Do Opportunity Zones Create Opportunities?

James Alm, Trey Dronyk-Trosper, and Sean Larkin *

Abstract: The Tax Cuts and Jobs Act of 2017 allowed governors of the fifty states to designate low-income areas as a "Qualified Opportunity Zone" (QOZ). This designation entitled the investors in these QOZs to significant tax incentives, with the goal of encouraging investments in low-income communities that would increase economic opportunities in these areas. In this paper we estimate the impact of QOZ designation on several dimensions of economic development – residential and business real estate prices – using data from Florida for the period 2016-2020 and controlling for endogenous QOZ designation in our estimations. Our- still preliminary- estimation results indicate that opportunity zones have had a positive effect on non-vacant residential property values, but the impact on commercial and vacant property is unclear.

Keywords: Opportunity zones, tax incentives, place-based development policies.

JEL Codes: H24, I38, O23, R38.

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* Tulane University, Department of Economics, Tilton Hall, New Orleans, LA 70118 (Alm jalm@tulane.edu; Dronyk-Trosper treyldt@gmail.com; Larkin slarkin@tulane.edu). Please address all correspondence to James Alm. We are grateful to Augustine Denteh for many helpful comments on our estimation strategies.

1. Introduction

The Tax Cuts and Jobs Act (TCJA) of 2017 allowed governors of the fifty states to designate some low-income areas as a special "Qualified Opportunity Zone" (QOZ). This designation entitled the investors in these QOZs to significant tax incentives, with the goal of encouraging investments in low-income communities that would increase economic opportunities in these areas. In this paper we estimate the impact of QOZ designation on several dimensions of economic development – business and residential real estate prices – using data from Florida for the period 2016-2020 and controlling for endogenous QOZ designation in our estimations. Overall, we find that QOZ designation has had little impact on a slight, if small and positive, impact on short run economic opportunities, results that are robust to various estimation methods.

An "Opportunity Zone" (OZ) is a designated low-income area within a state, selected by the governor of the state from census tracts in the state that meet specified eligibility requirements, with investments in an OZ then eligible for a range of generous tax incentives. The TCJA specified two criteria that census tracts had to meet to qualify for these incentives, thereby receiving the special QOZ designation. First, the poverty rate in the census tract must be at least 20 percent. Second, the median family income in the census tract must be less than or equal to 80 percent of either the statewide median family income or the metro family median income (where applicable), whichever is higher. The governor of each state can then nominate up to 25 percent of these "low-income census" (LIC) tracts in the state as a QOZ, and up to 5 percent of all QOZs nominated can be non-LICs if these census tracts are geographically contiguous with an LIC. This process was a one-time process that was completed before the end of 2018, and in December 2018 the U.S. Treasury finalized its certification of QOZs.

The stated intention of the QOZ incentives was to encourage investment in these low-income areas in order to improve incomes, jobs, and economic development in areas that were seen as lagging behind in opportunities, especially opportunities for minority groups. These tax incentives are of several types, of which the main ones relate to the treatment of realized capital gains on the investments. As discussed in more detail later, there is a temporary deferral of realized capital gains from a sale of an investment outside of a QOZ investment, if the realized gains are reinvested in a QOZ. Also, there is a step up in basis of 10 percent if the investment stays in the QOZ for 5 years and a step up in basis of 15 percent if the investment is held for 7 years. Finally, all capital gains from the sale of an investment in an QOZ are excluded from taxable income if the investment is held for at least 10 years. In their entirety, these tax incentives create significant tax breaks for investors, tax breaks that are of more value to higher income investors.

In total, Treasury designated 8764 OZs in the fifty states and in Washington, D.C., Guam, Northern Mariana Islands, Puerto Rico, Samoa, and the Virgin Islands, from 42,160 potential census tracts out of a nationwide total of 74,163 census tracts.[1] All tracts that were nominated by the governor and subsequently certified by the Secretary of the U.S. Treasury become designated QOZs, and investors in these QOZs become eligible for the tax incentives. As a result, each governor's designation provided an opportunity for the governor to introduce investments in low-income communities that will, in principle, increase economic opportunities in these areas.

[1] The various government regulations for OZs include, among others: "Investing in Qualified Opportunity Funds", available online at https://www.federalregister.gov/documents/2018/10/29/2018-23382/investing-in-qualified-opportunity-funds; "Investing in Qualified Opportunity Funds", available online at: www.federalregister.gov/documents/2019/05/01/2019-08075/investing-in-qualified-opportunity-funds; "Treasury, IRS issue proposed regulations on new Opportunity Zone tax incentive", available online at https://www.irs.gov/newsroom/treasury-irs-issue-proposed-regulations-on-new-opportunity-zone-tax-incentive; and "Special Rules for Capital Gains Invested in Opportunity Zones", available online at https://www.irs.gov/pub/irs-drop/rr-18-29.pdf. See also Novogradic (2018), Eastman and Kaeding (2019), Nitti (2019), Tankersley (2019), and Tax Policy Center (2019) for useful information.

The tax incentives included in OZs are similar to a range of "place-based development policies" that have been utilized over the years. In the United States, these place-based development policies include programs like Enterprise Zones, Renewal Communities, Enterprise Communities, the New Market Tax Credit, the Historic Tax Credit, and the Low-income Housing Tax Credit. There are also place-based policies around the world, such as Structural Funds and Enterprise Zones in the European Union and Special Economic Zones in China, among many other programs. The specific provisions of these many programs vary, but the common feature is the use of targeted incentives that are intended to encourage investment in underperforming areas. There has been much research that has examined the impact of these policies on economic development. Overall, this research has found that the success of these policies is decidedly mixed, both in the United States and abroad (Bartik, 1991, 2003, 2019; Ladd, 1994; Papke 1994; Peters and Fisher, 2002, 2004; Bondonio and Greenbaum, 2007; Billings, 2009; Hanson, 2009; Neumark and Kolko, 2010; Bowers et al., 2011; Ham et al., 2011; Hanson and Rohlin, 2011, 2013; Accetturo and de Blasio, 2012; Gobillon, Magnac, and Selod, 2012; Givord, Rathelot, and Sillard, 2013; Reynolds and Rohlin, 2014; The World Bank, 2015; Jenson 2018).[2] Indeed, preliminary work on OZs by Chen, Glaeser, and Wessel (2019), Sage, Langen and van de Minne (2019) and Theodos, González, and Meixell (2020) finds that OZs are not having their hoped-for impacts.

Using Florida data for the period 2016 to 2020, we estimate the impact of QOZ designation on residential and business real estate prices in these areas. Our simplest estimation method uses OLS methods, with the main explanatory variable of interest a dummy variable for whether or not an area is designated as a QOZ. However, estimating these price effects is

[2] See Glaeser and Gottlieb (2008), Neumark and Simpson (2014) and Duranton and Venables (2018) for recent and comprehensive surveys of this literature.

complicated by the endogenous nature of QOZ designation. Frank, Hoopes, and Lester (2020) and Alm, Dronyk-Trosper, and Larkin (2021) examine the factors associated with QOZ selection, and both find strong evidence that determine QOZ designation is more likely in areas that have higher rates of unemployment, higher levels of welfare receipt, and lower median income, all of which are consistent with the presumed goals of QOZs; both studies also demonstrate the importance of several political drivers.[3] These studies therefore indicate that QOZ selection is endogenous, dependent on specific determinants of the eligible areas, and this endogenous selection must be considered in any estimations of the effects of QOZ designation on economic opportunities. Accordingly, we also estimate models in which QOZ designation is determined as a predicted probability, as well as models in which QOZs are compared with otherwise similar OZs that were not designated as QOZs using a "fuzzy regression discontinuity" approach. All of our estimation strategies suggest that opportunity zones have had little impact on either residential or business real estate prices.

Note that opportunity zones have faced increased criticism along several fronts, including the politicization of QOZ designation[4], their unintended consequences[5], and the anticipated failures[6] of OZ designation, and these criticisms have even made their way into recent high-

[3] Theodos, Meixell, and Hedman (2018) also examine QOZ selection, although their analysis of QOZ selection relies mainly on simple comparisons of the mean characteristics of OZs that are selected versus those not are designated for QOZ selection. See also Theodos and Meixell (2018), who apply similar methods to the specific case of California.

[4] See "A Trump Tax Break To Help The Poor Went To a Rich GOP Donor's Superyacht Marina", available online at https://www.propublica.org/article/superyacht-marina-west-palm-beach-opportunity-zone-trump-tax-break-to-help-the-poor-went-to-a-rich-gop-donor. See also "Symbol of '80s Greed Stands to Profit from Trump Tax Break for Poor Areas", available online at https://www.nytimes.com/2019/10/26/business/michael-milken-trump-opportunity-zones.html.

[5] See "Fixing America's Forgotten Places – Opportunity Zones, created by Trump's tax law, are meant to help the heartland thrive and make the country more equal, but can they pull it off?", available online at https://www.theatlantic.com/ideas/archive/2018/07/how-do-we-help-this-place/565862/.

[6] See: "The Problem with Opportunity Zones", available online at https://www.citylab.com/equity/2018/05/the-problem-with-opportunity-zones/560510/; "How a Trump Tax Break to Help Poor Communities Became a Windfall for the Rich", available online at https://www.nytimes.com/2019/08/31/business/tax-opportunity-zones.html; "Trump Tax Break That Benefited the Rich Is Being Investigated", available online at

profit entertainment programs.[7] Some politicians have already begun crafting bills to address these criticisms and even to advocate the complete dissolution of the OZ program.[8] We do not discuss these dimensions of the OZ program.

In the next section, we discuss the details of opportunity zones. We then present our data and methods, followed by our results. We conclude in the final section.

2. What is an "Opportunity Zone"? Definitions and tax incentives

2.1. Definitions

To facilitate our discussion, we begin with some basic definitions that define the main features of the Opportunity Zone (OZ) program.

A low-income census tract (LIC) is a census tract in which either the poverty rate is at least 20 percent or tracts in which the median family income is less than or equal to 80 percent of the statewide median family income or metro family median income (where applicable), whichever is higher. A related definition is a Treasury-identified census tract, which is a census tract that is contiguous with one or more LICs but which does not meet the LIC criteria.

A state governor may declare 25 percent of the LICs in the state as a Qualified Opportunity Zone (QOZ) based on 2011-2015 ACS 5-year data from the Census Bureau.[9] Note that 5 percent of all QOZs nominated can be contiguous with an LIC, rather than an LIC itself, as specified by a Treasury-identified census tract. Because of this provision, census tracts adjacent

https://www.nytimes.com/2020/01/15/business/trump-opportunity-zone-investigation.html; and "Developers Rushing to Opportunity Zones for Tax Break, But Is It Helping Louisiana's Low-Income Areas?", available online at www.theadvocate.com/new_orleans/news/business/article_0ddb2d22-2576-11e9-bde9837b83173a57.html.

[7] See the episode of the HBO series *Billions* entitled "Opportunity Zone", in which the character Bobby Axelrod (or Axe) wants to invest in an OZ in the Yonkers neighborhood in which he grew up.

[8] On 6 November 2019 Sen. Ron Wyden (D-OR) introduced in the U.S. Senate a bill to reform the OZ program. See https://www.finance.senate.gov/imo/media/doc/Opportunity%20Zone%20Reporting%20and%20Reform%20Act%20of%202019%20Bill%20Text.pdf.

[9] Note that for 51 QOZs nominated late in the process, the 2012-2016 ACS data was used.

to an LIC, but not necessarily meeting the criteria for QZ nomination, may still be nominated for QOZ status. However, no more than 5 percent of the QOZs that are nominated within each state may be these contiguous tracts.

A Qualified Opportunity Fund (QOF) is a self-certified entity treated as a partnership or corporation for federal tax purposes and organized in any of the 50 states, District of Columbia, or the five U.S. territories for the purpose of investing in qualified opportunity zone property. At least 90 percent (or more) of held assets must be QOZ property.

A QOZ business is a business with substantially all of its tangible assets located in QOZs. Internal Revenue Service (IRS) regulations require that 70 percent of all tangible property held be in a QOZ, and that 50 percent of the gross income from a QOZ business be derived from active trade or conduct in a QOZ (Internal Revenue Service, 2018). Several enterprises cannot qualify as a QOZ business, including a golf course, a country club, a massage parlor, a hot tub facility, a suntan facility, a gambling facility, and stores specializing in alcoholic beverages to be consumed off the premises. A QOZ business may include houses and apartments for rent.

A QOZ property must be a property purchased after 31 December 2017, be qualified as a QOZ at the time of purchase, and remain qualified for substantially all of the time held. These properties include:

- QOZ Stock: Equity in a QOZ business held by a QOF.
- QOZ Partnership Interest: Partnership interest in a QOZ business held by a QOF.
- QOZ Business Property: Tangible property used in a trade or business in a QOZ if the original use of such tangible property commences with the QOF or the QOF substantially improves the tangible property, where "substantial improvement" means that during any 30-month period *additions* to the tax basis of the building (excluding land values) are made such that the value added to the tax basis is higher than the adjusted taxpayer basis at the beginning of any 30-month period.

Note that a 90 percent investment in a business with a 70 percent QOZ business property means that there must be a minimum 63 percent investment in QOZs for a QOF.

2.2. Tax incentives

There are three tax incentives from investing in a QOF. First, there is a temporary deferral of realized capital gains from a sale outside of an OZ if reinvested in a QOF, which must be realized (and taxed) when the property is sold or at the end of 2026, whichever occurs first. An investor must invest in a QOF within 180 days of realizing the capital gains to qualify for deferment.

Secondly, capital gains newly invested into a QOF will receive a step-up in basis of 10 percent if the investment is held for 5 years, and another 5 percent (for a total of 15 percent) if held for 7 years. This provision enables investors to reduce 15 percent of their capital gains invested into a QOF from taxable income if held for the full 7 years.

Third, there is permanent exclusion from taxable income of capital gains from the sale or exchange of an investment in a QOF if the investment is held for 10 years. This incentive only applies to gains accrued after an investment in a QOF. As a result, capital gains earned before investment in the QOF receive benefits from the first and second tax incentives, while capital gains earned after investing in the QOF benefit from this third incentive.

In their entirety, these tax incentives mean that, for an investment that is held for ten years, all unrealized capital gains used for investment in a QOF will not be taxed until 2026, only 85 percent of the original capital gains invested will be taxed (100 percent would have been if realized originally), and no taxes will be paid on the appreciation of the investment. These represent quite significant tax breaks for investments in a QOF. Given that the marginal tax rate on capital gains varies from 0 percent for low income earners to 20 percent for higher income earners, these tax benefits will be of more value to higher income investors.

As an example that illustrates the magnitude of these benefits, consider the case of an individual facing a 20 percent capital gains tax rate who sells stocks, earns $1 million in capital gains on these sales, and then reinvests these capital gains in a QOF that earns $50,000 every year. After 6 years, the investor will have made $1,300,000 (or the initial $1,000,000 in capital gains plus $300,000 from the [6 X $50,000] in returns each year). Selling this QOF in its entirety would result in capital gains taxes on $300,000 of earnings, plus $900,000 from the original investment due to the step up in basis (e.g., "…if the investment is held in the QOF for 5 years"), thereby reducing the capital gains tax base by $100,000. Selling the QOF after 8 years would result in earnings of $1,400,000 but capital gains taxes on only $850,000 of the original investment plus the $400,000 in newly earned capital gains (e.g., "…if the investment is held in the QOF for 5 years, up to a total of 15 percent if the investment is held in the QOF for 7 years"), reducing the capital gains tax base by $150,000. However, selling the investment in year 11 would result in capital gains taxes on only the initial amount less the 15 percent reductions because of the permanent exclusion of capital gains from holding the investment for 10 years (e.g., "…there is permanent exclusion from taxable income of capital gains from the sale or exchange of an investment in a QOF if the investment is held for 10 years"). All of accumulated capital gains from the QOF investment would avoid the 20 percent capital gains tax rate, and only $850,000 of the initial $1 million in capital gains would be subject to the capital gains tax rate, and any additional capital gains earned would be received tax free.

3. Data and methods

3.1. Data

Our main variables that capture economic development effects are residential and commercial parcel sales prices in the state of Florida. This information comes from Florida state tax rolls that include real estate transaction data at the individual transaction level, including census tract identifiers, month, year, and type of transaction for every real estate transaction in Florida from 2016-2020. We use only those transactions that are considered to be "arms-length" transactions, i.e. between strangers. These data include, separately, residential and business real estate prices. Given that OZ designation occurs at the census tract level, we aggregate these sales to the tract level.

Our explanatory factors include demographic variables, economic variables, and political variables. Demographic and economic variables are drawn from the American Communities Survey (ACS), for 2011-2015, 2012-2016, and 2014-2018 5-year estimates. ACS data include median household income, median family income, educational attainment, race and ethnicity information, total population, unemployment rate, metropolitan area population, the percent of the population on welfare, and the percent of the population in various age groups.

We also use information on the specific geographic location of campus of higher education, obtained from the U.S. Department of Homeland Security Homeland Infrastructure Foundation-Level Data. This source includes location information from a census of institutions of higher learning, including doctoral/research universities, masters colleges and universities, baccalaureate colleges, associates colleges, theological seminaries, medical and other health care-related schools, schools of engineering and technology, business and management schools, art, music, and design schools, law schools, teachers colleges, tribal colleges, and other specialized institutions.

Our political variables measure political control of state government institutions at the time of opportunity zone nomination. We generated some of these variables from ballotpedia.com, which we coded by hand. We also coded the legislative district and census tract crosswalk, using GIS data from the U.S. Census Bureau. These data measure the upper and lower state legislative partisanship by district and state executive partisanship for January-March 2018, the period immediately following enactment of the OZ program in the TCJA of 2017 during which states could nominate eligible census tracts to be opportunity zones.

We use the complete list of QOZs and LIC census tracts in Florida from the U.S. Internal Revenue Service (IRS). Also, we use consumer price index information to adjust nominal dollars to real dollars from the Federal Reserve Bank of St. Louis. All dollar amounts are in 2018 USD, and all observations are at the census tract level. We distinguish between the *Pre-period*, or January 2016 to March 2018, and the *Post-period*, or March 2018 to November 2020.

The national data include all census tracts in the lower 48 states except Nebraska. For the Florida data, there are 4,245 Census tracts in ACS data, including 1,706 LICs, and 427 QOZs in Florida; however, we do not include tracts that are unpopulated in any of the ACS periods, that do not have arms-length real estate transactions in both the pre- and the post-period, or that are missing any ACS variables. Our final Florida data include 4,037 Census tracts, 1,621 LICs, and 411 QOZs. Summary statistics are reported in Table 1. A list of all variable names and definitions is provided in the Appendix.

3.2. Methods

Our regressions only look at those census tracts in Florida classified by the IRS as LICs. We estimate the impact of QOZ designation on the percent change in real mean real estate

transaction prices in Florida between the pre- and post-periods, controlling for demographic, political, and economic variables. Note that all estimates are preliminary.

We estimate several models. In the simplest model, we estimate OLS regressions with many of these demographic and economic variables, with our main explanatory variable of interest a dummy variable for QOZ designation, equal to one if the census tract is an opportunity zone, and zero otherwise. However, as noted earlier, Frank, Hoopes, and Lester (2020) and Alm, Dronyk-Trosper, and Larkin (2021) provide strong evidence that QOZ designation is endogenous, determined in part by many of these same demographic and economic variables, along with various political variables; that is, selection into the treatment group (e.g., QOZ designation) may be influenced by these variables, along with prior trends toward relatively accelerating real estate prices (pro-investor) or relatively decelerating real estate prices (pro-distressed community). This endogenous selection as a QOZ must be considered in estimating the impact of QOZ designation on economic opportunities.

We address this potential endogeneity through several methods. In a second model, we first estimate the likelihood of opportunity zone nomination using the *national* sample of opportunity zones along with partisanship variables and demographic information used by policy makers at the time (2011-2015 and 2012-2016 ACS 5-year estimates). We then include this calculated probability of nomination as the right-hand side variable of interest as a replacement for the QOZ binary variable in the original specification, in an OLS equation of the percent change in *Florida-specific* real estate transaction prices. Because it is unlikely that *national* opportunity zone nomination is correlated with *Florida-specific* trends, this method should control for any endogeneity in QOZ designation.

In a third model, we employ a "fuzzy regression discontinuity" approach. Although the eligibility criteria based on median family income and poverty rates were laid out by the TCJA of 2017, meeting these criteria did not guarantee selection into treatment but simply meant that the census tract was eligible for selection into treatment. As a result, it is possible to compare the performance of opportunity zones that were designated as opportunity zones with those census tracts that met these criteria but that were not designated as QOZs, to determine the effects of QOZ designation. The first stage of this fuzzy regression discontinuity approach estimates the probability of selection into the treatment based on which side of the cutoff into which the census tract falls, and the second stage estimates the effect of the probability of QOZ designation on the percent change in real estate transaction prices between the pre- and the post-period. We apply both parametric and non-parametric models with several bandwidths to ensure robustness. For the non-parametric models, a triangular weight is used, and the appropriate bandwidth is calculated following the algorithm laid out by Calonico, Cattaneo and Titiunik (2014).

Finally, in a fourth model we utilize an instrumental variables approach using two-stage least squares. The percent of a census tract zoned as residential in 2017 is used as an instrument for the probability that a tract is nominated as an opportunity zone. This is likely relevant to opportunity zone nomination, as opportunity zones were originally designed to increase employment prospects and support businesses, two things associated with businesses which generally operate on commercially-zoned property. The percent residential likely satisfies the exclusion restriction since we are looking at percent change in real estate prices between the pre- and post-period, and while the percent residential does change slightly from year to year the change is not correlated with a change in real estate prices (see appendix table A1). Because the results may be driven by a few very large or very small transactions, we run the model both on

the entire sample of low-income census tracts and a truncated subsample in which the ten tracts with the highest percent change in real estate prices and the ten tracts with the lowest percent change in real estate prices are dropped from the sample prior to analysis.

4. Results

4.1. OLS estimation results

We present the OLS estimation results in Table 2, which estimate the impact of QOZ designation on the percent change in real mean real estate transaction prices between the pre- and post-periods after controlling for demographic and economic characteristics.[10] The results provide weak evidence that overall real estate prices have in fact grown at a slightly slower rate in opportunity zones compared to the rest of the state. These results seem to be driven by the slower growth in vacant real estate prices relative to other LICs. There is also suggestive evidence that non-vacant residential property has increased in value faster in opportunity zones than in non-QOZ low-income census tracts. However, recall that QOZ designation is likely endogenous. The following sections present models that deal with this selection issue.

4.2. Predicted QOZ designation estimation results

As one method to control for endogenous QOZ designation, we first estimate the likelihood of opportunity zone nomination using the national sample of opportunity zones along with demographic, economic, and partisanship variables used by policy makers at the time (2011-2015 and 2012-2016 ACS 5-year estimates). We then include this calculated probability

[10] Note that we are unable to use political variables in these OLS estimations because the only political variables that are available are time-invariant political variables, which of course do not provide an accurate picture of partisanship over time.

of nomination as the right hand side variable of interest in an OLS equation of percent change in Florida real estate transaction prices as a replacement for the QOZ binary variable in the original specification.[11] These results are reported in Table 3.

The extraordinarily large estimates for both categories of vacant property appear to be driven by a few extremely large percent changes in means, likely driven by the relatively low transaction count of vacant properties and the wide variance in their value. In any event, these results provide no evidence that predicted QOZ designation had any consistent impact on real estate prices.

4.3. Fuzzy regression discontinuity estimation results

Results for the first stage of the RD models can be seen in Figures 1 and 2, using the poverty rate cutoff in Figure 1 and the income level cutoff in Figure 2. Recall that the first stage of the fuzzy regression discontinuity approach estimates the probability of selection into the treatment based on which side of the cutoff the census tract falls, and the second stage estimates the effect of the probability of QOZ nomination on percent change in real estate transaction prices between the pre- and the post-periods.

In both Figures 1 and 2, there is no compelling evidence of a discrete jump in probability of selection at the cutoff of either criteria. This explains the apparent lack of a result in the second stage results for the impact on real estate prices between the pre- and the post-periods (Figure 3 for the poverty rate cutoff and Figure 4 for the income level cutoff).

[11] Note that we tried to use both partisanship variables and distance to nearest metropolitan area as instruments for selection for Florida alone, as an alternative approach for generating the predicted probability of QOZ designation. However, both variables had F-statistics of around 2.0, and so were too weak to be of use.

Further examination of QOZ selection compared to the eligibility criteria (Figures 5 and 6) suggest that, although there is no discrete jump at the cut-offs because of the dual nature of the criteria, there is certainly a marked increase in the likelihood of nomination when at least one of the criteria is met. Indeed, Figures 5 and 6 suggest that there is a dosage effect, as the higher the poverty rate and the lower the income the more likely a census tract is to be nominated in the first place. Figures 7 and 8 also examine the overall percent change in real estate prices compared to the two criteria. These figures do not provide causal evidence of the impact of QOZ designation. Even so, the results in Figures 7 and 8 fail to find convincing evidence of an increase in value of opportunity zone property.

Table 4 shows the results of non-parametric fuzzy regression discontinuity estimation with percent change in real estate prices as the dependent variable in the second stage. The first two columns (Models 1 and 2) display results only using median family income as the running variable, while the other two columns (Models 3 and 4) display estimation results in which only the poverty rate was used as the running variable. Controls for economic and demographic variables are included in Models 2 and 4. The sign of the first stage estimates are expected; that is, being the above the income threshold is negatively associated with the likelihood of being nominated as a QOZ, while being above the poverty threshold is positively associated with the likelihood of being nominated as an OZ. These signs align with previous estimates and expectations, although the first stage estimates are not statistically significant for any of the models. The second stage estimates are also not statistically significant, though of opposite sign. Because the variables in the first stage lack significance, it is possible that these cut-offs function as weak instruments because only one of the relevant running variables is examined at a time so the cut-offs are not strict. Also, when examining the figures it is apparent that the likelihood of

QOZ nomination increases as distance from the cut-offs increases, so there may not be an immediate "jump" along either dimension when examined in isolation.

Tables 5, 6 and 7 contain the results for the parametric fuzzy RD regressions. This approach allowed multiple bandwidths to be examined. Like the non-parametric estimation methods, the results are generally mixed and statistically insignificant, though this could be due to the relatively small number of observations available in each bandwidth causing reduced precision of the estimates. The results when using income as a running variable are all positive, while the results when using the poverty rate as a running variable or when using both running variables are all negative. While these are in-line with the results from the non-parametric methods, once more none of these results are statistically significant.

4.4 Instrumental variables estimation results

The estimates from two-stage least squares regressions are found in table 8. As expected, in the first stage the percent of a census tract that is residential in 2017 is found to be negatively related to the probability of opportunity zone nomination and statistically significant. Importantly, for all models, the F-statistic is higher than 10, indicating that our instrumental variable is strong. For both non-winsorized models (models 1 and 2), an increase in the estimated probability of opportunity zone selection is related to an increase in real estate prices. This is also true for the winsorized model with no controls (model 3), but in the winsorized model with controls (model 4), the results are positive but statistically insignificant.

5. Conclusions and next steps

Our various estimation results are still preliminary. Even so, these results suggest that opportunity zones have had a positive impact on non- residential real estate prices but have not had a correspondingly clear impact on business and vacant real estate prices, results that are robust to various estimation methods.

What might explain these results? One possibility is the obvious one: QOZ designation has increased the profitability of owning residential property in the designated zones. This is supported by the fact that there were about three times as many Qualified Opportunity Funds specializing in residential real estate projects as compared to QOFs specializing in commercial real estate (Council of Economic Advisers, 2020). However, there are other possible explanations. The program is still in its infancy, and so it has not had sufficient time to achieve its intended effects. The use of real estate price changes as the indicator of economic opportunity is not able to capture the relevant impacts on such other indicators as poverty rates, unemployment rates, and income levels.[12] There may be specific features of Florida that have affected the estimation results, including possible pre-TCJA trends in these prices that may affect the estimation results. These other explanations suggest that more time is needed before examining the effects of QOZs, that other measures of economic opportunity should be used in empirical work, and that effects in other states must be considered. We intend to pursue all of three of these approaches in future work.

[12] Relatedly, the use of real estate price changes is likely influenced by outliers in price changes. Using a windsorized data set and/or using the percent change in median prices (rather than the percent change in mean prices) as the dependent variable are approaches that may deal with the issue of outliers.

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Table 1: Summary statistics (means) for Florida low-income census tracts, 2016-2020

	All census tracts	Low-income census tracts	Opportunity Zones
%Δ in Mean price, total	0.157	0.223	0.186
%Δ in Mean price, commercial non-vacant	2.111	1.188	0.708
%Δ in Mean price, commercial vacant	7.125	11.566	3.156
%Δ in Mean price, residential vacant	3.198	6.157	1.374
%Δ in Mean price, residential non-vacant	0.082	0.123	0.152
Low-income Census Tract	0.402	1.000	1.000
Percent tract zoned as residential, 2017	0.887	0.849	0.815
Opportunity Zone	0.102	0.253	1.000
$\widehat{QOZ}$	0.159	0.247	0.337
Percent under 18	0.190	0.209	0.222
Percent over 65	0.216	0.178	0.167
Total Population	4.999	4.765	4.675
Percent Black	0.150	0.251	0.390
Percent Hispanic	0.222	0.274	0.219
Percent Native American	0.002	0.002	0.002
Percent family households	0.641	0.611	0.607
Percent less than HS	0.122	0.188	0.222
Percent college	0.290	0.180	0.143
Median HH income	57.207	39.345	34.866
Percent on welfare	0.154	0.254	0.315
Unemployment rate	0.065	0.084	0.118
Percent non-citizen	0.084	0.115	0.098
Campus of higher education	0.073	0.096	0.085
In metropolitan area	0.960	0.935	0.922
N	4037	1623	411

Table 2: OLS regressions for percent change in price from pre- and post-period for all Florida low-income census tracts

	(1) All Real Estate	(2) Vacant Commercial	(3) Non-Vacant Commercial	(4) Vacant Residential	(5) Non-Vacant Residential
Qualified Opportunity Zone	-0.101*	-9.407	-0.388	-6.335	0.019*
	(0.057)	(22.230)	(0.394)	(11.817)	(0.011)
Percent under 18	-0.514	108.853	2.689	43.731	-0.042
	(0.504)	(226.948)	(3.649)	(110.637)	(0.095)
Percent over 65	0.246	-0.470	2.284	-71.777	-0.181***
	(0.288)	(141.301)	(2.183)	(68.476)	(0.057)
Total Population	-0.006	3.079	-0.134*	-2.281	-0.005***
	(0.011)	(4.438)	(0.079)	(2.261)	(0.002)
Percent Black	0.012	10.229	0.463	-39.262	0.050*
	(0.141)	(66.961)	(1.052)	(31.738)	(0.026)
Percent Hispanic	-0.052	-26.094	1.161	-109.471**	0.043
	(0.194)	(90.643)	(1.427)	(46.598)	(0.037)
Percent Native American	1.258	-221.633	64.464**	564.530	-0.475
	(3.047)	(1816.369)	(31.621)	(654.064)	(0.624)
Percent family households	-0.419	-11.620	0.254	168.539***	-0.002
	(0.287)	(131.319)	(2.090)	(64.541)	(0.055)
Percent less than HS	0.039	-165.535	6.744**	-56.355	0.054
	(0.395)	(181.628)	(2.807)	(88.915)	(0.075)
Percent college	-0.233	-150.332	-0.493	195.261**	-0.233***
	(0.364)	(169.884)	(2.636)	(88.138)	(0.071)
Median HH income	-0.001	-0.931	0.010	-1.889**	-0.001**
	(0.003)	(1.681)	(0.025)	(0.794)	(0.001)
Percent on welfare	0.568*	-106.648	-5.624**	-79.553	-0.028
	(0.335)	(144.211)	(2.390)	(76.849)	(0.064)
Unemployment rate	0.082	-2.587	-2.891	188.890	-0.214*
	(0.611)	(253.370)	(4.350)	(127.189)	(0.114)
Percent non-citizen	0.561	138.105	-2.134	295.210***	-0.047
	(0.381)	(179.989)	(2.766)	(97.196)	(0.073)
Campus of higher education	-0.071	79.753***	-0.418	-12.237	0.002
	(0.076)	(30.061)	(0.512)	(17.537)	(0.014)
In metropolitan area	0.107	15.929	1.306**	6.070	0.008
	(0.094)	(43.098)	(0.612)	(17.604)	(0.017)
Constant	0.359	70.219	-0.574	-23.423	0.271***
	(0.245)	(116.601)	(1.770)	(56.140)	(0.048)
R^2	0.021	0.025	0.027	0.022	0.064
N	1,621	455	1,178	1,161	1,576

Notes: Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: OLS estimates for percent change in prices from pre- and post-period as dependent variable, using estimated probability of QOZ designation from national sample in first stage probit

	(1) All Real Estate	(2) Vacant Commercial	(3) Non-Vacant Commercial	(4) Vacant Residential	(5) Non-Vacant Residential
$\widehat{QOZ}$	-0.0126	84.53	-4.725*	-97.24	0.0968
	(0.397)	(157.0)	(2.820)	(86.90)	(0.0757)
Controls?	Yes	Yes	Yes	Yes	Yes
R^2	0.019	0.025	0.028	0.023	0.063
N	1,621	455	1,178	1,161	1,576

Notes: Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Fuzzy RD results using non-parametric methods with probability of QOZ nomination as dependent variable in first stage and total percent change in real estate prices as dependent variable in second stage

Running Variable	(1) Income	(2) Income	(3) Poverty Rate	(4) Poverty Rate
First Stage Estimates				
Meets LIC Criteria	-.02769	-.01553	0.04739	1.0340
	(0.03753)	(.03652)	(0.0382)	(0.301)
Second Stage Estimates				
$\widehat{QOZ}$	-2.1893	-2.8583	0.74366	0.33672
	(3.4367)	(7.4737)	(1.1589)	(1.4053)
Bandwidth	+/- 8.435	+/- 7.933	+/- 0.055	+/- 0.067
Controls	No	Yes	No	Yes
N	1,313	1,256	1,210	1,473

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Parametric RD results using 2SLS with probability of QOZ nomination as dependent variable in first stage and total percent change in real estate prices as dependent variable in second stage.

	(2)	(4)	(6)
$\widehat{QOZ}$	-1.355915	-0.3683091	-2.00638
	(1.624554)	(2.349119)	(1.79863)
Bandwidth	+/- 0.5	+/- 1	+/- 2
Controls	Yes	Yes	Yes
N	89	184	321

Standard errors in parentheses, distance from income threshold in thousands of dollars is the running variable. Controls include economic and demographic variables.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Parametric RD results using 2SLS with probability of QOZ nomination as dependent variable in first stage and total percent change in real estate prices as dependent variable in second stage.

	(2)	(4)	(6)
$\widehat{QOZ}$	1.21355	1.15624	0.8126369
	(0.984097)	(6.86069)	(0.5294304)
Bandwidth	+/- 0.5	+/- 1	+/- 2
Controls	Yes	Yes	Yes
N	99	103	400

Standard errors in parentheses, poverty rate is the running variable. Controls include economic and demographic variables.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Parametric RD results using 2SLS with probability of QOZ nomination as dependent variable in first stage and total percent change in real estate prices as dependent variable in second stage.

	(1)	(2)	(3)
$\widehat{QOZ}$	-0.884762	-0.448878	-0.065597
	(0.432237)	(0.239115)	(0.246934)
Bandwidths	+/- 0.5	+/- 1	+/- 2
Controls	Yes	Yes	Yes
N	184	269	652

Standard errors in parentheses, Both distance from income eligibility threshold in thousands USD and poverty rates are used as running variables. Controls include economic and demographic variables.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Instrumental variables results, 2SLS.

		(1)	(2)	(3)	(4)
First-Stage Results	Percent Residential	-0.49979***	-0.27328***	-0.51110***	-0.28633***
		(0.08047)	(0.08049)	(0.08213)	(0.08238)
	F-stat	38.58	11.53	38.73	12.08
Second Stage Results	$\widehat{QOZ}$	0.87517**	1.7512**	0.42697**	0.59071
		(0.36121)	(0.86493)	(0.19951)	(0.41031)
Controls		No	Yes	No	Yes
Windsorized		No	No	Yes	Yes
N		1621	1621	1600	1600

Standard errors in parentheses, Controls include economic and demographic variables.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: OLS estimates, percent change in non-vacant residential real estate prices is the dependent variable.

%Δ NVR Real Estate Prices	(1)	(2)	(3)	(4)
Opportunity Zone	0.039***	0.019*	0.030***	0.006
	(0.010)	(0.011)	(0.008)	(0.009)
Winsorized	No	No	Yes	Yes
Controls	No	Yes	No	Yes
R^2	0.010	0.064	0.008	0.083
N	1576	1576	1557	1557

Standard errors are in parentheses. The dependent variable is the percent change in real estate prices.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 1: Percent of census tracts nominated as opportunity zones by poverty rate (Florida only) - Subsample included in the broad bandwidth shown

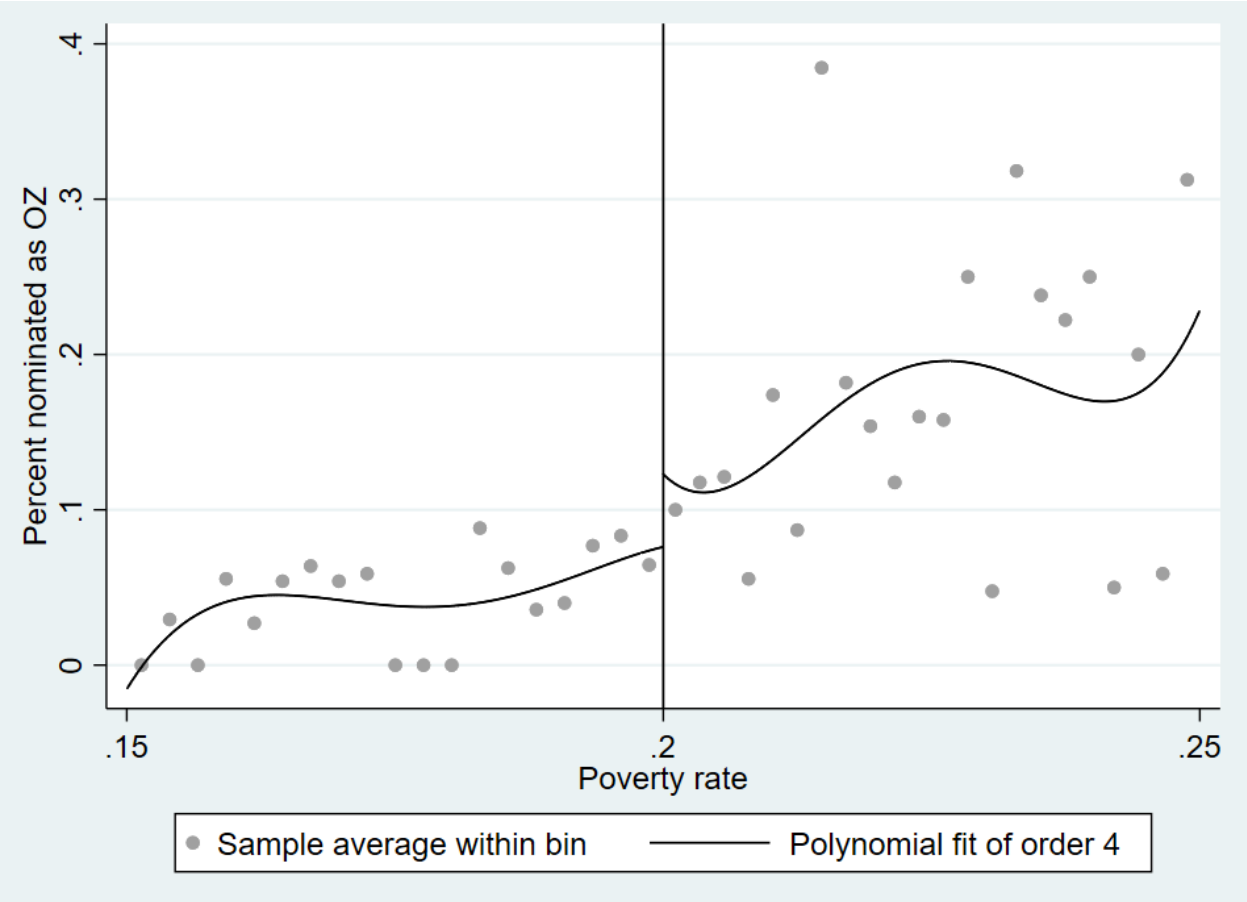


Figure 2: Percent of census tracts nominated as opportunity zones by distance from income eligibility cutoff (Florida only) – Subsample included in the broad bandwidth shown

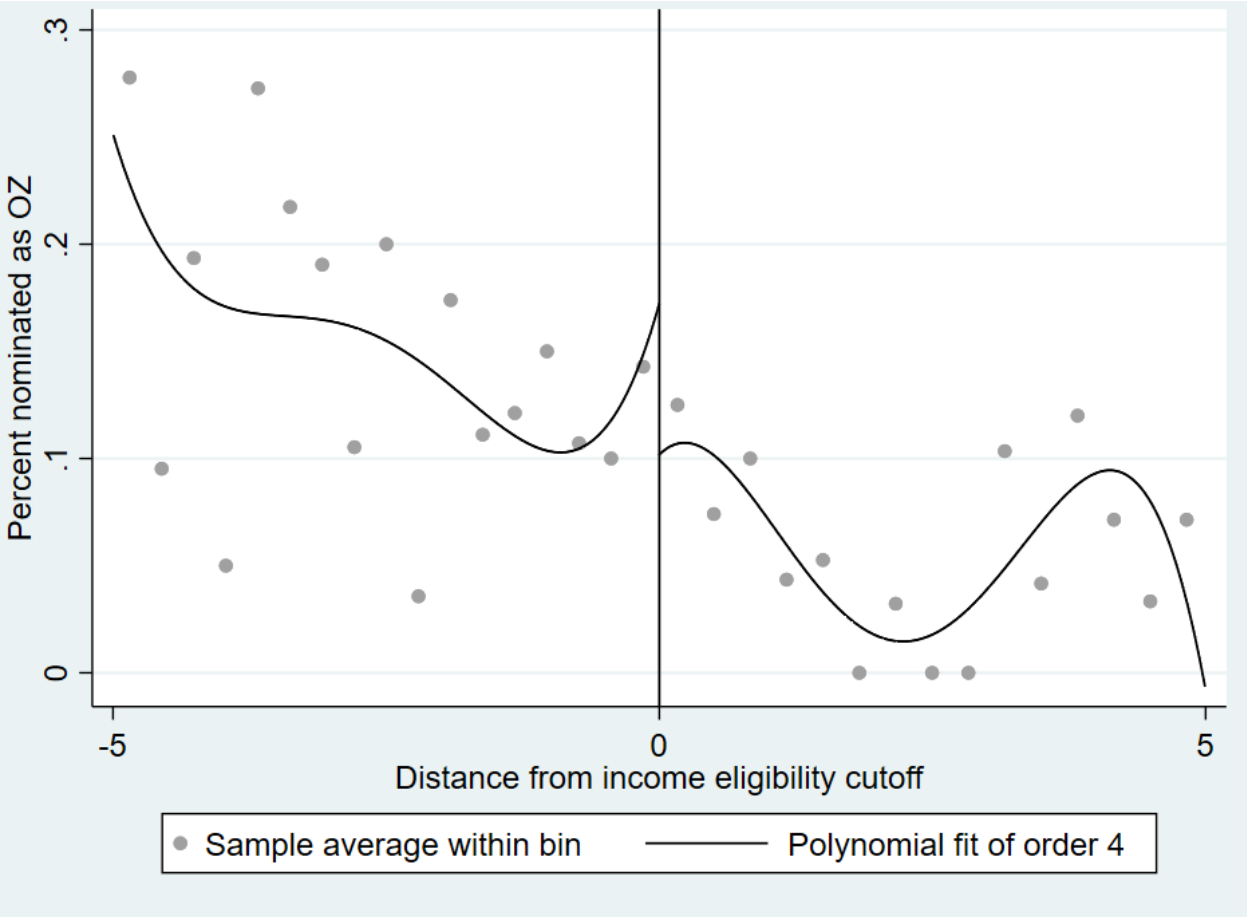


Figure 3: Percent change in mean total real estate prices by distance from the poverty cutoff (Florida only) – Subsample included in the broad bandwidth shown

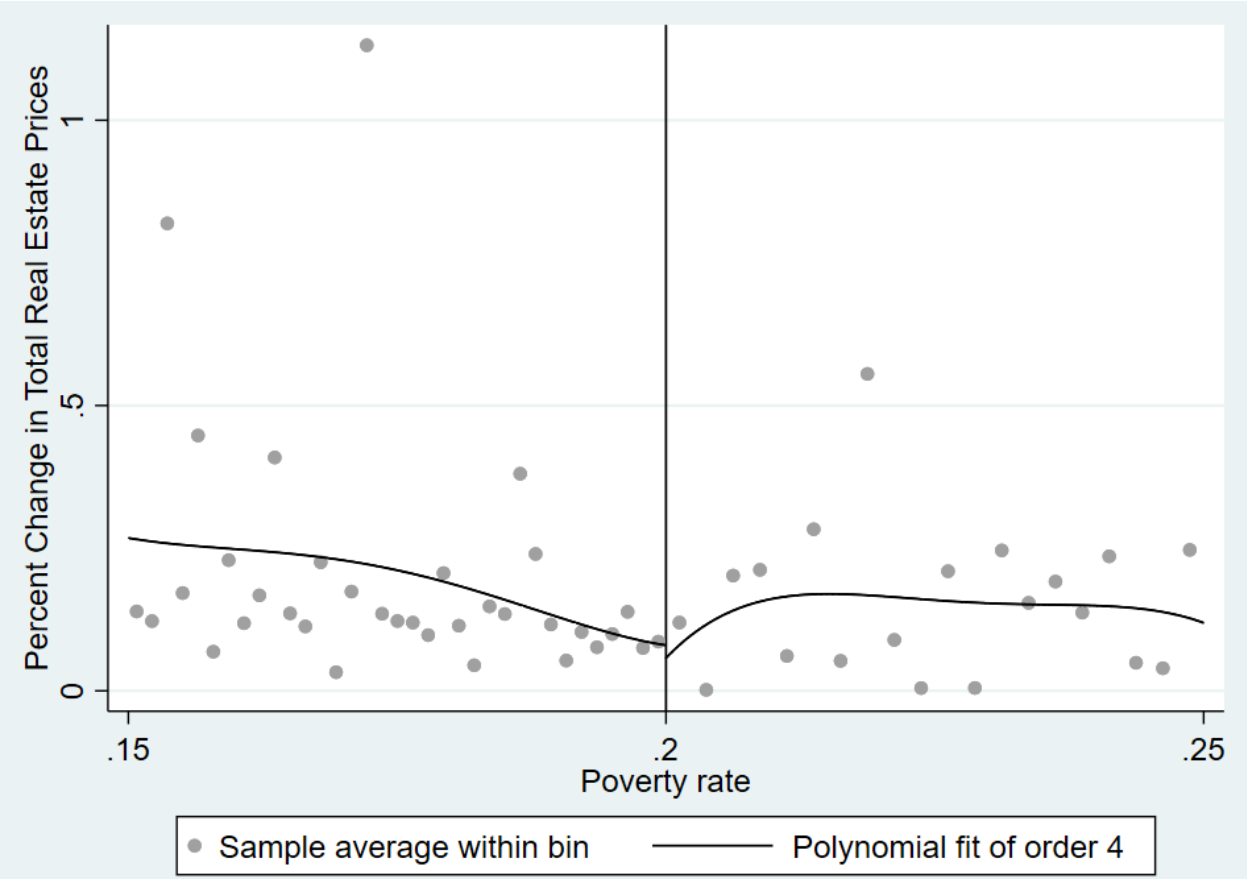


Figure 4: Percent of census tracts nominated as opportunity zones by distance from income eligibility cutoff (Florida only) – Subsample included in the broad bandwidth shown

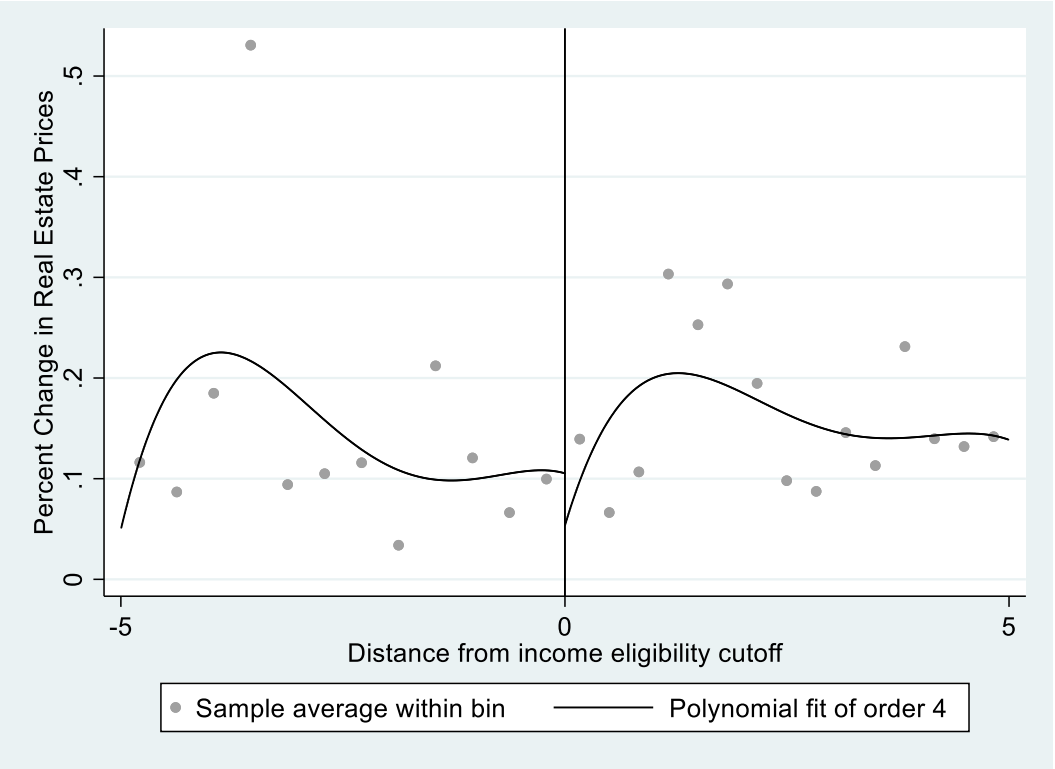


Figure 5: Percent of census tracts nominated as opportunity zones by poverty rate (Florida only) – Entire sample

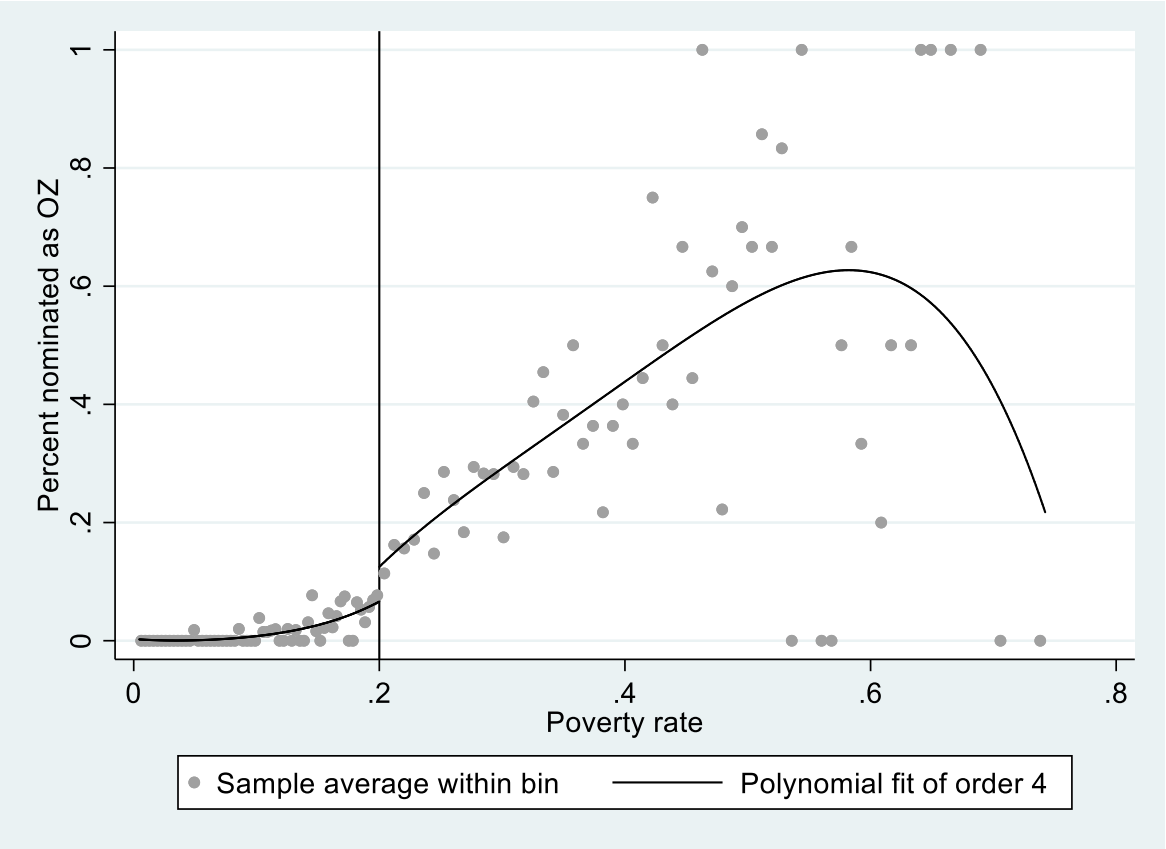


Figure 6: Percent of census tracts nominated as an opportunity zone by distance from income eligibility cutoff (Florida only) – Entire sample

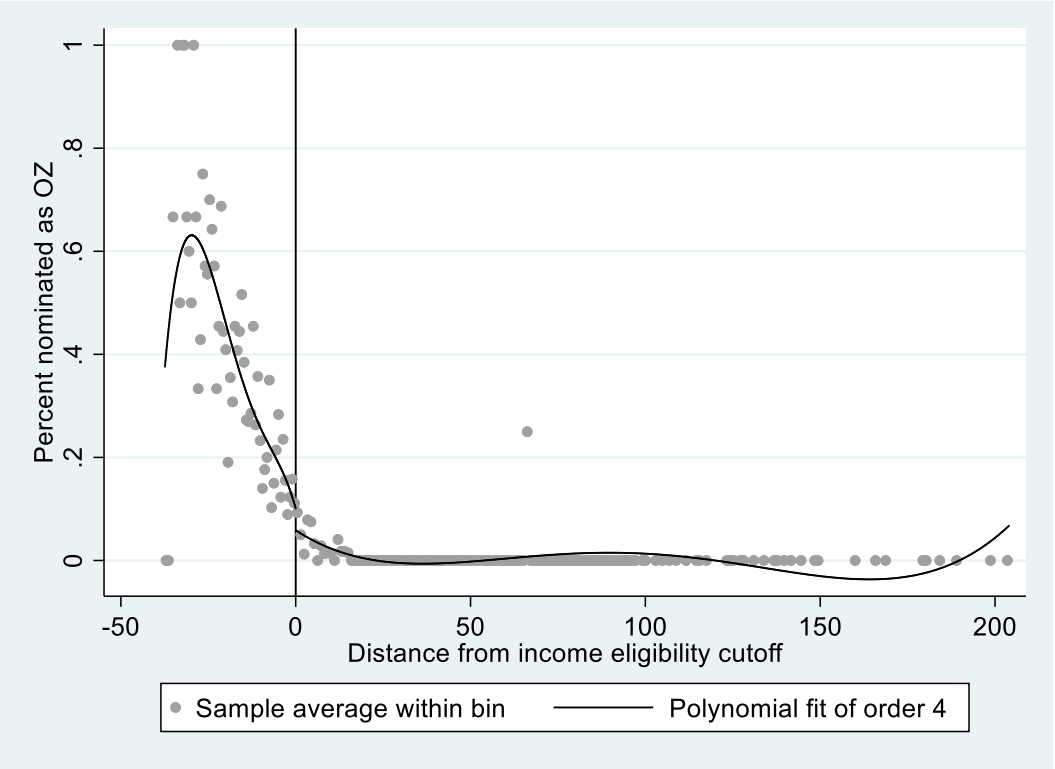


Figure 7: Percent change in mean real estate value by poverty rate (Florida only) – Entire sample

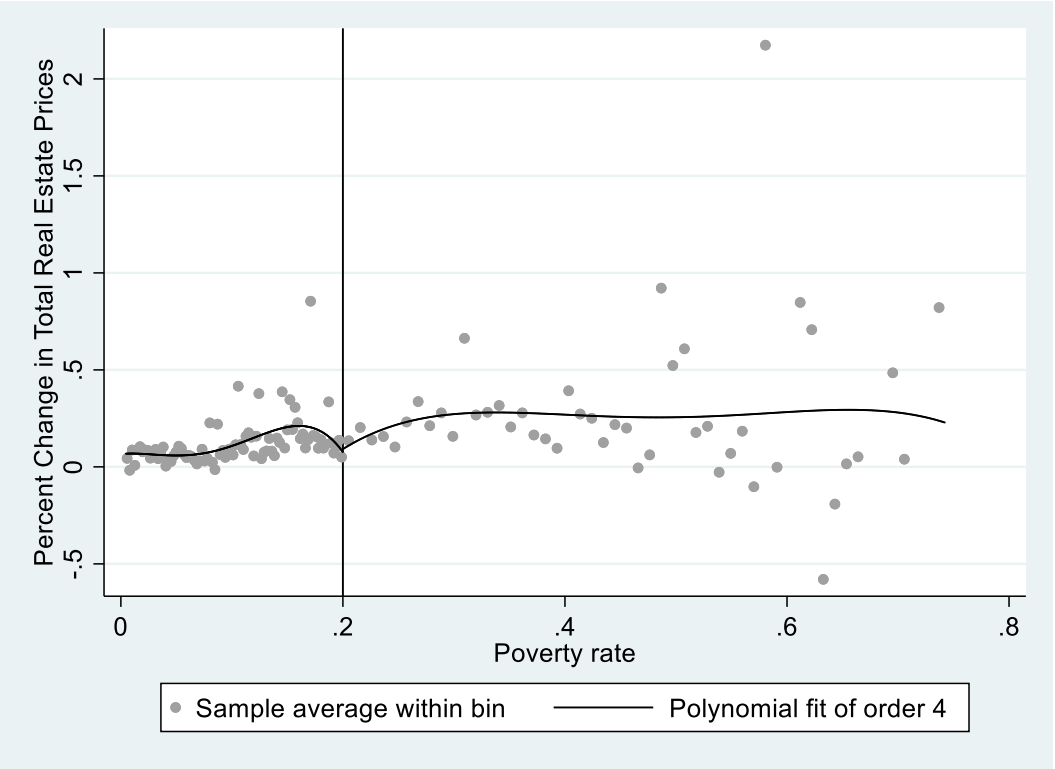
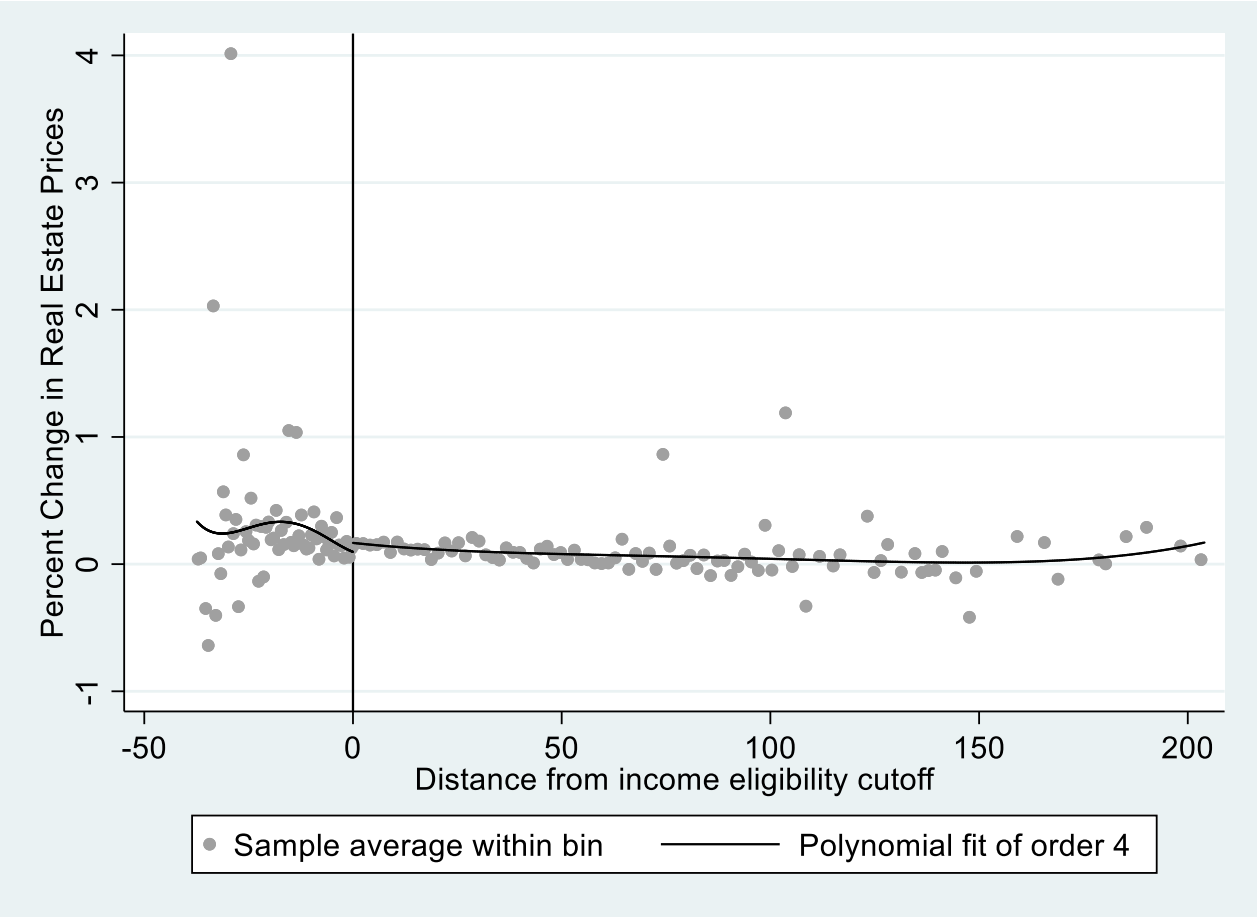


Figure 8: Percent change in mean real estate by distance from income eligibility cutoff (Florida only) – Entire sample



Appendix: Variable names and definitions

- *Perc_change_avgpricetot:* Percent change in mean real estate transaction price from pre to post period.

- *Perc_change_avgpricecomnovac*: Percent change in mean commercial, non-vacant real estate transaction price from pre to post period.

- *Perc_change_avgpricecomvac*: Percent change in mean commercial, vacant real estate transaction price from pre to post period.

- *Perc_change_avgpriceresvac*: Percent change in mean residential, vacant real estate transaction price from pre to post period.

- *P*erc_change_avgpriceresnovac: Percent change in mean residential, non-vacant real estate transaction prices from pre to post period.

- *LIC*: Binary variable equal to one if the census tract was considered a low-income census tract by the IRS at the time of OZ nomination, and zero otherwise.

- *QOZ:* Binary variable equal to one if the census tract is registered as an opportunity zone, and zero otherwise.

- $\widehat{QOZ}$: Probability [0,1] that a census tract is nominated as an opportunity zone, calculated from a probit regression model (Alm, Dronyk-Trosper, and Larkin, 2021).

- *Perc_under18:* Percent of the census tract under the age of 18, from the ACS 2014-2018 5-year estimates.

- *Perc_over65:* Percent of the census tract over the age of 65, from the ACS 2014-2018 5 year estimates.

- *Pop:* Total population of the census tract in 1,000's, from the ACS 2014-2018 5-year estimates.

- *Perc_black*: Percent of the census tract that identifies as non-hispanic Black or African-American, from the ACS 2014-2018 5-year estimates.

- *Perc_hisp*: Percent of the census tract that identifies as Hispanic, from the ACS 2014-2018 5-year estimates.

- *Perc_nativeam*: Percent of the census tract that identifies as Native American, from the ACS 2014-2018 5-year estimates.

- *Perc_famhh*: Percent of family households in the census tract as compared to all household, from the ACS 2014-2018 5-year estimates.

- *Perc_lessthanhs*: Percent of the census tract's population over 25 with a highest educational attainment of less than HS (or equivalent), from the ACS 2014-2018 5-year estimates.

- *Perc_college:* Percent of the census tract's population over 25 with a highest educational attainment of a 4-year degree or higher, from the ACS 2014-2018 5-year estimates.

- *Median_hh_income:* Median household income, in 2018 USD, from the ACS 2014-2018 5-year estimates.

- *Perc_welfare:* Percent of the census tract's population that receives some form of welfare (SNAP, state welfare programs, and so on), from the ACS 2014-2018 5-year estimates.

- *Perc_unemp:* Unemployment rate of the census tract, from the ACS 2014-2018 5-year estimates.

- *Perc_noncitizen:* Percent of residents that do not have an American citizenship, from the ACS 2014-2018 5-year estimates.

- *Campus_highered:* Binary variable equal to one if there is a campus of higher learning present, and zero otherwise, from the U.S. Department of Homeland Security Homeland Infrastructure Foundation-Level Data.