in the impact of expansion across counties. Specifically, counties with the highest within-sample levels of baseline uninsurance, student homelessness, and rent burden experienced a meaningful reduction in the student homelessness rate.

The most proximate existing research, which has focused more narrowly on evictions, has found seemingly contradictory results that suggest that Medicaid expansion reduces eviction rates (Zewde et al. 2019, Linde and Egede 2023). However, looking at a larger range of experiences of housing instability, using the student homelessness rate seems to nullify this effect. This divergence could be attributed to the measures of housing stability relied upon, or from the utilization of nationwide data in these studies, which potentially introduces more exogenous factors biasing these estimates compared to the border-county methodology employed in this study.

To resolve these unsettled findings, future research should examine how housing stability has been affected by the recent "Great Unwinding" of Medicaid following the end of the public health emergency. During COVID-19, the recertification process was eliminated from Medicaid, and its reintroduction has resulted in the loss of coverage for approximately 18 million individuals between April 2023 and February 2024 (Kaiser Family Foundation 2023). Disenrollment rates have varied widely across states, with rates surpassing 50% in states including Utah and only 10% in some states, such as Maine. This scenario presents researchers with a valuable opportunity to investigate the potential relationship between Medicaid coverage and housing stability within a more contemporary context.

Though the overall estimates in this paper deviate from the extant eviction studies, the findings do converge with existing research in that prior studies find a greater impact in areas with higher pre-expansion eviction rates and uninsurance rates. In the present study, this same dynamic emerges: Medicaid expansion in counties with elevated rates of student homelessness and uninsurance prior to expansion also tend to exhibit statistically significant, negative correlations with student homelessness. Further research should explore additional sources of heterogeneity of expansion across counties with differing characteristics.

Limitations

One major limitation presented by this research is the presence of measurement error in the dependent variable, which is virtually inevitable with any administrative data concerning homelessness. In one

analysis by the Center for Public Integrity, roughly 300,000 students who experienced homelessness in the 2018-19 school year were not identified under McKinney-Vento (DiPierro and Mitchell 2022). They found severe undercounting across a range of settings, including "regions synonymous with economic hardship to big cities and prosperous suburbs." Although measurement error in the dependent variable does not introduce bias into the estimate of expansion, it is highly probable that it diminishes the precision of this estimate.

Further, it is likely that the accuracy of estimates is affected by attenuation bias resulting from measurement errors in the covariates. This analysis relied on the ACS five-year dataset for the control variables, using 2010-14 data for school years 2010-14 and 2015-19 for school years 2015-18. While these data reflect the most accurate averages, they only change once during the period of analysis, and therefore the true time-varying nature of the covariates is not accurately captured in the dataset. Considering the presumably random error this introduces, the estimate of the impact of Medicaid expansion is likely biased towards zero.

Though this analysis controlled for state and county fixed effects as well as a range of community-level, household-level, and housing market factors, the estimate also likely suffers from omitted variable bias. While the analysis employed the border-county methodology to minimize this bias, this does not control for all time-varying differences between counties. For instance, the analysis was not able to observe the robustness of training that different school districts offer their staff to identify and serve students experiencing homelessness, which is plausibly related to both the level of recorded numbers of students in the McKinney-Vento dataset and a state's decision to adopt Medicaid and therefore may exert bias on the estimate.

Policy Implications

As of April 2025, just 10 states have yet to adopt Medicaid expansion. However, these states contain 29% of the students enrolled in public schools nationwide (National Center for Education Statistics 2023). The results illustrate that counties with the most severe economic and affordable housing conditions are likely to experience a reduction in student homelessness as a result of expansion. This insight might provide informational incentives for state-level policymakers to push for adoption of expansion, recognizing that its second-order effects would be most advantageous to the counties with populations most susceptible to housing precarity.

Nevertheless, this effect is happening on the margins. For this reason, it is crucial for policymakers not to perceive expansion as a conclusive solution to the escalating homelessness crisis in the

nation. Instead, these results suggest that any attempt to address housing instability through Medicaid expansion will need to be accompanied by other complementary anti-homelessness strategies, including increased federal homelessness services funding and affordable housing production.

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APPENDIX: ADDITIONAL TABLES

Table A1: Alternative Specification Results: No Lag, Regressions with Time-Varying Controls (Table 6, Expanded)

Dependent Variable: Student Homelessness Rate (one year lag)	(15) High Uninsurance	(16) High Rent Burden	(17) High Child Poverty	(18) High Non-White Population	(19) High Homelessness
Key Independent Variable:	-2.570	-1.457	-2.721	-2.500	-0.640
Medicaid Expansion	(1.888)	(1.767)	(1.878)	(1.830)	(1.693)
Interactions					
High Uninsurance	-1.156				
(³ 75th Percentile)	(2.020)				
High Uninsurance *	-1.801				
Medicaid	(3.584)				
High Rent Burden		-3.306			
(³ 75th Percentile)		(2.121)			
High Rent Burden *		-3.306			
Medicaid		(2.121)			
High Child Poverty			0.437		
(³ 75th Percentile)			(2.138)		
High Child Poverty *			2.917		
Medicaid			(3.104)		
High Non-White Population				-4.178	
(³ 75th Percentile)				(3.409)	
High Non-White				0.966	
Population * Medicaid				(2.331)	
High Student Homelessness					1.124***
(³ 75th Percentile)					(0.207)
High Student					-8.575***

Homelessness * Medicaid					(2.725)
Time-Varying Controls					
Medicaid Income Eligibility for Parents (% of FPL)	0.028 (0.018)	0.027 (0.018)	0.025 (0.018)	0.028 (0.019)	0.031* (0.017)
Population Density (Population per Square Mile/100)	0.852* (0.500)	0.635 (0.454)	0.807* (0.487)	0.824* (0.491)	1.041* (0.557)
% Renter Occupied	0.046 (0.270)	0.053 (0.263)	0.069 (0.261)	0.071 (0.264)	0.044 (0.251)
% Vacant Units	0.867*** (0.329)	0.849** (0.331)	0.725** (0.350)	0.798** (0.338)	0.886*** (0.342)
Median Gross Rent	-0.003 (0.011)	0.001 (0.011)	-0.002 (0.011)	-0.004 (0.011)	0.002 (0.012)
% Female	0.147 (1.126)	0.352 (1.138)	-0.026 (1.147)	-0.047 (1.153)	-0.332 (1.104)
% Black of African-American	-1.351* (0.810)	-1.538** (0.779)	-1.289 (0.821)	-1.372* (0.810)	-1.549* (0.813)
% American Indian or Alaskan Native	0.321 (1.359)	0.269 (1.405)	0.272 (1.403)	0.238 (1.403)	-0.053 (1.462)
% Asian	1.812 (1.559)	1.713 (1.571)	1.655 (1.572)	1.818 (1.585)	2.236 (1.554)
% Native Hawaiian or other Pacific Islander	2.717 (3.479)	1.787 (3.617)	3.460 (3.436)	2.538 (3.502)	-0.050 (3.678)
% Some Other Race	0.192 (0.409)	0.282 (0.363)	0.118 (0.396)	0.165 (0.390)	-0.121 (0.375)
% Two or More Races	-0.319 (1.043)	-0.159 (1.058)	-0.178 (1.037)	-0.296 (1.050)	-0.377 (1.062)
% Uninsured	-0.317 (0.291)	-0.226 (0.293)	-0.205 (0.308)	-0.211 (0.299)	-0.258 (0.301)
Child Poverty Rate	0.113 (0.187)	0.145 (0.191)	0.162 (0.191)	0.110 (0.199)	0.125 (0.191)
Median Household Income (thousands)	0.441* (0.268)	0.411 (0.273)	0.460* (0.268)	0.436 (0.270)	0.374 (0.254)
% Unemployed	-0.495 (0.639)	-0.478 (0.657)	-0.460 (0.644)	-0.472 (0.638)	-0.352 (0.614)
Average Household Size	-20.058*	-20.695**	-15.548	-19.050*	-18.230*

	(10.757)	(10.362)	(11.159)	(10.916)	(10.441)
% High School Grad	-0.877	-0.847	-0.981*	-0.847	-0.812
	(0.541)	(0.554)	(0.525)	(0.541)	(0.518)
% Some College or Associates Degree	0.370	0.288	0.493	0.361	0.386
	(0.395)	(0.403)	(0.389)	(0.406)	(0.393)
% Bachelor's Degree or Higher	-0.494	-0.344	-0.475	-0.407	-0.440
	(0.518)	(0.516)	(0.526)	(0.537)	(0.562)
Rent Burden (Ratio of Average Monthly Rent to Average Household Income)	0.380*	0.468*	0.400*	0.405*	0.352
	(0.217)	(0.258)	(0.218)	(0.224)	(0.214)
Constant	90.191	76.670	83.263	92.594	100.316
	(67.225)	(66.729)	(68.616)	(67.249)	(66.983)
County FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
R^2	0.047	0.049	0.047	0.047	0.062
Number of observations	2883	2883	2883	2883	2883

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

Note. Results are weighted by the average population of county residents during the period of analysis (SY 2010-11 to SY 2017-18).

Table A2: Alternative Specification Results: One Year Lag, Regressions with Time Varying Controls (Table 7, expanded)

Dependent Variable: Student Homelessness Rate (one year lag)	(10) High Uninsurance	(11) High Rent Burden	(12) High Child Poverty	(13) High NonWhite Population	(14) High Homelessness
Key Independent Variable:	0.223	0.558	-0.359	-0.182	0.339
Medicaid Expansion	(1.386)	(1.617)	(1.407)	(1.409)	(1.472)
Interactions					
High Uninsurance	1.803				
(³ 75th Percentile)	(2.015)				
High Uninsurance *	-3.610				
Medicaid	(3.178)				
High Rent Burden		-1.242			
(³ 75th Percentile)		(1.271)			
High Rent Burden *		-3.066			
Medicaid		(1.873)			
High Child Poverty			0.997		
(³ 75th Percentile)			(1.773)		
High Child Poverty *			1.988		
Medicaid			(2.524)		
High Non-White Population				-6.176	
(³ 75th Percentile)				(4.052)	
High Non-White Population *				1.548	
Medicaid				(2.801)	
High Student Homelessness					6.354***
(³ 75th Percentile)					(1.750)
High Student Homelessness *					-3.207*
Medicaid					(1.817)
Time-Varying Controls					

Medicaid Income Eligibility for Parents (% of FPL)	0.018	0.016	0.013	0.015	0.017
	(0.017)	(0.018)	(0.017)	(0.018)	(0.017)
Population Density (Population per Square Mile/100)	0.074	-0.112	0.036	0.034	-0.028
	(0.362)	(0.337)	(0.364)	(0.369)	(0.409)
% Renter Occupied	0.213	0.231	0.258	0.277	0.262
	(0.259)	(0.254)	(0.257)	(0.258)	(0.250)
% Vacant Units	0.719**	0.736***	0.615**	0.675**	0.685**
	(0.281)	(0.280)	(0.294)	(0.292)	(0.288)
Median Gross Rent	0.014	0.020*	0.016	0.015	0.014
	(0.011)	(0.011)	(0.012)	(0.011)	(0.012)
% Female	-0.140	0.018	-0.386	-0.457	-0.612
	(1.057)	(1.045)	(1.059)	(1.053)	(1.038)
% Black of African-American	-0.699	-0.902	-0.653	-0.752	-0.803
	(0.739)	(0.703)	(0.755)	(0.752)	(0.717)
% American Indian or Alaskan Native	1.162	1.293	1.316	1.233	1.036
	(1.259)	(1.307)	(1.328)	(1.342)	(1.314)
% Asian	1.993	1.748	1.778	1.948	2.303*
	(1.301)	(1.361)	(1.330)	(1.351)	(1.315)
% Native Hawaiian or other Pacific Islander	3.308	2.898	4.240	3.537	1.846
	(4.311)	(4.631)	(4.456)	(4.568)	(4.244)
% Some Other Race	0.092	0.259	0.083	0.116	0.062
	(0.273)	(0.249)	(0.263)	(0.266)	(0.266)
% Two or More Races	0.661	0.785	0.800	0.621	0.572
	(1.121)	(1.102)	(1.103)	(1.136)	(1.107)
% Uninsured	-0.272	-0.247	-0.257	-0.252	-0.213
	(0.257)	(0.260)	(0.267)	(0.256)	(0.256)
Child Poverty Rate	-0.052	-0.050	-0.034	-0.098	-0.049
	(0.164)	(0.165)	(0.173)	(0.169)	(0.170)
Median Household Income (thousands)	0.514***	0.471**	0.527***	0.503***	0.454**
	(0.192)	(0.188)	(0.193)	(0.194)	(0.185)
% Unemployed	0.006	0.066	0.059	0.042	0.122
	(0.565)	(0.581)	(0.581)	(0.577)	(0.556)
Average Household Size	-10.830	-12.110	-6.931	-10.134	-8.753
	(9.215)	(9.045)	(9.370)	(9.376)	(9.228)

% High School Grad	-0.571	-0.472	-0.619	-0.474	-0.479
	(0.476)	(0.467)	(0.457)	(0.465)	(0.462)
% Some College or Associates Degree	0.245	0.127	0.344	0.199	0.189
	(0.350)	(0.347)	(0.352)	(0.364)	(0.367)
% Bachelor's Degree or Higher	-0.522	-0.347	-0.509	-0.400	-0.384
	(0.481)	(0.472)	(0.485)	(0.495)	(0.547)
Rent Burden (Ratio of Average Monthly Rent to Average Household Income)	0.652***	0.793***	0.668***	0.687***	0.642***
	(0.210)	(0.230)	(0.211)	(0.216)	(0.207)
Constant	18.387	2.873	13.825	23.121	31.805
	(67.314)	(65.813)	(68.294)	(67.534)	(64.163)
County FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
R^2	0.077	0.080	0.076	0.077	0.095
Number of observations	2522	2522	2522	2522	2522

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

Note. Results are weighted by the average population of county residents during the period of analysis (SY 2010-11 to SY 2017-18).

The Unseen Dimension of Redistricting

How Moving Precincts to New Districts Impacts Electoral Turnout and Mobilizes Voter Groups

Eduard-Alex Ciuhandu[1]

Abstract

The effects of redistricting and gerrymandering on representation and electoral results have been the subject of much discussion over the last several years. However, much of the literature looks at the aggregated levels and does not account for possible micro effects, such as the impact on voter turnout at the lowest level. Lacking established theories on the particular subject, this paper develops a theoretical sketch and draws expectations regarding voter behavior when subject to redistricting, which are tested using a difference-in-differences design based on merged data for the Second Congressional District of Mississippi from 2016 to 2022. This analysis indicates that moving precincts from a safe Republican to a safe Democratic district increases voter turnout and the number of votes Democrats receive, suggesting that moving precincts from one district to another, even if both are non-competitive, increases electoral participation. This aggregate result emerges mainly through the mobilization of the voters of the formerly disadvantaged party, as the change does not appear to significantly impact turnout among the formerly advantaged party.

1. INTRODUCTION

An Unseen Dimension of Redistricting?

In the summer of 2024, an Atlanta-based local publication asked "Is gerrymandering responsible for low turnout precincts in Fulton County?" (Sassoon 2024). The article explores the opinions of electoral experts, who believe redistricting plays a role in determining turnout, mainly due to the emergence of uncontested or non-competitive districts. This is not a unique position: Individuals involved one way or another in debates over redistricting argue that there is a clear link between gerrymandering and voter turnout, with such allegations coming from very different parts of the U.S., such as Indiana (Bennett 2022), Illinois (Doubek 2024) and Mississippi (Harrison 2022b). In the latter case, the journalist even went as far as to say that redistricting reduces voters' desire to cast their ballots.

This article examines these claims through the case study of Mississippi's 2022 Congressional redistricting. The state's situation is thus interesting for several reasons, showing how difficult it is

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to normatively and empirically assess the fairness of redistricting plans and electoral processes. The state is known for its relatively high voting cost, ranking as the U.S. state with the most inaccessible voting processes, according to the 2024 Cost of Voting Index (Pomante 2024). This means that the effort required to vote is the highest among all U.S. states. Politically, Mississippi has long been dominated by the Republican party, and its four Congressional districts are reasonably predictable, with three being safe Republican and one safe Democratic. As local reporting summarized, Mississippi is "not known for very competitive elections" (Harrison 2022c).

As such, one would expect the redistricting process of 2022 to have been uneventful, as the approved maps just moved some counties or precincts from one district to another to account for population changes, while the partisan advantages remained the same (Boschma et al. 2025). The most significant modification was moving four counties (Adams, Amite, Franklin, and Wilkinson) from the Third (safe Republican) Congressional District to the Second (safe Democrat), a move that provoked a state-wide controversy. Democrats rejected the plan, as it stretched the only safe Democrat district. Detractors of the plan alleged that the new maps violated the principle of compactness, a measure also used to assess redistricting fairness (Pittman 2022). The NAACP argued that the four districts were racially gerrymandered (Pettus 2022), but an overseeing federal panel of three judges refused to rule on their constitutionality (Harrison 2022a). The new Congressional map was adopted, and in effect, the outcome did not change, with three Republicans and one Democrat winning in the 2022 elections (Harrison and Pender 2022). While the electoral outcome remained the same, there is still the question of whether this redistricting process had an impact on the voters' desire to cast their ballots.

At the national level, the debate around redistricting and electoral participation seems rather confusing at times. For example, one established observation regarding participation as a whole is the lower turnout among Black voters (Uteuova 2024). A rather tumultuous chain of events emerged based on this during the recently concluded redistricting cycle: The Brennan Center for Justice published a report analyzing this disparity after the 2020 election (Morris and Grange 2021), and last year when the Supreme Court upheld the South Carolina redistricting plan, which was previously challenged because of partisan gerrymandering, Justice Samuel Alito cited this report in his majority opinion. Mentioning the low turnout among Black voters, Justice Alito argued that it is unreasonable to think that the redistricting agents would have used racial data in redrawing the districts (Morris 2024). The Brennan Center reacted shortly after and

accused Justice Alito of misinterpreting their results (Irwin 2024).

These examples show two things: Experts expect there to be a relationship between redistricting and turnout, and the same experts can draw different conclusions when interpreting data on the subject. The main argument brought forward by individuals involved in the debate seems reasonable: Redistricting creates non-competitive districts, making voters less likely to show up to the polls. While this claim may appear self-evident, expert opinion is not definite evidence. Whether empirical data supports this argument is crucial for the future of the redistricting debate.

As such, this paper asks **how redistricting impacts political participation.** Going beyond theoretical and philosophical arguments on the link between redistricting and participation, fairness, and impact among different societal groups, it aims to empirically assess the causal effect of redistricting on overall turnout, and on voter turnout for each political party.

This paper is structured as follows: The next section reviews the academic literature regarding redistricting and participation. Following that, it presents a theoretical sketch that contradicts the established argument in the literature. To empirically test it, this analysis approaches the precinct-level data from the Second Congressional district in Mississippi before and after the 2020 redistricting cycle and presents a difference-in-differences empirical design in the fourth section, which is followed by the analysis. Finally, the fifth section discusses the implications and limitations of this research, and the last section concludes.

This paper finds strong causal evidence that moving a precinct from a safe Republican district to a safe Democratic one increases turnout by about 5 percentage points, with the Democratic candidate receiving on average 100 more votes per precinct solely due to this district change. As a share, moving a precinct causes the Democrats to win 5 percentage points more of the vote. This shows that while partisan redistricting can have negative effects on aggregate turnout, the shock of being moved from one non-competitive district to another non-competitive one causes increased turnout and higher support for the formerly disadvantaged party in the precincts. In a nutshell, the base of the formerly disadvantaged party is mobilized by the change, but I did not find concrete evidence that the base of the formerly advantaged party becomes demobilized.

2. LITERATURE REVIEW

Redistricting, Gerrymandering, and Political Participation

To approach the redistricting literature holistically, this paper first reviews the general literature on gerrymandering, showing that, in general, it assumes turnout

and voting behavior do not change. It then turns to the specific research on the effects of redistricting and gerrymandering on political participation.

Most of the research on gerrymandering focuses on quantities that can be used to assess whether a redistricting plan is gerrymandered (Tapp 2019; Warrington 2019). Arguably the most popular metrics are the efficiency gap (Stephanopoulos and McGhee 2015) and the compactness of a district (Niemi et al. 1990), mainly due to relatively easy-to-understand definitions. The latest innovation in gerrymandering research is the use of simulation methods (McCartan and Imai 2023; Zhu 2024). This approach has reconfirmed that partisan redistricting favors the redistricting party (Chen and Cottrell 2016) and reduces competition (Cottrell 2019). The most advanced application thereof is the "redist" statistical package (Kenny et al. 2021), which takes precinct-level data and user-defined constraints and simulates a large number of redistricting plans. The researcher can then compare the metric of interest for the actual redistricting plan to the distribution of the metric under the simulated plans (McCartan et al. 2022). A high deviation from the mean of the distribution indicates gerrymandering, while also controlling for any possible geographical bias. However, this approach assumes that the precinct-level results, implicitly the voter behavior, stay the same, and are not affected by the district boundaries. There are emerging improvements that try to account for heterogeneity in turnout rate (Bouton et al. 2023), but they are yet to establish themselves as the norm.

Few research articles challenge this assumption, but their result is unambiguous: Redistricted voters tend to vote less. There are multiple reasons for this: For one, redistricted voters tend to lack knowledge about the political landscape of the new district, usually not even knowing the name of the incumbent (Hayes and McKee 2009). The major apparent mechanisms in this regard are the disappearance of the incumbent's advantage and the lack of information. This is not unique to the U.S. – redistricting in Japan also leads to lower turnout due to increased information costs (Fujimura 2022). Interestingly, electoral competition does not seem to play a role. While it is intuitive to think that higher competition will lead to increased turnout, the empirical results show no effect (Moskowitz and Schneer 2019; Enos and Fowler 2014). This result is not particular for Congressional elections as it also holds for Gubernatorial races (Gerber et al. 2020).

When looking at gerrymandering in particular, defined as the use of redistricting to favor one party, existing studies suggest that there is a negative causal effect on turnout (D. Jones, Silveus, and Urban 2023). The principal mechanism of gerrymandering is creating non-competitive districts, where one party has such a major advantage that

the results are practically known beforehand. Empirically, this has two dimensions: On the one hand, voters who were moved to a district where their party has an advantage are more likely to cast their ballot (Fraga, Moskowitz, and Schneer 2022), but on the other hand, the overall effects of the change in the partisan composition of the district reduces turnout (Hunt 2018). Finally, there is also a possible indirect effect, as partisan gerrymandering also affects the behavior of the parties, as competent political actors are less likely to run if the district provides an advantage for the other party (Stephanopoulos and Warshaw 2020).

Another crucial insight related to participation is that the effects of redistricting on turnout can be mediated by race. Research has shown how the negative effects of redistricting are significantly stronger among Black voters, but this effect disappears in the case of a Black candidate (Hayes and McKee 2012). Similar results explore the role of ethnic demographics, showing that voters are more likely to participate in elections if at least a candidate shares their ethnic affiliation. This effect is the strongest among Black voters, who are more likely to vote if they are assigned to a majority Black district with Black candidates (Fraga 2016).

While this brief literature review focused on the academic articles regarding participation, gerrymandering research which does not directly analyze but indirectly assumes no effect on participation is the majority. As shown above, through the few articles focused on the link between redistricting and participation, some show how redistricting can lower the individual's odds of voting. However, there are no insights regarding which voters tend to participate less and which more after redistricting. Additionally, there is no differentiation between the impact of "normal" redistricting and gerrymandering. As these types of research questions are novel, there is a research gap regarding the impact of redistricting on participation that this paper aims to address.

3. THEORETICAL APPROACH

Mobilization and Demobilization

Before turning to data to assess the role of redistricting in influencing political participation, it's worth revisiting the plausible arguments regarding the relationship between the two. Going beyond overall turnout alone, this paper aims to determine who is more likely, and who is less likely, to participate and be mobilized after redistricting.

The established and widespread theoretical perspective is that redistricting reduces turnout, as it implies a higher information cost for the voter (Blais 2006; Rosenstone and Hansen 1993; Murphy and Yoshinaka 2009). However, while this phenomenon may be present when looking at aggregate political participation, this paper

argues that it should not hold for precincts that are moved from one district to another. There are two reasons for this: On one hand, the change in scenery can mobilize voters who were not convinced by either political offer in the old district. Especially due to the longevity of Congressional careers and the powerful incumbent advantage, voters can easily become dissatisfied with the electoral offer and choose to abstain from voting. Moving the precinct to a new district can undo this phenomenon. Additionally, if the former district was non-competitive, it is plausible to assume that some voters of the disadvantaged party did not cast their ballots, knowing their political efficacy was reduced. Once their precincts are moved to a new district, be it a non-competitive one that provides an advantage for the formerly disadvantaged party, or a competitive one, these voters suddenly have an incentive to vote.

As such, this paper hypothesizes that:

H_1: Moving a precinct to a new district increases electoral turnout.

Consequently, there is the question of how the overall incentives to vote shift after such a district change. First, consider the supporters of the formerly advantaged party: they suddenly lose their relationship with their representative. The incumbent advantage disappears, leaving supporters to either shift their support to the new candidate of the party or to abstain from voting. Additionally, there is the question of political efficacy. If the new district presents an advantage to the opposing party, the supporters of the formerly advantaged party are even more disincentivized to cast their vote, knowing the chances of winning are low to non-existent. It is also possible (if improbable) that some voters are "compliers"—i.e., voters who when assigned to a safe Republican district vote Republican, and when assigned to a safe Democratic district vote for Democrat. Especially for swing voters, there might be an additional incentive to bandwagon, or "be on the winning side", although such an effect is expected to be rather minimal. Accounting for all these aspects, this paper further hypothesizes that:

H_2: Moving a precinct to a new district decreases the votes of the formerly advantaged party.

For the formerly disadvantaged party, the effect should be exactly the opposite. While there still is the unfamiliarity of the political landscape of the new district, supporters will perceive their political efficacy as suddenly increased. Especially if the precinct was previously assigned to the district where their party was disadvantaged for a long time, the supporters perceive district change as an important difference, allowing them to be on the winning side for the first time. This sudden shock of increased incentives can even impact voters who only slightly support the party. There is a certain

theoretical symmetry between the two phenomena: The formerly advantaged party loses votes, and the formerly disadvantaged party wins votes. As such, this paper further hypothesizes that:

H_3: Moving a precinct to a new district increases the votes of the formerly disadvantaged party.

Turning to the share of votes (percentages), the relationships are straightforward when combining the first three hypotheses. A higher number of votes, consisting of a higher number of votes for the formerly disadvantaged party and a lower number of votes for the formerly disadvantaged party will lead to a lower share of votes for the formerly advantaged party and a higher share of the vote for the formerly disadvantaged party. From here, two hypotheses are formulated:

H_4: Moving precincts to a new district decreases the vote share of the formerly advantaged party.

H_5: Moving precincts to a new district increases the vote share of the formerly disadvantaged party.

Although these statements are logical consequences of the first three hypotheses and do not add independent theoretical insight, they are included to add further empirical falsifiability. Depending upon the empirical results, this may provide further empirical support to my novel theoretical approach.

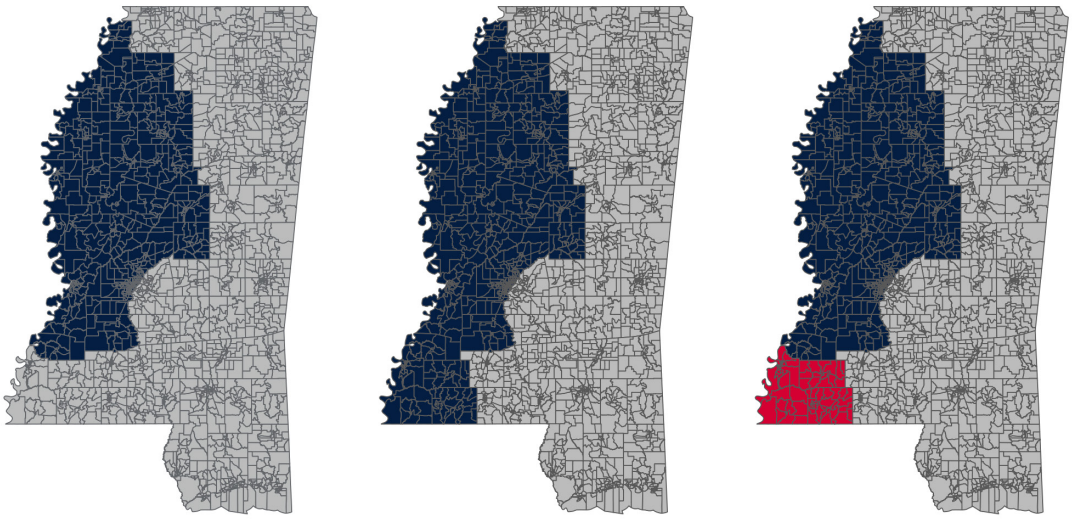
4. DATA AND METHODS

Difference-in-differences with Mississippi's Second Congressional District

To empirically test the hypotheses presented, this paper uses the state of Mississippi, or more specifically its Second Congressional district, to construct its sample. The reason for approaching Mississippi is rather straightforward: Redistricting did not change the overall electoral outcome, and the process as a whole was relatively uneventful. Other than moving some precincts near the district borders from one district to the other, everything stayed the same: As before the 2020 redistricting cycle, the state still has three safe Republican and one safe Democratic district. As such, there were no major political scandals regarding redistricting and gerrymandering that might affect voters through protests or mediatic discussions, allowing me to isolate the effect of redistricting itself.

The precincts of four counties—Adams, Amite, Franklin, and Wilkinson—were moved together from the Republican Third District to the Democratic Second District, the state's only minority-majority district. Figure I shows this graphically. Based on this empirical observation, I construct my sample as follows (visually displayed it on the right side of the figure): The precincts

Figure I: Mississippi Second Congressional District, Treatment and Control Groups based on 2020 Redistricting Cycle



2012-2020 2022 Treatment and Control

that were part of the safe Democratic district before and after the redistricting cycle serve as my control group (painted in blue). My treatment group consists of all precincts that were moved from the safe Republican district to the safe Democratic district (painted in red).

Precinct-level data presents unique challenges as it is usually not centralized. I could find no readily available longitudinal datasets at the precinct level, so I constructed one using cross-sectional election cycle data from the 2022 (MIT Election Data and Science Lab 2023), 2020 (MIT Election Data and Science Lab 2021b; Voting and Election Science Team 2022c), 2018 (MIT Election Data and Science Lab 2022; Voting and Election Science Team 2022b) and 2016 (MIT Election Data and Science Lab 2021a; Voting and Election Science Team 2022a) Congressional elections. All the data I used to create my longitudinal dataset is freely available on the Redistricting Data Hub and was produced by VEST and the MIT Election Lab. Additionally, I also merged this data with the ALARM dataset (T. Kenny and McCartan 2021), which includes information from the 2020 US Census aggregated at the precinct level. From that dataset, I take two demographic indicators, the share of the Black and White voting age population (as a percentage of the total voting age population)[2].

I used approximate string matching to reconcile precincts which had slightly altered their names between elections,

2 For clarity: The ethnic demographics used come only from the ALARM dataset, which is based on the US Census and aggregates variables at precinct level. I do not use any official data from the state of Mississippi.

taking the most similar match and allowing for a maximum string distance of two. For the few cases with still unmatched precincts, I manually looked for possible matches. In cases where I could not find any probable match, I dropped the observation.

Given the structure of the data, the most suitable method is a difference-in-differences design (Donald and Lang 2007). This approach works for the following context: There are two groups, one that is assigned to treatment and the other that is not, and the researcher has data both before and after the treatment. This is the case for the data I merged, as I have observations both in the treatment and control groups, and both before (2016, 2018, 2020) and after (2022) treatment. Empirically, the simple way to use difference-in-differences is by introducing two indicator variables and the interaction between them: one holds for the post-treatment period (2022), and the other for the treatment group. In my case, I labeled them "Post" and "Treatment". The interaction between them is the causal effect of the treatment on the outcome. This method has a strong parallel trends assumption, meaning that the outcome has similar, if not the same, trends over time before treatment onset between the two groups. The use of control variables is controversially discussed in methodological literature, so I use multiple models with and without controlling for ethnic demographics and county effects. I add the ethnic demographics as the Second Congressional district is a minority-majority district with a Black incumbent, and thus the effects can be mediated by race, as discussed in the theoretical section. As the treatment group consists of the precincts of four complete counties, I control for possible county-specific effects.

Formally, I define my model as:

$$Y_{it} = \beta_1 Post_t + \beta_2 (Post_t \times Treatment_i) + \alpha_i + \lambda_t + \epsilon_{it}$$

where Y_{it} represents the outcome of interest of precinct i at time t, $Post_t$ is an indicator variable that holds when t is 2022, $Post_t$ multiplied by $Treatment_i$ is the interaction effect, α_i and λ_t are precinct and year fixed effects, respectively, and ε is the error term. This is a two-way fixed effects specification and does not require controls for time-invariant variables, as it is a panel model. The treatment variable is included only in the interaction and not as a stand-alone since it is absorbed into the precinct fixed effects. Note that I also run simpler models, where the treatment variable is present and where I also include control variables. There are two differences between this equation and the simpler models: The treatment indicator is included as a stand-alone, and there are no fixed effects. In all models, β_2 is the quantity of interest, as it estimates the causal effect of the treatment on the outcome.

5. EMPIRICAL ANALYSIS

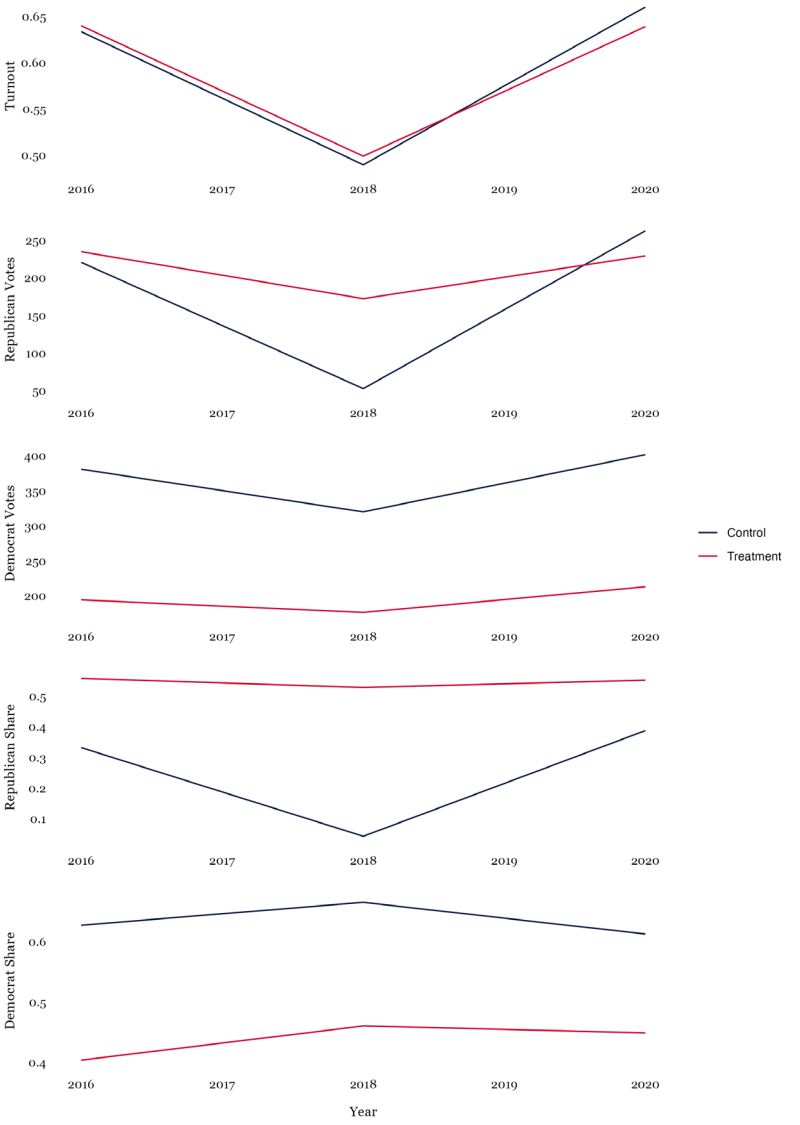
Higher Turnout and More Support for the Democrats

5.1 Parallel Trends Assumption

In a difference-in-differences analysis, the first step is to assess whether the parallel trends assumption holds in this case. As my hypotheses imply five dependent variables, I plot the averages of each outcome grouped by treatment or control group over time before 2022 in Figure II. Visually inspecting the time trends, it is plausible to assume that the groups move parallel over time for turnout and the Democrats' share. For all others, the trends do not seem parallel.

To go beyond visual inspection, I run a formal test on the pre-treatment outcomes: For each outcome of interest, I run a regression where I include year indicators and a treatment variable, interacting the

Figure II: Parallel Trends Analysis for Variables of Interest



treatment variable with each year variable. If these interactions are significant, there is a difference in trends, if not, one can assume that the parallel trends assumption holds. I include all results in Table I. For all models other than the Republicans' share, all interaction variables are statistically insignificant, meaning that the parallel trends assumption holds. For the Republicans' share, one interaction term is significant. In addition to the visually unparallel trends, I conclude that for this outcome the parallel trends assumption is violated. I will nonetheless empirically analyze it but will refrain from interpreting the results as clear causal evidence.

5.2 Causal Analysis

For each outcome of interest, I run four models: Three simple OLS regressions, and one panel model as described in the equation at the end of section four. The OLS models are as follows: The first one only includes the Post and Treatment indicators and the interaction between the two. The second model includes two ethnic demographic controls, namely the percentage of voting-age Black and White citizens as a percentage of the total voting-age population in 2020. The third model includes county controls. I do not report the coefficients of the control variables. I do not include further control variables as they are not always recommended for a difference-in-differences design, and it is challenging to gather data at the precinct level.

Table II shows the results for turnout as the dependent variable, measured here as a percentage of the voting-age population in the precincts in 2020. For the first three OLS variables, the interaction term is insignificant, but in the fixed effects specification, it shows positive and significant results, meaning that moving the precincts to a new district increased the overall turnout. As the fixed effects specification accounts for all possible time-invariant unobserved variables, I consider it the most authoritative one. The fixed effects model also has a significantly higher R^2 value than the normal models, showing that it explains more of the variation of the dependent variable. The model shows that being assigned to treatment caused the precincts to experience a turnout increase of about 5.2 percentage points. Thus, in the case of H_1, I can reject the null hypothesis. It is important to discuss what this result shows, and what it does not: It shows that overall turnout has increased, but it does not say anything about which groups were mobilized, and which were demobilized to vote following the change.

For that, I turn to Table III, which shows the results with Republican votes as the dependent variable. In all models, the results for the interaction term are negative, which is in line with my hypothesis, but none of the results are significant. Thus, I cannot draw any inferences, and in the case of H_2, I fail to reject the null hypothesis. Table IV shows the results for the Democratic votes. Here the

results are clear: For all models, irrespective of the specification, the interaction effect shows a positive and significant coefficient. This means the treatment causes the Democratic party to receive approximately 100 more votes per precinct. Thus, in the case of H_3, I can reject the null hypothesis.

The remaining question is how or through which mechanisms are turnout and Democratic votes increased? While the data I used cannot verify this conjecture, it is consistent with my results to imagine that Democratic voters who did not participate in elections when the precinct was part of a safe Republican district, as the results were in principle known beforehand, felt empowered and mobilized through the change of scenery. The other possible scenario could be that some voter who previously voted Republican now switched their support to the Democrats. I judge this scenario to be less plausible, as I found there was no significant negative effect on the Republican votes. The results for H_2 also show an asymmetrical relationship: While the treatment mobilizes the base of the party that was previously disadvantaged, it does not demoralize and demobilize the base of the party that lost its advantage due to redistricting.

The results from Tables V and VI are consistent with these insights: Table V looks at the Republican share of the votes as the dependent variable and shows that there is a significant negative result across all models. Republicans lost on average approximately 14 percentage points in each precinct due to the change of district. However, I do not interpret these results causally, as the parallel trends assumption does not hold for this variable. Another interesting aspect is the result for the second model, where the treatment with the ethnic demographic controls explains about 62% of the variation of the Republican share, showing that the racial makeup of the precinct is highly correlated with the relative support for Republicans. I do not report the results for the control variables in the table, but they are as expected: A higher share of the Black voting-age population appears to lead to a lower share of Republican votes and a higher share of the White voting-age population to a higher.

Table VI also behaves as expected: For the second and last model, the interaction effect is positive and significant. For the other models, it is positive but not significant. As the fixed effects model is significant, I can reject the null hypothesis in the case of H_5. On average, the treatment leads to approximately a 5-percentage point increase in the share of Democratic votes. For the second model, the R^2 is again strikingly high at 90%. This provides a further clue that the vote split is highly correlated with the ethnic makeup of the precinct. Again, I do not report the results for the control variables, but they are as expected: A higher share of the Black voting age population leads to a higher share

of Democratic votes and a higher share of the White voting age population to a lower. Also of interest is the difference between the percentage points differences: While the Republican share drops by 14 points, the Democrat share only rises by 4. This could hint in the direction of third-party candidates gaining traction due to district change, but this topic requires further research.

To conclude the analysis section, I showed empirically that when moving precincts from a safe Republican district to a safe Democratic district, the share of Republican votes decreases, and the share of Democratic votes increases. This is largely due to a higher overall turnout, also caused by the district change. Additionally, there is an unequal relationship: More supporters of the newly advantaged party (Democratic) turn out to vote, but there is no insight to show that the supporters of the formerly advantaged and newly disadvantaged party (Republican) are demobilized and do not attend the Congressional elections anymore. Additionally, I found hints that race might play a crucial and significant role in determining the vote split, but this requires further research.

6. DISCUSSION

Implications and Limitations

Finally, there is the question of the implications and limitations of my analysis. Starting with the former, redistricting has an impact on political participation. This is especially relevant for two areas: On one hand, my results can be used to support a further normative argument to be made against gerrymandering, as it can alienate voters, disincentivizing them to cast their ballots. This can potentially lead to lower trust in Congress and elected officials, and general dissatisfaction with the political system. Congress already is the lowest-trusted political institution in the U.S. (J.M. Jones 2023), and this might have catastrophic consequences, such as a reduced willingness to obey laws among the population (D.R. Jones 2015).

The results are arguably more important for the academic and quantitative research on gerrymandering. Simulation methods have been a revolutionary innovation in the field, but they usually assume that the precinct-level results stay constant. This paper shows that they do not, meaning that while simulation results are currently the best estimates researchers have, they are also likely to be biased. Accounting for turnout changes should be the next main improvement in the simulations approach. However, it is unclear how much turnout fluctuates in general depending on district assignment, or if my results are generalizable for the population of precincts.

This highlights the main limitation of my results. As I only focus on a particular place and time, namely four counties in southwestern Mississippi, before and after the 2020 redistricting cycle, there

is no reason to assume that my results are necessarily generalizable without further study. My analysis is causal by design, but the treatment effect is probably heterogeneous, meaning that while the coefficients are accurate and represent the causal effect for my sample, they might be higher or lower for other precincts in other counties and states. Accordingly, it is crucial to replicate this design for other states and then look for which factors determine the extent of the treatment effect. To this end, more research efforts are needed.

CONCLUSION

Using Mississippi's Second Congressional district before and after the 2020 redistricting cycle, I showed how the precincts that were moved from the safe Republican Third district to the safe Democratic Second experienced increased turnout and more support for the Democratic candidate. Thus, while partisan redistricting can have negative effects on turnout as a whole, the shock of being moved from one non-competitive district to another causes increased turnout and higher support for the formerly disadvantaged party in the precincts. The higher turnout also seems to be solely impacted by the increased support for the Democratic candidates, as there is no evidence to show that the move reduced the mobilization of the Republican voters.

In a nutshell, moving precincts across districts, even when both the old and the new districts are non-competitive, incentivizes the supporters of the formerly disadvantaged party to cast their ballots and does not seem to affect the electoral participation of the formerly advantaged party. The aggregate result is an increase in electoral participation. As such, there seems to be a baseline effect of redistricting on participation, even when the overall state-wide electoral outcome does not change.

Regarding the explanatory power of my results, while it is possible to debate whether the treatment effects are heterogeneous and vary depending on other factors, the results are clear and consistent and present a causal effect. Thus, while the magnitude of this effect may be lower or higher in other states and districts, , it is reasonable to expect that redistricting from a safe district of one party to a safe district of another will still have a positive impact on turnout and votes for the formerly disadvantaged party.

All these insights show the need for further research: The factors that could influence the dimensions of the treatment effect may be an interesting research area. However, arguably more important is finding ways to account for fluctuating turnout in simulation methods, as they are not only the standard in academia but also used in court cases to determine whether a redistricting plan is gerrymandered or not.

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Table I

	Dependent variable:				
	Turnout	Republican Votes	Democrat Votes	Republican Share	Democrat Share
	(1)	(2)	(3)	(4)	(5)
2018	-0.144***	-168.022***	-60.645**	-0.288***	0.038*
	(0.018)	(19.334)	(18.888)	(0.015)	(0.016)
2020	0.027	41.996*	20.829	0.055***	-0.015
	(0.018)	(19.443)	(18.995)	(0.015)	(0.017)
Treatment	0.006	14.172	-186.209***	0.225***	-0.224***
	(0.039)	(42.162)	(41.190)	(0.032)	(0.036)
2018:Treatment	0.003	105.625	42.709	0.260***	0.019
	(0.055)	(59.615)	(58.239)	(0.045)	(0.051)
2020:Treatment	-0.028	-47.425	-2.163	-0.061	0.060
	(0.055)	(59.650)	(58.274)	(0.046)	(0.051)
Constant	0.633***	220.494***	380.526***	0.332***	0.627***
	(0.013)	(13.696)	(13.380)	(0.010)	(0.012)
Observations	1,727	1,787	1,787	1,787	1,787
R^2	0.062	0.071	0.039	0.329	0.055
Adjusted R^2	0.059	0.068	0.037	0.327	0.052
Residual Std. Error	0.289 (df = 1721)	316.503 (df = 1781)	309.201 (df = 1781)	0.241 (df = 1781)	0.269 (df = 1781)
F Statistic	22.748*** (df = 5; 1721)	27.045*** (df = 5; 1781)	14.599*** (df = 5; 1781)	174.631*** (df = 5; 1781)	20.679*** (df = 5; 1781)

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

Table II

	Dependent variable:			
	Turnout			
	OLS			*Panel FE*
	(1)	(2)	(3)	(4)
	No Controls	Ethnic Demographics Controls	County Controls	
Post	-0.220***	-0.219***	-0.223***	-0.223***
	(0.015)	(0.014)	(0.014)	(0.006)
Treatment	-0.001	-0.023	-0.203***	
	(0.021)	(0.021)	(0.043)	
Post:Treatment	0.048	0.047	0.051	0.052**
	(0.043)	(0.042)	(0.041)	(0.019)
Constant	0.594***	-0.839***	0.733***	
	(0.007)	(0.147)	(0.028)	
Observations	2,268	2,268	2,268	2,268
R^2	0.098	0.136	0.177	0.432
Adjusted R^2	0.097	0.134	0.166	0.235
Residual Std. Error	0.277 (df = 2264)	0.272 (df = 2262)	0.267 (df = 2237)	
F Statistic	82.256*** (df = 3; 2264)	71.363*** (df = 5; 2262)	16.014*** (df = 30; 2237)	640.149*** (df = 2; 1684)
Note:	*p<0.05, **p<0.01, ***p<0.001			

Table III

	Dependent variable:			
	Republican Votes			
	OLS			Panel FE
	(1)	(2)	(3)	(4)
	No Controls	Ethnic Demographics Controls	County Controls	
Post	-24.231	-23.505	-23.397	-21.105**
	(15.618)	(14.337)	(14.030)	(7.896)
Treatment	34.309	-5.389	163.455***	
	(23.427)	(21.299)	(43.582)	
Post:Treatment	-34.653	-35.378	-35.486	-37.778
	(46.979)	(42.331)	(42.099)	(23.559)
Constant	177.750***	1,286.710***	119.556***	
	(7.619)	(148.709)	(28.661)	
Observations	2,349	2,268	2,349	2,349
R^2	0.002	0.191	0.209	0.008
Adjusted R^2	0.001	0.190	0.198	-0.335
Residual Std. Error	304.556 (df = 2345)	273.779 (df = 2262)	272.838 (df = 2317)	
F Statistic	1.911 (df = 3; 2345)	107.030*** (df = 5; 2262)	19.744*** (df = 31; 2317)	7.091*** (df = 2; 1744)
Note:				*p<0.05, **p<0.01, ***p<0.001

Table IV

	Dependent variable:			
	Democrat Votes			
	OLS			Panel FE
	(1)	(2)	(3)	(4)
	No Controls	Ethnic Demographic Controls	County Controls	
Post	-161.787***	-163.461***	-162.577***	-163.396***
	(14.643)	(13.126)	(12.792)	(4.840)
Treatment	-172.404***	-113.863***	97.544*	
	(21.964)	(19.500)	(39.735)	
Post:Treatment	100.845*	102.519**	101.635**	102.454***
	(44.045)	(38.756)	(38.382)	(14.443)
Constant	366.965***	752.449***	233.231***	
	(7.143)	(136.149)	(26.131)	
Observations	2,349	2,268	2,349	2,349
R^2	0.073	0.284	0.305	0.399
Adjusted R^2	0.072	0.282	0.296	0.191
Residual Std. Error	285.538 (df = 2345)	250.655 (df = 2262)	248.753 (df = 2317)	
F Statistic	61.868*** (df = 3; 2345)	179.161*** (df = 5; 2262)	32.819*** (df = 31; 2317)	579.803*** (df = 2; 1744)
Note:				*p<0.05, **p<0.01, ***p<0.001

Table V

	Dependent variable:			
	Republican Share of the Vote			
	OLS			Panel FE
	(1)	(2)	(3)	(4)
	No Controls	Ethnic Demographics Controls	County Controls	
Post	0.157***	0.161***	0.157***	0.157***
	(0.015)	(0.010)	(0.013)	(0.010)
Treatment	0.292***	0.205***	0.082	
	(0.022)	(0.015)	(0.042)	
Post:Treatment	-0.141**	-0.145***	-0.141***	-0.141***
	(0.044)	(0.029)	(0.040)	(0.031)
Constant	0.253***	0.392***	0.342***	
	(0.007)	(0.102)	(0.027)	
Observations	2,349	2,268	2,349	2,349
R^2	0.114	0.620	0.263	0.118
Adjusted R^2	0.113	0.619	0.253	-0.188
Residual Std. Error	0.285 (df = 2345)	0.187 (df = 2262)	0.261 (df = 2317)	
F Statistic	100.792*** (df = 3; 2345)	738.470*** (df = 5; 2262)	26.633*** (df = 31; 2317)	116.244*** (df = 2; 1744)
Note:				*p<0.05, **p<0.01, ***p<0.001

Table VI

	Dependent variable:			
	Democrat Share of the Votes			
	OLS			Panel FE
	(1)	(2)	(3)	(4)
	No Controls	Ethnic Demographics Controls	County Controls	
Post	-0.046**	-0.050***	-0.046***	-0.048***
	(0.014)	(0.004)	(0.012)	(0.003)
Treatment	-0.198***	-0.088***	0.053	
	(0.021)	(0.007)	(0.038)	
Post:Treatment	0.046	0.050***	0.047	0.049***
	(0.043)	(0.013)	(0.037)	(0.008)
Constant	0.635***	0.656***	0.507***	
	(0.007)	(0.046)	(0.025)	
Observations	2,349	2,268	2,349	2,349
R2	0.046	0.911	0.300	0.170
Adjusted R2	0.045	0.911	0.290	-0.117
Residual Std. Error	0.277 (df = 2345)	0.085 (df = 2262)	0.239 (df = 2317)	
F Statistic	37.492*** (df = 3; 2345)	4,648.460*** (df = 5; 2262)	31.986*** (df = 31; 2317)	179.097*** (df = 2; 1744)
Note:				*p<0.05, **p<0.01, ***p<0.001

Is a Lesser Evil Good Enough?

Voting Trends in the 2016 and 2020 U.S. Presidential Elections

Liam Zuckerman[1]

Abstract

Lesser-of-two-evils voting is a theory of electoral behavior that suggests that, when faced with two options they dislike, voters should choose whichever candidate they feel will cause less harm. In recent years, messaging around presidential campaigns has increasingly appealed to this principle, especially in the Democratic Party. This paper examines American National Election Studies (ANES) data from the 2016 and 2020 U.S. presidential elections to determine whether Americans actually turn out for a "lesser-evil" candidate. It discovers that lesser-evil voting is observable in the general population, typically with higher rates for Democratic candidates than for Republicans. However, among populations that dislike both major-party candidates, a large proportion tends to abstain from voting or, less frequently, to vote for a third party. Breaking down the voting patterns by perception of the candidates' personalities further reveals that a strong impression of both candidates is required for lesser-evil messaging to be effective, and much of the population choosing between two "evils" appears not to have such a high interest in the candidates. Lesser-evil voting for Democratic candidates is more observable in certain subpopulations that risk losing civil rights, though qualitative evidence from the 2024 election suggests that these effects might have gotten weaker. While voters do often settle for a lesser-evil candidate, such decisions come as the result of both stellar messaging and an informed populace, and the phenomenon is probably not a salient enough effect to continue to drive campaign strategy to the extent that it appears to do today.

"If you want Donald Trump to win, then say that. Otherwise, I'm speaking."

That was Kamala Harris' response to a crowd of pro-Palestine protesters who had interrupted a Detroit rally near the beginning of her bid for the presidency. The group belonged to the Uncommitted National Movement, a coalition of historically Democratic voters who were threatening to abstain from voting for Harris to pressure the party into taking a harder stance on Israel (Sullivan 2024). In her retort, Harris chose not to respond to the group's specific concerns, but to attempt to recenter the problem as a fight against Donald Trump.

She would use the framing, "Vote for me to stop Trump," throughout her campaign. She focused on abortion rights and the

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preservation of democracy, arguing that Trump would strip away a woman's right to make decisions about her body—and that he might even become a dictator, destroying the democratic ideals that American society depends on (Reuters 2024).

But many voters felt that Harris was proposing very little, actual policy. While some political enthusiasts had read through her lists of progressive economic proposals, for most Americans, the ads, debates, and press conferences failed to convey a satisfactory view of what she would do, as opposed to what she might prevent. She relied, in short, on fear of Trump to get the job done. Clearly, that was not enough.

How did American society get here? Why is it that, ever since Donald Trump entered the political stage, Democrats seem only to have been able to attack him, rather than to present themselves as compelling candidates on their own terms?

The answer might lie in the fact that Democrats have been trying to leverage a longstanding dynamic of the American two-party system: lesser-of-two-evils voting. For almost as long as the United States has existed, this conundrum has burdened the electorate. If someone is faced with two options they might not like, which should they go with? Political theorists might say it is an easy question to answer. After all, it was back in 322 B.C. that Aristotle wrote in Nicomachean Ethics, "For the lesser evil can be seen in comparison with the greater evil as a good, since this lesser evil is preferable to the greater one, and whatever preferable is good" (Hogan 2024).

The lesser-evil strategy seems to have worked for President Joe Biden in 2020, but does asking voters simply to settle work in general? Is it really an easy calculus for the single mother working two full-time jobs who has neither the time nor the energy to keep up with the news? Even if she is worried about losing certain rights, such as access to abortion, is that threat enough to counteract the allure of Trump's promises of economic prosperity and decreased crime—especially when no such assurances from Democrats have reached her ears? What about those voters who do not feel they have much to lose if Trump regains power? Or, conversely, those voters who place more weight on a particular evil that even the better of the two might cause, as with those Uncommitted protesters?

This paper first examines the history of lesser-evil voting as a democratic principle and considers the extent to which the Democrats have relied on such messaging in recent years. Then, it will dissect data from the 2016 and 2020 elections in order to answer the central question in regard to this strategy: Do people actually get themselves out to vote for the lesser evil? If so, what are the characteristics of candidates that motivate them to do so?

THE HISTORY OF LESSER-EVIL VOTING

When establishing the American representative democracy, the Founding Fathers presumably hoped that giving the people the power to vote would ensure that every election, no matter the victor, would result in an outcome that satisfied a majority or near-majority of the electorate. For the first few years of the Union, this seemed more or less to hold true. But as the country's two major parties solidified, and presidential-candidate nominations became strictly partisan affairs, the question of whether the outcome of the election would be acceptable came down to one variable: Could at least one of the parties nominate an acceptable contender? If not, if both nominees were perceived as deeply flawed, there would be a lot of unhappy voters, no matter the winner (Hogan 2024).

Lesser-evil voting became particularly relevant in the runup to the Civil War, when both parties nominated unpopular candidates, and voters looked merely to vote for whomever they believed would do less harm (Hogan 2024). Since then, this dynamic has been a major component of most elections—increasingly so, as polarization has skyrocketed and politicians' ties to corporate interests have further removed them from the constituencies they are meant to represent (Druckman et al. 2013). Conventional political wisdom suggests that people should just vote for the lesser evil to get through four more years, just as voters have done since the mid-19th century (Hogan 2024).

Many politicians have tapped into this assumption, as evidenced by the spike in "negative campaigning" in recent elections. Instead of promoting a particular candidate, such initiatives spend most of their time and money on attack ads aimed at smearing their opponent's image. By the end of the 2024 election, 99% of pro-Trump ads and about 95% of pro-Harris ads were attack ads or "contrast" ads (constituting attacks with a little positive messaging mixed in) (Geer 2012; Wesleyan Media Project 2024). Clearly, both parties were buying into the idea that portraying their opponents as evil threats to the country constituted effective strategies. There is evidence that, for already polarized voters, a strong dislike of the opponent increases turnout, and attack ads might also help to demobilize more politically withdrawn voters who do not support their candidate particularly strongly (Ahn and Mutz 2023). On a macro level, though, the Democrats' recent campaigns were notable in that their most prominent messaging was framed as stopping the harm that Trump might cause. Whether because of his rather unpresidential approach to foreign affairs, his touting of abortion restrictions, or his role in the January 6th, 2021, attack on the U.S. Capitol and potential threat to democracy, Democrats clearly appealed to a lesser-evil voting strategy. On the other

hand, while Trump routinely mocks and villainizes his opponents and the left, he consistently grounds his campaign in his policy and cultural agenda (Reuters 2024).

More recently, scholars have begun to recognize nuances that complicate this lesser-evil voting strategy. Shrinking audiences for televised and print media, and a surge of online news outlets, have widened the knowledge gap between hyper-informed "political junkies" and the much less well-versed average American (Curran et al. 2009). If, at first glance, it looks like neither candidate is likely to advocate for them, it seems plausible that most Americans will check out and not bother putting in the time and energy to learn which might be the less bad of the two. Negative ad campaigns are presumably aimed at combating this apathy, but research on the effectiveness of large-scale appeals to lesser-evil voting is essentially nonexistent, so it is unclear whether or not such strategies work. One of the only effects supported by research is that people are turned off by politicians who have tried to buy votes, but other forms of "evil"—like welfare coercion—seem to sway voters less (Mares and Visconti 2018). There is also some indication that minority groups in particular are more likely to settle for a lesser-evil candidate, particularly the Democratic candidate, because they feel themselves at risk of losing rights and liberties should the greater evil be elected (Hogan 2024).

Many more ideologically extreme voters, especially those on the left, have voiced objections to the concept of lesser-evil voting in recent years. Though a much smaller and arguably trivial part of the electorate, this highly educated group refuses to vote for a major-party candidate, even if they feel they are the less-bad option, because they regard the harm that candidate might cause as unconscionable. The Uncommitted movement is probably the most prominent example, but some libertarians and independents further to the right also subscribe to this notion (Halle and Chomsky 2016; Timotija 2024).

Because lesser-evil voting is, at its core, a logically valid way to approach a democratic election, it likely continues to animate the American populace to a certain extent. On the other hand, the apathy felt by most Americans toward politics—not to mention the moral and intellectual objections raised by some of those extremist voters—might mean that the rates of lesser-evil voting required to justify the recent surge in attack ads and the framing of Democratic campaigns over recent years will be absent from actual voting data.

METHODS

This paper's central goal is to determine whether, in situations where voters dislike both presidential candidates—e.g., they are dealing with a lesser-evil scenario—they are likely to vote for a

candidate that they deem less bad. I use American National Election Studies (ANES) survey data aggregated from the 2016 and 2020 election cycles, as both represent elections during which national opinion suggested a choice between two evils, and where Democrats relied heavily on lesser-evil messaging. I aggregate the data from both cycles, rather than considering them independently, because it would be almost impossible to analyze the effect of cycle-specific messaging with the provided ANES data, and because combining them gives a larger total sample size more indicative of overall population trends. The contexts for both elections are very different, but polls from both cycles indicate large proportions of the electorate with unfavorable views toward both candidates, so-called "double haters" (Pew 2017; Pew 2023). The proportion was notably higher in 2016 than in 2020, though both were higher than the typical election. However, because I analyze the machinery of lesser-evil voting, not people's specific political motivations to vote, aggregate data should more accurately reflect the prevalence of lesser-evil voting in democracies in general.

In the ANES, respondents (R) are asked two rounds of questions concerning their feelings about the major-party candidates:

a. Is there anything that R likes about the Democratic presidential candidate?

b. Is there anything that R dislikes about the Democratic presidential candidate?

a. Is there anything that R likes about the Republican presidential candidate?

b. Is there anything that R dislikes about the Republican presidential candidate?

For a given respondent R, parts (a) determine whether they feel that they are deciding between two evils; if they respond "no" to both questions, they do not like either candidate, so they are in the population operating under lesser-evil voting theory.

I only examine this subset of the total survey population for all data analysis because, in general, if a voter likes a candidate, they will vote for them without feeling like they are choosing between two evils. In any election, there will be hardliners who back their candidate enthusiastically, but they are not relevant to an examination of whether voters will support a lesser-evil candidate or whether lesser-evil voting messaging works.

Continuing with the "lesser-evil subset," I then turn to part (b) of the questions. In order to answer the broadest question of whether people tend to vote for a lesser evil at all, I create a contingency table of which candidate(s) R dislikes (both, Democrat, Republican, or neither) and how they vote (Democrat, Republican, third party or did not vote). If a respondent dislikes one candidate, if they respond "yes" to part (b)

of one question, then the opposite candidate can be considered the lesser evil: They do not like either, but they have a marked dislike for just one.

Within the same subset of voters, I examine a different metric for perception of a lesser-evil candidate. Respondents are also asked to rate on a scale of 1 (extremely) to 5 (not at all) how well they feel different traits—"honest," "strong leadership," "really cares" and "knowledgeable"—apply to both major-party candidates. None of the traits stand out as better predictors than the others for vote choice, so I create a combined metric for candidate perception, where positive values correspond to a preference for the Democratic candidate and negative values correspond to a preference for the Republican candidate. This yields a numerical, rather than a categorical, measure of a respondent's sense of which candidate is the lesser evil, called "preference." A multinomial logistic regression is then performed to determine the effect that overall preference for a given candidate (again, in the population that broadly likes neither candidate) has on a respondent's probability of voting for them, as opposed to not voting.

In order to see whether Democratic messaging specifically succeeds in convincing voters that the Democratic candidate is the lesser evil, I look at the rates of dislike for the opposing candidate within parties in the same subset of voters who do not like either candidate. I use a 7-point scale for party ID, counting "strong Democrat" (1), "not very strong Democrat" (2) and "Independent-Democrat" (3) as Democratic; "strong Republican" (7), "not very strong Republican" (6) and "Independent-Republican" (5) as Republican; and "Independent" (4), Independent.[2] For the two party groups, I compare the rates of dislike for the opposing candidate, under the assumption that stronger lesser-evil messaging will result in higher rates of dislike for the opposing candidate. This is based on extensive research suggesting that voters who identify with a certain party are much more likely to receive messaging aligning with their party, due primarily to selective exposure (Bakshy et al. 2015). For the Independents, I compare the rates of dislike for the two candidates to see which way the uncommitted group is swayed—again, presumably through messaging.

I also study the likelihood that different sub-populations will vote according to the lesser-evil. Reigning political theory suggests that voters who feel they are at risk of losing rights and liberties are more likely to settle for a lesser evil in the face of no good viable options. Therefore, I examine whether minorities in sex (women), race (non-whites), sexuality (non-heterosexuals) and immigration status (immigrants) are

2 I count the "Independent-[party]" categories as in-party, rather than independent, because most current research in the era of polarization suggests that there is almost no difference between "leaners" and true party members; leaners vote along party lines almost as often as true members do (Druckman et al. 2013).

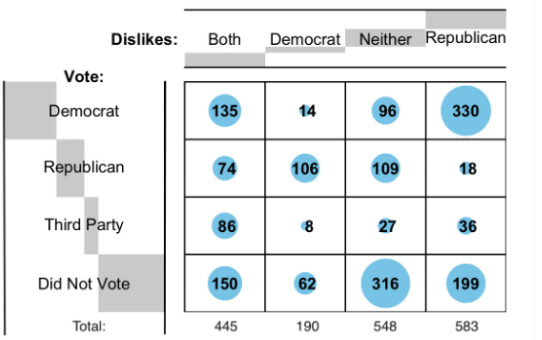
more likely to vote for the Democrat than their majority counterparts, given that they perceive the Democratic candidate as the lesser evil (again, determined by a dislike of the Republican candidate). I only analyze the Democratic vote because Democrats tend to place more emphasis on protecting civil rights than Republicans, so it stands to reason that only voters who feel that the Democratic candidate is the lesser evil will be considering loss of their civil rights while making their decision.

RESULTS

There are 12,550 total respondents in the combined 2016 and 2020 ANES. Of these, I examine a subset of 2110 respondents who report not liking anything about either major-party candidate, about 17% of the total respondents. This is not a very large percentage, and it probably does not represent the actual proportion of the population who feel that these elections were between two evils, as the criterion for selection for this subset is very strict: Respondents must not like *anything* about either candidate. It is possible, therefore, that there are many respondents who do like at least one thing about at least one candidate, but who still feel that the election consists only of bad options overall. However, as the ANES does not offer any more specific relevant numerical questions, and this subset definitely does consist only of people who feel they are voting between two evils, it nonetheless provides insight into overall lesser-evil voting patterns.

Figure 1 displays the counts for each vote option by disliked candidate(s). It immediately suggests from inspection that respondents tend not to just dislike the Democratic candidate, as that group is by far the smallest, with 190 corresponding respondents. The largest group, with 583 respondents, is the group that only dislikes the Republican candidate (Trump). This is an early indication that Democratic messaging that Trump is a worse or dangerous option is successful. However, the remaining two groups, both of which represent respondents feeling that neither option is less bad, sum to 993, about 47% of the total examined subset, which is larger than the sum of the two lesser-evil groups (773, 37%). This could indicate

Figure 1



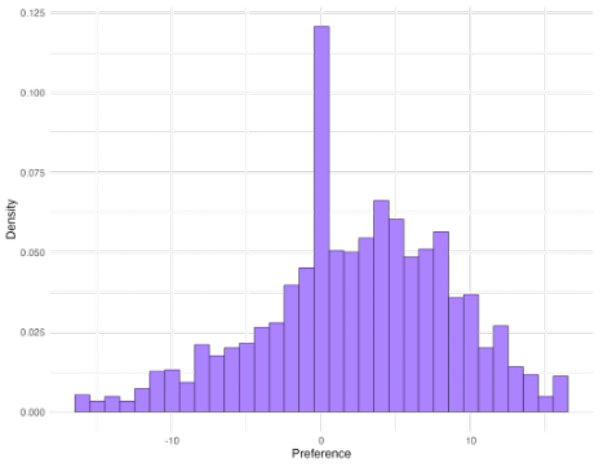
A contingency table showing the counts for each vote option (Democrat, Republican, third party or no vote) according to the candidate(s) about which respondents reported disliking something. Totals for each dislike category are shown beneath each column, and the blue bubbles represent the relative proportion of votes in each category. The total counts in this table are less than in the total subset because respondents who did not answer both "dislike" questions are omitted.

that, in general, when voters feel that they are choosing between two bad options, they often do not care to differentiate between lesser evils.

Moving on to the next metric for defining "lesser evil," I examine the effect that a respondent's opinion of a candidate's adherence to a combination of positive traits—namely honesty, leadership, caring and knowledgeability—has on their likelihood of voting for them. This method reveals more specifically how respondents' perceptions of candidates' personalities influence their vote choice, as opposed to the previous method, where "dislike" was unspecified and could, for different respondents, pertain to policy, personality or some other factor.

The preference metric, which ranges from -16 (strong preference for the Republican) to 16 (strong preference for the Democrat), is, as expected, correlated with vote choice by inspection and somewhat normally distributed—though there is a slight bias toward the Democratic candidate and a strong bias for no preference whatsoever (preference = 0) (figure 3). To determine the strength and effect of this correlation, however, I create a model of the relationship using a multinomial logistic regression. Not voting is used as the baseline vote choice for the regression, under the assumption that voters who do not like either candidate will not be inclined to vote at all, but a preference for one will sway their vote in that direction. The alternative vote choices are therefore Democrat, Republican, and third party, with the regression giving the probability that a respondent will vote for each choice based on the preference metric. Figure 4 shows the modeled relationship, as well as the exact

Figures 2 and 3



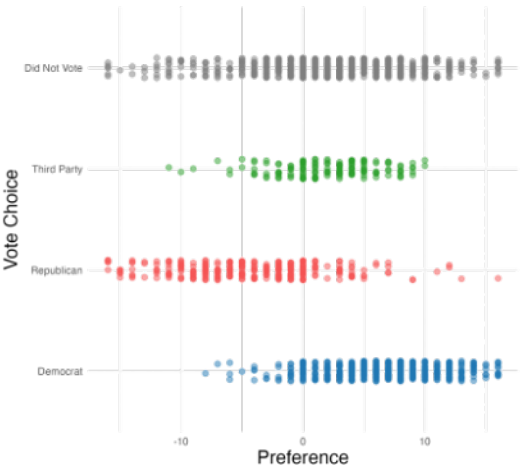
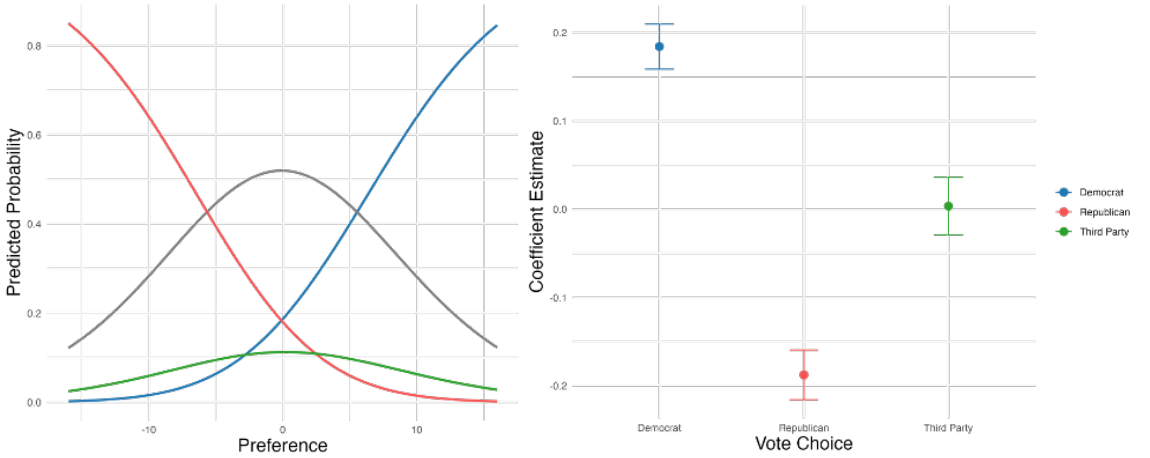


Figure 2: (Left) Histogram showing the -16 – 16 preference metric distribution for the subset of 2110 respondents.
Figure 3: (Right) Actual votes for all respondents in the subset, as a function of the preference metric.

Figure 4



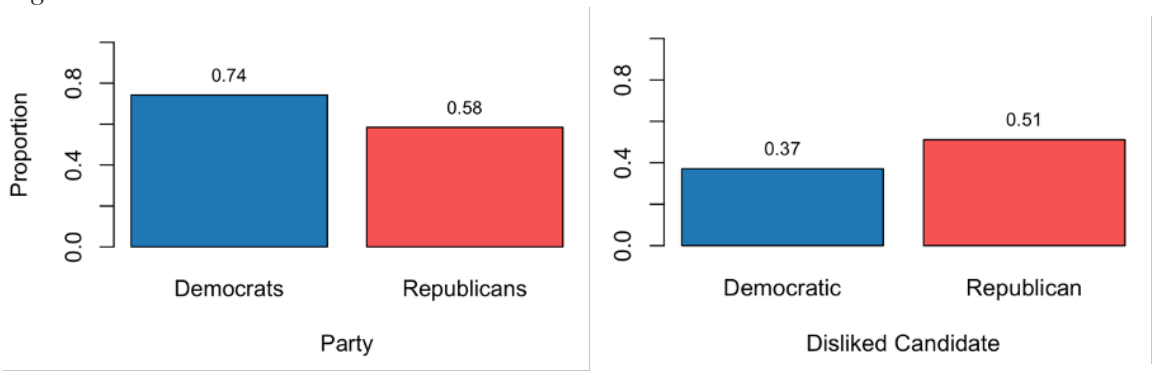
(Left) Multinomial logistic regression model of preference effect on vote choice. Baseline (no vote) is shown in grey, with respective party votes overlaid.
(Right) Calculated multinomial logistic regression coefficients for each of the alternative options with 95% confidence intervals. Note that the third-party coefficient is not significantly different from 0.

coefficients for each of the three voting groups.

The calculated coefficients are 0.184, -0.188, and 0.004 for the Democratic, Republican and third party candidates, respectively, though only the former two are statistically significant ($p_{D,R}$<10-7; p_{TP} = 0.83). The strength of the effect of preference on vote choice probability, therefore, is not significantly different for Democrats and Republicans, and while there is a very slight bias toward preference for the Democrat in the third-party voters, it is not significant. On the whole, however, preference does tend to be a good predictor of vote choice when it is sufficiently far from 0 (no preference). When voters feel strongly that one candidate's personality is better suited to hold office, they are more inclined to vote for them, even if they do not like anything about the candidates. It is important to note from figure 3, however, that there is still a large proportion—about 15.6%—of voters in the subset who have no preference whatsoever between the candidates' personalities, again indicating that many voters who feel they are choosing between two bad options do not care to select a lesser evil.

To analyze the effect of in-party messaging on the lesser-evil calculus, I next examine the level of polarization of respondents of different parties against the opposing candidate. Figure 5 shows the rates of dislike for the opposite party's candidate by party ID, as well as the rates of dislike for each of the major-party candidates among independents. About 74.3% of Democrats report disliking something about the Republican candidate, which is significantly more than the 58.5% Republicans who report disliking the Democratic candidate (p = 10-10). The 684 independents in the relevant subset, about 32%, also tend to dislike the Republican candidate more, with

Figure 5



(Left) Proportions of party members who report a dislike for the opposing party's candidate.
(Right) Proportions of independents who report a dislike for each of the major-party candidates.

about 51.2%, compared with 37.1% for the Democrat (p = 10-7).

In general, it seems that Democrats are more effective than Republicans at convincing members of their party that the opposing candidate is the greater evil. The message also seems to have reached independents, as they too are more inclined to perceive the Republican candidate as the worse of the two.

Finally, I consider the strength of this lesser-evil voting effect—now confirmed to some extent, if weak in many populations—among minority groups versus their more privileged counterparts. Among women in the subset who dislike the Republican and therefore perceive the Democrat as the lesser evil, about 79% actually vote for the Democratic candidate, compared to about 82% of men. When it comes to sex, then, it appears that the minority at risk of losing rights is not more inclined to vote for the lesser evil.

Race, sexuality and immigration status show a different story, however. About 61% of non-white respondents vote for the Democrat, as opposed to just 54% of white respondents, marking a significantly greater lesser-evil effect for the minority group (p = 0.0082). Examining sexuality provided similar results, with about 65% of queer people and 56% of heterosexual people voting for the Democrat (p = 0.0200). Finally, immigration status resulted in the largest difference, with 69% of immigrants compared with 54% of citizens voting for the Democrat (p = 0.0002).

CONCLUSIONS

When faced with two unfavorable options for president, Americans often vote for the one they weakly prefer. In recent elections, this has been especially true for Democrats, who, even when they do not like either candidate, tended to dislike Trump over their own candidate more often than Republicans disliked the Democratic candidate. In general, when a voter is able to

recognize one candidate as being the lesser of two evils, they are significantly more likely to vote for this person than they are to vote for a third party or to abstain from voting. When voters have strong perceptions of both candidates' personalities and much prefer one to the other, they are significantly more likely to vote for the candidate they prefer—again, even after reporting broadly not liking either candidate. This becomes even more true for minorities in respect to race, sexuality and immigration status, all of whom are more likely than their majority counterparts to settle for a lesser-evil Democratic candidate.

However, more than half of the time that voters dislike both candidates, they fail to select a major-party candidate they like more. Whether it is because they are generally withdrawn from politics or because they hold strong political ideologies and refuse to compromise, these voters often do not bother with picking the worse of two options and instead abstain from voting altogether.

In 2024, it seems that the second kind of voter became even more influential. Confronted with no obvious "good" answer, and perhaps no strong preference for one candidate's personality over the other, many voters appear to have stayed home, resulting in a marked decline in turnout from the previous two presidential elections (Bender 2024). Even though people are generally willing to vote for a lesser evil once convinced, it is the convincing that seems to pose a barrier—especially for the Democratic campaign, which has tended to rely much more heavily on lesser-evil voting than has the Republican campaign. Plus, dramatic shifts in voting demographics might have meant that some immigrants, traditionally the most willing group to settle for the Democratic lesser evil, either refrained from voting or voted for Trump (Sherman 2024). And, though Democrats might have been hoping that women would turn out in numbers for Harris after the Dobbs decision overturning federal access to abortion, women have historically been no more likely to settle for a Democratic lesser evil than men have, and 2024 seems to have been no exception (Sherman 2024).

While lesser-evil voting is observable in large American voter populations, it is a relatively weak effect that relies on stellar messaging reaching even the most politically withdrawn citizens. Campaigns, particularly Democratic ones in the Trump era, might therefore want to consider abandoning their reliance on lesser-evil voting. By now it should be clear that the most reliable way to get people to vote for a candidate is not to give them something to vote against, but something to vote for.

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The Missing Top

Describing the Absence of Large Firms in Developing Economies

Juan Pablo Fernandez[1]

Abstract

The "Missing Top" concept reflects the absence of large firms in poorer nations and emphasizes development policies aimed at large firms' growth. Economic theory has traditionally attributed economic growth to production factors, technology, and human capital. These explanations are of obvious importance, but they imply an abstract approach. However, firms are a concrete manifestation of the production factors just mentioned. In fact, economies with the largest wealth, measured in terms of GDP, are closely related to the size and number of large firms that they have. Even though these two factors, GDP and the number of large firms, are entirely correlational, statistical analysis helps to describe key insights of this relationship. This article shows that the accumulation of global GDP in a handful of countries, and the accumulation of large firms in those same countries, both follow a particular power-law distribution. The purpose of this is to underscore the consequent implications for both economic inequality studies and development policy. Firstly, that power laws are an accurate tool to describe the dynamics of global inequality. Secondly, it suggests that policies enabling the growth of large firms could have profound positive implications for development both at an aggregate and at a micro level, but are overlooked as the support of large firms is often regarded as an unpopular take.

INTRODUCTION

The "Missing Top" phenomenon highlights a critical yet often overlooked constraint on economic growth in developing countries: the absence of large firms. Traditional economic growth theories emphasize factors such as capital accumulation, technological advancement, and human capital development. While these are undeniably important, they provide an abstract framework that often neglects the tangible, structural components driving wealth accumulation. This paper argues that the concentration of economic power within a small number of large firms is not merely a characteristic of advanced economies but a fundamental driver of their growth. By examining the distribution of global GDP alongside the presence of large firms, a pattern governed by power laws is revealed. This suggests that fostering large enterprises is among the most relevant factors, though

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not the only, for meaningful economic development.

Power laws, an essential concept in the present analysis, describe relationships where a few large values dominate while many small values are much more common. This pattern appears in natural and social systems, from earthquake sizes to city populations. For example, Zipf's law, a specific type of power law, often applies to economic data, showing that a small number of countries or firms hold a disproportionate share of global wealth and business influence. By using power laws, we can better understand the unequal distribution of GDP and the dominance of the world's largest firms, revealing underlying structures in the global economy.

In the following sections, the paper first explores the importance of large firms in economic growth, illustrating their role through empirical data and historical context. Then, it delves into the heavy-tailed distribution of wealth, using power laws to analyze the concentration of GDP and firm revenues. Later it examines the geographical distribution of large firms, identifying patterns of accumulation and absence across different countries. Finally, the paper discusses the role of policy in supporting the growth of large firms.

THE IMPORTANCE OF LARGE FIRMS IN ECONOMIC GROWTH

In just a few companies, and in just a few countries, there is an enormous accumulation of wealth. Considering the estimate that global Gross Domestic Product reached $109,931 billion in 2024 (IMF 2025), the revenues of the top 2000 companies of Forbes' Global List (Forbes 2024) account for 47% of global GDP. Additionally, two countries, the U.S. and China, are home to 901 of these companies (45%). The sum of these same two countries' GDP accounts for approximately $47,441 billion dollars; this would be 43% of global GDP. To recap:

- The revenues of the 2000 largest companies are **47%** of the World's GDP
- **45%** of the largest companies are located in the U.S. or China.
- **43%** of the World's economic output is generated by just these two countries.

In 1906, economist Vilfredo Pareto demonstrated in his book, "Cours d'économie politique," that approximately 80% of the land in the Kingdom of Italy was owned by 20% of the population. Later, in 1946, the management expert, Joseph M. Juran, who led the development of the widely practiced business methodologies referred to as Six Sigma and lean manufacturing, popularized

the Pareto Principle, "also known as the 80-20 rule, which states that 80 percent of consequences stem from 20 percent of causes" (Bunkley 2008).

Well, the economic accumulation described in the opening paragraph of this section could be more aggressive than the famous Pareto Principle: The U.S., a country with approximately 4.2% of the world's population, accounts for about 31.1% of the largest firms. These proportions will be explored further in later sections. For now, note the nature of the contribution of the largest firms in the world's economy. Large firms not only affect a nation's aggregate economic numbers but also significantly contribute to national economic performance at a micro level through employment, innovation, productivity, trade, fostering local supply chains, and so on.

In 1977, the American business historian Alfred Chandler pointed out how companies sought to achieve economies of scale by expanding their operations and standardizing production processes. This allowed them to reduce costs and compete more effectively. Moreover, companies began to consolidate various stages of production and distribution under one management to improve efficiency and coordination. Large companies have originated from this professionalization of management, and from the stock exchange markets that enabled the enlargement of funding opportunities and their ability to reach economies of scale (Chandler 1977). This has been the story of economic development in the last two centuries, and today, the World Bank acknowledges and details this phenomenon.

In 2021, the World Bank published the report "Making it Big! Why Developing Countries Need More Large Firms," supporting the idea that firms play an important role in economic growth, and that their absence is hindering development among the least developed countries (Ciani et al. 2021). The report also highlights how large firms are able to offer higher wages and better non pecuniary returns to workers such as training and specialization, job stability, a contract, health insurance, and social security benefits. This is a considerable contribution to development, since small and medium enterprises generally have more difficulty to provide all those benefits for their employees.

Different from medium or small enterprises (the most common in developing countries), larger firms have resources to invest in research and development, which can lead to the development of new products, processes, and technologies, which are known to be drivers of economic growth (Ciani et al. 2021).

The economic spillovers to the wider economy caused by large firms in developing countries are well documented. In Mexico, "As a host of a long-term flow of investment from Nissan, the State of Aguascalientes has

not only experienced an important economic growth, but also has benefited from the development of local suppliers and their integration into the Global Value Chains" (Mendoza 2018). Moreover, a single company which is a Top 5 among Mexican firms, FEMSA, gives formal employment to over 600,000 people (Expansion 2024), in a country where roughly 55% of the labor force works in the informal sector. Examples in this regard could be found in various other economies.

Going back to the macroeconomic perspective, this table shows a sample of countries in different stages of development, showing the number of firms from Forbes Global 2000 list that they have, the sum total revenues of these firms, and the size of the country's GDP for reference (To see complete with all the countries table see Appendix 2):

The last column helps visualize how the revenues of just the top global companies' account for substantial shares of GDP, despite variation. With this table, the objective is only to depict the size of these economic agents. Note that revenues of the companies can exceed the host country's GDP (happens with Switzerland, Japan, Hong Kong, among others); this is because firms' revenues reflect the total income from

Table 1 - Revenues of Top Companies as share of GDP (US$)

Country	Number of Forbes Global 2000 firms	Revenues of top firms (Billions)	GDP 2024 (Billions)	GDP Percent
United States	621	$18,711	$29,168	64%
China	280	$7,908	$18,273	43%
Japan	181	$4,288	$4,070	105%
India	71	$1,269	$3,889	33%
United Kingdom	66	$2,076	$3,588	58%
South Korea	61	$1,653	$1,870	88%
Canada	59	$1,270	$2,215	57%
Germany	50	$2,299	$4,710	49%
France	49	$2,018	$3,174	64%
Brazil	26	$669	$2,188	31%
Sweden	25	$324	$609	53%
Ireland	22	$400	$561	71%
Saudi Arabia	16	$608	$1,101	55%
Thailand	16	$253	$529	48%

Source: self-elaboration with data retrieved from the World Economic Outlook (IMF, 2025) and the Forbes Global 2000 List (2024 version).

all of their operations worldwide, not just within the borders of the country.

The Forbes Global 2000 list, a well-known and comprehensive ranking with a global scope, is considered here, as it is a useful reference for analyzing the size distribution of the world's largest firms. The Forbes Global 2000 ranking provides a broad and well-curated selection of the most significant companies globally from any sector of the economy, incorporating multiple financial metrics like revenues, profits, assets, and market value (Murphy 2024). From the list, the variable taken for the present analysis is Revenue, as it is a straightforward measure of economic activity and market reach, making it a good proxy for firm size. However, it is important to note that Forbes does not include Russian or Iranian firms, and that there is another selection bias issue: The Forbes methodology prioritizes large, publicly traded firms (Murphy 2024), potentially overlooking significant private firms or state-owned enterprises.

HEAVY-TAILED DISTRIBUTION OF WEALTH, DESCRIBED BY POWER LAWS

Empirical observations show that there are important differences between the largest economies and the rest of the economies in the world. However, a more precise way to measure those differences is to analyze the data set of economic entities using skewed distributions, or Power Laws: Pareto distribution, Zipf distribution, and Polynomial distribution. The most known power law distribution is Zipf's law.

In his article "Power Laws in Economics: An Introduction," French economist Xavier Gabaix stated "that a series of power laws count as actually nontrivial and true laws in economics—and that they are not only established empirically, but also understood theoretically" (2016). This article gives a formal definition of Power Law useful for the present analysis:

"A power law, also called a scaling law, is a relation of the type $Y = \alpha X^{\beta}$, where Y and X are variables of interest, β is called the power law exponent, and α is typically an unremarkable constant." (Gabaix 2016).

The most well-known power law was named Zipf's law after the linguist George Kingsley Zipf, first formulated it in the 1930s. The law states that the frequency of any given word is inversely proportional to its rank in the frequency table. This means that the most common word in a language (usually a functional word such as "the" or "and") occurs about twice as often as the second most common word, three times as often as the third most common word, and so on. He discovered that when ranking items (e.g., words, economies, cities, or companies) in descending order of frequency or size, then the size of the item with rank

is inversely proportional to its rank (Zipf 1949).

Formally, Zipf's Law can be written as follows:

$$S_r = \frac{C}{r^{\propto}}$$

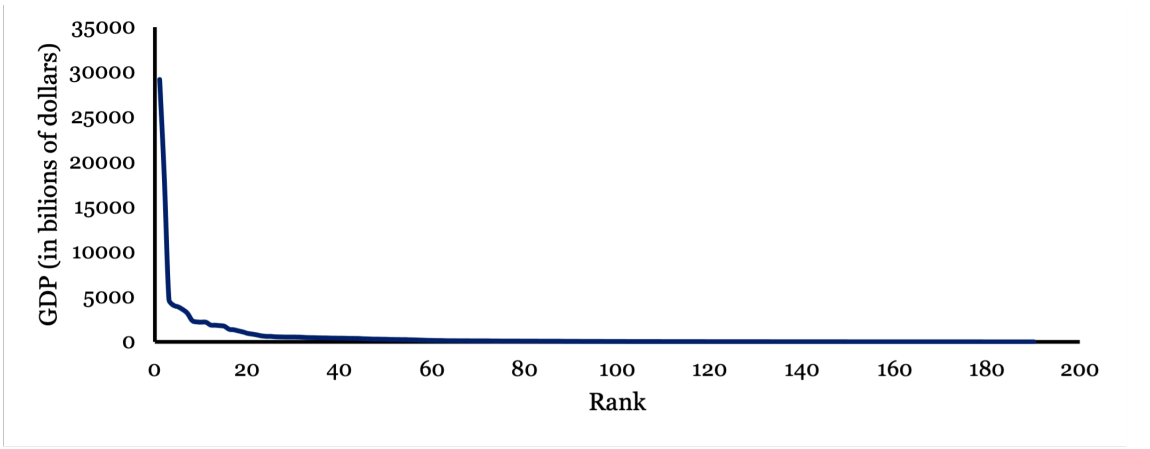
Where S_r is the size of the item at rank; r is the rank of the item (1 for the largest/most frequent, 2 for the second, etc.); C is a constant representing the size of the largest item; and α is a positive exponent (often close to 1 in empirical cases) (Gabaix 2016). This means the second-ranked item is half the size of the top-ranked item, the third-ranked item is a third the size, and so on.

Addressing the issue of Wealth distribution globally, measured in terms of the nation's GDP, when ranking their economies by size, an exponential factor of size is noticed by purely observing a plot of rank and size (see Figure 1). The question is how much the position in the rank explains the size of an economy. Power laws can give an interesting insight, as it is going to be explored soon.

Now, plotting the rank of economies (on the x-axis) versus their GDP (on the y-axis) resulted in a heavy-tailed, right-skewed distribution. The distribution of wealth has a small number of extremely large values (the largest economies with very high GDPs) and a large number of smaller values (the many smaller economies). This corresponds to a power-law-like behavior, where GDP values decline slowly as rank increases. The "tail" of the distribution extends far to the right due to these few extremely high values

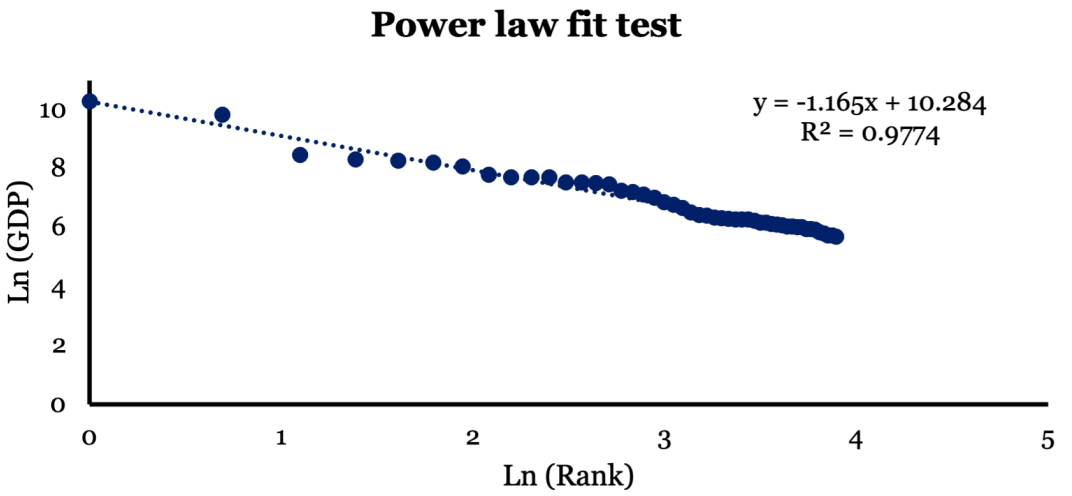
The differences in development in terms of GDP are substantial among the few largest economies while those of the smaller economies are negligible. For instance, the U.S. economy is the only economy worth between $20 and $30 trillion (actually valued at $29.2 trillion). At $18.2 trillion, China is the only economy located between $15 to $20 trillion. The remaining 189 countries

Figure 1: Economies vs Size of GDP, 2024 (US$)



Source: self-elaboration using data from the WEO (IMF 2025)

Ranking of the World's Economies vs Size of GDP (US$)



Source: self-elaboration using data from the WEO (IMF 2025)

fall in the range between $0 and $5 trillion. Germany, which is #3 in the ranking, has an economy worth $4.7 trillion.

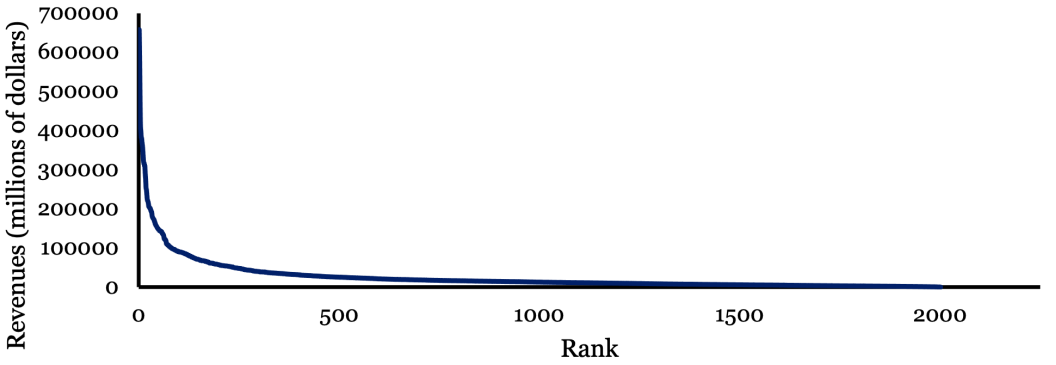
To test whether the list of countries ranked by the size of their GDP follows Zipf's law (the specific case of a power law where the rank-frequency distribution has an exponent close to 1), the process goes as follows. First, rank countries from 1 to *N* based on GDP, with rank 1 assigned to the country with the largest GDP. Second, transform both the ranks and corresponding GDP values using the natural logarithm, in order to linearize the power-law relationship. Third, create a log-log plot of rank versus GDP. If the data roughly form a straight line, this already suggests the presence of a power-law relationship. Fourth, fit a linear regression model to the log-log data:

$$ln\ (GDP)\ = \beta_0 + \beta_1 ln\ (rank)\ + \epsilon$$

Where β_1 estimates α (the exponent of the power-law). If is close to -1, this supports Zipf's law. Of course, another way to interpret this is that the coefficient tells you the elasticity of GDP with respect to rank. More specifically, it tells you the percentage change in GDP associated with a 1% change in the country's rank in the size distribution. Finally, the model's fit is evaluated using the coefficient of determination (to assess how well the linear model explains the variability in the log-transformed data.

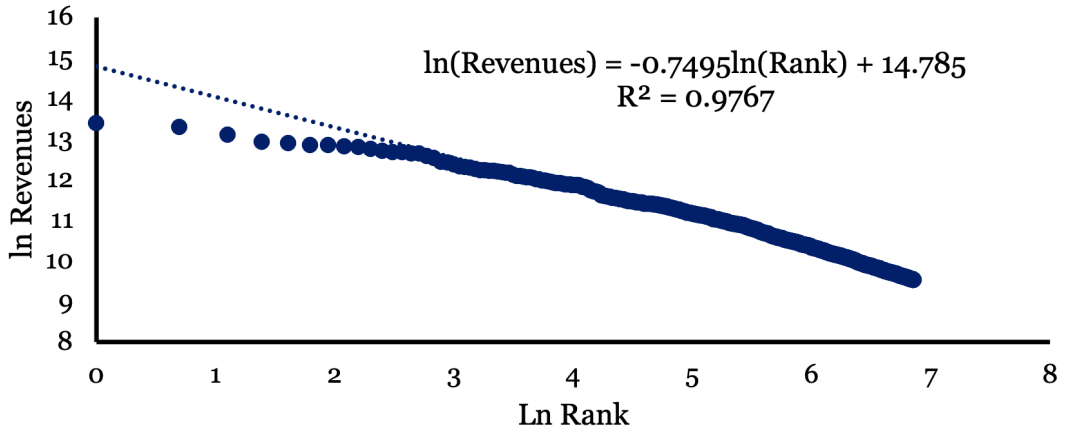
In Figure 2, the dots plot empirical data. The line is a power law fit (R^2 = ~0.98), regressing ln Rank on ln size (of GDP). The slope is approximately −1.17, close to the ideal Zipf's law, which would have a slope of −1. For this concrete case, computer scientist Aaron Clauset's method was applied for determining the range of data over which the power law holds, following the processes described in his influential paper "Power-

Figure 3. Ranking of the World's Top Firms vs Revenues, 2024 (US$)



Source: self-elaboration using data from Forbes Global 2000 list (2025)

Figure 4. Power Law Fit Test: Ranking of the Top Firms vs Revenues (US$)



Source: self-elaboration using data from Forbes Global 2000 list (2025)

Law Distributions in Empirical Data" (Clauset et al. 2009). Applying this method, it is observed that the power-law stated above holds for the first 49 countries in the ranking (from Kazakhstan to the U.S.).

With this understanding of GDP, the next step in the study is to analyze how large firms behave, using the same power-law testing process. First, the Forbes Global 2000 list is used to plot the rank of firms against their revenues. A similar pattern is observed—a heavy-tailed, right-skewed distribution with extremely large values on the left-hand side.

In the case of firms, the inequality between the largest companies and their immediate followers is not as stark as it is among countries by GDP. Nonetheless, it is worth describing to capture the exponential

nature of this distribution. Only two companies have annual revenues around $600 billion dollars: Walmart and Amazon. The only two with revenues between $400 and $500 billion dollars are the oil giants Saudi Aramco and Sinopec. This is followed by a group of 11 companies with revenues between $300 and $400 billion dollars, including Apple, UnitedHealth Group, and Berkshire Hathaway, among others. Next, there is a group of 13 companies with revenues ranging from $200 to $300 billion dollars, followed by 52 companies with revenues between $100 and $200 billion dollars. Beyond this, a long, right-skewed tail is observed.

Now, let us proceed testing whether the list of firms ranked by the revenues follows Zipf's law (Figure 4). The line is a power law fit ($R^2 = 0.98$), regressing ln Rank on ln Revenues. The slope is approximately –0.75, close to the ideal Zipf's law, which would have a slope of –1. Therefore, we have the exponent for this regression model to be approximately 0.75. Once again, the process is to analyze the top section of the ranking, according to Clauset's method. In this case, the regression model fits the largest 951 firms in the Forbes Global 2000 list when ranked by revenue.

Repeating the process for previous years, this distribution pattern found in the size of firms and economies holds at least for the previous 5 decades, when global data for a substantial share of the global economy started to be available. Furthermore, empirical analysis shows how the top economies, the ones consistently located in the higher section of the rankings, exhibit an outstanding resilience across decades, even though the names or industries of the largest firms might change.

In conclusion, the analysis of heavy-tailed wealth distributions through the lens of power laws, particularly Zipf's law, reveals consistent patterns in both national GDP and firm revenues. The striking regularity observed across diverse datasets underscores the robustness of power-law dynamics in economic structures. This pattern highlights the inherent inequality in economic size distribution, where a small number of entities—be they countries or firms—command disproportionate economic weight. Such insights not only enrich our theoretical understanding of economic hierarchies but also raise critical questions about the structural barriers that prevent many nations and firms from scaling. As we transition to examining the geographical accumulation and absence of large firms, it becomes imperative to explore how these distributions manifest spatially and what implications they hold for economic development across different regions.

ACCUMULATION VS. ABSENCE OF LARGE FIRMS

The absence of large firms in developing countries is the flip side of the geographic concentration of large firms. It has been discussed how just a handful of countries host a substantial number of the world's largest firms. Now, it is possible to correlate and graph these two indicators to show the size of a country's GDP (and therefore its weight in the global economy) in relationship to the number of top firms.

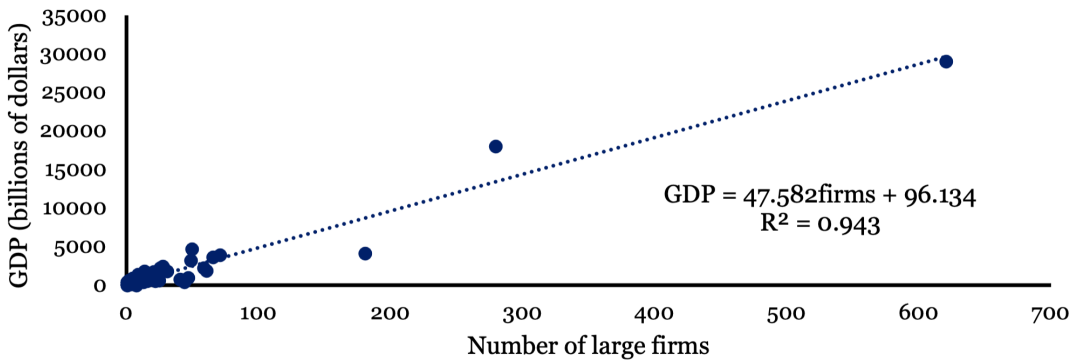
In figure 5, note how 94% of the variation in the GDP of countries with at least one large firm is explained by the number of such firms they host. Furthermore, this figure highlights how countries cluster around smaller GDP scales as they host fewer and fewer relevant firms. These observations lead to the next point: examining the specific countries included in the Forbes Global 2000 list.

Considering the Forbes Global 2000 List for 2024, only 61 countries are included in this elite report (see Appendix 2). This allows for a more detailed description of which countries are represented. This is an essential part of the "Missing Top" concept.

It is observed how key groups of countries regarded as "developed" are included in the large firm analysis, while those considered "least developed" are not. For example, the Forbes Global 2000 report includes all G20 members (a group representing about 85% of global GDP and 75% of international trade), with the exception of Russia, which Forbes does not include in its report. Additionally, from the group of Least Developed Countries (LDCs), which is a formal coalition classified by the United Nations and that represents 44 countries (UN Committee for Development Policy 2024), not a single least developed country is included in Forbes' report.

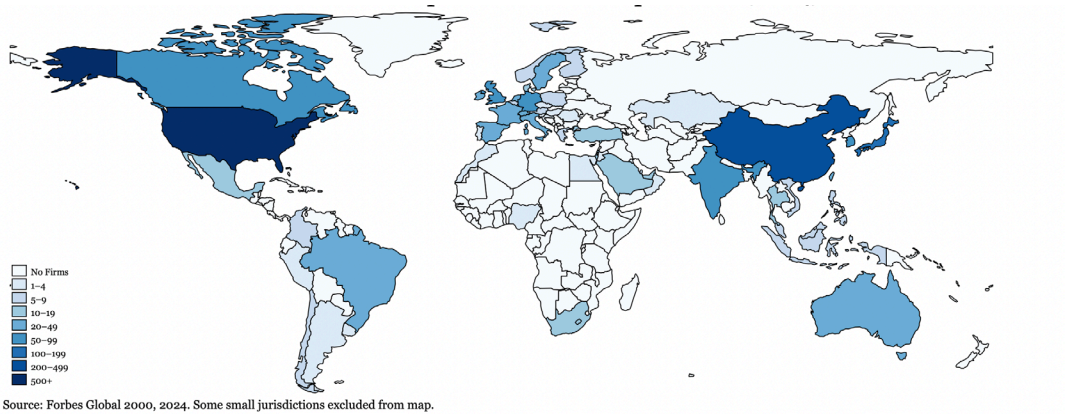
Moreover, a substantial group of Latin American countries (which are not included

Figure 5. Countries GDP vs Number of Top Firms, 2024 (US$)



Source: self-elaboration using data from the WEO (IMF 2025) and Forbes Global 2000 (2024)

Figure 6: Heat Map: Where are the World Top Firms Headquartered? (2024)



Note: Small jurisdictions such as Bermuda, Cayman Islands, and Hong Kong are not included in this map due to shapefile resolution limitations.

in the LDC list, except for Haiti) — often regarded as developing economies — are missing from the Forbes Global 2000 list. In particular, no Caribbean or Central American country is included. The absence of countries like Bolivia, Ecuador, and Paraguaymight suggest that these economies, with their lower aggregate economic output, have not been able to produce competitive global firms. An interesting question or hypothesis, however, could be the opposite: could the creation of a group, or even a single large firm, trigger the economic growth of a developing nation? As it is going to be explored in the final section, the recent history of Southeast Asia, and the role of policy, could lead to enriching debates about the theory of economic growth.

REGRESSING TOP FIRMS ON GDP

The previous empirical section indicated a correlation between the countries' GDP and the number of firms in the top 2000 list from Forbes. Since the central argument is that having top firms is associated with higher national income, a regression model is proposed using GDP as the dependent variable. It stems from asking the question: does having more top firms (or a higher presence in the upper tail) help explain a country's GDP, after controlling for other relevant factors? Of course, if the amount of top firms matters for development, the answer to that question matters in so far that it could strengthen certain vision of industrial or development policy.

The proposed model tests whether the number of top firms is associated with GDP after accounting for other important national

Table 2: Regression Results for Log GDP in 2024

(Standard errors in parentheses)

	(A)	(B)	(C)	(D)''
Constant	11.623***	6.282***	4.801***	4.910***
	(0.153)	(0.729)	(1.036)	(1.034)
ln(num_firms)	0.746***	0.574***	0.498***	0.465***
	(0.056)	(0.047)	(0.061)	(0.065)
ln(population)		0.336***	0.421***	0.417***
		(0.045)	(0.062)	(0.062)
State capacity			0.131**	0.140**
			(0.058)	(0.058)
R-squared	0.754	0.876	0.894	0.861
Adj. R-squared	0.750	0.871	0.888	0.853
No. observations	59	59	58	56

Source: self-elaboration with data retrieved from the World Economic Outlook (IMF 2025), the Forbes Global 2000 List (2024 version), the State Capacity Index (O'Reilly & Murphy 2022), and the World Development Indicators (World Bank Group 2025).

Notes:

- Dependent variable: ln(GDP) in 2024.
- $***p < 0.01$, $**p < 0.05$, $*p < 0.1$
- (D)'' Robustness Check: num_firms < 200, this excludes the two largest economies with the largest number of top firms: U.S. and China.

characteristics, offering potential evidence that this relationship is not just due to large populations or stronger state institutions. Hence, an estimation is provided of a log-log model where GDP is regressed on the log of the number of top firms, alongside population and state capacity controls. These control variables are selected because: 1) Population is a standard control for economic scale. A country with a huge population might have more firms and more GDP just due to sheer market size. Controlling for this isolates the effect of firm presence beyond just having a large economy; and 2) using the State Capacity Index as a governance quality proxy (O'Reilly & Murphy 2022) helps to tackle an important alternative explanation: perhaps some countries don't have many top firms because their institutions are weak or corrupt. Including state capacity helps to show that even among countries with decent institutions, being missing from the top firms list correlates with lower GDP.

Note also that logging the number of top firms in the country is used to improve model fit by reducing skewness and making the relationship with ln(GDP) more linear. As pointed out in previous sections, the number of firms in top ranks decays approximately according to a Zipf-like (power law) distribution. This implies a multiplicative rather than additive relationship, making logarithms a natural fit for modeling this pattern.

The results indicate that a 1% increase in the number of top firms is associated with an approximate 0.5% increase in GDP ($p < 0.001$), even after adjusting for the structural differences population and state capacity. A 1% increase in population is associated with an approximate 0.42% increase in GDP. A one-unit increase in state capacity is associated with an approximate 13.1% increase in GDP, holding other variables constant. This model explains nearly 90% of the variation in GDP across countries.

Interestingly, results remain consistent in magnitude and significance when the U.S. and China—outliers in firm counts—are excluded from the analysis.

This suggests that the presence of large global firms may not simply reflect national economic size — it may also contribute to it. Moreover, even among countries that do have at least one top firm, more top firms is strongly associated with higher GDP. These findings potentially support one of the central claims: the presence of top-ranked firms is a powerful predictor of national income and an important piece of the global inequality puzzle.

Of course, further research can explore the role of large firms as explanatory variables for GDP, since intuitively it can be acknowledged that the number of top performing firms could also be caused by the magnitude of the market, and assess this under the light of additional control variables as human capital, labor markets, or trade and openness (to name a few). In this article, the purpose is to show the nature of the correlation between large firms and aggregate economic production, after having exposed how both measures are governed by similar patterns explained by power laws, and to signal this indicator as an interesting variable to study economic growth in real terms.

THE ROLE OF POLICY IN SUPPORTING LARGE FIRMS

This last section recovers some essential contributions from both academia and the development finance institutions, in order to describe how policy is able to shape the world's economic landscape through fostering the development of large firms. First, the section explores an already cited insightful report from the World Bank that signals the need for large firms that developing countries have. Second, arguments from development economist Alice Amsden are brought up supporting the role of policy in attaining large economic growth through top firms' creation, especially considering success cases in Asia. Thirdly, based from the paper "The New Economics of Industrial Policy" (Juhasz, Jane, and Rodrik 2024), a comprehensive work discussing recent literature that provides "rigorous evidence on how industrial policies work", this analysis highlights the points where the role of policy in supporting large firms is discussed.

The World Bank's 2021 report, "Making it Big: Why Developing Countries Need More Large Firms," provides concrete policy recommendations to foster the growth of large firms. It emphasizes that governments should create environments conducive to firm expansion by improving market access, facilitating access to technology, ensuring the availability of capital and skilled labor, and fostering strong managerial capabilities (Ciani et al. 2021). The report highlights the role of the state in reducing entry barriers, enhancing market contestability, and lowering operational hurdles that inhibit firm growth. In addition, targeted industrial policies can be instrumental in nurturing specific sectors, promoting foreign direct investment, and supporting entrepreneurship through financial incentives, tax breaks, and business incubators.

Development finance institutions (DFIs) also play a pivotal role according to the World Bank's recommendations. DFIs can provide critical support through financing packages, technical assistance, and advisory services tailored to the needs of growing enterprises. Collaboration between DFIs and financial intermediaries can enhance firms' access to capital and support entrepreneurial ventures. The report underscores the importance of an integrated approach where government policies, private sector initiatives, and international cooperation converge to create ecosystems that enable firms to scale effectively (Ciani et al. 2021). By addressing structural constraints and fostering a dynamic business environment, policymakers can help bridge the "Missing Top" and drive sustainable economic growth.

Adding economic theory, and considering that this issue affects mostly the underdeveloped countries, it comes as appropriate to consider the particular contributions to development economics of the prominent economist Alice Amsden. She explored the dynamics of state-led growth and the critical role of large firms in economic transformation, particularly in her seminal works "Asia's Next Giant: South Korea and Late Industrialization" and "The Rise of 'The Rest': Challenges to the West from Late-Industrializing Economies" (Glasmeier et al. 2017).

These works from Amsdem offer critical insights into the role of large firms within the broader context of economic development. She emphasized that developing countries are more likely to achieve sustainable growth by fostering national firms rather than relying heavily on foreign multinational corporations (Glasmeier et al. 2017). Amsden argued that domestic enterprises, when effectively supported, could become engines of productivity and innovation, driving structural transformation and reducing dependency on external economic forces.

Central to Amsden's argument is the active role of the state in economic

development. Contrary to neoclassical views that advocate minimal government intervention, she demonstrated through case studies of East Asian economies that state-led initiatives were pivotal in nurturing large firms. She advocated for strategic government involvement in creating competitive, knowledge-based assets, suggesting that policies such as targeted subsidies, performance-linked incentives, and industrial coordination can catalyze firm growth (Glasmeier et al. 2017). This developmental state model underscores the importance of aligning public policy with the specific needs of firms poised to scale, thereby addressing the structural barriers that often prevent the emergence of large enterprises in developing economies.

Moreover, Amsden reviewed the assumption that free markets alone could efficiently allocate resources for optimal growth. She highlighted how performance-oriented subsidies and state interventions were not mere distortions but essential tools for economic discipline and capacity building. Indeed, governments can play a transformative role in scaling firms from small enterprises to significant economic players (Glasmeier et al. 2017).

Integrating these insights into the previous analysis reinforces the argument that proactive, well-designed industrial policies are crucial for enabling the growth of large firms, which in turn drive national economic performance.

Building on this, in the article "The New Economics of Industrial Policy" (2024), Rodrik et al. argue that while East Asian states "have traditionally been characterized as hard, in contrast with the soft states prevailing else-where, East Asian models of industrial policy are a precursor of today's successful practices and provide useful guidance on the design of future industrial policy." If that is the case, what characterizes this industrial policy and how much is it related to supporting large firms creation? Opposite to what could be thought on this, the authors emphasize that industrial policy should focus not on "picking winners" but on providing public inputs (infrastructure, skills, credit, regulation) that make it easier for large firms to operate and lead ecosystems (Juhasz, Jane, and Rodrik 2024, 218). In fact, "the recent crop of papers offers a more positive take on industrial policy".

Despite that the authors do not advocate directly for the creation of large firms, they suggest that successful industrial policy is now using a broader range of policies beyond the typical instrument of subsidies, or of trade policy, such as tariffs. Rather, policies supporting the industrial enterprise "customized public services and inputs that are tailored to the firms' needs and target specific obstacles to productivity-enhancing investments" (Juhasz, Jane, and Rodrik 2024, 218). This points out that, indeed, the state has an important role in the success of its firms that expands beyond rules,

regulations or trade policies, but it can help them achieve competitiveness in terms of productivity that helps them reach scale.

CONCLUSIONS

The described geographical concentration of economic power is not a byproduct of development but a driving force behind it. The analysis presented in this paper highlights the pivotal role of large firms in shaping economic landscapes. The consistent power-law distribution observed in both national GDP and firm revenues illustrates the inherent inequality in economic structures, where a few dominant entities exert disproportionate influence. Countries with a robust presence of large firms exhibit higher GDPs, greater economic resilience, and more dynamic innovation ecosystems. The "Missing Top" is, therefore, not just a descriptive term but also a diagnostic tool for identifying structural deficiencies in developing economies.

Moreover, the policy implications are profound. Development strategies should consider pivoting from generic support for small and medium enterprises to targeted interventions that enable the growth of large firms. This includes reducing entry barriers, facilitating access to capital, and fostering environments conducive to scaling operations. Drawing from the experiences of rapidly industrializing nations and the theoretical insights of development economists like Alice Amsden, it becomes evident that strategic state intervention can catalyze the emergence of national champions. By addressing the "Missing Top," policymakers can hopefully unlock new pathways for sustainable growth.

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Appendices 1 (Countries by GDP) and 2 (Countries by number of top 2000 firms) are available online at https://gppreview.com

APPENDIX 3: REGRESSION MODEL FOR ROBUSTNESS CHECK

Table 4 - Regression Model for Robustness Check

Dependent Variable: **ln(GDP, 2024)** *(N = 56: Excludes United States and China)*	**Model Statistics:** • **R-squared**: 0.861 • **Adjusted R-squared**: 0.853 • **F(3, 54)**: 107.27 • **Prob > F**: 0.000 • **Root MSE**: 0.442

Variable	Coefficient	Std. Error	t-value	p-value	95% Confidence Interval
ln(Number of Top Firms)	0.465	0.065	7.19	0.000	[0.335, 0.594]
ln(Population)	0.417	0.062	6.71	0.000	[0.292, 0.542]
State Capacity	0.140	0.058	2.42	0.019	[0.024, 0.256]
Constant	4.910	1.034	4.75	0.000	[2.835, 6.986]

Source: self-elaboration with data retrieved from the World Economic Outlook (IMF 2025), the Forbes Global 2000 List (2024 version), the State Capacity Index (O'Reilly & Murphy 2022), and the World Development Indicators (World Bank Group 2025).

A Critical Analysis of Virginia's Prison Geography and Policy Pathway Forward

Steven Keener[1] and Tucker Keener[2]

Abstract

The extreme growth of America's prison population began in the 1970s and necessitated the building of new carceral facilities across the country. The promise of prisons bringing middle-class income level jobs with stable benefits made these facilities desirable for non-metropolitan areas suffering from declines in industries such as farming and mining. This created a new reality of incarcerated individuals predominately coming from metropolitan areas and being housed in prisons long distances away from their home communities. These distances negatively impacted behavior, mental health, the wellbeing and financial resources of families, and the success of children of incarcerated parents. This study utilized a geospatial analysis to document and analyze Virginia's prison geography with a focus on the areas most impacted by incarceration. The results show prisons concentrated in nonmetropolitan areas of the state, as far as a 15 hour round trip between a major metropolitan area and one of most populated prisons. The implications of the results are explored with a particular focus on how these distances place strains on Virginia families. The public policy solutions are explored to mitigate the negative effects that prison geography has on individuals directly impacted and their loved ones.

The collateral consequences of America's carceral system have been extensive. In 2024, approximately 1.9 million individuals were behind bars on any given day in the United States (Sawyer and Wagner 2024). Approximately 45% of Americans have experienced the incarceration of an immediate family member, with Black Americans (63%) having disproportionately experienced this reality (Enns et al. 2019). Individuals that have experienced familial incarceration face unique challenges. For example, the children of incarcerated parents are more likely to have behavioral issues, mental health challenges, and negative academic outcomes (Poehlmann-Tynan and Turney 2021). The array of challenges associated with mass incarceration demands continued interrogation.

One avenue of analysis involves the geography of the modern prison system.

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In particular, more research is needed on how a state's prison geography dictates the distances between individuals behind bars and their home communities. Analysis is also needed on the unique challenges created by these distances. Long distances between prison and individuals' homes can create unique strains on those behind bars, their loved ones, and the community awaiting their reentry. For loved ones, distances make visitation more challenging (Cochran et al. 2016). Visitation can have a major impact on incarcerated individuals' behavior and their mental health (Cochran 2012). It can also reduce recidivism risks and increase the likelihood of successful reentry (Listwan et al. 2011). Distance of incarceration has a number of other implications.

It is imperative that state leaders understand their prison geography and its impact, as well as public policies to address it. This is especially important when considering that the majority of individuals behind bars are located in state prisons (Sawyer and Wagner 2024). This study analyzed Virginia's prison geography and the impact it has on individuals, families, and communities. The article first summarizes how the modern prison system was built during the onset of mass incarceration. It then details the empirical literature on the impact of, and collateral consequences related to, carceral location. The article then explains the results from a geospatial analysis of Virginia's prison system. The article concludes with a discussion of the impacts of Virginia's prison geography and policy implications for the Commonwealth.

LITERATURE REVIEW

There is a robust body of literature that has documented the building of America's carceral system. This includes the policies that fueled mass incarceration, and the decisions made to address the country's growing prison population. The empirical literature has also documented the impact of distance of incarceration on individuals behind bars, their loved ones, and the reentry process.

Building the Modern Prison System

The American prison population increased dramatically during the 1980s and 1990s. The state and federal prison population grew an average of 8% annually between 1985-1996 and grew from 360,000 individuals in the early 1970s to over 1.5 million in the early 2000s (Nellis 2024). From 1991-1998, America's violent crime rate fell by 20% but the jail and prison population increased by 50% (Schlosser 1998). The U.S. now leads the world in total incarceration and is sixth in the world when controlling for population (World Population Review 2024). This growth came with numerous ramifications. For example, the proportion of individuals incarcerated in state prisons over 40 years old grew from 16% in 1974 to 33% in 2004 (Porter et al. 2016). The prison population growth was

largely attributed to public policy decisions during the "tough on crime" era.

The most impactful "tough on crime" era policies were first implemented at the state level. In 1973, Governor Nelson Rockefeller and the New York legislature passed strict mandatory minimum sentencing laws, reversing previously aggressive approaches to treatment (Kohler-Hausmann 2010). These laws created a mandatory minimum prison sentence of 15 years for selling two ounces, or possessing four ounces, of an illegal drug. They also created mandatory minimum prison sentences for individuals' second felony convictions for various offenses. Other states, and eventually the federal legislature, followed New York's lead and began implementing mandatory minimum sentencing, especially for drug-related offenses (Schlosser 1998). This time period had been commonly referred to as the "War on Drugs" era (Hodge and Dholakia 2021). Other punitive sentencing laws included three strike laws, which mandated long punishments including life sentences after multiple felony convictions, and truth-in-sentencing laws, which eliminated discretionary parole and made it more difficult to earn credits toward early release (Clark, Austin, and Henry 1997; Ostrom and Ostrom 2012). In 1995, Virginia eliminated parole (Commission on Parole Review). These laws increased the number of individuals behind bars and extended their time.

As the prison population grew, officials had to decide whether to reform the laws or build more prisons. In 1982, when Mario Cuomo became governor of New York, the state's incarcerated population had more than doubled. Governor Cuomo responded by building more prisons (Schlosser 1998). Rural communities that had suffered from declines in industries such as farming and mining asked for prisons to be built in their localities. This was done under the assumption that the prisons would be a growth economic industry (Huling 2002). More prison beds were added during Governor Cuomo's tenure than all of the state's previous governors combined, and the facilities were almost exclusively built in upstate, rural New York (Schlosser 1998). Similar building strategies occurred in other states, as the majority of new prisons were built in non-metropolitan areas (Huling 2002). The notion that mass incarceration could be an economic driver in areas that needed rejuvenation had taken hold.

Rural towns became dependent on the carceral system maintaining its size. Prior to 1980, only 36% of prisons were located in rural communities, but after the prison building spree of the 1980s-1990s, the majority were located in rural areas. From 1990-1999, a prison opened in rural America approximately every 15 days (Huling 2002). Correctional officers became a major profession in these areas as it provided steady middle-class income and benefits (Schlosser

1998). However, it is not clear that the prisons created economic growth. There is evidence that prisons negatively impacted the social and environmental elements of those towns (Huling 2002). Also, while these prisons were built in rural areas, most incarcerated individuals came from urban and suburban areas. For example, the city of Philadelphia, and Philadelphia County, has sent the highest total number of individuals to Pennsylvania prisons (Widra 2023). The growth of rural prison towns came with numerous consequences.

Impact of Distance of Incarceration on Incarcerated Individuals

Researchers have found a consistent association between increased distance from prison to home communities and misconduct behind bars. Lindsey and colleagues (2017) found that greater distances from home was associated with increased misconduct, and this impact was more pronounced on younger people. These results were partially mediated by visitation. Cochran (2012) found that visitation from loved ones reduced the likelihood of misconduct. However, while regular visitation reduced misconduct, individuals that were visited frequently early in their stage of incarceration but less so later on were more prone to misconduct. Those individuals that consistently did not receive visitors throughout their carceral supervision were also more at risk of misconduct. Visitation during the early stages of incarceration helped with adjustment to the carceral setting and thus reduced misconduct. Visitation later more directly helped create social ties and helped build social capital essential in the reentry process (Cochran and Mears 2013). These impacts varied across race and ethnicity, with Latinos having been more likely to be placed farther from home than Black and White individuals. However, high levels of community disadvantage, which disproportionately impacted Black individuals, exaggerated the negative impacts of distance (Cochran, Mears, and Stewart 2015). Cochran and Mears (2013) posited that lost visitation could have caused frustration and aggression that drove misconduct.

Increased distance has also impacted mental health and reentry. Individuals incarcerated farther than 50 miles from home were more likely to exhibit signs of depression (Edgemon and Clay-Warner 2019). A lack of social support, and barriers to visitation, were found to be associated with various mental illnesses (Machado et al. 2024). A visit not occurring that was expected often caused increased frustration, aggression, and/or depression (Cochran 2012). Despite the well documented challenges of reentry, consistent visitation and general family support helped individuals be more optimistic about the process (Visher and O'Connell 2012). The consistent visitation also helped improve mental health during the first year post-release, which improved the reentry process (Folk et al. 2019). Researchers also

found that consistent visitation and general maintenance of social ties was associated with reductions in recidivism risks (Bales and Mears 2008; Berg and Huebner 2011; Cochran 2014; McNeeley and Duwe 2019; Wolff and Draine 2004). Researchers have also found that the negative impacts of distance on loved ones outside of prison were pronounced.

Impact of Distance of Incarceration on Loved Ones

Family relationships can change during incarceration. More frequent visits from family members have been found to improve the family relationship (Mowen and Visher 2016). However, visitors had to overcome a number of barriers to spend time with their loved ones. They had to travel long distances, overcome financial barriers, bring children with them, go through extensive security protocols, and ultimately expend a great deal of energy (Tewksbury and DeMichele 2005). In general, research has indicated that more frequent contacts during this time kept families better connected (Folk et al. 2019). This was mediated by prior family dynamics, mental health challenges, and types of convictions (Mowen and Visher 2016). The economic, social, and emotional tolls of having a family member incarcerated often compound as well (Comfort et al. 2016). In addition to expending energy to visit, families have been typically generous in their financial support of their incarcerated loved ones, even if they did not have extensive resources (Hood and Gaston 2022). In fact, while distance has fractured social bonds, the cost, time of visits, and stress related to the strict and confusing rules of visitation has made the process more harmful than helpful for many families (Boppre, Dehart, and Shapiro 2022; Christian 2005). Tadros and Presley's (2024) analysis of Facebook posts, in a group dedicated to individuals with incarcerated loved ones, found participants consistently complained about trying to determine how to make visitation work, financial burdens, and overall confusion about how to navigate the criminal justice system. Policies that reduced the costs and restrictions of visitation have helped improve family relationships (Mowen and Visher 2016).

A number of other challenges related to distance have been identified in the literature. For example, the children of incarcerated parents faced an array of unique challenges not faced by their peers. These challenges were exacerbated when there was no contact with their parents. This lack of contact was associated with children feeling alienated from their parents, having higher rates of behavioral issues, and battling the continued stigma of parental incarceration (Shlafer and Poehlmann 2010). These challenges extended to the juvenile justice system, as youth were often placed in detention centers far away from their home community. Young and Turanovic's (2020) study of juveniles in Florida found that visitation

was more common for wealthier families and those with strong relationships between the parent and their child. These challenges were exacerbated during the Covid-19 pandemic as facilities suspended in-person visitations and lockdown periods became normal. Families felt even more stress, worry, and frustration (Boppre and Novisky 2023). These families typically lacked social support structures due to the stigmas of familial incarceration and they faced a number of mental and physical health issues (Hood and Gaston, 2022). The distance and separation of incarceration clearly has taken a toll on all involved.

Gap in the Research

The existing literature extensively documented how the U.S. created its mass incarceration crisis and how states responded with prison building strategies. It also documented the array of challenges and negative effects that the distance and separation of incarceration placed upon individuals directly impacted, as well as their loved ones. Research is needed on the modern geography of state prison systems and the effects on those impacted. This can create a pathway toward policy reform aimed at mitigating the harms of distance within the existing framework of a state's prison geography.

METHODOLOGY

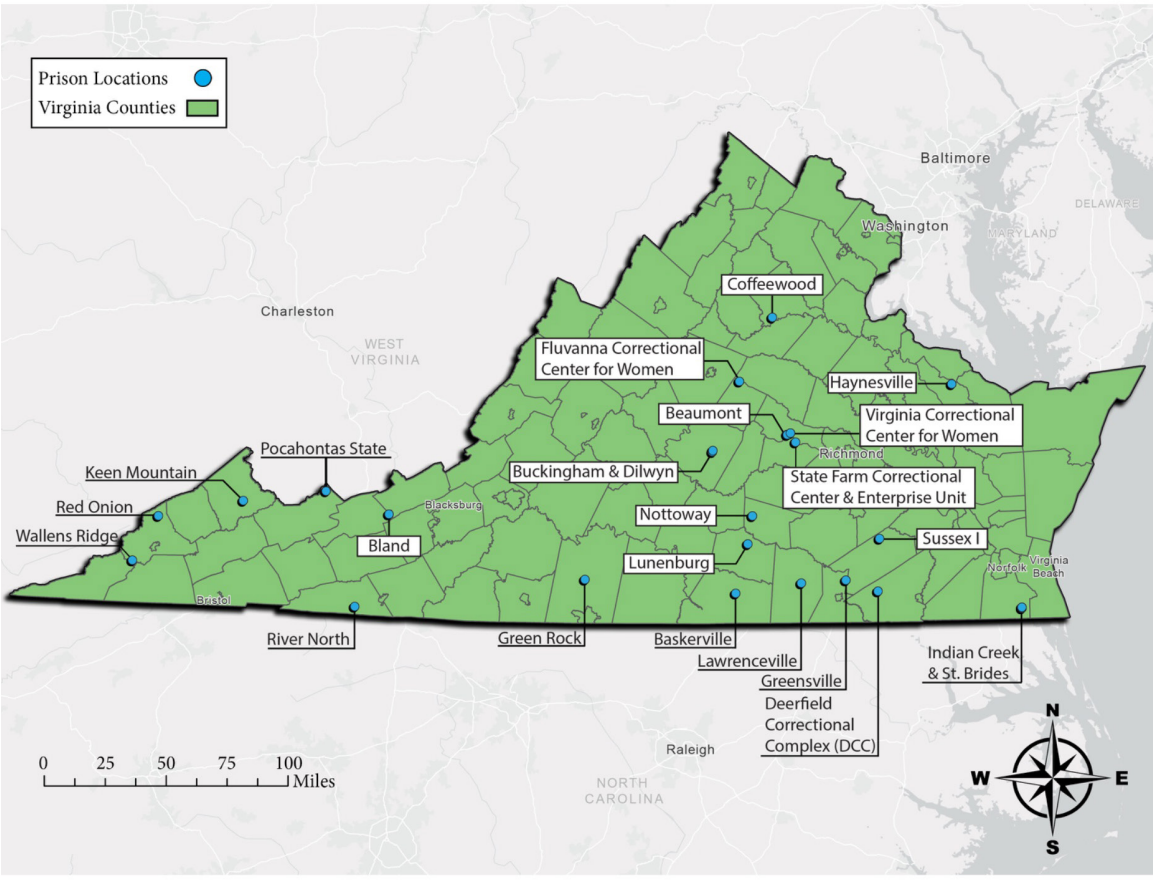
This study aimed to fill that gap with a geospatial analysis of Virginia's prison system. The geospatial analysis was conducted between Virginia's state prisons and the cities and counties that had high populations of incarcerated individuals. The results displayed the specific drive times and miles traveled between high incarceration rate metropolitan areas and major institutions.

ArcGIS Pro was used for the geospatial analysis. Specifically, a network analysis was conducted using the closest facility tool. This tool precisely measured the distance between each metropolitan location and the correctional facilities. It also measured the drive time and travel miles between the metropolitan areas and correctional facilities. It then ranked which facilities were closest and which were the farthest away for each location. This tool only showed one-way trips in an automobile and did not account for traffic. This tool used available road data through the ArcGIS Network to determine drive time and miles traveled. The routes presented showed actual routes one could have driven to get to a correctional facility to visit their loved one; whereas other network analysis tools could have given drive time and travel miles but not displayed the actual travel routes one would have taken to visit an incarcerated individual.

The locations of Virginia's state prisons were obtained through the Virginia Department of Corrections (VADOC) website. VADOC classified each correctional institution as a major institution, correctional field unit, or correctional work center. While each of these correctional facilities housed individuals, major institutions were only used for this analysis because these facilities hold individuals for longer durations and are most likely to have consistent visitation. It is important to note that the Virginia Correctional Center for Women (VCCW) and Fluvanna Correctional Center for Women (FCCW) were the only major institutions that housed women, with all 20 other major institutions housing men. Major institutions were located using addresses obtained from the VADOC website and geolocated in the ArcGIS Pro using the geocoding addresses tool. This tool used the addresses and geolocated them into mappable points. Figure 1 displays the locations of all major institutions across the state. The major institutions were located mainly in non-metropolitan areas in central, southwest, and southern Virginia.

Data on the home locations of incarcerated individuals were obtained from the Virginia Public Access Project. The data were made available due to a change in state law. The home locations of incarcerated individuals were previously counted as the prison in

Figure 1: Virginia's Major Correctional Institutions



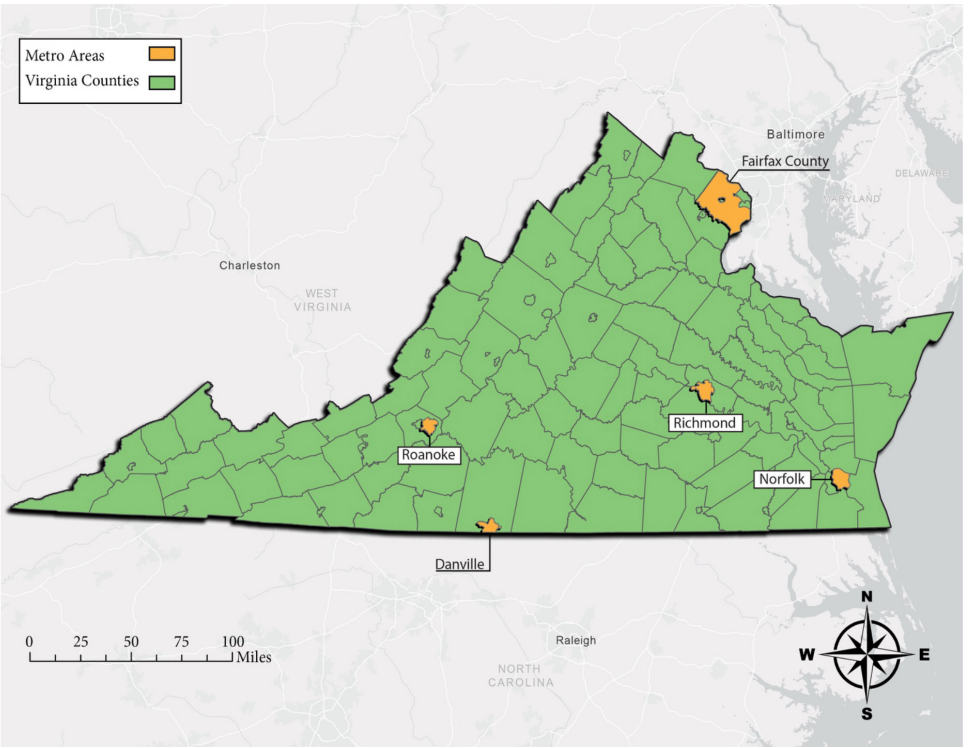
which they were located. The new state law counted their home location as the last known home address before incarceration. The Virginia Public Access Project (2021) calculated the total population gained or lost once incarcerated individuals were counted in this manner. This gave an estimate of the total number of individuals in Virginia prisons whose last known home location was each city or county. Table 1 displays the population growth of each locality after the population counting changed, which helped estimate which areas had the largest number of individuals behind bars. The results indicate that Norfolk, Richmond, Newport News, Virginia Beach, Hampton, Chesterfield County, and Henrico County had the biggest population shifts, ranging from 741-1,951 individuals.

Many of the cities and counties with the biggest population growth due to this new law were located in southeastern, central, and northern Virginia. Roanoke was the sole location in southwestern Virginia. Since individuals from across the state were visiting loved ones behind bars, the highest population growth location from each region of the state was selected for the drive time analysis. Norfolk represented the Hampton Roads region, Richmond represented central Virginia, Roanoke represented southwest Virginia, Fairfax

Table 1: Highest Total Population Changes in Under New Virginia Incarceration Census Law

Location	**Population Growth Under New Law**
Norfolk City	1,951
Richmond City	1,891
Newport News City	967
Virginia Beach City	808
Hampton City	803
Chesterfield County	758
Henrico County	741
Spotsylvania County	676
Roanoke City	669
Fairfax County	556
Petersburg City	555
Prince William County	487
Rockingham County	425
Danville City	410
Hopewell City	314

Figure 2: Metropolitan Areas Used in Drive Time Analysis



County represented northern Virginia, and Danville represented southern Virginia. This provided a more holistic view of the types and lengths of travel families were making for visitation. For example, while the drive time to Nottoway Correctional Center from Norfolk was different than from Newport News or Hampton, it still gave an estimate for the Hampton Roads region. The drives for these cities were not exactly the same, but similar for the region. This analysis included Roanoke and Danville to represent southwest and southern Virginia, areas that could have been left out; however, then there would have been no drive time estimates for those regions. Figure 2 displays the locations of the five areas that were used in the drive time analysis.

The average daily population (ADP) data from each Virginia prison were recorded to estimate the number of individuals impacted by the distances. The statewide ADP for December 2024 was 21,635 with male ADP being 20,504, and female ADP being 1,131. This helped focus the drive time analysis on the facilities that held the highest number of individuals. Figure 3 shows the ADP of the VADOC monthly population count from December 2024 (Virginia Department of Corrections 2024). Greensville Correctional Center, St. Brides Correctional Center, and Nottoway Correctional Center were the largest ADP in the state. Figure 4 displays clustered geographic locations of high ADP facilities. This shows that southern and southwestern regions of the state had the

Figure 3: Average Daily Population of Virginia Correctional Centers as of December 2024

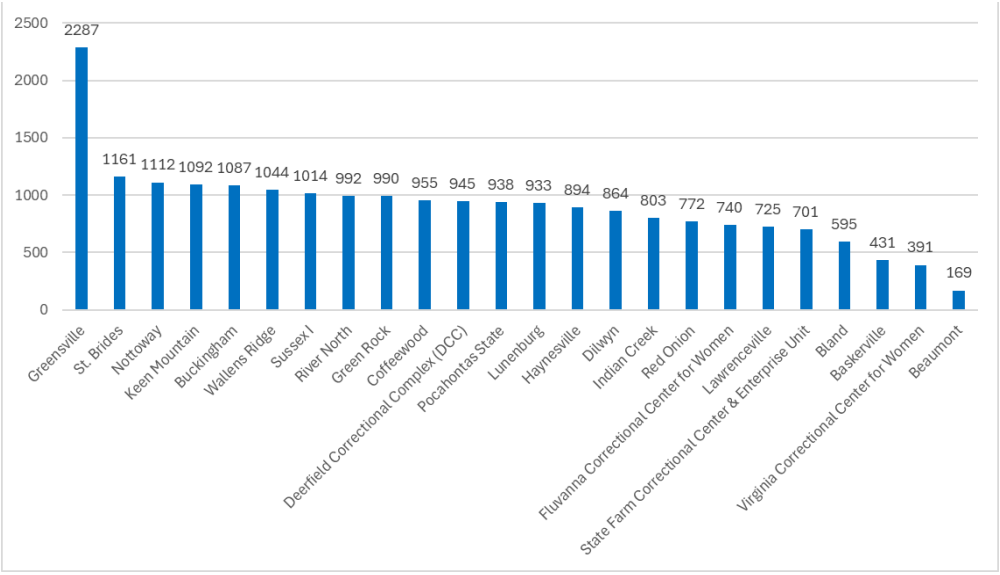
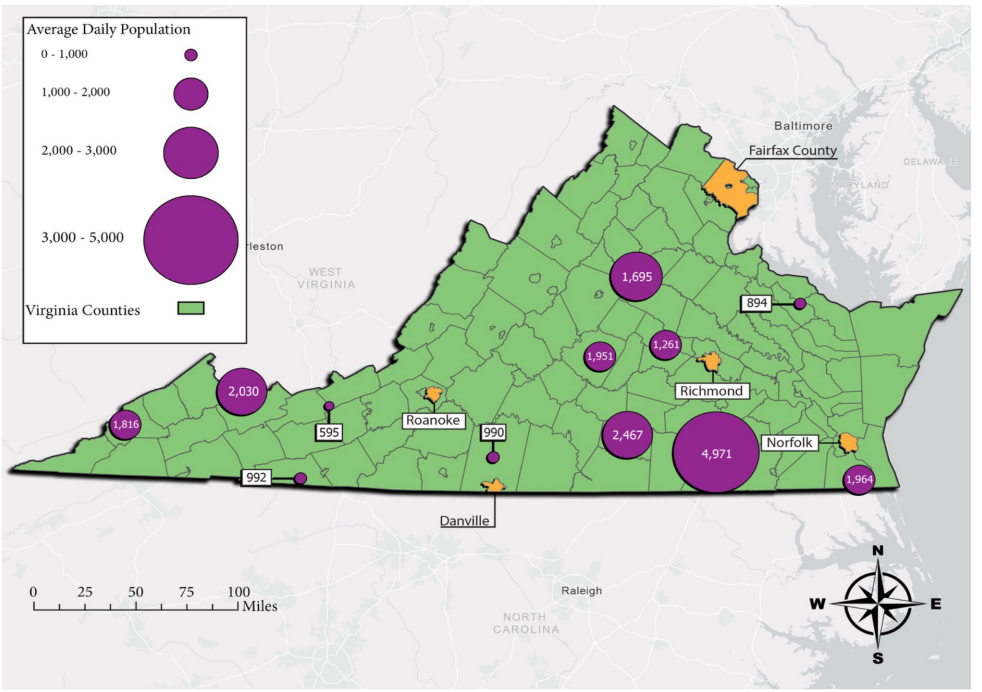


Figure 4: Clustered Geographic Location of High Average Daily Population Facilities



highest clusters of total individuals behind bars across multiple facilities in those regions.

RESULTS

Virginia's incarceration rate has outpaced the national rate. According to the Prison Policy Initiative (2024), approximately 679

per 100,000 Virginians were incarcerated in 2024 compared to the U.S. rate of 614 per 100,000 Americans. Black Virginians were disproportionately represented, with approximately 1,020 per 100,000 Black state residents in state prisons compared to 247 per 100,00 White residents and 118 per 100,000 Hispanic residents. Virginia's total population under carceral supervision was at least double those behind bars in 2024 with an additional 60,000 individuals on probation supervision. This helped frame the geospatial analysis results within the reality that Virginia housed a carceral population larger than the national average and disproportionately impacted Black residents.

The results from the geospatial analysis unveiled long drive times between individuals' homes and their location behind bars. The average drive time of all routes calculated was 173 minutes with 166 average miles to travel one way (346 minutes and 332 miles round trip). Figure 5 displays the entirety of driving routes from the geospatial analysis. It displays the possible routes one could take from each aforementioned metropolitan area with a high total incarcerated population (Norfolk, Richmond, Roanoke, Fairfax County, Danville) to a correctional facility. As displayed in the map, families and individuals were likely traveling all across the state to see loved ones behind bars, spending a great deal of time and money on gas, food, and potentially lodging. Appendix

Figure 5: Driving Routes Between Metropolitan Areas and Correctional Facilities

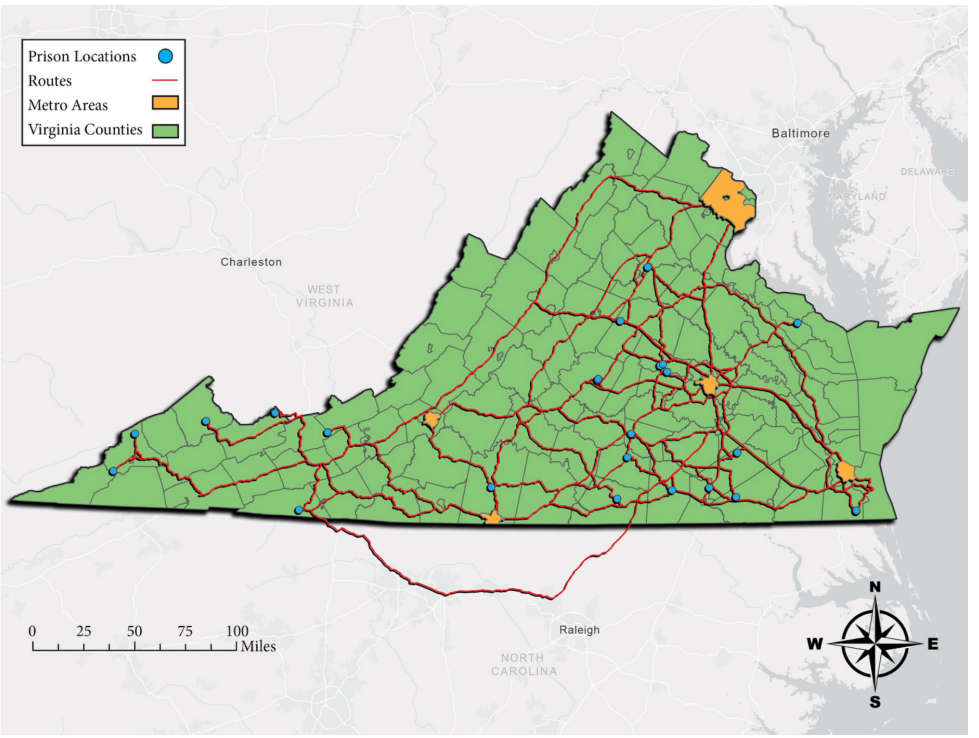


Table 2: Average Travel Time Between Metropolitan Areas and All Correctional Facilities

Metropolitan Area	Average Travel Time
Fairfax	3 hours and 26 minutes one way (6 hours and 52 minutes round trip)
Norfolk	3 hours and 13 minutes one way (6 hours and 26 minutes round trip)
Roanoke	2 hours and 47 minutes one way (5 hours and 34 minutes round trip)
Danville	2 hours and 41 minutes one way (5 hours and 22 minutes round trip)0
Richmond	2 hours and 17 minutes one way (4 hours and 34 minutes round trip)

Figure 6: Longest Drives Between Each Metro Area Location and Correctional Facility

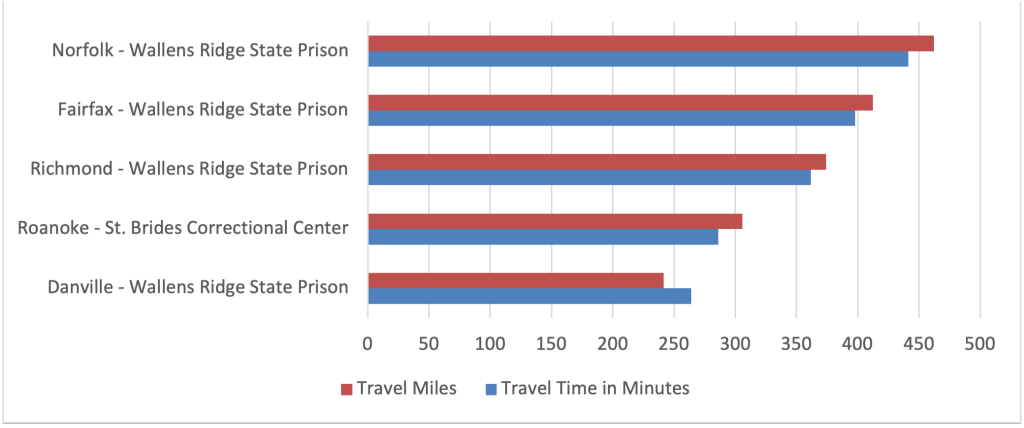


Figure 7: Longest Driving Routes Between Each Metro Area and Correctional Facilities

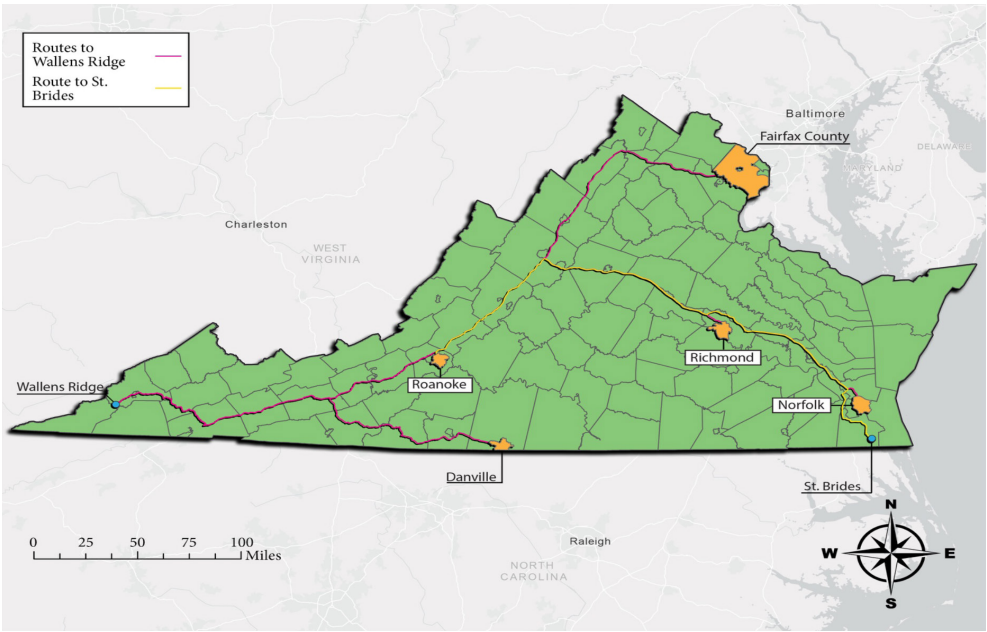


Figure 8: Longest Travel Routes Between Metro Areas and Correctional Facilities

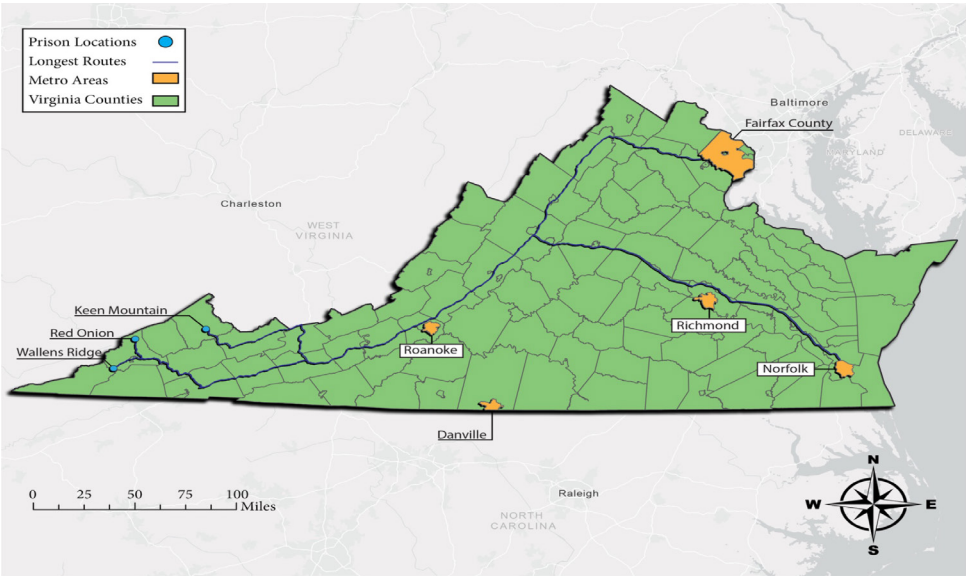
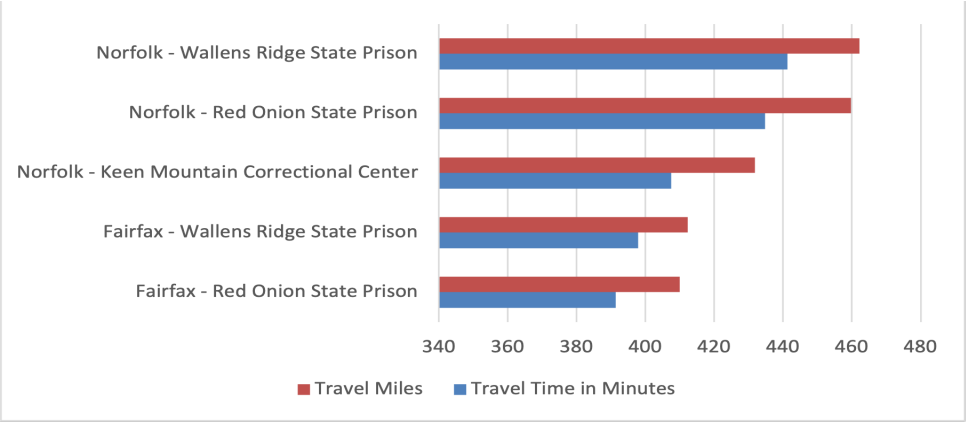


Figure 9: Longest Total Miles and Travel Time in Minutes to Correctional Facilities



A shows the full list of drive times and travel miles.

Specific travel times between each selected metropolitan area and the correctional facilities were then analyzed. Table 2 displays the average travel times for each locality to correctional facilities. Routes from Fairfax had the highest average of 206 minutes one way (412 minutes round trip) and routes from Richmond had the lowest average of 137 minutes one way (274 minutes round trip). Four of the five localities (Norfolk, Fairfax, Richmond, Danville) shared the longest route to Wallens Ridge State Prison. The longest travel time for the city of Roanoke was to St. Brides Correctional Center. Figure 6 displays the travel times in minutes and miles for each of the longest routes one way, while figure 7 displays the routes taken from

the metropolitan areas to the correctional facilities.

The drive time analysis revealed that the five longest travel routes involved the city of Norfolk and Fairfax County, with routes heading towards southwest Virginia correctional facilities. The top five routes were between Norfolk and Wallens Ridge State Prison, Red Onion State Prison, and Keen Mountain Correctional Center, and between Fairfax and Wallens Ridge State Prison and Red Onion State Prison. Figure 8 shows these travel routes. Norfolk to Wallens Ridge Correctional Center was the longest route with a travel time of about 441 minutes one way (882 minutes round trip). The longest route from Fairfax was also to Wallens Ridge State Prison with a travel time of about 391 minutes one way (782 minutes round trip). Figure 9 displays the total miles and total minutes traveled one way from Norfolk and Fairfax to these correctional facilities.

The drive time analysis also revealed the longest travel routes and length traveled to the only two female major institutions in Virginia, FCCW, and VCCW. The longest routes were between Danville and FCCW, and Roanoke and VCCW. Figure 10 displays the travel routes between these cities and those facilities. The route from Danville to FCCW was 144 miles with a drive time of 152 minutes one way (304 minutes round trip). The route from Roanoke to VCCW was 165 miles with a drive time of 154 minutes one way (308 minutes round trip). Figure 11 displays the total miles and total minutes traveled from Danville to FCCW and Roanoke to VCCW.

It is evident that while the average distances to all facilities were long, prisons in deep southwest Virginia caused particular strain. Wallens Ridge State Prison was a long driving distance from most metropolitan areas in which a high total number of incarcerated populations originated. The drive to Kean Mountain Correctional Center was also particularly difficult. Over 1,000 individuals were incarcerated at Kean Mountain Correctional Center and Wallens Ridge State Prison respectively, meaning thousands of Virginians were likely struggling with this long distance from their loved ones. It is also important to note that these results did not account for traffic, stops for food, gas, rest, lodging, or any other situation that could impede one's ability to travel in a timely manner. It also assumed good driving conditions, which may not be the case based upon weather, conditions of roads, terrain, etc. Also, these drive times were typically analyzed as a one-way trip. It is likely that many families were traveling this round trip total in a single day when visitation was open. These results showed the great lengths one may have endured to see a loved one. The trip alone could be extremely difficult for most individuals but may have been even more stressful if one did not have access to reliable transportation,

ability/funds to travel large distances, and/or the ability to take the time out of one's day for the trip. This was especially true for individuals with inflexible work schedules. The implications of these results are far reaching.

Figure 10: Longest Travel Routes Between Metro Areas and Women's Correctional Facilities

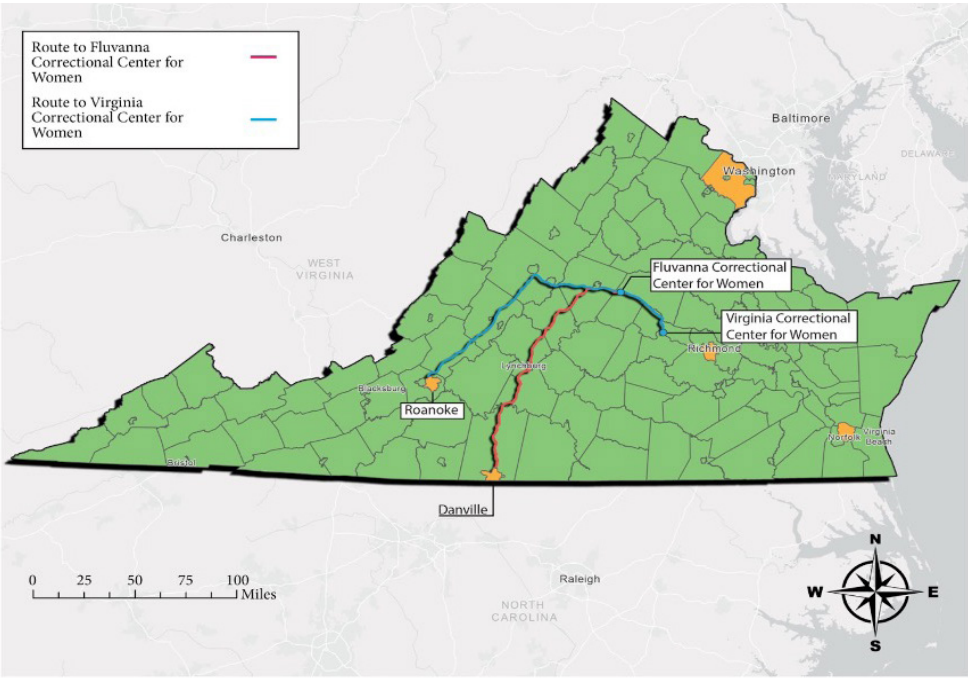
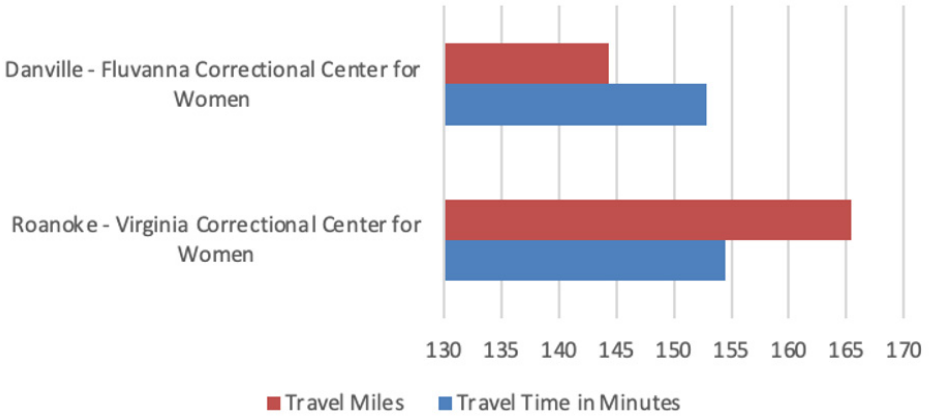


Figure 11: Longest Total Miles and Travel Time in Minutes to Women's Correctional Facilities



DISCUSSION

The geospatial analysis and accompanying maps showed that Virginia's prison geography followed a similar developmental model to other states. This created long distances between metropolitan areas where large numbers of incarcerated individuals called home and where they were confined for their prison sentence. The results carry a number of implications for those directly and indirectly impacted, while creating a clear pathway toward policy reform.

Virginia's prison geography appears to have developed similarly to other states. This means that most institutions were built in non-metropolitan areas (Schlosser 1998). The highest populated prisons were in locations like southern Virginia (Greensville Correctional Center and Nottoway Correctional Center), deep southeast Virginia (St. Brides Correctional Center), and deep southwest Virginia (Kean Mountain Correctional Center and Wallens Ridge State Prison). These locations are long distances from major metropolitan areas. On the other hand, the highest total number of individuals incarcerated were from metropolitan areas in central Virginia like Richmond, Chesterfield County, and Henrico County and the Hampton Roads region like Norfolk, Richmond, Newport News, Virginia Beach, and Hampton. This created a landscape of long, difficult to travel distances between prison locations and home communities.

The geospatial analysis results showed exactly how long these driving distances were, and when accompanied with the existing literature, illuminated the challenges faced by many Virginians. Norfolk, where the highest total incarcerated individuals originated, was an average six hour round trip drive time to all Virginia prisons. A round trip between Norfolk and Wallens Ridge State Prison would take a family approximately 15 hours to complete, and a round trip between Fairfax County and Wallens Ridge State Prison would take a family approximately 13 hours to complete. Round trips between Richmond and Wallens Ridge State Prison would take approximately 12 hours, Roanoke and St. Brides Correctional Center would take approximately 10 hours, and Danville and Wallens Ridge State Prison would take approximately 9 hours. This is especially concerning since the average daily population of St. Brides Correctional Center and Wallens Ridge State Prison were each over 1,000 people respectively. These distances seemed unfathomable, especially for a short period of visitation.

The existing literature points to a number of issues related to these long distances. It would be expected that individuals incarcerated far from home, such as those in Wallens Ridge State Prison from Norfolk, Richmond, Fairfax County, and Danville, or in St Brides Correctional Center if they are

from Roanoke, would have more misconduct issues (Cochran 2012; Cochran and Mears 2013; Lindsey et al. 2017). This is directly connected to the reality that it is far less likely they will have received consistent visitation from loved ones and thus more likely to face increased risks of mental health and recidivism issues (Bales and Mears 2008; Berg and Huebner 2011; Cochran 2014; Cochran and Mears 2013; Edgemon and Clay-Warner 2019; Folk et al. 2019; Machado et al. 2024; McNeeley and Duwe 2019; Visher and O'Connell 2012; Wolff and Draine 2004). These distances also made it difficult for local reentry practitioners, such as those working on housing and addiction recovery resources, to physically travel to the prison for reentry planning.

The loved ones of individuals in these facilities likely have suffered as well. Families were likely to have faced financial strains, logistical challenges, and general exhaustion in trying to visit loved ones in facilities like Wallens Ridge State Prison and St. Brides Correctional Center (Comfort et al. 2016; Tewksbury and DeMichele 2005). These families would have been traveling long distances to then be subjected to restrictive visitation policies, such as no physical contact policies, and invasive search procedures in the name of security and contraband enforcement. Some family members may have decided not to travel for visitation, even if they could, because it ended up being more harmful than helpful (Boppre, Dehart, and Shapiro 2022; Christian,2005). A lack of visitation could harm family relationships and be especially detrimental to children (Hood and Gaston 2022; Mowen and Visher 2016; Shlafer and Poehlmann 2010). Beyond these general challenges, particular subsets of the incarcerated population face unique issues.

These challenges could be particularly pronounced for Black Virginians and women behind bars. Black Virginians have experienced incarceration, and their families have faced the collateral consequences of incarceration, at a disproportionately high rate (Enns et al. 2019; Prison Policy Initiative 2024). Due to historical and persistent inequities, Black Americans have also disproportionately dealt with poverty (Shrider 2023). Given these intersecting factors, Black Virginians were more likely to have faced all of these challenges documented in the literature. They are more likely to have first faced the strains of incarceration, and then the financial hurdles that make long travel to visit loved ones behind bars difficult. Thus, the carceral geography has disproportionately impacted Black Virginians.

For gender, the vast majority of individuals behind bars have been men. However, the rate of women behind bars has increased over the past five years (Budd 2024). Women have faced unique challenges behind bars, such as inadequate healthcare (Norris et al. 2022). Incarcerated mothers

have experienced unique strains as they have dealt with the general challenges of imprisonment while also being disconnected from their children, which has made them far more likely to face lingering trauma from incarceration (Breuer et al. 2021). In particular, women from Danville incarcerated at Fluvanna Correctional Center and women from Roanoke incarcerated at Virginia Correctional Center for Women faced the biggest strains among this population in Virginia. This is on top of the fact that in 2016, a judge approved a settlement of a lawsuit that claimed the medical care at Fluvanna Correctional Center was so poor that it violated inmates' constitutional rights (Oliver 2019). These strains to the justice-impacted individual and their families could be mitigated through public policy.

Policy Implications

Some states have actively worked to mitigate the harms of distance, specifically between incarcerated parents and their children. Illinois passed Public Act 101-0471, which required judges to consider caregiver status when determining a sentence (Illinois General Assembly 2020). Tennessee, California, Louisiana, Oregon, Washington, and Missouri passed laws that created diversion programs and/or prioritized access to existing diversion alternatives for caregivers (Ruth 2023). Nonprofit organizations have largely filled the void in states that lack these policies or have these policies but have not considered distance for non-caregivers. In Virginia, for example, Assisting Families of Inmates has transported family members to state prisons for physical visitation, while also facilitating video visitations at home.

Virginia could follow the lead of these states and reduce the harm of its prison geography on incarcerated parents and their children. Considering caregiver status when determining a sentence and looking for diversion opportunities is a good start to reduce the number of children negatively impacted by incarceration. Virginia could then go a step further and help all individuals incarcerated, not just those with caregiver status. They could legislate the prioritization of distance from home when selecting the prison location for individuals behind bars. For example, individuals from Roanoke should not be sent to St. Brides Correctional Center. They could also use the results from the geospatial analysis to make decisions regarding which facilities to shut down. The state could also prioritize diversion programs that keep individuals out of prison and in their communities. These programs have typically focused upon some underlying issue, such as mental health and/or substance use disorder, that would be better addressed in the community. For example, Virginia's behavioral health court dockets have diverted individuals with serious mental illness away from prison into community-based mental health treatment programming with the potential for criminal charges to be reduced

and/or dropped. Expanding the number and use of these dockets could prevent more people from being locked up for long periods of time at significant distances from home.

Policies and/or programs that reduce prison populations would mitigate the harm of Virginia's prison geography as well. Since 2010, the U.S. prison population has steadily declined (Nellis 2024). This is partially credited to ;tough on crime' era policies being reformed, such as reducing or eliminating mandatory minimums, while creating pathways to early release. Virginia could reduce its prison population by decriminalizing things no longer deemed necessary for criminal punishment, diverting individuals away from the carceral system into community-based programs, reforming punitive sentencing laws, and releasing individuals that are not a threat to community safety. For example, Virginia passed a law in 2020 that expanded the number of credits incarcerated individuals could earn toward early release (Woods 2024). Virginia also decriminalized marijuana, which stemmed the tide of individuals being incarcerated for this drug offense (Oliver 2020). However, when the law was passed, people already serving time for marijuana still remained behind bars and were not automatically released (Oliver 2021). Continued decarceration efforts will fuel more reductions in the prison population and reduce the number of individuals facing long distance separation from their loved ones.

It is important to note that these reforms would benefit correctional staff and communities, as well as those behind bars. Policies that prioritize location of incarcerated individuals' loved ones could increase visitations and help reduce recidivism rates, which would make communities safer (Listwan et al. 2011). It would also be expected that if visitations were increased, the general strains of individuals behind bars would decrease, which in turn would improve behavior within the facility. Policies that prioritize decarceration and diversion would help reduce the prison population, which will in turn increase the safety in the facility. With a reduced population the correctional staff could also focus more on identifying issues and connecting individuals to resources, as opposed to having to focus solely on security. By reducing the strains of carceral geography and an overall focus on diversion and decarceration, safety is likely to increase in facilities and communities.

Conclusions

Much was learned from the geospatial analysis but there are a number of limitations and areas for future research. This analysis was clearly limited to Virginia, and while assumptions could be made about other states' prison geographies, independent analyses are necessary. Also, the data used to analyze the areas in which incarcerated individuals were from is only available in the aggregate. Future researchers should

attempt to match individual home addresses to their prison location to precisely know how far individuals are from home, and any variation across demographic variables. This research also assumed that Virginians reentering their communities from these long distances faced reentry challenges due to the lack of visitation and mental health struggles. Future researchers should analyze the role of distance preventing local reentry practitioners from physically being in the facility to help individuals solidify a reentry plan. This plan can include details about how the individuals will access housing, employment, identification, mental health treatment, medication, and other resources. Future researchers should also analyze the unique challenges carceral geographies create across race, gender, and class lines. Lastly, this project is limited because it largely assumed visitation would be positive for all involved. There are many instances, such as burned bridges and abusive relationships, where visitation is not helpful, and separation of those individuals is actually the healthiest option.

The study's results illuminated the impact of Virginia's prison geography on communities most harmed by incarceration. Cities like Norfolk, Richmond, Newport News, Virginia Beach, and Hampton have lost hundreds, and sometimes thousands, of individuals to the prison system. When individuals from these metropolitan areas ended up in facilities like Wallens Ridge State Prison and Kean Mountain Correctional Center, their families faced distances over 300-400 miles and round trip drives as long as 15 hours to visit them. Individuals incarcerated far away from their home communities were more likely to have misconduct issues, suffer mental health challenges, and struggle in the reentry process. This distance was also likely to strain family relationships and disproportionately impact the children of incarcerated parents. Families were likely to face resource strain as they supported their loved ones and tried to navigate the financial barriers of long travel to restrictive visitation sessions. This analysis must also be housed within the reality that the prison system has disproportionately impacted Black Virginians. All collateral consequences of the system would also disproportionately affect this population. Future research should continue to identify and analyze the magnitude and impact of America's prison geography on individuals, families, and communities. There are clear public policy models for how to mitigate the harms of the prison geography that Virginia and other states can follow and then build upon.

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Appendix A - Drive Times between All Metro Areas and Correctional Facilities

Route Name	Travel Time (Minutes)	Travel Miles
Fairfax - Coffeewood Correctional Center	82.22	65.18
Fairfax - Virginia Correctional Center for Women	122.61	121.30
Fairfax - Beaumont Correctional Center	125.97	122.98
Fairfax - State Farm Correctional Center & Enterprise Unit	126.16	124.67
Fairfax - Fluvanna Correctional Center for Women	127.69	100.32
Fairfax - Haynesville Correctional Center	129.68	112.96
Fairfax - Sussex I State Prison	154.51	153.98
Fairfax - Greensville Correctional Center	156.34	164.66
Fairfax - Nottoway Correctional Center	163.08	159.20
Fairfax - Lawrenceville Correctional Center	168.50	169.37
Fairfax - Buckingham Correctional Center	168.59	137.69
Fairfax - Dillwyn Correctional Center	168.76	138.20
Fairfax - Deerfield Correctional Complex (DCC)	170.84	174.22
Fairfax - Lunenburg Correctional Center	176.54	171.67
Fairfax - Baskerville Correctional Center	193.63	197.21
Fairfax - Indian Creek Correctional Center	210.67	214.45
Fairfax - St. Brides Correctional Center	213.86	214.45
Fairfax - Green Rock Correctional Center	244.99	218.19
Fairfax - Bland Correctional Center	270.22	286.55
Fairfax - River North Correctional Center	305.33	317.87
Fairfax - Pocahontas State Correctional Center	322.12	338.64
Fairfax - Keen Mountain Correctional Center	364.18	382.05
Fairfax - Red Onion State Prison	391.41	409.93
Fairfax - Wallens Ridge State Prison	397.85	412.37
Danville - Green Rock Correctional Center	27.36	18.64
Danville - Baskerville Correctional Center	81.37	70.90
Danville - Lunenburg Correctional Center	100.03	82.86
Danville - Nottoway Correctional Center	102.17	91.00
Danville - Lawrenceville Correctional Center	115.04	100.45
Danville - Buckingham Correctional Center	126.31	107.55
Danville - Dillwyn Correctional Center	126.48	108.06
Danville - River North Correctional Center	139.47	118.42
Danville - Greensville Correctional Center	141.15	124.98
Danville - Virginia Correctional Center for Women	148.89	132.25
Danville - Beaumont Correctional Center	149.82	132.21
Danville - State Farm Correctional Center & Enterprise Unit	150.39	133.15

Route Name	Travel Time (Minutes)	Travel Miles
Danville - Deerfield Correctional Complex (DCC)	152.09	134.96
Danville - Fluvanna Correctional Center for Women	152.87	144.35
Danville - Bland Correctional Center	156.63	126.52
Danville - Sussex I State Prison	161.92	145.18
Danville - Pocahontas State Correctional Center	188.51	167.74
Danville - Coffeewood Correctional Center	194.17	172.09
Danville - Keen Mountain Correctional Center	230.58	211.15
Danville - Indian Creek Correctional Center	235.77	208.35
Danville - Haynesville Correctional Center	236.22	220.16
Danville - St. Brides Correctional Center	238.96	208.35
Danville - Red Onion State Prison	257.53	241.39
Danville - Wallens Ridge State Prison	264.24	241.47
Norfolk - Indian Creek Correctional Center	36.73	25.20
Norfolk - St. Brides Correctional Center	39.92	25.20
Norfolk - Deerfield Correctional Complex (DCC)	81.13	66.84
Norfolk - Sussex I State Prison	93.09	69.65
Norfolk - Greensville Correctional Center	101.40	82.44
Norfolk - Lawrenceville Correctional Center	115.21	99.12
Norfolk - Virginia Correctional Center for Women	119.44	120.64
Norfolk - Beaumont Correctional Center	122.80	122.33
Norfolk - State Farm Correctional Center & Enterprise Unit	123.00	124.02
Norfolk - Haynesville Correctional Center	128.09	103.47
Norfolk - Fluvanna Correctional Center for Women	139.67	146.64
Norfolk - Nottoway Correctional Center	152.48	145.22
Norfolk - Baskerville Correctional Center	153.67	132.33
Norfolk - Lunenburg Correctional Center	159.70	134.37
Norfolk - Buckingham Correctional Center	170.48	164.01
Norfolk - Dillwyn Correctional Center	170.65	164.52
Norfolk - Coffeewood Correctional Center	176.50	167.36
Norfolk - Green Rock Correctional Center	238.67	212.06
Norfolk - Bland Correctional Center	313.59	336.37
Norfolk - River North Correctional Center	347.77	336.09
Norfolk - Pocahontas State Correctional Center	365.49	388.47
Norfolk - Keen Mountain Correctional Center	407.56	431.87
Norfolk - Red Onion State Prison	434.78	459.76
Norfolk - Wallens Ridge State Prison	441.22	462.20
Richmond - Virginia Correctional Center for Women	39.85	32.48

Route Name	Travel Time (Minutes)	Travel Miles
Richmond - State Farm Correctional Center & Enterprise Unit	41.91	32.14
Richmond - Beaumont Correctional Center	43.21	34.16
Richmond - Sussex I State Prison	58.74	48.48
Richmond - Fluvanna Correctional Center for Women	60.07	58.48
Richmond - Greensville Correctional Center	60.58	59.15
Richmond - Nottoway Correctional Center	68.09	55.52
Richmond - Lawrenceville Correctional Center	70.99	68.69
Richmond - Deerfield Correctional Complex (DCC)	75.08	68.72
Richmond - Haynesville Correctional Center	81.27	62.53
Richmond - Lunenburg Correctional Center	81.55	67.99
Richmond - Buckingham Correctional Center	84.48	67.11
Richmond - Dillwyn Correctional Center	84.65	67.61
Richmond - Baskerville Correctional Center	96.12	96.53
Richmond - Coffeewood Correctional Center	99.39	84.46
Richmond - Indian Creek Correctional Center	122.64	121.00
Richmond - St. Brides Correctional Center	125.83	121.01
Richmond - Green Rock Correctional Center	167.01	144.98
Richmond - Bland Correctional Center	234.00	248.21
Richmond - River North Correctional Center	269.11	279.53
Richmond - Pocahontas State Correctional Center	285.90	300.30
Richmond - Keen Mountain Correctional Center	327.96	343.71
Richmond - Red Onion State Prison	355.19	371.59
Richmond - Wallens Ridge State Prison	361.63	374.03
Roanoke - Bland Correctional Center	77.99	72.85
Roanoke - Green Rock Correctional Center	82.21	62.68
Roanoke - River North Correctional Center	113.11	104.17
Roanoke - Buckingham Correctional Center	117.67	100.96
Roanoke - Dilwyn Correctional Center	117.84	101.47
Roanoke - Fluvanna Correctional Center for Women	122.47	131.84
Roanoke - Nottoway Correctional Center	128.79	117.48
Roanoke - Pocahontas State Correctional Center	129.90	124.94
Roanoke - Lunenburg Correctional Center	142.26	129.95
Roanoke - Virginia Correctional Center for Women	154.52	165.43
Roanoke - Beaumont Correctional Center	159.56	168.15
Roanoke - Baskerville Correctional Center	161.15	129.40
Roanoke - Coffeewood Correctional Center	163.77	159.58
Roanoke - State Farm Correctional Center & Enterprise Unit	164.17	141.78

Route Name	Travel Time (Minutes)	Travel Miles
Roanoke - Keen Mountain Correctional Center	171.96	168.35
Roanoke - Lawrenceville Correctional Center	180.53	158.84
Roanoke - Red Onion State Prison	198.92	198.59
Roanoke - Greensville Correctional Center	202.07	177.58
Roanoke - Wallens Ridge State Prison	205.62	198.67
Roanoke - Sussex I State Prison	209.74	188.32
Roanoke - Deerfield Correctional Complex (DCC)	217.79	194.45
Roanoke - Haynesville Correctional Center	234.56	241.87
Roanoke - Indian Creek Correctional Center	283.11	305.65
Roanoke - St. Brides Correctional Center	286.30	305.65

The Economic and Environmental Case for Zero-Emission Public Transit

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Abstract

Completing over 7 billion trips annually and directly contributing to local economies, public transit is critical to the economic and social fabric of the United States. Public transit allows Americans to move more freely to get to work, school, and everywhere in between. Without public transit, American metro areas would not be as accessible to those without cars or those who are unable to drive. However, diesel-powered buses dominate the public transportation space, contributing to air pollution that disproportionately impacts children, people of color, those with pre-existing diseases, and other vulnerable populations. This policy brief outlines the compelling case for transitioning to battery electric buses (BEBs) to achieve a cleaner and more equitable public transit bus system. Despite high upfront costs, BEBs provide substantial operational savings, reduce environmental and noise pollution, and advance public health. Drawing from domestic and international case studies, this policy brief identifies actionable economic policy frameworks, including subsidies, innovative financing, and equity-focused resource allocation that can accelerate electrification. The transition to zero-emission public bus systems represents an opportunity to improve air quality and health but also drive economic growth. Policymakers, transit agencies, and private stakeholders must collaborate to realize the full potential of public transit electrification.

INTRODUCTION

The United States has over 2,000 public transit agencies, resulting in more than 36 billion total passenger miles in 2023. In 2023 alone, there were 7.11 billion public transit trips made, with 87% of those trips directly benefiting the local economy (American Public Transportation Association 2024). Public transit is critical to America's economy but has a significant impact on air pollution within the communities it serves. Diesel-powered buses emit harmful pollutants such as fine particulate matter (PM 2.5), nitrogen oxide, carbon dioxide, and many other chemicals. Diesel-powered buses contribute to climate change by emitting large amounts of greenhouse gases. Diesel-powered buses can also cause lung inflammation and asthma in children, pregnant people, low-income households, people of color, those with pre-existing diseases, and the elderly

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most at risk to adverse effects from diesel-powered bus fumes (Public Health Institute 2024; American Lung Association 2024). Furthermore, with the majority of public transit buses operating in urban areas, it is critical to reduce emissions. Urban residents are exposed to more unhealthy air-quality days than those living in rural areas and, on average, experience 12 times more excessive ozone days and excessive PM 2.5 days per year than their rural counterparts (U.S. Department of Transportation 2023).

It is critical to rethink public transit bus systems throughout the U.S. in a way that grows the economy while protecting public health. This new way forward is through the electrification of public transit buses by the means of battery electric buses (BEBs), also known as zero-emissions buses. BEBs are powered by battery packs that run an electric motor in order to turn the vehicle's wheels. Their batteries are recharged through plug-in chargers utilizing energy from the grid and, with today's current technology, have a range of approximately 150 miles (Environmental and Energy Study Institute 2018). However, an average electric transit bus costs $750,000, around $250,000 more than the average diesel-powered transit bus (American Public Power Association 2019). Additionally, the charging infrastructure necessary for this transition contributes to the higher upfront costs of electrification.

Electrification of public transit bus systems in U.S. cities is a critical opportunity to address pressing environmental and public health challenges while stimulating the economy. This paper demonstrates how, through strategic economic policies, such as targeted subsidies, innovative financing mechanisms, and market-driven incentives, can overcome market barriers to adoption. By aligning these policies with equity-focused frameworks and technological advancements, the U.S. can realize the full potential of zero-emission transit systems.

BENEFITS AND BARRIERS TO ELECTRIFICATION

The electrification of public transit bus systems throughout the U.S. offers substantial cost savings. BEBs generate lower operating costs due to reduced fuel and maintenance expenses. In fact, it is about 2.5 times cheaper to power BEBs than it is to power diesel-powered buses. This is due to the market comparisons of electricity and gas, with electricity having a more stable market (Environmental and Energy Study Institute 2018). Current fuel costs estimate that diesel-powered buses have an average annual fuel cost of $29,250 while BEBs have an average annual energy cost of $21,600, assuming batteries are charged exclusively during peak energy demand hours (Center for Transportation and the Environment n.d., 2-3). Due to the simplicity of the design, maintenance costs are, on average, $0.18/mile for BEBs while maintenance costs for diesel-powered buses are, on average, $0.88/mile (Johnson et al.

2020, 5-6). These cost savings, when taken together under a total cost-benefit analysis, demonstrate significant long-term financial benefits of electrification.

The transition to BEBs not only saves money, but human lives as well. The American Lung Association has found that a nationwide transition to electric transit bus systems by 2050 would save 6,300 lives every year, avoid 93,000 asthma attacks, and recuperate the productivity losses of 416,000 workdays every year due to air pollution-induced illnesses (U.S. Department of Transportation 2023). Additionally, diesel-powered buses contribute significantly to noise pollution. Traditional diesel-powered buses create a large amount of noise pollution, an issue that can cause insomnia, chronic stress, cardiometabolic disease, and cardiovascular diseases. BEBs, on the other hand, create very little noise pollution, reducing the health risks associated with noise pollution (U.S. Department of Transportation 2023). While these public health savings may not be realized directly by public transit agencies, there are strong economic benefits to creating a cleaner, safer environment.

While strong benefits to electrification exist, it is critical to acknowledge the barriers to electrification. First, there are high initial investment costs. The cost of an electric transit bus is, on average, $250,000 more than a diesel-powered transit bus and the additional infrastructure necessary for one electric bus to operate can be an additional $10,000 to $30,000 (American Public Power Association 2019; Matthews 2023). This may, in the future, adjust to reflect an anticipated decline in battery costs. By 2026, Goldman Sachs anticipates that battery prices will drop 50% compared to 2023 costs (Goldman Sachs 2024). However, this downward trend may not be realized due to emerging trade barriers presented by the Trump Administration. On April 5, 2025, the Trump Administration put a 54% tariff on Chinese goods, including manufacturing components like lithium-ion batteries. Given that the United States imported over $4 billion of these batteries from China in the first four months of 2024 alone, the tariff acts as a substantial tax on core BEB technology (Temple 2025). This will likely result in an additional cost for transit agencies looking to electrify their public transit fleet. Estimations reflect that 53 of the largest cities in the U.S. did not generate enough revenue in 2022 (Waters 2024). The high upfront costs of electrifying public transit bus systems are the biggest barrier to this transition.

Additionally, previous funding opportunities under the Clean Heavy-Duty Vehicles Program and the Commercial Clean Vehicle Credit under the Inflation Reduction Act have stalled and, as a result, municipalities looking to make the switch to BEBs may have increased financing concerns (St. John 2024). Even with this

change of policy federally, there are state and local funding opportunities that can support financing the switch. In fact, 48 states have state-wide hybrid and electric vehicle incentives and over five states have funding opportunities for local governments. It's important to note that many of the funding opportunities at the state-level are funded by the Volkswagen Settlement funds. This may leave programs with depleted funds and a need for budget reconsiderations to continue these critical programs for transit systems (Igleheart 2023).

Finally, there is a high planning burden placed on public transit agencies looking to transition. Because of the complexity of planning a transition to BEBs, many transit agencies may depend on third-party consultants, who possess the specialized expertise required. These third-party consultants can assist with developing strategies for fleet conversion, evaluating infrastructure needs, and estimating costs for charging stations and maintenance needs. For example, some agencies may realize more cost savings with depot charging, where there is a one-to-one bus to charger ratio with lower powered charging stations. However, other transit agencies with longer routes may realize more cost savings with opportunity charging, where higher-powered chargers are placed at strategic points along routes in order for buses to top-off along the route (Benoliel et al. 2021, 2-9). With established high costs and an overall learning curve with new technology (Benoliel et al. 2021, 2-9), transit agencies are presented with more barriers to electrification which can be mitigated through these public-private partnerships.

SUCCESSFUL U.S. PLANNING STRATEGIES

While the transition to BEBs presents challenges for U.S. localities, some cities have successfully navigated these barriers through strategic planning. Examining these cases provides insights and actionable policy steps to further public transit electrification across U.S. transit systems.

First, the Los Angeles (L.A.) Metro has committed to transitioning its entire bus fleet to zero-emission vehicles by 2030. To make this possible, L.A. Metro received over $77.5 million from the Federal Transit Authority to replace aging compressed natural gas buses and support the transition to BEBs. Through this funding, L.A. Metro was able to offset the capital expenditures associated with BEB adoption (Smith 2024). A significant milestone in this plan was achieved with the full electrification of the G Line in the San Fernando Valley. This complete transition was made possible through phasing buses in, allowing L.A. Metro to gradually integrate electric buses while also investing in necessary charging infrastructure. Recently, L.A. Metro has worked with other transit agencies across Los Angeles County to buy BEBs together.

A major collaborative effort has occurred between L.A. Metro and the Los Angeles County Municipal Operators Association (LACMOA), and, in October 2024, L.A. Metro's board approved the allocation of $49.84 million in state Zero Emission Transit Capital Program funds to LACMOA members. In fact, this collaboration is the largest regional procurement initiative in U.S. history (Smith 2024; Metro Magazine 2024).

Another successful BEB deployment program is located in King County Metro. The Seattle metro area has been a leader in electric vehicle deployment, and, in 2016, King County Metro began adding BEBs to its fleet. Initially, the King County Metro conducted extensive pilot programs to assess BEB performance, range, and reliability, prioritizing data-driven decision-making. In early 2024, King County Metro signed a 5-year contract with GILLIG to purchase 500 BEBs, with an initial 89 BEBs for $111 million. To support further purchases, King County Metro received around $6.7 million from the Federal Transit Administration (Sander 2024; Switzer 2024). King County Metro has also worked with local utilities to develop charging facilities, including a 100% electric bus base in Tukwila to support 120 BEBs (Sander 2024). Through King County Metro's work with local utilities, grid capacity is ensured while optimizing energy consumption. Through guiding the procurement process with data and having strong relationships with local utilities, King County Metro aims to achieve a 100% zero-emission fleet by 2035.

Finally, New York City's Metropolitan Transportation Authority (MTA) has utilized state and city funding to electrify their bus fleet. Through a pilot program, MTA tested various BEB models under different operating conditions, collecting data on performance, energy consumption, and maintenance needs. This approach informed deployment strategies and critical operational planning efforts. Additionally, MTA prioritized environmental justice concerns by focusing initial deployment of BEBs in communities disproportionately impacted by air pollution. MTA's current plan to electrify its fleet includes four stages between 2015 and 2040. Stage 1 of this plan concluded in 2024 and initiated the deployment of 560 BEBs to assess infrastructure and operational feasibility while focusing on local workforce development. Stage 2 started in 2025 and is expected to conclude in 2029 with over 1,000 BEBs introduced to multiple bus depots. Additionally, all new bus orders will be zero-emission by 2029 (MTA 2024). In January 2025, MTA purchased 265 new zero-emission buses which are expected to be on the road in late 2025 throughout five boroughs. To support these 265 buses, MTA is making infrastructure upgrades in depots around the city while working with the New York Power Authority and Con Edison to build new charging stations as well as

automated overhead pantographs (Metro Magazine 2025 & MTA 2025). In Stage 3, MTA aims to have 60% of the fleet be zero-emission by 2034, and, Stage 4, will result in a zero-emission fleet by 2040 (MTA 2024). To fund the transition, MTA is partially funded through the revenue generated by congestion pricing, a policy that imposes a $9 toll on vehicles entering lower Manhattan and began in January 2025. Between subway repairs and the purchase of new BEBs, MTA is projected to receive $15 billion from congestion pricing alone (Milman 2024).

BREAK-EVEN POINT ANALYSIS AND SWOT EVALUATION

The transition to BEBs represents a significant shift in public transportation, offering both long-term environmental and economic benefits. However, the initial capital costs required for purchasing and deploying BEBs are substantially higher than that of traditional diesel or propane buses. This higher upfront investment is a large barrier to many transit agencies, especially for smaller agencies that may be more financially constrained. A break-even point is the specific threshold where the cumulative savings from reduced operational costs offset the initial investment in the effort of making electrification viable (Say et al. 2024, 1-2, 8-13). In this analysis, we can assess factors that impact the break-even point for different types of bus transit systems, including agency size, route type, and financing models. Additionally, it is critical to examine how federal and state funding mechanisms will affect the time required to break even.

The break-even point in the context of bus electrification refers to the time required for the cumulative cost savings to equal the initial investment in BEBs and related infrastructure, such as charging stations. The high upfront costs of BEBs, including vehicle purchase, battery costs, and the establishment of charging infrastructure, must be offset by the long-term operational savings.

Savings from BEBs typically come from reduced fuel costs and lower maintenance costs. BEBs have significantly lower fuel costs compared to diesel buses, which rely on more volatile and expensive fossil fuels. In fact, even if BEBs are charged exclusively at peak energy demand hours, the average annual fuel costs savings is around $8,000. (Center for Transportation and the Environment n.d., 2-3) Additionally, BEBs have fewer moving parts compared to diesel buses, which reduces the frequency and cost of maintenance. Electric motors require less maintenance than diesel engines, and BEBs do not require oil changes or other costs that diesel buses do. In fact, per mile maintenance costs for BEBs are, on average, $0.70 less than per mile maintenance costs for diesel buses. (Johnson et al. 2020, 5-6)

According to a study conducted NREL, an average BEB realizes a discounted break-even point in just 3.6 years. (Johnson et al. 2020) This break-even point can be adjusted for the number of buses in the fleet and if economies of scale are realized. Furthermore, it is critical to examine the factors that may impact the break-even point for a specific transit agency. The impacts on the break-even point for different scenarios can be seen in Table 1.

While the break-even analysis provides a critical financial perspective on bus electrification, transit agencies must also consider a broader set of factors that influence the success of their transition to BEBs. Beyond cost considerations, agencies must evaluate operational challenges, operational, funding risks, technological advancements, and political factors that could accelerate or delay implementation.

To comprehensively assess these factors, a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis can help transit agencies and policymakers understand the full spectrum of financial, operational, and strategic implications of electrification. This framework provides a concise and structured way to identify the key benefits of BEBs, the challenges agencies may face, potential opportunities for innovation and funding, and external risks that could impact long-term success. The research presented has informed the SWOT analysis found in Table 2.

POLICY RECOMMENDATIONS TO DRIVE ELECTRIFICATION

To realize the substantial benefits and opportunities of public transit electrification while addressing the weaknesses and concerns of electrification, it is critical that policy is implemented to assist public transit agencies in overcoming the hurdles. The major hurdle for American transit agencies is the break-even point. The goal of current and future policy surrounding the electrification of public transit bus systems is to push the break-even point closer to the initial investment date.

In recent years, there have been large strides in economic policy incentivizing the electrification of the U.S. transit bus system. Within the Inflation Reduction Act (IRA) of 2022, the Clean Heavy-Duty Vehicles Program granted the EPA to disperse $1 billion to replace eligible Class 6 and 7 vehicles with zero-emission alternatives. The IRA also established tax credits of up to $40,000 per vehicle purchased through the Commercial Clean Vehicle Credit and up to $100,000 per charger purchased through the Alternative Fuel Vehicle Refueling Property Credit (Wang et al. 2024, 8-15). Finally, the IRA created a long-term extension of the 30D tax credit for light-duty vehicles, a new commercial EV credit (Section 45W), and a used EV credit (Section 25E). Additionally, the Bipartisan Infrastructure Law created a Clean School Bus Program, allocating $5

billion in competitive funding for states and school districts to purchase electric school buses. (Electrification Coalition 2024) Despite these legislative advancements, the Trump administration has effectively frozen or weakened several of these programs, creating uncertainty for transit agencies (John 2025). The Clean Heavy-Duty Vehicles Program has seen delays in grant dispersals, abruptly halting progress on planned fleet transitions (Bikales, Siegel 2025). The Commercial Clean Vehicle Credit now faces administrative barriers that make it more difficult for agencies to access, reducing the incentive's effectiveness (Magill 2025). Likewise, the Clean School Bus Program has encountered delays, limiting the ability for local governments to access promised funding (Bikales, Siegel 2025). Without these reliable federal funding opportunities, state and local agencies may struggle to maintain momentum in electrifying their fleets, forcing them to seek alternative funding sources such as state-level programs or private-public partnerships (DiNatale 2025).

Many states have had funding opportunities to urge state transit agencies to electrify. One example is the Volkswagen Clean Air Act Civil Settlement, where every state and territory received between $8 million and $423 million to promote ZEBs (Environmental Protection Agency 2024). Additionally, public-private partnerships have become instrumental in facilitating the electrification of transit fleets across various states. These collaborations enable transit agencies to leverage private sector expertise and funding, accelerating the transition to BEBs. For instance, King County Metro in Washington is evaluating the use of a public-private partnership model to convert its bus depots to accommodate electric vehicle charging (Treece 2024).

While significant progress has been made at the federal and state level, there is a need for further policy-driven interventions to accelerate adoption and long-term sustainability of electrified public transit bus systems. The following recommendations aim to enhance future electrification efforts while addressing financial, operational, and equity considerations.

1. Subsidies and Incentives

One of the most effective strategies for electrification has been the implementation of subsidies and financial incentives to offset the upfront costs of electric buses and charging infrastructure. In the case of Shenzhen, China, the city's public transit bus fleet was 100% electrified within 5 years by leveraging national subsidies to adopt electric buses and charging infrastructure. (Say et al. 2024, 1-2, 8-13) While there is little federal appetite to reinstate the Clean Heavy-Duty Vehicles Program, states could pass legislation that develops a similar program with a model that ensures state-specific needs are met. Additionally, to ensure

that anticipated cost declines for BEBs are realized for American transit agencies, it is critical to make trade decisions that ensure that American cities will not be harmed.

Recommendations:

- State-level subsidies and programs for deploying charging stations and purchasing BEBs or ZEBs
- Time-of-use electricity tariffs to lower charging costs during off-peak
- hours, as seen in Shenzhen, China (Say et al. 2024, 1-2, 8-13)
- Federal and state tax exemptions for electric buses, including road taxes and parking fees, similarly seen in New York City and Oslo, Norway (Milman 2024; Say et al. 2024, 1-2, 8-13)
- Lift or mitigate the 54% tariff on Chinese lithium-ion batteries.

2. Innovative Financing Mechanisms

Innovative financing mechanisms can also help overcome budgetary constraints and share financial risks across public and private sectors. Since it is more cost effective and efficient to deploy larger electric bus fleets (Say et al. 2024, 1-2, 8-13), it is important to disperse the risk. For example, in Los Angeles, state-led green investment programs provided low-interest loans for transit bus electrification, while revenues from carbon credits were reinvested into expanding charging infrastructure. Similarly, in Oslo, Norway, public-private partnerships allowed the city to co-finance charging stations with private energy companies, reducing financial burdens on the public sector. (Say et al. 2024, 1-2, 8-13)

Recommendations:

- Introduce green or municipal bonds to fund large-scale electrification projects
- Expand federal or state revolving loan funds dedicated to transit bus electrification
- Foster public-private partnerships to share financial risks and benefits between public agencies and private stakeholders

3. Targeted Equity Policies

Electrification efforts must prioritize equity within policy measures, given that over half of U.S. transit riders earn less than $50,000 per year (American Public Transportation Association 2024, 2). With a transitioning public transportation system, the U.S. can address historical underfunding in bus systems serving low-income communities to ensure that the benefits of electrification are equitably distributed. While this may not be a priority for the current federal administration, state governments and individual transit agencies can prioritize BEB adoption on routes that predominantly route through environmental justice communities.

Recommendations:

- Direct resources to historically underfunded transit bus systems and regions
- Maintain fare affordability for low-income riders despite electrification costs
- Design grant and rebate programs that target rural and underserved areas, modeled after the Clean School Bus Program under the Bipartisan Infrastructure Law

ADDRESSING COUNTER ARGUMENTS

While the transition to BEBs offers substantial environmental and operational benefits, the path to widespread adoption is not without its challenges. Critics of electrification often raise concerns about the high upfront costs, the readiness of the industry to scale up production and infrastructure, and the loss of jobs. Through addressing these concerns, the future policy framework used around public transit bus electrification will be more robust.

While the upfront costs of the buses themselves and associated infrastructure pose a large barrier to adoption, BEBs have substantially lower operational and maintenance costs (Environmental and Energy Study Institute 2018). By having these lower operating and maintenance costs, a break-even point is present and achievable with the proper project planning. By employing strategic subsidies and financing mechanisms, public transit agencies will be relieved of that initial cost burden. Furthermore, by utilizing private-public partnerships, that burden is not fully taken on from local or federal governments but is shared across many stakeholders. Additionally, if modular and adaptive systems are promoted, excessive upfront investments due to worst-case scenario planning can be avoided (Benoliel et al. 2021, 9). Finally, with greater widespread adoption across regions, based on the competitive nature of the market, it is likely that the cost of BEBs will drop, increasing the cost savings that can be realized. With collaborative economic policy design, it is possible to overcome this barrier and eventually be realized as a cheaper upfront option.

Some critics may argue that BEBs are unreliable, and the industry is not prepared for the demand of the U.S. public transit bus systems. Rhetoric that BEBs fail to work in cold weather or in mountainous regions has been debunked through numerous case studies. In fact, Three Rivers School District in Kalamazoo, Michigan, has testified to how their electric school buses outperform their diesel-powered buses in the winter months. Additionally, the Eastern Band of Cherokee Indians in North Carolina have utilized the regenerative braking system within their mountainous terrain (Electric

School Bus Initiative 2024). Additionally, in some cases, the regenerative braking capability of BEBs has allowed for a 16% increase in range (Electric School Bus Initiative 2024). While new technology can propose some unforeseen complications, BEBs have proven themselves to be reliable for daily routes, even in harsh environments.

Finally, critics may argue that the transition to BEBs will cause job loss, however, there is evidence that this will not happen. The automotive industry will likely not suffer substantial job loss due to the similarities in the systems between diesel-powered buses and BEBs. Additionally, the majority of grid energy is created domestically, supporting the local job market. In fact, under the Biden Administration's commitment to have 500,000 fast chargers for electric vehicles there is an opportunity to generate workforce needs of about 28,950 job-years from 2021 to 2030 (U.S. Department of Transportation, 2023).

CONCLUSION

The electrification of public transit bus systems is an opportunity to address pressing environmental and public health challenges. By implementing targeted economic policies, such as subsidies, innovative financing mechanisms, and market-driven incentives, the U.S. can accelerate the adoption of BEBs while overcoming financial and operational barriers. These policies can not only reduce upfront costs for transit agencies but also pave the way for long-term savings through lower operational and maintenance costs.

Beyond the financial benefits, electrification offers a pathway to significant environmental sustainability. By reducing harmful diesel emissions, we can improve air quality in urban areas, mitigate the adverse health impacts on vulnerable populations, and contribute to the United States' climate goals.

Policymakers, industry leaders, and local public transit agencies must collaborate to build a cleaner, healthier, and more equitable future for public transit. By embracing the economic, environmental, and social aspects of electrification, it is possible to create a public transit bus system that not only powers U.S. cities but also empowers the people who live within them.

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Table 1

Agency Size	Route Type	Financing Model	Impact on Break-Even Point
Small	Urban	Federal Funding	• Federal funding opportunities provide smaller transit agencies with substantial financial support to transition to BEBs (Linscott, Posner 2021). • This financing model can significantly accelerate the breakeven point from 16 + years to 9 – 13 years. (National Academies of Science, Engineering, and Medicine 2021).
Small	Urban	Public-Private Partnership	• Public-private partnerships provide a pathway to economic viability for small urban transit agencies transitioning to BEBs (Treece 2024). • Public-private partnerships can reduce break-even points by 30 to 40% compared to traditional financing methods (Lockwood 2009). • By distributing costs and risks across multiple stakeholders, smaller urban agencies can overcome capital constraints (U.S. Department of Transportation 2007). • These partnerships grant agencies access to technical expertise, which could otherwise be cost-prohibitive.
Large	Urban	Public-Private Partnership	• Public-private partnerships provide large urban transit agencies a path to economic parity between diesel and electric buses (Treece 2024). • These partnerships can reduce break-even points to through: • Innovative financing structures • Shared infrastructure investments • Performance guarantees • Large urban agencies are particularly well-positioned to benefit due to: • Substantial fleet sizes • Attractive energy consumption profiles • Ability to standardize across multiple depots
Large	Rural	Federal Funding	• Federal funding greatly enhances the economic feasibility of BEB adoption for large rural transit agencies (Linscott, Posner 2021). • Funding helps offset additional rural operational costs, including: • Longer routes requiring larger batteries • More dispersed charging infrastructure
Large	Rural	Public-Private Partnership	• Public-private partnerships help large rural transit agencies tackle unique challenges of rural electrification while improving economic outcomes (Treece 2024). • Public-private partnerships can reduce break-even periods through: • Shared infrastructure investments • Technical support • Innovative financing • Especially valuable in addressing grid capacity limitations and maintenance expertise gaps common in rural deployments.

Table 2

Strengths	Weaknesses
• Long-Term Cost Savings • Lower fuel and maintenance costs compared to diesel buses • Environmental Benefits • BEBs produce zero tailpipe emissions, reducing GHG emissions and improving air quality • Energy Efficiency • BEBs convert energy more efficiently than diesel engines, reducing overall energy consumption • Public and Political Support • Growing public awareness and political momentum for clean energy and sustainability policies encourage investments in electric fleets • Improved Passenger Experience • BEBs operate more quietly and smoothly, providing a better experience for riders	• High Upfront Costs • Initial investments in BEBs and charging infrastructure are significantly higher than diesel alternatives • Charging Infrastructure Requirements • Agencies must build and maintain extensive charging networks, which can be expensive and complex to implement • Range Limitations • BEBs require additional charging stops for long routes • Technological Uncertainty • Rapid advancements in battery technology may lead to obsolescence, requiring additional future investments • Operational Adaptation • Transit agencies must retrain staff, adjust scheduling, and develop maintenance expertise for electric fleets.
Opportunities	Threats
• Public-Private Partnerships • Collaborating with private firms can reduce upfront costs and share financial risks • Federal and State Incentives • Government grants, subsidies, and tax credits can make electrification more financially viable • Grid Modernization & Renewable Energy Integration • Pairing BEBs with renewable energy sources, like solar-powered charging stations, can further reduce costs and emissions • Advancements in Technology • Innovations in battery storage and fast-charging solutions can improve efficiency and reduce range concerns • New Revenue Models • Energy-as-a-Service (EaaS) contracts and vehicle-to-grid (V2G) integration could create new funding and cost-saving opportunities	• Uncertain Federal Funding • Changes in government policies and funding priorities could affect subsidies and grants for electrification • High Electricity Demand & Grid Strain • Widespread BEB adoption could increase electricity demand, requiring grid upgrades and resilience planning • Competing Transit Technologies • Hydrogen fuel cell buses and alternative fuels may compete with BEBs, impacting long-term investment consideration. • Supply Chain Constraints • Limited availability of raw materials, like lithium for batteries, and global supply chain disruptions may drive up costs • Environmental justice concerns are also raised in the supply chain • Political and Regulatory Barriers • State and local policies on emissions standards, procurement, and energy regulations could either accelerate or hinder adoption

Global Health and the Securitization of AIDS

Examining National Security and Human Security Approaches to the HIV/AIDs Pandemic in the 21st Century

Sydney Thornton[1]

In 2002, Kevin de Cock, who would go on to become the director of the World Health Organization's (WHO) Department of HIV/AIDS, argued that HIV/AIDS was the single greatest threat to "life, liberty, and the pursuit of happiness and prosperity," facing Africa, and the globe as a whole (Elbe 2009, 121)[2]. At the time of his comments, HIV/AIDS had already been a significant public health threat, triggering calls for a comprehensive collective global health response for several decades. The timing and intensity of de Cock's remarks demonstrate that despite the sustained widespread knowledge and concern over HIV/AIDS that existed for years, the disease had not been effectively responded to by the global community in the first decades of the crisis, allowing an even larger crisis to blossom. In the over ten years since de Cock's remarks, the HIV/AIDS crisis has primarily followed a similarly ineffective trajectory of management, with the pandemic sustaining growth yearly in the numbers of HIV infections and deaths from the advanced form of the disease (AIDS) every year (UNAIDS 2023)[3]. As a result, the study of previous governmental responses is imperative to the effectiveness of future HIV/AIDS initiatives. Through comparative analysis, this paper argues that human security provides a more effective framework for addressing the HIV/AIDS crisis than national security as it avoids stigmatization, discrimination, and politicization, which have proven adverse effects on disease eradication. However, while government approaches to HIV/AIDS must be grounded in human security, these initiatives are most readily achieved when they leverage national interests as motivating factors toward collective human security collaboration.

HIV/AIDS is a disease complex that first caught international attention in the late 1970s (Misztal and Moss 1990, 4).

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2 Elbe (2009) analyzes Kevin de Cock's work and beliefs on AIDS prior to his appointment with the WHO. Also see de Cock, Mbori-Ngacha, and Marum's (2002) work which analyzes the adverse effects of AIDS on African states' long-term healthcare development potential.

3 The most recent data produced by UNAIDS (2023) (the United Nations initiative focused solely on multinational HIV/AIDS responses) shows that the pandemic continues to grow yearly, with ~39 million people living with the disease in 2022 and 1.3 million of those having been diagnosed in 2022 alone.

Early on, there was significant variance in HIV/AIDS geographic prevalence, presentation, prognosis, and disease course. As a result, early disease transmission went largely unnoticed, ignored, or incorrectly documented even after 1987, when the Centers for Disease Control and Prevention (CDC) landed on its comprehensive disease definition (Misztal and Moss 1990, 5). The tendency to ignore early evidence of the pandemic was heavily influenced by HIV/AIDS' unique characterization, particularly early on, as a socially segregated disease based on one's sexuality (Misztal and Moss 1990, 5-6; 27; 52).[4] This false assumption that HIV/AIDS was a pathogen isolated to the Queer community caused the state actors to under-respond to the initial outbreak of the disease. Early responses to HIV/AIDS were also largely absent or insufficient from the major Western powers due to a lack of international collaboration and communication around HIV/AIDS (Misztal and Moss 1990, 5-6).

As a result of the foundational complexities of HIV/AIDS presented above, international political responses to the pandemic have been challenged in three significant ways: I) providing access to antiretroviral medications and preventative devices—such as condoms, II) providing access and determining the content of sexual health and disease education, III) and developing labeling, monitoring, and potential restriction policies for infected individuals. International approaches to these issues fall into two categories: national security and human security.

Prior to and during the Cold War, states were generally seen to prioritize securing the territorial and political independence of the state itself as the paramount goal of security, with military authority acting as a defining characteristic of sovereignty (Peou 2014, 31; Behringer 2012, 1). This national security approach to international diplomacy represents an applied example of traditionalist, realist perspectives on international relations, which conceptualizes an anarchic international system and define power through a closed finite system with a zero-sum, or winner-take-all, struggle between nation-states (Morgenthau 1948 qt. in Behringer 2012, 1; Behringer 2012, 10). Within the realist perspective, there exists a variety of subtypes, including classical realism and its later derivatives, structural realism, and neorealism, in which classical realist theories on the balance of power predict state decision-making through frameworks such as game theory (Behringer 2012, 10).[5] Nevertheless, these varieties of realism share in their state-centric nature, making states the predominant

4 See Aggleton, Davies, and Hart, ed. AIDS: Activism and Alliances. (1997) for further explanation on the labeling of HIV/AIDS as a Queer disease and the adverse effects this social label had on eradication efforts, particularly in the early days of the pandemic.

5 For further discussion on subtypes of realism and the intersection of realism and national security approaches, see the work of classical realist Morgenthau (1948) and structural realists Walt (1987) and Waltz (1979).

level of analysis when discussing security (Peou 2014, 31-32; Behringer 2012, 10). Additionally, realist perspectives share a great-powers centric focus, exhibiting an evident preoccupation with and tendency to overly contribute outcomes to the most powerful states in a system (Behringer 2012, 10). While realist national security approaches have historically been the norm of international engagement, these techniques are often criticized for their isolationary nature, prioritizing states' needs over securing basic human rights, and their tendency to discourage collective action.

Early approaches to the HIV/AIDS crisis have been grounded in realism and national security—framing the disease as a threat to a state's internal political, economic, and military stability (Aginam and Rupiya 2012, 8-12).[6] Prominent health and national security researcher Stefan Elbe argues that while establishing firm causal links between HIV/AIDS spread and the destabilization of nation states political or military control has been hard to prove, this has not decreased states' concern over the potential social, economic, and civil unrest that an acute large scale outbreak of HIV/AIDS could bring (2009, 128).[7] As a result, approaches to HIV/AIDS have often taken severely isolationary and restrictive approaches to control disease spread (Elbe 2009, 120). National security approaches to HIV/AIDS have aimed to treat the symptoms of the disease—HIV/AIDS infections and spread; and not the disease itself— the social determinants of health that make a population susceptible to the disease. Elbe argues that this is the result of hegemonic state actors' securitization of the HIV/AIDS crisis, which pushed the responsibility to respond away from public health entities and onto individual political leaders and clandestine military intelligence entities (Elbe 2009, 92).

By driving the responsibility to respond to public health concerns away from the medical field and collective decision-making of IGOs and towards individual leaders, national security approaches slow HIV/AIDS eradication through politicization and predatory misinformation, delaying the initiation of policies and promoting disunity and inefficiency in global public health responses (Anderson-Rodger and Crawford 2023, 195-196). Through their propensity to discredit collective action and promote isolationary responses from state actors, national security approaches provide opportunities and incentives for individual leaders to politicize, manipulate, or misrepresent public health information for their own political gains. A prominent example of this politicization was seen when the U.S. utilized earmarked AIDS funding to

6 Also, see Enemark (2017, 99-100) and Elbe (2009, 90-92) for additional discussions on the interplay between the security sector and HIV/AIDS.

7 Aginam and Rupiya (2012) also discuss these concepts further in their work and point to the devastating social, political, and economic impact of past pandemics like the black plague and Spanish flu as critical reminders that keep nation-states in a security mindset when viewing HIV/AIDS

restrict global access to condoms and promote conservative religious values by requiring that 33% of the President's Emergency Plan for AIDS Relief (PEPFAR) be allocated towards abstinence-only education (Gable et al. 2008, 1781).[8] This attempt by the U.S. to politicize the distribution of aid funding was highly criticized both by IGOs and aid recipient countries, as it directly contradicted evidence-based public health recommendations, which strictly encouraged condom use, discussion, and distribution (Gable et al. 2008, 1781). Additionally, reports from Human Rights Watch on the effects of PEPFAR in Africa found that countries like Uganda—which had recently made significant gains in HIV prevention and reduction through sexual and contraceptive education—saw a reversal of these public health improvements, with officials directly citing the United States' attack on condoms (Santelli 2013, 4). An adolescent health and wellbeing report issued by The Lancet Commissions found "high-quality evidence that abstinence-only education is ineffective in preventing HIV, incidence of sexually transmitted infections, and adolescent pregnancy," whereas they found "high-quality evidence of some benefit" to preventing HIV through comprehensive sex education combined with contraception use (Patton et al. 2016, 2450 —2452). Despite this overwhelming evidence, national security approaches push decision making away from public health authorities and provide a guise for individual leaders to prioritize their personal religious beliefs and interests as paramount over collective human wellbeing. This environment promotes predatory behavior from individual leaders who can use transnational threats such as disease, climate change, or food insecurity as political leverage. The U.S. is not the only perpetrator adversely politicizing the HIV/AIDS crisis. In her work, Campbell highlights former South African President Thabo Mbeki, who publicly questioned the existence of HIV/AIDS and asserted that the disease was a fiction perpetuated by international drug companies to increase profits (2003, 158). Campbell argues that following these comments, the Summertown HIV project saw a significant increase in distrust of medical staff, leading to a decrease in patients served (Campbell 2003, 158-159). Campbell's work serves as a stark example of the tangible damage that is done to eradication efforts when individual leaders use national security as a facade and platform for elevating their own beliefs and interests. As a result of the politicizing effect of national security approaches, Campbell posits that programs such as Summertown can only be effective in an environment privileging diverse multi-sectoral partnerships, such as human security (Campbell 2003, 176-179).

8 For further details on the political restrictions placed by the U.S. on AIDS prevention funding, see the U.S. Government Accountability Office (2006). *Global Health: Spending Requirement Presents Challenges for Allocating Prevention Funding Under the President's Emergency Plan for AIDS Relief.*

Initial national security approaches to HIV/AIDS have emphasized mandatory testing, labeling, and disclosure protocols for infected individuals, as well as prohibiting infected persons from specific areas, activities, and rights (Elbe 2009, 118-121). In essence, national security approaches to HIV/AIDS have been aimed at confining the disease and its movement across national borders by attempting to identify those with the disease, labeling them, and restricting their movement and activities. Criticisms of these national security approaches argue that they infringe on civil liberties, violate established bioethics norms, stigmatize and discriminate against infected individuals, and politicize the crisis, leading to significantly worse healthcare outcomes and an inability to eradicate the pandemic.

Extreme securitization responses to HIV/AIDS can be seen since the beginning of the pandemic. In 1987, one of the first U.S. responses to the pandemic proposed identifying all HIV-infected individuals in violation of medical principles of informed consent and isolating them in a former leper colony in Hawaii (Elbe 2009, 118). In 2004, the Chinese government went forward with its "Four Frees and One Care" policy after stating that voluntary counseling and testing (VCT) had not been effective enough. As a result, China instituted a mandatory screening policy, tracking down more than 250,000 former plasma donors and testing them without notification or consent (Elbe 2009, 121). Following China's example, other world leaders have made similar proposals to violate international medical norms of consent and bodily autonomy to increase mandatory HIV testing (Elbe 2009, 122). Then-Botswanan President Festus Mogae proposed a compulsory testing program for all university students applying for scholarships. This move was highly criticized by the UN and WHO for its violation of established bioethical norms of nondiscrimination. Furthermore, Uganda's 2007 parliamentary committee proposed mandatory testing for all pregnant women, yet again disregarding these women's right to informed consent (Elbe 2009, 122). The most widely criticized of these proposals came in 2008, when leaders in Papua New Guinea proposed a mandatory microchip program to allow the government to monitor the sexual activity and geographic location of HIV-infected individuals, as well as disseminate individuals HIV status to the public as needed (Enemark 2017, 100).

The government proposals detailed above demonstrate that national security's prioritization of nations as the unit of analysis over humans poses an insurmountable threat to patients' civil liberties and the medicolegal ethics of informed consent, nondiscrimination, and patient bodily autonomy (Gable et al. 2008, 1779-1784).[9] In her work *Letting Them Die:*

9 For further explanation of the medical and legal framework of consent for HIV testing, see UNAIDS and WHO (2004), "Policy Statement on HIV Testing".

Why HIV/AIDS Intervention Programmes Fail, Catherine Campbell examines a case study of the Summertown found that fear of infringements on bodily autonomy and systematic discrimination, like that described above, was one of the primary motivating factors keeping miners from seeking HIV/AIDS diagnosis or treatment (2003, 176-177). Elbe further elaborates on the pattern observed by Campbell, arguing that mandatory testing and labeling programs have slowed global HIV/AIDS eradication efforts by deterring individuals from seeking education about HIV/AIDS and their status for fear of stigmatization and losing control of medical decisions and personal information (2009 120-121).

As a result of these limitations and the complexity of threats that have developed out of the post cold war reorganization of global power, the international security debate has transitioned away from realist national security perspectives and toward liberalist human security perspectives (Peou 2014, 50; Behringer 2012, 10). Liberalism stands in stark contrast to realism by positing that the international balance of power is a positive sum game, in which a gain by one state does not necessarily indicate a loss for the other states in a system. Liberalism posits that there is no finite amount of power available in the international system. Instead, it argues that there is an infinite amount of power available to states to be gained through collective action, the elimination of war, and the improvement of human conditions globally.

The human security approach, which was first formally introduced to the international stage in 1996 by Lloyd Axworthy then-Canadian minister for foreign affairs, developed as an applied example of liberalism. Tadjbakhsh and Chenoy (T&C) argue that the human security perspective is based on redefining the word "security" from meaning the safety of nation-states from military threats to meaning the safety of people and communities from any threat to a dignified life (T&C 2007, 9-14). Human security-centric institutions such as the United Nations Development Program (UNDP) break down the elements necessary to achieve a dignified life into seven individual facets (Peou 2014, 51; T&C 2007, 14-16). These facets are (1) economic security—assured basic income; (2) food security—access to nutritious food; (3) health security—freedom from "infectious and parasitic diseases;" (4) environmental security—freedom from environmental degradation; personal security—(5) freedom from violent threats to one's person; communal security—(6) access to a collective identity either ethnic religious or otherwise; and (7) political security—access to human rights and political process (Peou 2014, 52; T&C 2007, 14-16).

At its core, human security rejects the realist national security perspective. It

HIV/AIDS program. The program, located at a mining settlement in Johannesburg, South Africa,

conceptualizes its unit of analysis as humans, not countries. Therefore, prioritizing humans' biological needs for survival and allowing it to fill the realism gaps in addressing intangible threats to security, such as viral illness (Elbe 2009, 112). An additional reconceptualization made by human security is its emphasis on the potential role of nation states as orchestrators of fear and not simply safeguards from it (Behringer 2012, 13). As a result, the "responsibility to protect" (R2P) notion has become central to human security. It states that it is the responsibility of the international community, namely the observing great and middle powers, to take actions to prevent, react, and rebuild within states that have failed or are unable to protect their own citizens from instruments of insecurity (Behringer 6). This notion of R2P is often associated with international peacekeeping interventions; however, it is imperative to note that the responsibilities of hegemonic states under R2P extend far beyond traditional militaristic threats to security to encompass any threat, be it viral, environmental, or political, to dignified human life regardless of transnational borders.

Human security approaches to HIV/AIDS are grounded in humanitarian goals and perspectives as opposed to security goals. International public health organizations such as the WHO and UN have found a positive correlation between respecting human rights and preventing HIV/AIDS (Gable et al. 2008, 1781). The R2P framework emphasizes the responsibility of hegemonic states to use their advanced educational and technological infrastructures toward the development and equitable distribution of HIV/AIDS treatments and technologies. Human security emphasizes voluntary testing, treatment, and monitoring for HIV/AIDS, regardless of national borders or other discriminating factors between peoples (gender, ethnicity, religion, HIV status, etc.) (Elbe 2009, 120-121). Elbe argues that this approach to testing makes better use of limited public health resources by directing them toward symptomatic patients and decreasing the potential for discrimination based on nonconsensual disclosures of patients' infection status (Elbe 2009, 120-121). Gable, Gostin, and Hodges make similar assertions about HIV/AIDS testing, stating that voluntary opt-out or opt-in testing protocols for HIV/AIDS should be the standard of care in pregnant women to uphold medical ethics of informed consent and patient autonomy (2008, 1780 —1781). Human security does acknowledge the necessity for some reasonable limitations on patient autonomy, as long as these restrictions meet a threshold of statistically significant public health protections for the collective. This can be seen through international human security organizations, such as the UN and WHO's support of mandatory COVID-19 testing, vaccination, and masking policies. Involuntary policies aligned with a human security approach to

COVID-19, as they were shown to produce appreciable increases in herd immunity and decreases in transmission, as well as death rates. However, the same cannot be said of mandatory HIV/AIDs testing policies, as both Gable, Gostin, and Hodges' study and Elbe's work found voluntary testing programs have produced incidence and transmission rates on par with involuntary programs, suggesting that the results produced by national security approaches do not justify their invasiveness (2008, 1781; 2009, 123). As a result, involuntary approaches to HIV/AIDs do not meet the threshold of effectiveness to necessitate their limitations on patient autonomy.

While human security and national security approaches are often characterized as mutually exclusive or antithetical, historical responses to HIV/AIDS show that these approaches are exponentially more effective when states' inevitable national security goals are acknowledged in tandem with human security priorities. The security interests of nation-states can be significant attributes to achieving goals of human security. By pressuring states towards international compromise and collective action, national interests can act as motivators when the achievement of national goals cannot be reached through the actions of one state alone. This is particularly true in cases of health security, as the unconfinable nature of pathogens and their vectors makes collective action across international borders necessary to achieve disease management or reduction. As a result, issues such as HIV/AIDS are uniquely situated to harness national security interests to work in collaboration with human security, as nation-states must consider other nation-states' health security in order to secure their own.

This potential positive interplay between national and human security can be seen in the 2001 World Trade Organization (WTO) Declaration on the agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), adopted at Doha, Qatar. Instituted in 1995, the first phase of TRIPS imposed minimum intellectual property standards globally, which aligned with U.S. and European norms. This shift made it significantly more difficult for many countries to legally produce or import both brand name and generic HIV/AIDS medications (Susser 2014, 175-176). In the late 1990s, South African Minister of Health, Nkosazana Dlamini-Zuma, sought legal mechanisms to improve access to medicines, citing the AIDS emergency in her country, and was then sued by 39 pharmaceutical corporations (Susser 2014, 175-176). This legal battle likely delayed access to lifesaving antiretroviral treatments in one of the hardest-hit regions (Susser 2014, 175-176).

Yet, five years later, in response to global advocacy and negotiation among WTO members, the U.S. and other hegemonic powers were moved to change these

practices in TRIPS, resulting in the 2001 Doha Declaration. In declaration, the WTO internationally recognized the legal validity of "compulsory licensing" (Susser 2014, 175-176). This decision clarified and reaffirmed existing flexibilities within TRIPS, and emphasized the right of all WTO member states to "protect public health and, in particular, to promote access to medicine for all" (Susser 2014, 176).[10] Additionally, the WTO decision in Doha strongly emphasized that public health objectives should guide the interpretation and implementation of TRIPS, particularly in times of crisis (Susser 2014, 175-176).[11]

Interestingly, the U.S. was motivated to compromise at Doha in part due to national interests over the availability of Cipro, an anthrax medication, following the October 2001 U.S. Anthrax scare (Susser 2014, 175-176). This episode prompted the U.S. to reconsider its previously restrictive stance on drug accessibility. The U.S. national interests combined with global public health needs at Doha, and its corresponding actions and positive human security effects, illustrate how national interests can be harnessed to achieve human security goals. Ultimately, the 2001 Doha reversal is cited as a landmark victory for humanitarian and human security goals by UNAIDS. 10 years after Doha, UNAIDS estimates that the WTO decision directly led to a 99% reduction in the cost of these HIV/AIDS antiretroviral therapies (UNAIDS 2001).

In 2005, UNAIDS published three potential trajectories of the HIV/AIDS crisis that could occur based on varying degrees of international humanitarian cooperation by states (2005, 12- 13). The defining difference between these three sceneries is the degree to which nation-states prioritize collective action addressing the social determinants of health at the root of HIV/AIDS (UNAIDS 2005, 12-13). With the 2025 deadline on the horizon, it is clear that the goals of UNAIDS stated in the early 2000s have not yet come to fruition. As a result, this paper seeks to offer revised policy directions based on these UNAIDS trajectories in the hopes of renewing and continuing the international effort toward HIV/AIDS eradication.

Future HIV/AIDS initiatives must focus international aid funding on auxiliary categories of health security, specifically food and water security. These programs lower populations' susceptibility to AIDS—treating the illness (poverty and instability) and not just the symptoms (HIV infections, spread, and deaths) (UNAIDS 2005, 22). These health security initiatives should be pursued through strong regional alliances over international hegemonically-controlled institutions (UNAIDS 2005, 16; Gable 2008, 1783).11 Additionally, all international aid funding for HIV/AIDS must be attachment/

10 For a more detailed discussion on the proceedings at Doha in 2001, see Bello (2001).

11 For fuller discussions on the importance of compulsory licensing claims in AIDS treatment availability and affordability in South Africa, see Nattrass (2007), Petchesky (2003), Susser (2009), and Susser (2010).

obligation-free in order to avoid repeating past instances of individual religious biases suppressing evidence-based practices. In previous examples such as PEPFAR, it is clear how the addition of enforced individual religious beliefs, such as abstinence only education, not only decreased the effectiveness of the program but also directly competed with and harmed existing national efforts, which made considerable gains in HIV prevention (Santelli et al. 2013, 4). Removing hegemonic powers' abilities to add caveats to offers of desperately needed aid will help circumvent much of the politicization that has slowed the HIV/AIDS response and burdened the response with distrust. Overall, this paper hopes to demonstrate that HIV/AIDS is a pressing, multifaceted, and ongoing global crisis that requires the participation of both individual nation-states and the collective collaboration of the international community to combat it effectively.

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Diplomats to Disenfranchised

Chinese Foreign Policy and Outcomes on Overseas Labor

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Abstract:

This paper critically examines China's foreign policy and overseas labor relations, contrasting the socialist Mao era's Eight Principles and capitalist post-Mao era "Going Out" policies. In both cases, overseas workers embodied the respective foreign policy regime's values: generosity, Third-World solidarity, and cultural integration under the Eight Principles; capitalist materiality, exploitation, and isolation under "Going Out." In the two periods, overseas workers realized China's foreign policy values and contributed to international development projects. However, the transition toward capitalist values shifted overseas workers' role from Third-World diplomats of the Mao era to disfranchised tools of capitalism in the post-Mao era. As China's global influence grows through the Belt and Road Initiative (BRI), this investigation sheds light on the historical importance of foreign policy values and overseas laborers' relations and rights.

INTRODUCTION

As of 2017, the People's Republic of China (PRC) surpassed the International Monetary Fund and World Bank as the largest official creditor worldwide, committing a total of $564 billion U.S. dollars since its creation in 1949 (Horn, Reinhart, and Trebesch 2021, 1). In addition to capital, China exports labor as its number of overseas workers grew from 5,000 in 1976, to 150,000 in 1993 (Copper 2016, 15), to over 553,000 in 2023 (Ministry of Commerce People's Republic of China 2023). To investigate the implications for China's global relations and its workers, this paper contrasts the PRC's differing foreign policies: Mao Zedong administration's Eight Principles in 1964 and Deng Xiaoping's "Going Out" Strategy from 1983. Analyzing the transition from the Eight Principles to "Going Out," this paper divides foreign policy between the centrally planned, socialist regime of the Mao era from 1949 to 1976, and the decentralized, liberal regime of the post-Mao era from 1979 to 2009 (Copper 2016, 10). As Xi Jinping's centralization of authoritarian power may demark a new periodization from after 2009 to the present (Flint and Xiaotong 2019, 315), this paper analyzes the 2013 BRI and its reproduction of "Going Out" values. From the Mao to post-Mao eras, China's labor relations evolved from resisting to representing global imperialism, from sharing socialist ideals in an exchange of labor to advancing capitalist pursuits in an exploitation of labor. In further analyzing foreign policy

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and overseas labor trends, this paper argues that the transition to a capitalist ideology and emphasis on profitability changed overseas workers' role from Third-World diplomats during the Mao era, to disenfranchised tools of capitalism in the post-Mao era. However, across this period, overseas workers continuously realized China's foreign policy values and significantly contributed to international development projects, cementing their importance within and beyond China.

LABOR DIPLOMATS

Mao's Eight Principles and Chinese Tan-Zam Railroad Workers

After its 1949 founding, the PRC maintained a centrally-planned, socialist economy under its first chairman, Mao Zedong, further reflected in its foreign policy of communist and "Third World" unity. Initially, the PRC only distributed foreign aid to other communist countries, financially assisting the Korean War, Vietnam War, and national liberation wars in colonized countries (Copper 2016, ix). However, after the 1960s Sino-Soviet split, the PRC broke out of its global isolation and expanded its foreign assistance to non-communist countries. To align itself with the Third World against imperial powers, the Mao administration's Premier Zhou Enlai embarked on a tour of Africa between 1963 and 1964 (Copper 2016, ix) to demonstrate its rejection of the West and Soviet Union's post-World War II exploitation of Third-World powers. Stopping in Ghana in 1964, the PRC adopted "China's Eight Principles for Economic Aid and Technical Assistance to Other Countries" (Enlai 1964, 1) which guided Chinese foreign policy and labor relations through Mao's 1976 death. The Eight Principles' ideals include equality and mutual benefit, sovereignty, low-interest loans, self-reliance, investment returns maximization, best-quality equipment provision, technological mastery, and shared Chinese and local standards of living (Enlai 1964, 1). During the Mao era, the Eight Principles enabled China to distinguish itself from the West and USSR, foster relations and development among Third World countries, and transform its labor force into diplomats modeling such ideals. Through the 1960s, China funded roads, bridges, and other infrastructure projects in Africa (Brautigam 2020, 3). Gregg Brazinsky analyzes the Chinese development of tea factories in Guinea and Mali, receiving recognition "for both its longstanding expertise with the crop and its willingness to mentor other newly independent nations" under the Eight Principles (Brazinsky 2016, 10). However, the expansive and expensive Tan-Zam Railway project most exemplifies the Eight Principles and its foreign policy's effects on workers.

Between 1970 and 1975, China realized the Eight Principles by constructing the Tan-Zam (or TAZARA) Railway, 1,060 miles of rail connecting landlocked Zambia with the Tanzanian coast (Monson 2009, 3). To help

recipient countries of its aid "embark step by step on the road of self-reliance and independent economic development" (Enlai 1964), China provided a $400 million U.S. dollars long-term and interest-free loan to the African countries (Monson 2009, 3). In giving "aid in the form of interest-free or low-interest loans" with an extended "time limit for the repayment" (Monson 2009, 3), China did not ask for immediate reimbursement with returns to relieve Tanzania from burdensome debt. Next, China ensured that "the personnel of the recipient country fully master the [shared] technology" (Enlai 1964) by committing 13,500 Chinese to work overseas on the project in 1972, fostering an overseas Chinese labor force (Monson 2009, 58). Fulfilling the principle that "the experts dispatched by China…will have the same standard of living as the experts of the recipient country" (Enlai 1964), China encouraged its overseas workers to live at the local standards (Monson 2009, 15) — and complete the same arduous labor tasks as locals (Monson 2009, 7). Taking on a labor-intensive project requiring "less investment" than a capital-intensive approach (Enlai 1964), Chinese and local laborers together completed "back-breaking manual labor such as digging ditches, spreading gravel, and hauling heavy materials" (Monson 2009, 52) to construct the Tan-Zam. In the face of challenging labor, the Chinese exhibited "self-discipline and hard work," which both enabled the completion of the Tan-Zam project and characterized Chinese workers as models of progress (Galway 2022, 241), socialism, and the Third World.

Channeling the Eight Principles' unburdensome loans, Chinese-local exchange and equality, and generosity, Chinese overseas workers contributed to more than Tan-Zam's construction but served as diplomats cultivating solidarity with the Third World and rejecting the exploitative imperial West and the Soviet Union. While the profit-driven West and Soviet Union declined initial opportunities to undertake the project (Monson 2009, 3), China agreed to complete the Tan-Zam railway, demonstrating the PRC's diplomatic alignment with the Third World against other powers. Further, China surpassed the USSR as the leading investor in Africa after financing the Tan-Zam, exceeding the Soviet's $325 million in U.S. dollars invested in Egypt's Aswan Dam (Copper 2016, 15). Accumulating a net loss of $26 million in 1980 (Copper 2016, 18), China saw the Tan-Zam as an opportunity for generosity, rather than economic gain. While undertaking immense commitment and financial risk in developing the Tan-Zam, China's foreign policy emphasized dispatching workers to realize these ideals. In her book Africa's Freedom Railway: How a Chinese Development Project Changed Lives and Livelihoods in Tanzania, historian Jamie Monson argues that Tan-Zam workers across national, ethnic, and linguistic identities formed "groups that gave those far from home a feeling of belonging" (Monson 2009, 151) In transcending geo-

graphic and cultural divides, interviewed Chinese Tan-Zam retirees shared that "the experience of construction work was meaningful and did bring change to their lives and outlooks" (Monson 2009, 150). As their first opportunity to travel outside China and learn about East Africa, Chinese overseas workers gained exposure to a new society and developed their global understanding (Monson 2009, 150). Through building the Tan-Zam, Chinese overseas workers immersed in a new culture and exchanged their ideals to form bonds with locals. In executing and embodying the Eight Principles, Chinese Tan-Zam workers aligned with locals, modeled the PRC's values, and differentiated China from the profit-driven and exploitative West and Soviet Union.

DISENFRANCHISED

'Going Out' Values and the Exploitation of Chinese BRI Workers

After Mao's death in 1976, the PRC's economy pivoted to a decentralized free market and its politics shifted to Deng Xiaoping's "Going Out" foreign policy. Responding to the limitations of Maoist policies which culminated in disasters such as the 1958 Great Famine, the Deng Administration sought to liberalize, announcing the 1983 "China's Four Principles of Economic and Technological Cooperation" which introduced "Going Out" policy (Ziyang 1983, 1). "Going Out" policies include friendship and sovereignty, "good economic results," technological exchange and Chinese-local equality, and promotion of "the growth of the respective national economies" (Ziyang 1983, 1). In contrast to the Eight Principles, "Going Out" highlights the PRC's ideological shift from diplomacy to profitability. Practicing this profit-focused foreign policy, the PRC reformed state-owned enterprises (SOEs) "to operate overseas and grow globally" (National People's Congress, 2001). First, by rebranding "state-run enterprises" with "public ownership" to "state-owned enterprises" with "state ownership," the "Going Out" policies embraced a terminology of state capitalism to center profit-maximization (Andreas 2019, 194). As a result of this ownership reorganization, SOEs encompass a diversity of ownership organizations—central state-backed, local state-invested, and hybrid public-private (Smith and Zheng 2016, 2)—and, consequently, the multi-faceted economic interests of individuals, private, and public entities. Despite different ownerships and interests, SOEs share investment risks with government agencies, operate without the constraints of private companies, and, consequently, are less concerned with short-term profitability and annual dividend returns to shareholders (Henderson, Appelbaum, and Ho 2013, 12). To support their investment capabilities, "Going Out" equipped SOEs with policy tools to compete for international projects, including state-provided bank guarantees, insurance, and subsidized working capital loans (Lee 2022, 319). SOEs navigate

relationships between Chinese banks and host-country governments to advance projects overseas (Halegua 2022, 763), accounting for three-quarters of Chinese overseas investments (Smith and Zheng 2016, 2), a 60% majority of their operations concentrated in construction and mining (Henderson, Appelbaum, and Ho 2013, 10).

In expanding foreign development and promoting SOE investment abroad, "Going Out" increased the export of Chinese labor, as SOEs bring Chinese workers overseas to complete such labor-intensive projects (Halegua 2022, 766). However, like its relations with the state, SOEs' relations with workers were altered under "Going Out." In contrast to being "industrial citizens" under Mao, Deng's "maiduan gongling" reforms required workers to sell their claims to secure jobs and social benefits so firms could "comply with international norms" and "meet the objective requirements of market competition" (Andreas 2019, 195). Rather than members part of enterprises, this shift "disenfranchised" laborers, who became hired laborers used by enterprises to become globally competitive and profitable, as argued by author and sociologist Joel Andreas (2019, 195). In contrast to Tan-Zam Railway workers under the Eight Principles, "Going Out" sought to increase project profitability by an increased role of SOEs in overseas development. However, as evidenced by the BRI, this reduced Chinese overseas workers to hired labor, exploited through poor conditions and limited regulations.

In the three decades after 1980, Chinese overseas projects reveal how worker membership, cultural exchange, and fair treatment declined over time as a result of profit-focused foreign policy. First in 1983, at the onset of "Going Out," small groups of Chinese engineers consulted on hydropower development overseas, including in the United States (Ghosh 2024). In a discussion of his forthcoming work on the subject, Harvard professor Arunabh Ghosh argued such workers forged relations between Western countries and fostered a "reverse" technological exchange from China to the United States. In the wake of establishing formal diplomatic relations with the U.S. and the twin oil shocks in the 1970s, this partnership aligned with the PRC's interest in investing in newly financially viable hydropower to promote economic development overseas (Ghosh 2024). Still similar to the Eight Principles and Tan-Zam, Chinese overseas workers integrated with Americans to contribute their expertise and guide these projects. However, in revealing the new impacts of "Going Out," this instance suggests a departure from Third-World solidarity and generosity toward capitalist partnerships and profitability.

Further in 1993, Chinese overseas laborers in construction and industry development in Saipan, part of the U.S. commonwealth of the Northern Mariana Islands,

demonstrated the trends toward profitability and disposable workers. While economically and politically part of the U.S., Saipan was exempted from American labor standards and immigration laws, including Federal minimum wage (Shenon 1993). In a vacuum of labor regulation, thousands of Chinese laborers developing Saipan endured long, six-day work weeks, and a minimum wage of $2.15 an hour in U.S. dollars, barely half of the then-$4.25 minimum wage in other U.S. territories (Shenon 1993). Despite facing exploitation for American imperial gains, an interviewed worker from Shanghai explained "We come here because we make more money here than in China, and because the recruiters in China tell us that Saipan is part of America" (Shenon 1993). As a consequence of the "Going Out" reforms changing SOE ownership and increasing their overseas role, Chinese workers found themselves disenfranchised from their former employment and searching for opportunities, even paying high fines to recruiters to find jobs abroad. Instead of realizing hopes of higher wages and American freedom, these workers faced "exploitation and misery under the American flag," as Philip Shenon wrote in The New York Times (1993). In a decade, Chinese overseas labor relations shifted further from the Eight Principles and ideas of Third-World solidarity, as workers in Saipan endured poor wages and conditions to maximize the profit generated for capitalist countries.

Even after he passed in 1997, Deng's successors maintained the "Going Out" values, revealing the persistence of a profit-oriented foreign policy and its consequences on overseas workers. The 2012 case of Chinese miners in Zambia demonstrates further exploitation and cultural isolation as a consequence of how "Going Out" emphasized profitability. When Zambians protested mining in unsafe conditions, Chinese mine owners in Zambia simply replaced the locals with Chinese overseas laborers (Halegua 2022, 767). Rather than improving the working conditions, the owners modified their employee demographic. While refused by Zambians, Chinese overseas workers endured poor conditions, saving the enterprises' wage money, boosting the mine productivity, and generating profitability. Perhaps because firms can most exploit Chinese workers, scholars Jeffrey Henderson, Richard P. Appelbaum, and Suet Ying Ho found that Chinese firms prefer bringing in Chinese workers rather than hiring locals (2013, 23). In relying on exported Chinese labor rather than incorporating locals, the authors additionally noted that Chinese and locals do not live together, interact, or partake in cultural exchange (Henderson, Appelbaum, and Ho 2013, 23). In contrast to integration on the Tan-Zam, Chinese overseas workers after "Going Out'"experience increasing isolation. Two decades prior Ghosh noted the significance of Chinese hydropower consultants in exchanging technology and advancing U.S.-China relations; yet, after further realization of "Going Out,"

profitability ideals, capitalist partnerships, and exploitation impeded Chinese-local exchanges. Spanning the decades since the Tan-Zam Railway, these cases reveal trends toward rising relations with former imperial powers, worker exploitation, and overseas isolation. Rather than diplomats, increased exploitation to drive profitability disenfranchised Chinese overseas workers.

PAST AND FUTURE OF CHINESE FOREIGN POLICY: THE BRI

Building on the legacies of former policy, this section interrogates the current consequences of Xi Jinping's BRI on Chinese overseas laborers. Compared to socialism under Mao and capitalism under Deng, the current centralization of authoritarian power under Xi Jinping and his BRI exemplifies a foreign policy disenfranchising workers by exploiting their labor, yet using workers to expand China's global influence. Paralleling the Eight Principles' large-scale infrastructure investment of the Tan-Zam Railroad, the 2013 BRI exemplifies the "Going Out" emphasis on overseas project profitability—at the expense of its workers. Echoing that emphasis on profitability and global development, the PRC embarked on the BRI "to promote policy, infrastructure, trade, financial and people-to-people connectivity" (State Council of the People's Republic of China 2021). China realizes these goals through developing large-scale infrastructure, including railroads, ports, pipelines, mines, and dams in neighboring and non-neighboring countries alike (Halegua 2022, 763). China reported signing agreements with over 150 countries, more than two-thirds of the world, as of December 2023 (Belt and Road Portal 2024). An analysis of available lending information suggests that China extends the majority of its foreign lending at commercial terms, with market interest rates and repayment terms(Horn, Reinhart, and Trebesch 2021, 16). SOEs drive these overseas BRI projects, suggesting the economic legacy of the "Going Out" reforms and the consequential disenfranchisement of Chinese workers. In alignment with its economic emphasis of "Going Out," China benefited $10.4 trillion in U.S. dollars from trade with BRI countries between 2013 and 2021 (Chinese Labor Watch 2022, 2). While reaped by the PRC, the economic benefits for partner BRI countries and laborers remain more ambiguous. The "debt-trap diplomacy" argument attempts to reduce China's global efforts to extortion of its partner countries. Defined by scholar Deborah Brautigam, "debt-trap diplomacy" follows "the claim that China deliberately seeks to entrap countries in a web of debt to secure some kind of strategic advantage or an asset of some kind" (2020, 2). While debt in the developing world rises in parallel with significant Chinese lending in Africa and Latin America, Brautigam reveals the debt-trap argument's flaws in the example of Sri Lanka's Hambantota Port, which China financed as part of the BRI (2019). After financial losses complicated

Sri Lanka's loan repayment, a Chinese company bought the port; however, preceding the sale, Sri Lanka only owed China 10% of an external debt exceeding $46.5 billion (Brautigam 2019). While ultimately gaining control of the port, China did not manufacture Sri Lanka's debt problems, which preceded Chinese BRI investments (Brautigam 2019). Even if China is not nefariously strategizing to undermine foreign politico-economic sovereignty, Brautigam remains concerned about Chinese banks' reliance on Chinese construction companies in developing BRI projects (Brautigam 2019). This preference excludes other bidders at the cost of the project and developing country, who may overpay rates to SOEs and China to realize new infrastructure (Brautigam 2019). While not a "debt-trap," the BRI's SOE-driven development advances China's profitability goals under "Going Out" at the expense of recipient countries, limited in their choices and benefits of financial partners.

In taking a central role in BRI project development, SOEs bring in Chinese workers to generate profits—at the cost of their exploitation (Chinese Labor Watch 2022, 18). In 2019, the Chinese Labor Watch reported that Chinese people working overseas on BRI projects "experience exploitative and dangerous working conditions… that not only match the International Labor Organization's definition of forced labor but also sometimes approach human trafficking and modern-day slavery" (Chinese Labor Watch 2022, 6). Surveying over 2000 workers in eight different BRI countries, BRI employers deceived, restricted their freedom, and physically harmed Chinese overseas workers to prevent them from leaving and force them to continue work (Chinese Labor Watch 2022, 6-7). Scholars Chris Smith and Yu Zheng further reveal the exploitation of Chinese overseas workers on the BRI, arguing that SOEs violate terms of labor (Smith and Zheng 2016, 67). Chinese firms undermine working hours and health and safety regulations; withhold wages and collect deposits to control worker mobility and coerce labor; stifle unions; and pay wages short even of subsistence (Smith and Zheng 2016, 67). Isolated within company-based dormitories and cultural barriers, SOEs mobilize Chinese workers to coerce their labor, exerting greater control over them than locals (Smith and Zheng 2016, 82). Arguing that "the success of this project is partly based on labor abuses" (Chinese Labor Watch 2022, 90), the Chinese Labor Watch questions whether China's gains derive from the BRI strategy or worker exploitation. Rather than representing, Chinese BRI workers bear the brunt of "Going Out," exploited by SOEs to achieve the PRC's profitability goals. In contrast to the 1970s Tan-Zam, the recent BRI policy agenda exemplifies the legacies of a "Going Out" foreign policy for Chinese overseas workers, exported and mobilized by SOEs to exploit for lower wages and higher productivity; yet the Eight Principles'

expansion of China's influence through its workers.

RECONCILING LABOR RELATIONS

Tracing Trends in the PRC's Global Role

From Mao's centrally-organized socialism to Deng's market-driven capitalism, the PRC underwent a multi-faceted political, economic, and social transformation extending into its foreign policy and overseas worker relations. In comparing the tenets of the Eight Principles and "Going Out," the foreign policies differ in their construction of loans, emphasis on Chinese-local integration, and underlying goals. First, the Eight Principles provided "interest-free or low-interest loans" with long-term repayments (Enlai 1964); "Going Out" utilizes commercial loans with market interest rates and repayment terms (Horn, Reinhart, and Trebesch 2021, 16). Additionally, the Eight Principles encouraged technological and cultural exchange, encouraging equal Chinese and local living standards (Enlai 1964); "Going Out" prioritizes productivity and profitability at the isolation and exploitation of Chinese workers, who in some cases face worse payment (Shenon 1993) and working conditions (Halegua 2022, 767) than locals. Fundamentally, the Eight Principles and "Going Out" vary in their goals: generously encouraging foreign development and socialism, versus achieving economic gains and capitalism. China underwent an ideological shift from egalitarianism under Mao to "appropriate" inequality after Deng (Copper 2016, 21). As its foreign policy values changed, China's overseas workers transformed from diplomats of Third-World socialism to disenfranchised tools of capitalism. Their incentives transformed from moral to material (Copper 2016, 21): while the Tan-Zam presented them an opportunity to contribute to Africa, workers see projects under "Going Out" as a necessity to reproduce themselves (Lee 2022, 316). This shift toward profitability drove the changes in Chinese society, foreign policy, and labor relations from Mao to today. In engaging with it, China grew to dominate the global economic order and expand its influence.

From 1949 to today, Chinese overseas workers continue realizing foreign policy values and contributing to international development projects, securing their significance within and beyond China. Under both the Eight Principles and Going Out, workers manifested the PRC's foreign policy, modeling Third-World solidarity or capital production. The type of work—arduous and physically demanding infrastructure development—remains similar from Mao to today, although its perception as a generous gift or capitalist commodity varied with policy. Since its foreign aid program began in the 1950s, China's global reach has continued to grow, urging scholars such as Ching Kwan Lee to study "Global China," "adopting a power rather than geographic perspective,"

to observe the PRC's "rigid and unadaptable" export of "its domestic political playbook to different parts of the world" (Lee 2022, 326). Lee's argument prompts consideration of China through a transnational lens transcending that of spatial or temporal borders. From the Eight Principles to "Going Out," from Mao to post-Mao, from centralized socialism to free market capitalism, such changes comprise only part of a larger and more complicated narrative of China's growing global influence and labor relations over time.

CONCLUSION

At its founding and under Mao, the Eight Principles guided the PRC's foreign policy, while overseas workers on the Tan-Zam Railway embodied Chinese ideals of generosity, Third-World solidarity, and cultural integration. In contrast, "Going Out" dominated post-Mao era foreign relations, increasing SOEs' influence in dispatching Chinese laborers abroad. As evidenced by the cases of the past three decades, the change in foreign policy's construction of loans, emphasis on Chinese-local integration, and underlying goals from generous socialism to profit-oriented capitalism drove the gradual decline of worker membership, cultural exchange, and fair treatment. The BRI reveals this legacy as SOEs drive its development, and dispatch Chinese workers overseas, who embody the capitalist policy's ideals of materiality, exploitation, and isolation. Given their rising numbers, overseas workers' roles in achieving the PRC's goals and expanding its influence should not be dismissed. While exemplifying the legacy of "Going Out," Xi Jinping's current expanding BRI project may embody a new era of Chinese foreign and worker relations. Further work analyzing the BRI regime as well as workers' conditions within China could reveal additional consequences of foreign policy for workers. As the PRC continues advancing the BRI and growing its overseas workforce, future shifts in China's foreign policy hold implications for workers: moves toward or away from profitability reshape Chinese labor relations, recasting workers as diplomats or disenfranchised.

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From Harvest of Shame to Harvest of Hope
A Retrospective Analysis of Barry Estabrook's Tomatoland *and its Continued Relevancy*

Sydney Thornton[1]

Tomatoland: From Harvest of Shame to Harvest of Hope
by Barry Estabrook. Andres McMeel Publishing, 2018, 256pp.[2]

"From Harvest of Shame to Harvest of Hope."

This subtitle marks the latest edition of *Tomatoland* by Barry Estabrook, the Vermont homesteader and political food journalist who served as a longtime contributor to Gourmet magazine (Garner 2011). *Tomatoland*, originally published over a decade ago in 2011, remains both a widely read leisure piece and a foundational academic text for its impassioned and engaging exploration of the history and politics of the modern tomato. The exposé traces the fruit's journey from its ancient Peruvian roots through decades of cultivation and engineering in laboratories, culminating in the modern tomato industry. Estabrook lays out two major arguments about the modern tomato. In the early chapters of his work, Estabrook first contends that perpetual industrialization has made today's tomato inferior to its historical and non-industrial counterparts. He then moves to examine the U.S. tomato industry, arguing that it is riddled with unchecked labor abuses and public health violations. Estabrook uses the tomato as a case study to comment on the unbridled use of pesticides and workers' rights abuses that permeate American industrial agribusiness, particularly in the American South. However, his reliance on anecdotal evidence, specifically in cases involving linked medical outcomes, significantly decreases the validity of his argument and credibility as a medical journalist. Additionally, Estabrook's continual emphasis on subsistence produce and individual consumer complicity in cases of agricultural labor abuses produces an insurmountable socioeconomic elitism. This classism ultimately pervades the piece and hinders his ability to propose implementable large-scale solutions for the reader or American agribusiness scholarship.

Tomatoland delivers a fast-paced, emotionally powerful narrative of the health dangers posed by unrestrained pesticide use and the benefits that come from de-industrializing one's food system. In his 2009 piece in Gourmet, which ultimately inspired *Tomatoland*, Estabrook argued that anyone in modern times "who ate a winter tomato inadvertently supported modern slavery," (Estabrook 2018, XX; Black

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2 ISBN-10: 1449489532

2011). While *Tomatoland* attempts to back up this controversial and provocative claim, Estabrook ultimately fails to adequately ground his text in existing food security literature. *Tomatoland* does not address the access, availability, or stability pillars of food security. Nor does it consider phenomena such as food deserts. While homegrown tomatoes may very well be superior to many in taste, nutrition, and textual quality, they are not realistically available or accessible for the vast majority of Americans.

Estabrook's emphasis on the consumer when discussing ethical production responsibilities is not supported by food security research. The 2024 UN FAO State of Food and Agriculture Report (SOFAR), places central responsibility for addressing food security pillars, such as access, availability, and stability, on national actors (FAO 2024). The report lays out a plan for "value-driven transformation of agrifood systems" through government-led agribusiness legislation, advocating for a focus on subsistence agriculture as the last step in food system reform (FAO 2024). The 2024 FAO report also explicitly delegates the least ethical responsibilities of production to consumers and subsistence producers (FAO 2024). As a result, Estabrook's work is ultimately undermined by his failure to provide his audience with socioeconomically conscious, actionable steps they may take in the future to avoid the pitfalls he highlights. This paper hopes to advocate against the continued utilization of *Tomatoland* in academic food security scholarship and its prominence in academic curricula.

Estabrook focuses most of his analysis on Florida's tomato industry, specifically its reputed capital, Immokalee, and the aggressive, often unimpeded pesticide use reported in its fields. Estabrook centers this analysis on the intersectionality of pesticide-associated public health concerns and workers' rights abuses. He pays close attention to the effect these pesticides have on the health of field workers, their immediate families, and their community. Estabrook utilizes first-hand narrative from these communities to highlight possible tomato farming associated disease clusters, or groupings of disease occurrences that share known epidemiological ties and occur with unusual density or frequency within a defined geographic area (Taylor Francis Knowledge Centers, n.d., Wu et al. 2021, 2). Estabrook then attempts to use this anecdotal evidence to question the broader liability big farm corporations could face due to these pesticide practices. He relies primarily on two possible disease clusters in the Florida tomato communities. The first cluster involves three mothers who worked in the same fields for the same corporation; they lived in the same neighborhood, and all bore a child with a severe birth defect at approximately the same time. Estabrook reports that all three of these women reported that they had been directly sprayed with

pesticides, in violation of safety regulations. Allegedly, these incidents took place near the time of their conception or shortly after. In addition, Estabrook emphasizes that the chemicals these women reported being exposed to were linked with birth defects in laboratory animal studies.

Estabrook portrays these three women's cases as unequivocally linked due to their shared exposure to pesticides. However, his analysis of this cluster relies entirely on personal narrative reports provided by the victims and does not include the consultation of medical or public health professionals. His analysis does not account in any way for the multitude of potential confounding variables that should be addressed in proper academic analysis, including family medical history, maternal comorbidities, smoking or drug use, alternative environmental exposure, and quality of prenatal care, among many others. Human disease is influenced by a complex combination of factors, and therefore, without this information, Estabrook is unable to investigate alternative causation in these cases (Wu et al. 2021, 2). As a result, Estabrook cannot distinguish true from spurious association, heavily limiting the validity of his assertions (Wu et al. 2021, 3).

Estabrook suffers similar shortcomings in his analysis of the second disease cluster, a group of aging African American farm workers in Lake Apopka, Florida. Estabrook relies primarily on a single anecdotal report from a retired farm worker, who claims to suffer from "diabetes, lupus, high blood pressure, emphysema, and arthritis" as a result of her exposure to pesticides in the 1960s-70s (2018, 47). Estabrook also reports that the woman had seen "plenty of [her] old friends and neighbors" suffer from the same conditions (2018, 47). Estabrook loosely corroborates the woman's hypothesis that pesticides cause her ailments by citing a limited 2006 study from the Farm Workers Association. This study also relied on anecdotal survey evidence, showing retired farm workers complaining of various diseases, including those listed by Estabrook's interviewee. Estabrook's willingness to present this case as evidence of disease clustering is highly ethically questionable, as it relies on a singular patient and again fails to account for confounding variables, such as race and socioeconomic status. Diabetes, high blood pressure, and arthritis are chronic conditions with complex etiologies that occur at high rates throughout the general population and at higher rates within African American populations. Additionally, conditions like emphysema and arthritis are linked to repetitive stress injuries common in labor-intensive jobs like farming, independent of toxin exposures. Estabrook's failure to address these weaknesses through concrete medical or epidemiological evidence calls into question the overall credibility of his medical journalistic practices.

Estabrook also focuses heavily on farming practices used by big tomato producers to maximize profits at the expense of the tomato's taste and quality. He points to practices such as ethylene gassing to accelerate ripening, over-use of nutrient-devoid soil, and over standardization as the primary practices used by industrial tomato farmers, which decrease tomato quality. He successfully compiles a large variety of longitudinal studies, customer surveys, expert panels, and nutritional data to clearly illustrate a decline in customer satisfaction with tomato taste and quality over the last 60 years, as these practices have been introduced and adopted regularly. Unfortunately, despite his clear articulation of this decline in quality, Estabrook offers very little in terms of a solution to this decline. In lieu of any legitimate proposals to improve the quality of large agribusiness tomatoes, Estabrook continually emphasizes the quality and superiority of homegrown tomatoes, specifically tomatoes grown in his yard in Vermont.

While Estabrook's love for his tomatoes does illustrate a solution for a subset of readers, it does not constitute a solution that his audience can homogeneously utilize. Estabrook fails to acknowledge the privileges in economic resources, geography, space availability, soil quality, pollution levels, and expendable time necessary for one to utilize his solution. Many individuals may be limited by available outdoor space or funding, living in infertile climate zones, or too busy with alternative obligations, such as work and child care, to consider growing their own produce as a legitimate alternative to consuming mass-produced produce. Estabrook does make some attempts to acknowledge small-scale efforts others have made at making de-industrialized produce available and accessible to all levels of socioeconomic status (2018, 179; 194). However, he devotes only a singular small chapter to these improvements and continually reiterates that these efforts are only active on a micro scale and are not available to the vast majority of his audience.

Additionally, Estabrook asserts that individual consumers bear the responsibility, moral, and ethical burden of their food production, arguing that we must all "insist on eating food that meets *our* standards only, not the standards set by corporate agriculture" (Estabrook 2018, XVI). With an estimated 54 million Americans facing food insecurity, and 23.5 million Americans living in food deserts, Estabrook's proposal to enact change by placing the burden of responsibility on the consumers to base their food choices on the taste or moral quality of their scarcely available options is highly unrealistic (USDA 2025). The implied rhetoric that those who consume corporate agricultural products out of necessity are morally inferior or apathetic promotes discriminatory stigmatization of those in lower-income areas. Furthermore,

Estabrook's emphasis on the consumer as his level of analysis prevents him from being able to propose implementable solutions for the systemic injustices he unveils.

Throughout *Tomatoland*, Estabrook fantastically outlines the many reasons one should think twice before picking up a store-bought, mass-produced tomato. He delivers a powerful and engaging narrative around a seemingly mundane topic and is able to utilize this single item to open a much larger and more important conversation about industrialization's adverse effects on American agribusiness. Unfortunately, as intensely as Estabrook works to expose the vast flaws in American agribusiness and its products, he provides his audience with no viable alternative to consuming them. Ultimately, Estabrook's reliance on anecdotal evidence when attempting to establish epidemiological assertions significantly decreases the validity of his argument to future academic agri-system scholarship. Additionally, Estabrook's continual emphasis on subsistence agriculture and individual consumer complicity in agricultural labor abuses produces an insurmountable socioeconomic elitism that ultimately overwhelms its ability to propose class-conscious solutions that uphold the established pillars of food security.

Future editions of this text would be significantly improved by the addition of an epilogue addressing the socioeconomic limitations of Estabrook's claims and addressing current government programs such as SNAP, EBT, and WIC, which do provide access to small-scale organic produce, in addition to more accessible industrialized produce. While no agrifood system is immune to the influence of capitalism, it is possible to balance such influence with a desire for universal nutritional accessibility in a human security centric system. Therefore, it is imperative that more attention and developmental resources be focused on the continued development of producer-owned and operated farmers' markets and farm share programs. Programs such as these have proliferated largely in the wake of Covid-19 driven food insecurity and often accept and even offer subsidies to those on government assistance to allow those of all socioeconomic status to have realistic access to non-industrialized produce.

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