**The Howard University Center of Excellence in Housing and Urban Research and Policy (CHURP)**

# *Homestead Tax Deductions and Home Values: The Case of Washington DC versus Maryland*

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# Homestead Tax Deductions and Home Values: The Case of Washington DC versus Maryland

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**Abstract**

In Washington DC, homeowners benefit from a generous homestead property tax deduction, which significantly reduces their property tax burden. This deduction specifically exempts a substantial portion of home assessment values from taxation. To understand the causal effects of this policy on home values, this paper examines the impact of an increase in DC homestead tax deductions. The increase was implemented as a policy decision to index the homestead deduction to the Consumer Price Index (CPI) starting from 2013. In the absence of a comparable property tax policy change in Maryland around the relevant years, we utilize this policy based natural experiment and compare the home value increases in the census tracts along the DC-Maryland border. Our findings reveal that this policy led to an economically and statistically significant increase in estimated home value in DC tracts compared to neighboring tracts in Maryland. Moreover, our results indicate that this effect is even more pronounced in neighborhoods with a majority Black population, thereby highlighting the potential redistributive implications of such tax policies.

## 1. Introduction

This study focuses on analyzing the comparative increases in estimated home values in the census tracts along the DC-Maryland border, considering the interaction with demographic features of the neighborhoods. This paper contributes to the existing literature in two main ways. Firstly, it leverages a natural experiment based on policy changes in homestead tax deductions to measure the causal impact of the property tax exemptions on home values. Given the mixed results from both empirical and theoretical literature regarding how property tax affects prices, our paper adds to the empirical findings, focusing on the unique geography of DC-Maryland.

Secondly, our paper demonstrates the heterogeneity of the causal effect based on the racial composition of neighborhoods. To our knowledge, there is limited literature on such a heterogeneous causal impact of homestead tax relief programs, and we are not aware of any other study investigating this issue in the DC-Maryland area.

The DC government has been implementing a variety of housing programs, including rent regulations, homestead exemptions, caps on assessment growth, subsidies for down payments and closing costs, and inclusionary zoning. These programs serve different purposes, with some aimed at providing subsidies for low to moderate income residents to rent or purchase affordable housing, such as inclusionary zoning, subsidies for closing costs and down payments, and property tax relief for the elderly and disabled. Among these measures, the homestead deduction appears to be the most appropriate for mitigating risks to the preservation of homeownership for owners of lower priced homes. This is because the impact of a fixed amount homestead exemption on the property tax burden is inversely related to home prices. In other words, the lower the home price, the more significant the benefit of tax reduction from a fixed amount homestead exemption. Therefore, implementing this type of deduction can be particularly beneficial for homeowners with lower priced properties, as it helps alleviate their property tax burden. However, there remains a debate concerning both this progressive intuition of the homestead exemption and the extent to which such flat rate exemptions are incorporated into house prices. This calls for further empirical analysis, particularly causal studies, to examine the impact of these exemptions on home values, which is the focus of this paper.[1]

The study of the association between property tax reliefs and home values also holds significant implications for the specific demographics of DC and its neighboring counties, particularly concerning racial disparities. Over the last two decades, Washington DC has experienced population growth; however, during the same period, the homeownership rate among Black residents has seen a decline.[2] To tackle the declining housing affordability and Black homeownership rate in DC, Mayor Bowser established the Black Homeownership Strike Force (BHSF) in the summer of 2022. The BHSF report

[1] For a more detailed report on property taxes in Washington DC see this report (Kohanzadeh 2018) †American Community Survey (ACS) 2021 5-year estimates.

[2] American Community Survey (ACS) 2021 5-year estimates.

highlighted three primary challenges: "A lack of supply of quality affordable homes for Black renters to buy, a lack of access to financing that can enable them to buy those homes, and risks to the preservation of current homeowners." [3] Due to limited vacant land, Washington DC faces challenges in increasing housing supply and curbing rising housing costs. Gentrification, driven by an influx of higher income, predominantly white residents, has further diminished the availability of affordable housing for both renting and buying in various neighborhoods in DC (McKinnish, Walsh, and White, 2010). To address these issues, the DC government has implemented programs like Inclusionary Zoning (IZ) and Home Purchase Assistance Programs (HPAP), aimed at providing financial assistance to lower-income residents to facilitate homeownership. However, the impact of these programs on housing prices in DC remains limited as the number of units sold through these initiatives is relatively small.[4]

To tackle the inquiries regarding the causal association between homestead tax deductions and home values, as well as the potential variation in effects across different neighborhoods, we adopt an empirical approach centered around the natural experiment of property tax policy changes. The District of Columbia has maintained its statutory property tax rate and assessment cap without any changes, but it indexed the homestead exemption to the Consumer Price Index starting from 2013. Consequently, DC homeowners' property tax exemptions increased as a result of this indexing. Unlike DC, in neighboring jurisdictions in Maryland, there have been no comparable policy changes of similar magnitude in residential property tax deductions during the study period. These policy differences provide a natural experimental framework to study the causal impact of property tax relief measures on house prices. This lack of comparable property tax policy change in Maryland allows us to utilize a Difference in Differences (DID) methodology to compare the home value increases in the census tracts along the DC and Maryland border.[5]

To assess the extent to which property tax advantages in DC have contributed to an upswing in home prices, specifically, our analysis focuses on estimating the

[3] Black Homeownership Strike Force Final Report. See the Report (Government of the District of Columbia 2022a)

[4] Cole-Smith et al. (2023)

[5] Both DC and Maryland offer additional property tax relief to seniors and disabled homeowners. In addition, the Individual Income Tax Credit aims to reduce the individual income tax liability of eligible homeowners and renters in DC. Unlike some relief programs that have specific eligibility criteria, fixed amount homestead exemptions are available to all homeowners if they reside in their property, without considering factors such as income, age, disability, or any other eligibility requirements. See the Website (Government of the District of Columbia 2011).

percentage changes in the first quartile, the second quartile (median), and the third quartile of home values. These distinct measures aim to capture the influence of the homestead tax deduction on low valued, median valued, and high valued homes within each neighborhood.

Our findings demonstrate a significant increase in home values in DC tracts compared to neighboring tracts in Maryland that can be attributed to this policy. Notably, this effect is even more pronounced in neighborhoods with a majority Black population, underscoring the potential redistributive implications of such tax policies.

The findings of this study hold significant implications that extend beyond the realm of property tax policy. While homestead exemptions effectively alleviate the property tax burden for homeowners, it is crucial to recognize the broader socioeconomic impacts that may ensue. On one hand, the capitalization of these exemptions into home prices can provide tangible benefits to homeowners, enhancing their overall financial wellbeing. However, it is essential to acknowledge the potential consequences of such policies, particularly within the context of lower-priced neighborhoods in Washington, DC. The allure of generous homestead exemptions may attract a surge of homebuyers to these communities, thereby catalyzing an upward trajectory in property prices. While this may initially seem advantageous, it raises concerns about housing affordability for lower-income renters, who may face increasing challenges in securing affordable accommodation. Consequently, there is a looming risk of exacerbating gentrification dynamics, whereby long-standing residents are displaced due to ultimate rising property prices and costs. This underscores the need for policymakers to adopt a nuanced approach, one that balances the promotion of homeownership with the preservation of community cohesion and socioeconomic diversity. By carefully navigating these complexities, policymakers can strive to foster inclusive urban development strategies that prioritize equitable access to housing for all residents. Nevertheless, a broader welfare implication of such changes in prices could be a topic for future research. In summary, while homestead exemptions may offer certain benefits in terms of property tax relief and preservation of homeownership, there is a need for a careful consideration of their potential impact on neighborhood affordability, gentrification and homeownership opportunities of lower income residents in DC.

The structure of the remaining paper is outlined as follows: Section 2 delves into a discussion of previous literature relevant to the topic. Section 3 provides

background information to offer additional context and understanding. Section 4 describes the data utilized in the study. Section 5 explains the empirical methodology applied in this research. Section 6 discusses the empirical results obtained from the analysis. Finally, Section 7 presents the conclusion, summarizing key findings and implications, and suggests potential areas for future research.

## 2. Literature Review

The relationship between tax policy and estimated house prices is intricate and multifaceted. Understanding the interplay between tax policy, housing markets, and related factors is crucial for policymakers when designing tax reforms that effectively balance the objectives of revenue generation, housing affordability, and economic stability (Bowman 2006). To alleviate the property tax burden for homeowners, local tax districts implement a combination of policy tools that are often linked to home values or homeowners' income, disability status, veteran status, or age. Property tax relief programs, such as assessment caps, reductions in statutory property tax rates, property tax credits, and homestead exemptions, are typically tied to the assessed value of the property. As a result, these relief measures tend to be factored into the market price of the property. The consideration of these tax policy implications becomes essential for policymakers as they strive to strike a balance between promoting affordable homeownership, generating revenue for the local government, and ensuring overall economic stability in the housing market. [6]

There is an extensive and mostly theoretical debate in early literature on the association between the property tax burden, spending on local public goods and capitalization in home prices (Oates 1969; Hamilton 1975; Fullerton 1992; Poterba 1992). Nevertheless, there is less agreement in the recent empirical literature on how property taxes and local public spending are capitalized in home prices or whether local property tax exemptions such as homestead tax deductions that is offered in 48 states produce progressive or regressive tax incidence (Moore 2008; Oates and Fischel 2016; Ihlanfeldt and Rodgers 2022). Recent studies such as (McMillen and Singh 2020) discussed the home value assessment bias that favors more expensive properties, i.e., the assessment to market value ratio falls as we move from lower market value houses to higher

[6]However, assessment caps only benefit the current owner because assessed value is reset at the time of resale. They favor old time homeowners over new ones as far as property tax burden is concerned. (Bowman 2006)

ones. They demonstrate that this regressive pattern has the potential to reverse the intended progressivity of the property tax, particularly for low priced homes, which could contribute to the general negative opinion of the tax (Cabral and Hoxby 2012). Ihlanfeldt and Rodgers (2022) also found that variations in assessment practices can result in different levels of progressivity in property taxation, affecting the distribution of tax burdens among homeowners.

In other recent studies, researchers have drawn from theoretical frameworks such as supply and demand dynamics, capitalization theory, and behavioral economics to examine the empirical impact of tax policy on overall housing prices. The studies that explored the relationship between property taxes and estimated house prices, with mixed findings. Some findings suggest that higher property tax rates can exert downward pressure on house prices, while others find limited impact or even positive effects due to improved local services and infrastructure (Sommer and Sullivan 2018). Lutz (2008) estimated the elasticity of property tax revenues with respect to house prices showing governments may adjust effective tax rates to offset changes in property values. Berry (2021) found that property assessments are regressive. Houses at the lower end of the distribution were assessed close to their market value and houses at the upper end of distribution were significantly under assessed compared to their market values. Another recent study, Valadez and Smith (2019) shows that there exists an inverse relationship between median home values and property taxes per capita in the U.S. The complexities inherent in the relationship between property tax and home values necessitate further empirical studies that specifically address the causal direction of the effect of property tax burden or relief programs on house prices. This paper attempts to fill this gap in the literature.

A number of studies explored the relationship between property tax policies and housing prices in DMV area. Bowman (2006) provides an overview of property taxation in the District of Columbia, Maryland, and Virginia, along with its significance. He then explores and evaluates potential policies to address the issue of rising property taxes resulting from rapidly increasing home values. He argues that rapidly rising home values can create challenges for local governments in maintaining fair and equitable property tax systems and property tax relief can help to stabilize house prices in areas experiencing rapid appreciation. Bowman (2006) notes that local tax districts use a combination of assessment caps and tax deferment programs as common policy responses

aimed at mitigating the impact of rising home values on the property tax burden.

The literature has paid less attention to the racial disparity aspect of the causal and potentially heterogeneous impact of property tax burden and tax relief programs. The unique demographic feature of the DC-Maryland border provides us with an opportunity to investigate how changes in homestead deductions affect neighborhoods with a majority Black population compared to a minority Black population. Such a heterogeneous effect can have significant implications for racial disparities in the housing market and carry important policy implications. We are not aware of any other study that investigates the relationship between this heterogeneity and the effect of homestead deductions on home values.

## 3. Background

Starting from the early 2000s, in DC and Maryland a series of measures were implemented to address increases residential property taxes. These included the reduction of tax rates for residential properties, the establishment of caps on assessment increases, and an increase in the homestead deduction, which serves to lower the taxable assessed value of homes. The Tax Parity Act of 1999 initiated a progressive overhaul of the District's property tax code, which unfolded gradually over several years. A significant change involved the consolidation of residential owner occupied and multifamily rental properties into a single class known as Class 1. Consequently, the tax rate applicable to multifamily rental properties saw a substantial decrease, dropping from 1.54 percent to 0.96 percent. Furthermore, the statuary tax rate for residential properties experienced three successive reductions during the 2000s. It was first lowered to $0.92 on $100 assessed value in 2005, further decreased to 0.88 percent of assessed value in 2006, and then again to its current level of 0.85 percent in 2008. Consequently, the District of Columbia boasts lower residential property tax rates in comparison to neighboring jurisdictions, such as Prince George's County and Montgomery County, which are subject to study in this paper.[7]

Moreover, the District has implemented extensive property tax relief measures, leading to reduced effective tax rates specifically for owner-occupied housing. The two primary programs in the District of Columbia are the

[7] For a more detailed report on property taxes in Washington DC. See the Report (Kohanzadeh 2018).

assessment increase cap and the fixed amount homestead deductions. Under the assessment increase cap program, tax assessment for owner-occupied properties is limited to a maximum increase of 10 percent per year, irrespective of the home's value. [8]

Similarly, the homestead tax deduction in the District of Columbia (DC) provides a fixed monetary reduction in the assessed value of residential properties occupied by their owners, regardless of the property's worth, specifically for property tax purposes. Notably, the DC homestead tax deduction has undergone fluctuations over previous decades. Initially set at $6,000 in 1978, the deduction amount underwent periodic increases over subsequent years. However, in 2009 when the deduction amount was $67,500, a decision was made to defer any increase in the homestead tax deduction until the fiscal year of 2013. From that point onward, the deduction amount has been subject to annual indexing based on the Consumer Price Index (CPI).[9]

Like DC, Maryland jurisdictions offer a 10 percent increase cap rate, commonly referred to as the homestead tax credit. Additionally, Montgomery County, Maryland, also presents a property tax credit amounting to $692, which is comparable to the homestead tax deduction in DC, albeit unchanged since 2010. [10] Conversely, Prince George's County has not implemented a comparable tax relief program within the study period.

Therefore, notable adjustments to the homestead deduction in DC have made it even more favorable. To the best of our knowledge, neighboring jurisdictions in Maryland have not experienced comparable policy changes of similar magnitude in residential property tax deductions during the study period. The assessment increase cap rate in Montgomery County has remained unchanged since 2010, while minor changes were observed in Prince George's County, albeit remaining consistent from 2012 to 2016. Finally, It is important to note

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[8] For a comparison of residential property tax burden between Washington DC and it's neighboring Jurisdictions See the Report (https://cfo.dc.gov/sites/default/files/dc/sites/ocfo/publication/attachments/2019%20DC%20Metro%20Area%20Tax%20Burden%20Study.pdf).

[9] Detailed changes in DC property tax policies over the years are available. See the Report (Government of the District of Columbia 2022b).

[10] Montgomery Tax Expenditure Report. See the Report Montgomery County Maryland Department of Finance (2019).

that the present value of a CPI indexed flat rate deduction can have a substantial long-term impact, influencing current property prices.[11]

## 4. Data

In this paper, we utilize panel data obtained from the American Community Survey, administered by the Census Bureau. The data covers the period from 2011 to 2019, excluding data for 2020 and beyond to avoid the potential effects of the recent Covid19 pandemic. The dataset pertains to 126 census tracts located on the border between Washington D.C. and Maryland. It is essential to note that the available tract level data represents a rolling 5-year average. This means that the median home value in 2019 is the inflation adjusted average of a specific tract's median home value over the its past five-year period (2015-2019).[12] Indeed, the unavailability of ACS annual 1-year estimates for the bordering tracts of DC and Maryland introduces complexities to our estimation process. To ensure accurate analysis and avoid overlapping periods, we adjusted the data. Specifically, we had to drop the middle years of 2014 to 2017. The refined dataset, therefore, consists of two periods: 2011 to 2013, which covers the average of the before period from 2007 to 2013 (using five year rolling averages), and the after period includes 2018 to 2019, which represents the average of the period 2014 to 2019.[13]We focus on three dependent variables of interest: census tract level housing values at the median, first quartile, and third quartile. To ensure a comprehensive analysis, we incorporate several covariates as control variables. These covariates include median income, median age of homeowners, the percentage of residents with college degree education or above, racial demographic features of census tracts, and the percentage of residents who are owner occupiers. All data used in the study are collected at the census tract level and are updated annually. The rolling five-year average data we utilize has already been adjusted for inflation for the last year of data. To ensure consistency and comparability across the entire dataset, we further

[11] This paper focuses on examining the causal impact of more generous property tax deductions on the housing market. Due to limitations in accessing individual transaction data and the actual effective tax rates at the level of census tracts, we have chosen not to estimate a property tax capitalization rate. Instead, we employ alternative methods to focus on the causal effects of the tax deductions on the housing market dynamics.

[12] The ACS annual 1-year estimates were not available for the bordering tracts of DC and Maryland.

[13] We also run our analysis using all years moving averages. Our results are partially robust if we include overlapping years in our analysis. However, inclusion of overlapping years may underestimate the effect and challenges the assumption of our before after DID analysis.

adjust the price estimates to a single base year of 2010 by utilizing Consumer Price Index data for the Washington metropolitan area.

As depicted in Figures 1a, 1b, 1c, and 1d,we present the distribution of select analysis variables along the DC-Maryland Border. Notably, the figures suggest that census tracts located in close proximity to the border overall exhibit comparable income levels, educational attainment, and demographic features. However, a distinct difference is observed in the property tax level [14], which is more favorable in DC relative to Maryland. It is important to note, however, that as detailed in the preceding section, the overall property tax burden has decreased even further in DC due to policy changes such as the indexing of the homestead tax deductions to inflation. Moreover, Figure 1d 1d reveals that census tracts located in the Southwest, Southeast, and Northeast quadrants of DC are predominantly inhabited by Black residents, with the closer tracts in Maryland exhibiting similar demographic patterns. Notably, Black residents comprise over 80% of the population along the DC-Maryland border in Southeast quadrants of DC. Similarly, in the Northeast quadrant of DC, the border population in both states consists of approximately 60% to 80% Black residents. As evidenced in Figures 1b and 1c, these same areas of the border exhibit lower median incomes and lower levels of educational attainment, as measured by the percentage of residents possessing at least a college degree. In contrast, census tracts located in the Northwest quadrant of DC and bordering Maryland are predominantly inhabited by a white population (80%), characterized by higher median household incomes, median home values, and educational attainment levels. Consequently, we will conduct separate analyses to assess the impact of tax deduction increases on predominantly Black versus predominantly white neighborhoods, in order to assess the potential for heterogeneous effects.

Figure 2 portrays the evolution of median home values in the border tracts of Washington, D.C. and Maryland. Notably, prior to 2013, the median home values were comparable on both sides of the border. However, a divergence became apparent thereafter, with Washington, D.C.'s home values experiencing a notable surge. This observed price pattern serves as the foundation for our identification strategy based on the Difference in Differences (DID) methodology. We posit that a more generous property tax deduction policy change has played a contributory role in driving this divergence in prices.

[14] Here, the tax rate pertains to the proportional collection of property taxes in relation to the aggregated housing valuation within a given census tract.

To obtain a reliable measure of home values, we employ the three quartiles of the home value distribution within a given tract. Specifically, this includes the first quartile of home values (Home Value Q1), the second quartile (Median Home Value or Q2) and the third quartile (Home Value Q3) approximates the $^{th}$percentile. These three measures are employed to approximately capture the effect of the homestead tax deduction for homeowners. All three measures of home value exhibit moderate positive correlations with educational attainment and high positive correlations with median household income but exhibit high negative correlations with the percentage of Black population. The three measures of home value are also highly correlated with each other. Moreover, educational attainment displays moderate positive correlations with median household income, and negative correlations with the percentage of minorities residing in a tract. A strong negative correlation is also evident between median household income and the percentage of Black population. Lastly, the effective property tax rate exhibits low negative correlations with all three measures of home values, educational attainment, the percentage of Blacks, and median household income.

Table 1 provides a comprehensive overview of the summary statistics for both the treatment group (DC) and the control group (Maryland) both before (up to and including 2013) and after the implementation of the treatment. Prior to the enactment of the homestead tax deduction policy, bordering tracts in Maryland and DC exhibited a comparable median home value. However, following the implementation of the homestead tax deduction in 2013, the inflation-adjusted median home values in DC experienced an average increase of 13.89%, while their counterparts in Maryland witnessed a decline of approximately 1.9% in inflation-adjusted median home values.

Despite our analysis being confined to tracts surrounding the DC-Maryland borders, Table 1 reveals potential marginal disparities in some of characteristics preceding the policy implementation. Nevertheless, both groups exhibited comparable growth in median household income, unemployment rates, population density, and racial and demographic composition. To ensure the robustness of our findings and account for any variations in tract characteristics, we incorporate controls for all tract attributes in our regression model, thereby evaluating the robustness of our results to the inclusion of potential confounding factors.

## 5. Empirical Methodology

The empirical framework for our study is predicated on the timing of the homestead deduction indexing, which experienced a delay between fiscal years 2009 to 2013 before gradually increasing thereafter. Given the absence of any comparable property tax policy change in Maryland, we have designed our study to compare the house price increases in DC census tracts with those of Maryland's. The census tracts on the DC side of the border are considered as the treatment group, whereas those on the Maryland side form the control group. As explained in detail in section 4 on data, our pretreatment spans 2011-2013 five year rolling averages covering 2007 to 2013, and the after period includes 2018 to 2019 five year rolling averages covering years 2014 to 2019. We have carefully selected census tracts that closely straddle the DC-Maryland border, ensuring a comparable geographic scope in terms of economic and demographic features. To increase the number of bordering tracts, we have also considered first and second order neighbors of the state border, especially in instances where census tracts are small. Furthermore, we have restricted our analysis to tracts within a three-mile band centered at the border line, encompassing 1.5 miles on each side of the border.

DC is demarcated by two Maryland counties, namely, Prince George's County and Montgomery County, as depicted in Figure 3 that illustrates the spatial distribution of the treatment and control groups. Despite the notably distinct socioeconomic characteristics of Montgomery and Prince George's counties, DC's border closely mirrors the socioeconomic traits of its neighboring counties. As evinced by Figure 1, the Southwest, Southeast, and Northeast regions of DC closely mirror the characteristics of Prince George's County, whereas the Northwest region follows Montgomery County's demographic traits. The total area of DC covers 25.8 square miles, comprising 54 census tracts, while Maryland encompasses 38.14 square miles, consisting of 72 census tracts.

To further enhance our analysis, we employed a generalized difference in differences model, which incorporates a comprehensive set of control variables within a two-way fixed effects framework. The inclusion of fixed effects enables us to control for any persistent differences in outcomes across different geographic locations over time, as well as any time invariant variations in outcomes across different census tracts. As a result, we present model 1 below to capture the impact of our treatment on the outcome variable of interest.

$$\log(P_{i,t}) = \beta_0 + \beta_1 Treatment_i \times Post_t + X_{i,t}\delta + \gamma_t + \lambda_i + \epsilon_{i,t} \quad (1)$$

In equation 1 , $\log(P_{i,t})$ denotes the natural logarithm of quartile home value (25th percentile, median, or 75th percentile) in a given census tract i at year t. Post is a binary variable that takes a value of 1 if the year is greater than 2013. Treatment represents a dummy variable that takes a value of 1 for the treatment group, which includes border census tracts on DC side. The terms $\gamma_t$ and $\lambda_i$ are time and tract fixed effects, respectively. To account for other factors that may impact our analysis, we have incorporated a collection of control variables, $X_{it}$, that comprise the median income, median age of homeowners, education level, percentage of owner occupier households, and percentage of the Black population, population density and unemployment rate at tract i in year t. The parameter vector $\delta$ contains the corresponding coefficients that help us understand how these variables affect our outcome of interest. Our estimate of interest is $\beta_1$, which represents the average treatment effect on the treated. Specifically, we aim to determine the effect of DC's homestead tax deduction on home values compared to Maryland home values.

In addition to our primary DID models, we have conducted additional analyses to test the robustness of our results. We varied our models by adding or dropping control variables and by limiting the geographic scope. For instance, we examined the results of our models while only including predominantly Black tracts, and considering only tracts that are adjacent to the DC-Maryland borders. We will provide a detailed explanation of these modifications in the results section of our analysis. By conducting these sensitivity analyses, we can ascertain the validity of our results and their generalizability to different settings.

## 6. Results

Table 2 displays the outcomes of the baseline generalized DID model. The results indicate a significant and positive difference in differences estimate, denoted as $\beta_1$. This implies that the homestead tax deduction raised median estimated home values in DC by 13.54 % (100 × (e 0.127 - 1)) in post policy years when compared to those prices in Maryland's tracts. For the lower quartile of home values in DC, the homestead tax deduction caused an increase of roughly 11.4%, whereas at the upper quartile of the home value distribution, the homestead tax deduction led to a rise of 17.12%. These findings suggest that the post 2013 homestead tax deduction adjusting drives up home values in DC, with a slightly greater effect observed for more costly home values within each tract. This outcome is consistent with economic a section of literature that suggests property taxes get capitalized in the form of higher property values.

The inclusion of tract and time fixed effects allows us to account for any unobserved time invariant tract features and the dynamic effect of macro variables over time. The last three columns of the table showcase the augmented model that includes additional control variables, such as median income, median age, education level, percentage of Black population, the percentage of owner occupiers, population density and unemployment rate measured at the tract level. The last three colums reveals that the homestead tax deduction increased home values by 8%, 9.86%, and 15.49% at the lower, median, and upper quartiles of the home value distribution in DC, respectively, even after controlling for all the mentioned control variables.[15]

A fundamental assumption in the DID (difference in differences) model is that the outcome variable of interest, such as home values quartiles in our case, would have exhibited a similar trend over time for both the treatment and control groups in the absence of the policy change (i.e., change in homestead tax deduction in DC). Figure 2 visually depicts the comparable median home value moving average trends in the studied border tracts of Washington, D.C. and Maryland prior to 2013, with a subsequent noticeable divergence emerging thereafter. To further assess the parallel trends assumption, we conducted a version of an event study by examining the changes in the median home value over time, including both before and after the policy change, for both the treatment and control groups while controlling for other variables. Our findings are presented in the appendix section Table 5 and indicate that the coefficients of treatment interacted with the pretreated time period were not statistically significant, which suggests the absence of overall pretreatment converging or diverging trends in home values.

As previously noted, disparities exist between neighborhoods in the Northeast and Southwest regions of DC and Maryland's border, in comparison to those in the Northwest. The Northwest border tracts include predominantly White neighborhoods and exhibit elevated levels of median income and housing prices. In previous analysis, we conducted a comparative analysis of all tracts on both sides of the DC and Maryland border. To further investigate any heterogeneous impacts between neighborhoods, we then divided our sample into two distinct groups: tracts with a majority Black population (over 50% Black

[15] The constraints of our sample size, coupled with the inclusion of multiple control variables, may prompt concerns regarding statistical power, potentially resulting in misleading significant results. Therefore, we performed a power analysis for each of our main regressions, utilizing Burlig, Preonas, and Woerman (2020) serial correlation-robust power estimates and their STATA package pcpanel for recommended power calculations. The calculated power for all our main regressions using the serial-correlation robust (SCR) method exceeds 80%.

residents) and tracts with a Black population less than 50% . As the other racial minority groups in our study area have small populations, most tracts can be classified as either having majority White or Black population. To this end, we have estimated the same specifications as presented in Table 2.

Table 3 provides insights into the influence of the homestead tax deduction within tracts where Black residents constitute either a majority or a minority. The coefficients of interest, as depicted in the table, exhibit larger magnitudes for median, first and third quartile home values. Our results in Table 3, demonstrate that in predominantly Black majority census tracts in DC, the homestead tax deduction increases the long run home values by 9.96%, 15.6%, and 23.86% at the lower quartile, median, and upper quartile of the home value distribution, respectively. In contrast, the effect is less significant for the White majority census tracts, with the only increase of 10.19% observed for home values at the first quartile, and no significant impact observed for median prices and the third quartile of the distribution.

Table 4 presents our revised specification, wherein we adjust the majority minority threshold to 70%/30% (more than 70% or less than 30% Black) [16]. This modification allows for the division of tracts into neighborhoods characterized by predominantly Black populations versus those characterized by predominantly White populations. Our findings reveal a robust and statistically significant coefficient of interest in our model when focusing exclusively on predominantly Black tracts. Conversely, for tracts where the Black population constitutes less than 30% of the total population, the coefficients appear statistically insignificant for the median, first and third quartiles.

This finding provides evidence that such flat rate property tax deduction incentives have a more pronounced effect on neighborhoods with lower median house prices and household incomes, and in the context of the DC-Maryland area, benefit African American homeowners more than their White American counter parts. Furthermore, these incentives can contribute to a possible decrease in the Black White wealth gap.

Nevertheless, the implementation of property tax exemption increases, while seemingly advantageous for homeowners, can lead to decreases in property tax revenues, which may prove costly, even for homeowners residing in low-priced neighborhoods. The potential reduction in investments allocated to local public

[16] The decision to adopt the 70/30 threshold serves a dual purpose: to transform our initial 50/50 analysis into a focused examination of predominantly Black versus White neighborhoods while simultaneously ensuring an adequate number of observations and clusters for our panel analysis. In our appendix analysis, which exclusively includes tracts adjacent to the border, the limited number of clusters is an unavoidable constraint. Consequently, in these regressions, we utilized bootstrap standard errors for robust estimation.

goods, such as schools, public transportation, parks, and other amenities, could exacerbate the overall financial burden imposed by such policies on residents. This could consequently impact the quality and availability of essential services, exacerbating socioeconomic disparities and diminishing the overall quality of life within communities affected by these policies.

Indeed, a comprehensive welfare analysis should encompass the possible effects of property value/price appreciation on renters especially in predominantly Black neighborhoods. Additionally, it is crucial to examine how these property tax policies could influence the movement of high-income populations into neighborhoods that have historically been home to lower income and minority communities and the potential implications for the ongoing gentrification in the DC area. Such an investigation will require more comprehensive data on individual sales and rental prices and local migration. It will provide valuable insights into the social and economic consequences of these policies on various segments of the population. However, it is important to note that in this paper, we solely focused on the effect of property tax relief on home values, providing evidence that the effect is heterogeneous based on the racial composition of neighborhoods.

Another concern may arise from market anticipation of the policy and its potential impact on our estimates. As mentioned, the decision made in 2009 to defer the increase in the homestead tax deduction until 2013 indeed introduces a period of anticipation during which buyers may have been aware of the impending policy change. This anticipation effect could potentially dilute the estimated treatment effect observed post-2013. We acknowledge that anticipation effects may lead to behavioral changes among buyers, such as adjusting their purchasing decisions in anticipation of future policy changes. This could manifest as accelerated or delayed buying activity, affecting market dynamics leading up to the implementation of the policy change. Our event study analysis, as described in the response to the previous comment, partially addresses the issue by showing that there was no significant relative increasing trend in prices in DC vs Maryland before 2013. In other words, we evaluate whether the observed treatment effect is attributable to the policy intervention rather than pre-existing trends or anticipation effects. However, for an ideal investigation into the presence of anticipation effects surrounding the 2009 decision, we would require transaction-level data, including the number and type of housing transactions in each neighborhood, to evaluate buyers' behavior and the dynamics of the change in the market. We acknowledge that data limitation is a constraint in our study, and we hope that in a future study, we can conduct a more detailed analysis of market dynamics with the proper data.

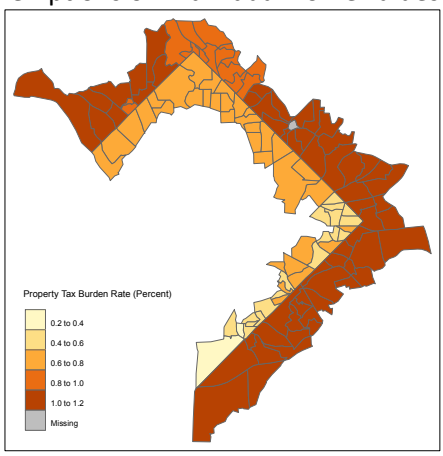
Finally, we conducted a comprehensive reanalysis that exclusively accounted for bordering tracts, and once again despite the reduction in the number of observations. The findings were consistent with our previous assessment, as evidenced by the statistically and economically significant coefficients of interest. The alternative analysis confirms that the CPI indexing of homestead tax deductions has a positive and statistically significant influence on housing prices in the District of Columbia. Notably, the effect is more pronounced predominantly Black tracts, where the magnitude of the impact is more substantial and the statistical significance more pronounced. For a detailed breakdown of our regression outcomes, we present Appendix Tables 6 to 8 in appendix, which display our results solely for bordering tracts.

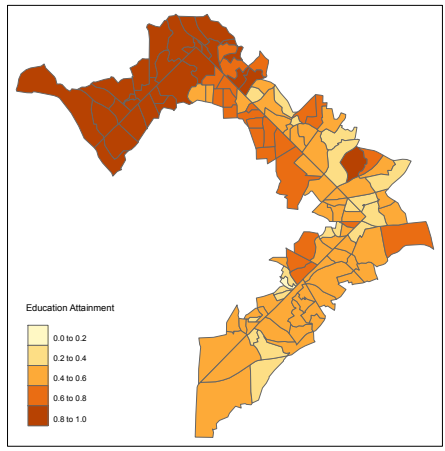
## 7. Conclusion

Washington DC offers its residents an opportunity through its homestead property tax deduction, which significantly reduces the property tax burden for homeowners. Specifically, this deduction exempts a substantial portion of home assessment values from taxation, amounting to roughly 25% of the median home value in DC census tracts bordering Maryland. To investigate the effects of this policy, we explore the impact of an increase in DC homestead tax deductions by indexing the deductions to the CPI since 2013. Our study finds that this homestead tax deduction increases home prices in DC along the border with Maryland by 8% to 15%, with stronger effects observed in majority Black neighborhoods, highlighting the potential redistributive implications of such tax policies. These findings are robust to various specification alternatives tried in this study and are consistent with a part of literature indicating that property taxes are partially capitalized.

This paper contributes significantly to the existing extensive literature on the topic in two main ways. Firstly, it employs a policy based natural experiment to assess the causal impact of property tax exemption on home values. The empirical and theoretical literature has yielded varied results on how property tax affects prices, making our study a valuable addition to the empirical findings, particularly focusing on the unique geography of DCMaryland. Secondly, our paper showcases the heterogeneity of the causal effect based on the racial composition of neighborhoods. Specifically, we find that the tax relief program of indexing homestead deductions to CPI has a more pronounced effect in neighborhoods with a majority Black population. This finding is noteworthy as there is limited literature exploring such a heterogeneous causal impact of the homestead tax relief program. As of our knowledge cutoff, we are not aware of

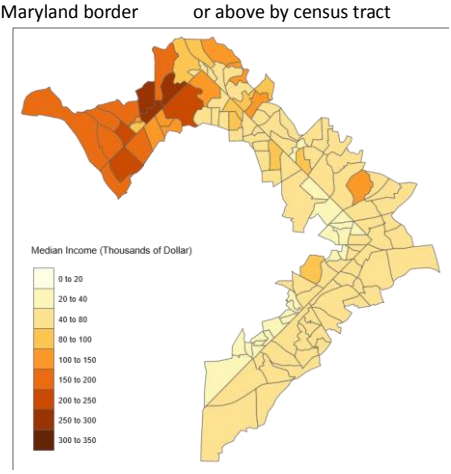
any other study investigating this specific issue in the DC-Maryland area, making our research a significant and novel contribution to the field. However, we acknowledge the limitations of our tract level data, which prevent us from controlling for individual house transaction prices and owner characteristics or applying spatial models. As such, future studies may benefit from utilizing more comprehensive data to investigate the impacts of specific homestead tax exemptions on individual home values.

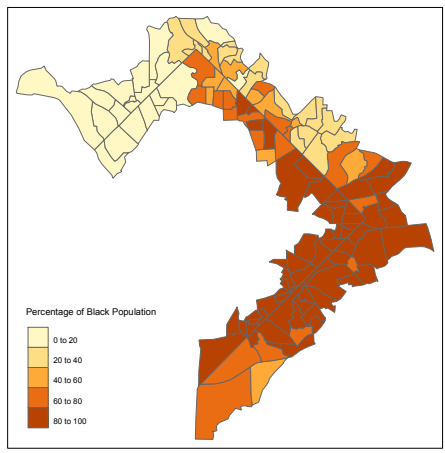



**(a)** The calculated tax burden by census tract along the DC-Maryland border

**(b)** The share of population with college education or above by census tract

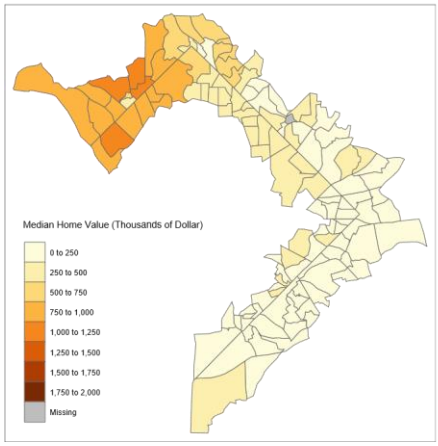


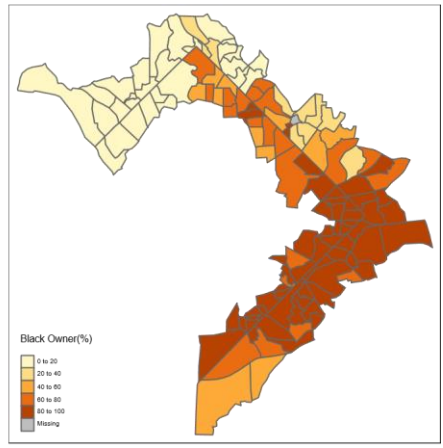

**(c)** The median household income by census tract along the DC-Maryland border

**(d)** Distribution of Blacks Population along the DC-Maryland border (as % of Total Population))

**Figure 1.** Comparing selected number of tracts characteristics along the DC and MD border. For the maps, DC area is in the inner side. All figures are based on ACS 2014 five year averages.




**(e)** Median Home Value along the DC-MD Border Census Tract




**(f)** Distribution of Black Home Owners along the DC-Maryland Border (as % of Total of by homeowners)

Figure 1 continued comparing DC and MD border tracts. For the maps, DC area is in the inner side. All figures are based on ASC 2014 five year averages.

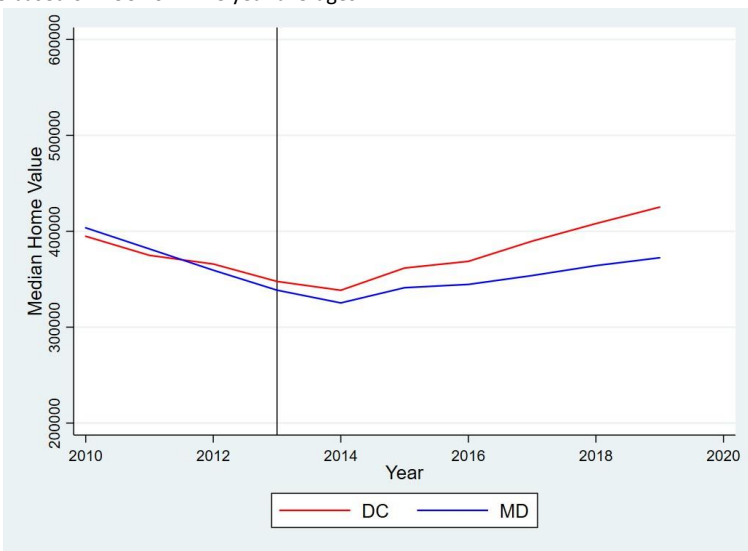


**Figure 2.** Illustrates the five-year moving average for the median home value (USD) over time in the border tracts of Washington, D.C. compared to those in Maryland[17].

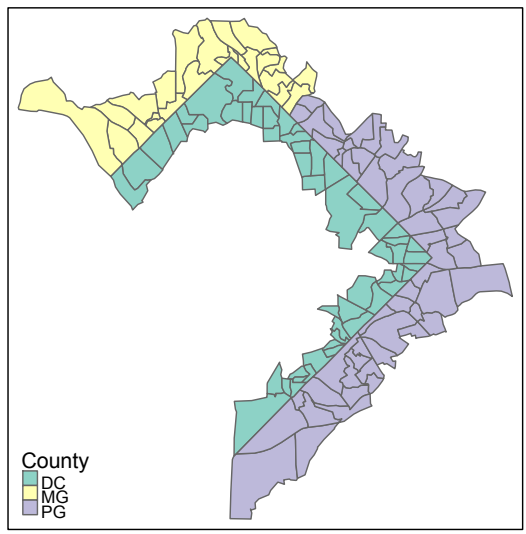



**Figure 3.** Treatment (DC) and Control (PG= Price George's, MG = Montgomery) Tracts.

[17] The purpose of the figure is to illustrate the trends in median home values in DC compared to Maryland before and after 2013. While there appears to be a potential trend change in 2011, our analysis indicates that the overall median home value before 2013 does not differ significantly between DC and Maryland tracts along the border. Furthermore, the graph clearly displays a noticeable gap between price trends in DC and Maryland after 2013. It is important to interpret the graph cautiously, as it represents variations in median home values before controlling for any other observable characteristics in neighborhoods.

**Table 1.** Summary Statistics by Treatment Group and Time

| | DC | MD | T-statistic for Equality |
|---|---|---|---|
| Pre 2013 | N = 162 | N = 212 | of Means |
| Median Income (x1000) | 57.85 | 77.27 | -4.22 |
| Log Median Home Value | 12.67 | 12.63 | 0.64 |
| Education (%) | 58.40 | 62.43 | 1.80 |
| Median Owner Age | 56.70 | 53.22 | 5.32 |
| Percentage of Black Population | 78.40 | 56.52 | 6.61 |
| Home Ownership | 49.21 | 54.35 | -1.97 |
| Population Density (x1000) | 10.59 | 7.50 | 4.95 |
| Unemployment | 7.69 | 5.40 | 6.27 |
| Post 2018 | N = 104 | N = 140 | |
| Median Income (x1000) | 66.08 | 81.47 | -2.50 |
| Log Median Home Value | 12.80 | 12.61 | 2.76 |
| Education (%) | 64.15 | 65.64 | -0.48 |
| Median Owner Age | 56.20 | 57.26 | -1.33 |
| Percentage of Black Population | 72.07 | 53.00 | 4.70 |
| Home Ownership | 51.39 | 54.37 | -0.93 |
| Population Density (x1000) | 12.40 | 7.69 | 5.98 |
| Unemployment | 5.73 | 3.79 | 5.43 |

Notes: The table presents the averages of the studied census tract characteristics along the DC-Maryland border. The final column displays the t-statistic for equality of means. The variable ”median income” represents the median household income in thousands of dollars. ”Education” indicates the percentage of residents with a college degree. ”Homeownership” reflects the rate of homeowner occupiers. ”Population density” is calculated as the population in thousands divided by the census tract area in square miles, while ”unemployment” represents the tract unemployment rate. Additionally, the variables include the median age of homeowners and the percentage of the Black population in the census tract. ”Log median home value” indicates the natural logarithm of the inflation-adjusted median home value in a census tract.

**Table 2.** Generalized DID Model Including Fixed Effects and Other Control Variables

| | Dependent: Quartile Home Value(log) | | | | | |
|---|---|---|---|---|---|---|
| | $Q_1$ | $Q_2$ | $Q_3$ | $Q_1$ | $Q_2$ | $Q_3$ |
| Treatment × Post | 0.108*** | 0.127*** | 0.158*** | 0.077** | 0.093*** | 0.144*** |
| | (0.028) | (0.028) | (0.040 | (0.032) | (0.031) | (0.042) |
| Median Income (log) | | | | 0.164*** | 0.168*** | 0.274*** |
| | | | | (0.058) | (0.056) | (0.079) |
| Education | | | | 0.195 | -0.087 | -0.257 |
| | | | | (0.146) | (0.176) | (0.220) |
| Median Owner Age | | | | -0.001 | -0.002* | -0.002 |
| | | | | (0.001) | (0.001) | (0.002) |
| Home Ownership | | | | -0.003*** | -0.002 * | -0.0002 |
| | | | | (0.001) | (0.001) | (0.001) |
| Percentage of Black Population | | | | -0.0003 | -0.00009 | 0.001 |
| | | | | (0.001) | (0.001) | (0.001) |
| Population Density (x1000) | | | | 0.009 | 0.009 | -0.003 |
| | | | | (0.008) | (0.006) | (0.007) |
| Unemployment Rate | | | | 0.001 | 0.001 | 0.003 |
| | | | | (0.003) | (0.003) | (0.005) |
| Constant | 12.46*** | 12.72*** | 12.92*** | 10.71*** | 11.10*** | 10.10*** |
| | (0.009) | (0.007) | (0.009) | (0.651) | (0.604) | (0.850) |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Tract Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of Observations | 616 | 618 | 622 | 616 | 618 | 622 |

Notes: The presented table displays the regression results for the generalized difference-in-differences (DID) model, where the treatment group is composed of DC tracts, and post is a binary variable set to 1 if the year is after 2013. The variable" median income" represents the median household income in thousands of dollars. " Education" indicates the percentage of residents with a college degree." Homeownership" reflects the rate of homeowner occupiers. " Population density" is calculated as the population in thousands divided by the census tract area in square miles, while" unemployment" represents the tract unemployment rate. Additionally, the variables include the median age of homeowners and the percentage of the Black population in the census tract. The dependent variables are the natural logarithm of the inflation-adjusted home value first, second and third quartiles in a census tract. The robust standard errors are adjusted for clustering at the level of the census tract. $*$ $p < 0.1$, $**$ $p < 0.05$, $***$ $p < 0.01$

**Table 3.** Heterogeneous Effect of the Policy Based on Tracts Racial Composition

| | Dependent: Quartile Home Value(log) | | | | | |
|---|---|---|---|---|---|---|
| | $Q_1$ | $Q_2$ | $Q_3$ | $Q_1$ | $Q_2$ | $Q_3$ |
| | Black Population >50% | | | Black Population ≤50% | | |
| Treatment × Post | 0.095** | 0.145*** | 0.214*** | 0.097** | 0.057 | 0.080 |
| | (0.045) | (0.038) | (0.049) | (0.041) | (0.046) | (0.073) |
| Median Income (log) | 0.097 | 0.122 ** | 0.216** | 0.245** | 0.095 | 0.131 |
| | (0.067) | (0.066) | (0.087) | (0.103) | (0.119) | (0.176) |
| Education | 0.161 | -0.099 | -0.017 | 0.397 | -0.017 | -0.685** |
| | (0.173) | (0.219) | (0.257) | (0.261) | (0.238) | (0.301) |
| Median Owner Age | -0.001 | -0.002 | -0.002 | -0.0002 | -0.002 | -0.003 |
| | (0.001) | (0.001) | (0.003) | (0.002) | (0.002) | (0.002) |
| Home Ownership | -0.003** | -0.002* | -0.001 | -0.004 | -0.001 | 0.004 |
| | (0.001) | (0.001) | (0.001) | (0.002) | (0.002) | (0.003) |
| Percentage of Black Population | -0.001 | -0.0009 | -0.001 | -0.0001 | -0.001 | 0.002 |
| | (0.002) | (0.001) | (0.001) | (0.002 | (0.002) | (0.003) |
| Population Density (x1000) | 0.009 | 0.008 | 0.001 | 0.009 | 0.008 | -0.017 |
| | (0.009) | (0.007) | (0.007) | (0.016) | (0.015) | (0.015) |
| Unemployment Rate | 0.0003 | -0.0007 | 0.00008 | 0.006 | 0.005 | 0.009 |
| | (0.004) | (0.004) | (0.005) | (0.006) | (0.007) | (0.011) |
| Constant | 11.34*** | 11.51*** | 10.73*** | 9.955*** | 12.21*** | 12.37*** |
| | (0.752) | (0.680) | (0.914) | (1.165) | (1.503) | (2.028) |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Tract Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of Observations | 408 | 410 | 415 | 208 | 208 | 207 |

Notes: The presented table displays the regression results for the generalized difference-in-differences (DID) model, where the treatment group is composed of DC tracts, and post is a binary variable set to 1 if the year is after 2013. The variable "median income" represents the median household income in thousands of dollars. "Education" indicates the percentage of residents with a college degree. "Homeownership" reflects the rate of homeowner occupiers. "Population density" is calculated as the population in thousands divided by the census tract area in square miles, while "unemployment" represents the tract unemployment rate. Additionally, the variables include the median age of homeowners and the percentage of the Black population in the census tract. The dependent variables are the natural logarithm of the inflation-adjusted home value first, second and third quartiles in a census tract. The robust standard errors are adjusted for clustering at the level of the census tract. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

**Table 4.** Heterogeneous Effect of the Policy Based on Tracts Racial Composition (Predominantly Black versus Other Tracts)

| | Dependent: Quartile Home Value(log) | | | | | |
|---|---|---|---|---|---|---|
| | $Q_1$ | $Q_2$ | $Q_3$ | $Q_1$ | $Q_2$ | $Q_3$ |
| | Black Population >70% | | | Black Population≤30% | | |
| Treatment × Post | 0.117** | 0.142*** | 0.219*** | 0.068 | 0.037 | 0.057 |
| | (0.0499) | (0.043) | (0.059) | (0.041) | (0.048) | (0.074) |
| Median Income (log) | 0.105 | 0.119* | 0.231** | 0.218 | -0.038 | 0.036 |
| | (0.073) | (0.070) | (0.097) | (0.181) | (0.196) | (0.285) |
| Education | 0.048 | -0.140 | -0.099 | -0.084 | -0.557* | -1.569*** |
| | (0.168) | (0.240) | (0.286) | (0.383) | (0.296) | (0.469) |
| Median Owner Age | -0.001 | -0.003* | -0.002 | -0.0005 | 0.0009 | -0.001 |
| | (0.001) | (0.001) | (0.003) | (0.001) | (0.002) | (0.004) |
| Home Ownership | -0.003** | -0.003* | -0.002 | -0.002 | 0.001 | 0.012** |
| | (0.001) | (0.001) | (0.001) | (0.002) | (0.002) | (0.005) |
| Percentage of Black Population | 0.0001 | -0.0004 | -0.001 | -0.003 | -0.002 | 0.003 |
| | (0.002) | (0.002) | (0.002) | (0.003) | (0.004) | (0.007) |
| Population Density (x1000) | 0.009 | 0.009 | 0.0004 | 0.009 | 0.019 | -0.012 |
| | (0.009) | (0.007) | (0.008) | (0.025) | (0.025) | (0.035) |
| Unemployment Rate | 0.001 | -0.0005 | 0.0007 | 0.007 | -0.005 | -0.009 |
| | (0.004) | (0.004) | (0.006) | (0.011) | (0.010) | (0.018) |
| Constant | 11.20*** | 11.55*** | 10.61*** | 10.90*** | 14.11*** | 13.81*** |
| | (0.861) | (0.754) | (1.088) | (2.144) | (2.442) | (3.251) |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Tract Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of Observations | 353 | 355 | 359 | 131 | 131 | 131 |

Notes: The presented table displays the regression results for the generalized difference-in-differences (DID) model, where the treatment group is composed of DC tracts, and post is a binary variable set to 1 if the year is after 2013. The variable "median income" represents the median household income in thousands of dollars. "Education" indicates the percentage of residents with a college degree. "Homeownership" reflects the rate of homeowner occupiers. "Population density" is calculated as the population in thousands divided by the census tract area in square miles, while "unemployment" represents the tract unemployment rate. Additionally, the variables include the median age of homeowners and the percentage of the Black population in the census tract. The dependent variables are the natural logarithm of the inflation-adjusted home value first, second and third quartiles in a census tract. The robust standard errors are adjusted for clustering at the level of the census tract. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

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**Supplemental material**

**Table 5.** Test for for the Existence of Pre Treatment trends

| | Dependent: Median Home Value (log) | | |
|---|---|---|---|
| | General | Black > 50% | Black > 70% |
| Treatment × Post | 0.055* | 0.109 | 0.100 |
| | (0.0329) | (0.038) | (0.043) |
| Treatment × Before | -0.030 | -0.039 | -0.042 |
| | (0.022) | (0.025) | (0.027) |
| Median Income (log) | 0.328*** | 0.230*** | 0.222*** |
| | (0.056) | (0.065) | (0.071) |
| Education | 0.231 | 0.199 | 0.163 |
| | (0.156) | (0.199) | (0.217) |
| Median Owner Age | -0.0007 | -0.0009 | -0.002 |
| | (0.001) | (0.001) | (0.001) |
| Home Ownership | -0.0001 | -0.0001 | -0.0001 |
| | (0.0008) | (0.0009) | (0.0009) |
| Percentage of Black Population | -0.007*** | -0.006*** | -0.006*** |
| | (0.0007) | (0.001) | (0.001) |
| Population Density (x1000) | 0.003 | 0.005 | 0.003 |
| | (0.004) | (0.005) | (0.005) |
| Unemployment Rate | 0.0002 | -0.003 | -0.003 |
| | (0.003) | (0.004) | (0.004) |
| Constant | 9.192*** | 10.22*** | 10.46*** |
| | (0.594) | (0.694) | (0.805) |
| Time Fixed Effects | Yes | Yes | Yes |
| Treatment Fixed Effects | Yes | Yes | Yes |
| Number of Observations | 618 | 410 | 355 |

Notes: The presented table displays the regression results for the generalized differencein-differences (DID) model, where the treatment group is composed of DC tracts, and post is a binary variable set to 1 if the year is after 2013 and before is a binary variable set to 1 if the year is before 2013. The variable ”median income” represents the

median household income in thousands of dollars. ”Education” indicates the percentage of residents with a college degree. ”Homeownership” reflects the rate of homeowner occupiers. ”Population density” is calculated as the population in thousands divided by the census tract area in square miles, while ”unemployment” represents the tract unemployment rate. Additionally, the variables include the median age of homeowners and the percentage of the Black population in the census tract. The dependent variables are the natural logarithm of the inflation-adjusted home value first, second and third quartiles in a census tract. The robust standard errors are adjusted for clustering at the level of the census tract. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

**Table 6.** Generalized DID Model Including Fixed Effects and Other Control Variables (Only Including Tracts at the Border)

| | Dependent: Quartile Home Value(log) | | | | | |
|---|---|---|---|---|---|---|
| | $Q_1$ | $Q_2$ | $Q_3$ | $Q_1$ | $Q_2$ | $Q_3$ |
| Treatment × Post | 0.085** | 0.092** | 0.125** | 0.074* | 0.085** | 0.127** |
| | (0.042) | (0.044) | (0.056) | (0.044) | (0.041) | (0.056) |
| Median Income (log) | | | | 0.161* | 0.161** | 0.310*** |
| | | | | (0.074) | (0.074) | (0.104) |
| Education | | | | 0.094 | -0.247 | -0.222 |
| | | | | (0.202) | (0.300) | (0.350) |
| Median Owner Age | | | | -0.0006 | -0.002 | -0.001 |
| | | | | (0.001) | (0.002) | (0.004) |
| Home Ownership | | | | -0.002 | -0.002 | -0.003 |
| | | | | (0.001) | (0.001) | (0.001) |
| Percentage of Black Population | | | | -0.001 | -0.0001 | 0.002 |
| | | | | (0.002) | (0.002) | (0.002) |
| Population Density (x1000) | | | | -0.005 | -0.004 | -0.021** |
| | | | | (0.010) | (0.009) | (0.010) |
| Unemployment Rate | | | | 0.007 | 0.001 | -0.001 |
| | | | | (0.005) | (0.005) | (0.007) |
| Constant | 12.50*** | 12.76*** | 12.97*** | 10.92*** | 11.42*** | 9.957*** |
| | (0.012) | (0.010) | (0.013) | (0.901) | (0.848) | (1.090) |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Tract Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of Observations | 323 | 325 | 327 | 323 | 325 | 327 |

Notes: The presented table displays the regression results for the generalized difference-in-differences (DID) model, where the treatment group is composed of DC tracts, and post is a binary variable set to 1 if the year is after 2013. The variable "median income" represents the median household income in thousands of dollars. "Education" indicates the percentage of residents with a college degree. "Homeownership" reflects the rate of homeowner occupiers. "Population density" is calculated as the population in thousands divided by the census tract area in square miles, while "unemployment" represents the tract unemployment rate. Additionally, the variables include the median age of homeowners and the percentage of the Black population in the census tract. The dependent variables are the natural logarithm of the inflation-adjusted home value first, second and third quartiles in a census tract. The robust standard errors are adjusted for clustering at the level of the census tract. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

**Table 7.** Heterogeneous Effect of the Policy Based on Tracts Racial Composition (Only Including Tracts at the Border)

| | Dependent: Quartile Home Value(log) | | | | | |
|---|---|---|---|---|---|---|
| | $Q_1$ | $Q_2$ | $Q_3$ | $Q_1$ | $Q_2$ | $Q_3$ |
| | Black Population >50% | | | Black Population ≤50% | | |
| Treatment × Post | 0.136** | 0.154*** | 0.182** | 0.057 | 0.030 | 0.080 |
| | (0.058) | (0.054) | (0.068) | (0.056) | (0.079) | (0.104) |
| Median Income (log) | 0.020 | 0.100 | 0.290** | 0.212 | -0.083 | -0.154 |
| | (0.067) | (0.084) | (0.135) | (0.158) | (0.247) | (0.278) |
| Education | 0.179 | -0.300 | -0.033 | -0.111 | 0.035 | -0.570 |
| | (0.244) | (0.351) | (0.403) | (0.396) | (0.526) | (0.510) |
| Median Owner Age | -0.0001 | -0.001 | 0.0001 | -0.004 | -0.006* | -0.008** |
| | (0.002) | (0.002) | (0.005) | (0.003) | (0.003) | (0.003) |
| Home Ownership | -0.0004 | -0.0004 | -0.00327 | -0.0004 | 0.0004 | 0.00599 |
| | (0.002) | (0.001) | (0.002) | (0.004) | (0.004) | (0.004) |
| Percentage of Black Population | -0.006 | -0.003 | -0.002 | -0.003 | -0.002 | -0.001 |
| | (0.003) | (0.002) | (0.003) | (0.006) | (0.007) | (0.00713) |
| Population Density (x1000) | -0.009 | -0.004 | -0.013 | 0.009 | -0.004 | -0.030 |
| | (0.009) | (0.010) | (0.012) | (0.033) | (0.030) | (0.025) |
| Unemployment Rate | 0.006 | -0.0008 | -0.005 | 0.0135 | 0.007 | 0.004 |
| | (0.006) | (0.006) | (0.008) | (0.0141) | (0.0187) | (0.0194) |
| Constant | 12.56*** | 12.06*** | 10.16*** | 10.87*** | 14.60*** | 16.01*** |
| | (0.861) | (0.901) | (1.450) | (1.989) | (3.056) | (3.376) |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Tract Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of Observations | 212 | 214 | 217 | 111 | 111 | 110 |

Notes: The presented table displays the regression results for the generalized difference-in-differences (DID) model, where the treatment group is composed of DC tracts, and post is a binary variable set to 1 if the year is after 2013. The variable "median income" represents the median household income in thousands of dollars. "Education" indicates the percentage of residents with a college degree. "Homeownership" reflects the rate of homeowner occupiers. "Population density" is calculated as the population in thousands divided by the census tract area in square miles, while "unemployment" represents the tract unemployment rate. Additionally, the variables include the median age of homeowners and the percentage of the Black population in the census tract. The dependent variables are the natural logarithm of the inflation-adjusted home value first, second and third quartiles in a census tract. The robust standard errors are adjusted for clustering at the level of the census tract. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

**Table 8.** Heterogeneous Effect of the Policy Based on Tracts Racial Composition (Predominantly Black versus Other Tracts) Only Including Tracts at the Border

| | Dependent: Quartile Home Value(log) | | | | | |
|---|---|---|---|---|---|---|
| | $Q_1$ | $Q_2$ | $Q_3$ | $Q_1$ | $Q_2$ | $Q_3$ |
| | Black Population >70% | | | Black Population ≤30% | | |
| Treatment × Post | 0.202*** | 0.184*** | 0.216*** | 0.035 | 0.012 | 0.060 |
| | (0.059) | (0.051) | (0.071) | (0.055) | (0.088) | (0.113) |
| Median Income (log) | 0.003 | 0.115 | 0.328** | 0.279 | 0.023 | -0.214 |
| | (0.065) | (0.093) | (0.156) | (0.213) | (0.388) | (0.451) |
| Education | 0.035 | -0.373 | -0.130 | -0.472 | -0.549 | -0.592 |
| | (0.241) | (0.393) | (0.453) | (0.670) | (0.836) | (1.041) |
| Median Owner Age | -0.001 | -0.002 | -0.0004 | 0.003 | -0.001 | -0.008 |
| | (0.002) | (0.002) | (0.005) | (0.003) | (0.004) | (0.005) |
| Home Ownership | 0.0007 | -0.0001 | -0.003 | 0.00005 | 0.0003 | 0.007 |
| | (0.002) | (0.001) | (0.002) | (0.006) | (0.006) | (0.007) |
| Percentage of Black Population | -0.005* | -0.004 | -0.001 | -0.005 | -0.006 | -0.006 |
| | (0.002) | (0.003) | (0.003) | (0.008) | (0.01) | (0.016) |
| Population Density (x1000) | -0.012 | -0.007 | -0.017 | 0.052 | -0.021 | -0.051 |
| | (0.008) | (0.010) | (0.012) | (0.047) | (0.049) | (0.068) |
| Unemployment Rate | 0.010* | 0.0001 | -0.004 | 0.008 | -0.006 | -0.019 |
| | (0.006) | (0.007) | (0.009) | (0.021 | (0.023) | (0.023) |
| Constant | 12.71*** | 12.07*** | 9.804*** | 9.884*** | 14.00** | 17.06** |
| | (0.747) | (1.010) | (1.698) | (2.568) | (4.711) | (5.335) |
| Year Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Tract Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Number of Observations | 185 | 187 | 189 | 76 | 76 | 76 |

Notes: The presented table displays the regression results for the generalized difference-in-differences (DID) model, where the treatment group is composed of DC tracts, and post is a binary variable set to 1 if the year is after 2013. The variable "median income" represents the median household income in thousands of dollars. "Education" indicates the percentage of residents with a college degree. "Homeownership" reflects the rate of homeowner occupiers. "Population density" is calculated as the population in thousands divided by the census tract area in square miles, while "unemployment" represents the tract unemployment rate. Additionally, the variables include the median age of homeowners and the percentage of the Black population in the census tract. The dependent variables are the natural logarithm of the inflation-adjusted home value first, second and third quartiles in a census tract. The robust standard errors are adjusted for clustering at the level of the census tract. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$