Upzoning and Single-Family Housing Prices

A (Very) Early Analysis of the Minneapolis 2040 Plan

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ABSTRACT

Problem, research strategy, and findings: In December 2018, the Minneapolis (MN) city council approved a new comprehensive plan that proposed eliminating single-family zoning restrictions throughout the city. In this project, I study the initial impact of this change on the sales prices of affected housing units. I estimate a series of difference-in-differences models comparing the sales price of houses within 3 km of the Minneapolis border in the year before and year after the city adopted the plan. I find that compared with similar unaffected properties in surrounding cities, the Minneapolis plan change was associated with a 3% and 5% increase in the price of affected housing units. In addition, there is some evidence that this price increase is due to the new development option it offers property owners. I find that the plan-related price increases are larger in inexpensive neighborhoods and for properties that are small relative to their immediate neighbors.

Takeaway for practice: By examining the short-term effect of the Minneapolis 2040 Plan's elimination of single-family zoning, my study is useful for planners working in cities considering similar reforms. My analysis, though preliminary, suggests that there is indeed demand for denser development in the city. But the price increases associated with the upzoning redounds most directly to relatively small properties and those in inexpensive neighborhoods. Planners should thus be sensitive to how this type of change can affect housing affordability and housing stock diversity.

 Keywords: housing prices, land use, zoning

Despite being the urban center of a major metropolitan area, Minneapolis (MN) has historically restricted a substantial portion of development on its residential land to single-family housing. In 2018, the city's zoning ordinance allowed only single-family homes on 70% of land zoned for residential uses. Minneapolis is not alone in this practice; nearly every major city in the United States uses single-family zoning regulations to limit residential development in similar ways. In the suburbs surrounding central cities, regulations that limit development to single-family homes are much more prevalent still (Fischel, 2015; Hirt, 2014; Levine, 2005; McCabe, 2016).

Single-family zoning regulations can produce harmful side effects that extend outside the neighborhoods in which they are used. Researchers find that strict residential development regulations can inflate land (Kok et al., 2014) and housing (Glaeser & Gyourko, 2002, 2005; Quigley et al., 2005) prices, produce patterns of racial and economic segregation (Lens & Monkkonen, 2016), and lead to ecologically harmful patterns of urban sprawl (Nechyba & Walsh, 2004; Pendall, 1999).

Moreover, there is a burgeoning consensus among planners that to make places more affordable, sustainable, and equitable, cities must work to increase both the amount and variety of housing within their borders (Been et al., 2019). Although single-family zoning restrictions are not the only barrier to achieving this goal, in high-demand central cities they can be highly constraining. As a result, critics are increasingly calling on cities to eliminate their use of single-family zoning restrictions (Manville et al., 2020a, 2020b; Wegmann, 2020).

It was in this context that the city of Minneapolis began the process of drafting their new comprehensive plan. First approved in December 2018, the city's 2040 plan recommended several progressive land use reforms, including eliminating off-street parking minimums and increasing densities along transit corridors. But, most notably, the plan abolishes single-family minimums, allowing instead three unattached residential units per parcel. Although the state of Oregon followed in short order with a similar set of reforms, Minneapolis was the first major American city to

completely eliminate single-family zoning and received substantial regional (Otarola, 2018), national (Capps, 2018), and even international ("Rebuilding: The Future," 2020) attention for doing so.

I examine the initial impact that the approval of the 2040 plan had on the price of affected properties. To do so, I take advantage of the unique administrative process through which the city adopted the plan. Following a contentious public debate, the Minneapolis City Council first approved the plan in December 2018. After initial approval, the city sent the plan to the Metropolitan (Met) Council, the regional governance body, for review. Following the Met Council's review, the city council approved an amended plan in October 2019. The plan included general details about proposed land use changes but left changing specific zoning requirements up to the city. The city initially updated its zoning code to conform to the single-family changes in the comprehensive plan in November 2019.

I study the effect of 2040 plan upzoning during this interim period between when the city had publicly signaled it would allow 3-unit structures across the city but before it had set the additional setback, bulk, and other requirements to which these new uses would still need to conform. In this study, I am thus examining the impact of an ostensibly radical land use change before the city implemented it in a more tempered form.

Depending on the context in which they are used, single-family zoning regulations can either increase or decrease the value of a particular property (Been et al., 2016; Ihlanfeldt, 2007; Kok et al., 2014). Minneapolis eliminated single-family zoning in hopes that it would increase residential development, creating more homes and ultimately moderating rising housing prices (City of Minneapolis, 2019). But this process takes time. If the plan is to spur future redevelopment, the change should first raise the value of houses for which there is demand greater than their current single-family use. Under the old plan, the value of a single-family house is determined by its current use and the option to redevelop at the same density. After the change, the property owner retains these previous two options but can now also redevelop up to a density of three attached units per parcel. If the potential future value of these 3 units is greater than its current single-family use, the upzoning should increase the property's value (Ohls et al., 1974).

But in other contexts, lifting single-family regulations may have either little impact on values or actually decrease them. Owners will only consider redeveloping their houses if the value of the denser development is greater than that of the single-family use (Brueckner & Rosenthal, 2009; Wolf-Powers, 2005). For properties where the existing single-family use is more valuable than the future redevelopment, the old zoning is not

binding and thus removing it should have little impact on a property's value. Lifting single-family regulations can decrease property values if owners of these properties believe these restrictions maintain the desirable low-density character of their neighborhood (Brueckner, 1998; Glaeser & Ward, 2009). Though the upzoning does not guarantee denser redevelopment will occur, it removes regulatory barriers to doing so. For owners who value this insurance against future dense development (and are unlikely to take advantage of the development option themselves), the upzoning may thus lower property values.

I test the initial impact of the proposed land use changes using a difference-in-differences (DiD) design comparing housing prices before and after Minneapolis initially adopted the plan. I compare these changes with houses located within a short distance of the Minneapolis border. This allows me to compare how prices of single-family properties changed before and after Minneapolis approved the new plan, with a similar set of properties that were not upzoned by their respective cities. In addition, I test whether the impact of the plan change affected certain types of houses more than others by comparing between high- and low-valued neighborhoods and by testing whether the price effect of the change differed based on a house's size relative to its immediate neighborhood.

Across all transactions, I find that relative to a similar set of nearby housing units, changing by-right development minimums from 1 to 3 units increased sales prices between 3% and 5%. My models suggest that this effect is larger for single-family houses located in census tracts where median assessed values are lower than the citywide median, and I find that the price effect is larger with houses that are relatively undersized compared with their immediate neighborhood.

Ultimately, it is too soon to know whether the 2040 plan will substantively change development patterns in Minneapolis. At the time of writing, the city has issued only a handful of permits that take advantage of the 2040 plan's single-family upzoning (Jones, 2020). However, because the upzoning increased property values, particularly for houses that are more likely to be redeveloped, this provides some evidence that buyers value the option to develop denser housing.

I proceed with this study as follows. In the next section, I survey perspectives on how land use regulations may affect property values. I then provide a brief summary of the 2040 plan, including the process through which Minneapolis adopted it. Next, I turn to a description of my empirical design and methods and provide a summary of my results. I end with a discussion of the policy implications of my findings.

The Impact of Land Use Regulations

Land use regulations are local ordinances that control how property owners can use their land. These laws have a long history in U.S. planning (Fischel, 2015; Hirt, 2013). Zoning regulations often seek to separate not only noncompatible types of uses, such as preventing a polluting factory from opening near a residential area, but also development based on density, size (generally referred to as *bulk restrictions*), and aesthetic characteristics (form-based restrictions).

These regulations have contributed to highly segregated patterns of land use and development, not only by types of uses but also by building forms and densities. Just as rarely are there industrial buildings interspersed with residential, in many cities it is unlikely to find a variety of densities as there are a variety of uses (Aurand, 2010). The most binding version of these regulations limits development to low-density single-family housing (which I refer to here as R1 restrictions, the code commonly used in the land use plans). Even in central cities where there is presumably demand for dense housing, R1 regulations prevent all but single-family housing on large swaths of urban land (Dougherty, 2020; Hirt, 2007).

Although many cities continue to use R1 zoning, academics and policy analysts increasingly question the benefits of these regulations. For example, researchers find that R1 regulations contribute to environmentally harmful patterns of urban sprawl and increase strain on public infrastructure (Brueckner & Helsley, 2011; Jenks et al., 1996). Because low-density housing is expensive and predominantly owner-occupied, the prevalence of these regulations causes neighborhood and community segregation by income and race. Moreover, particularly in high-demand urban areas, by limiting housing density on scarce urban land, restrictive regulations raise marketwide housing prices (Malpezzi, 1996).

Land Use Regulations and Housing Prices

In this study, I do not examine the social and economic harms caused by restrictive R1 zoning, at least not directly. Instead, I use the changes in the Minneapolis 2040 plan that committed the city to ending its use of R1 restrictions to study how these regulations affect property values. Particularly, I am interested in whether R1 zoning, by limiting how property owners can use their land, lowers the relative cost of the allowed use. In other words, does R1 zoning make single-family housing cheaper than it would otherwise be if the land use code allowed for denser housing?

In discussions of land use changes like those contained in the 2040 plan, people sometimes assume that by banning single-family zoning the city is banning single-family homes.[1] This is not the case. Cities predominantly use bulk requirements in low-density neighborhoods to set ceilings, not floors, on unit density. By removing the single-family limits, the 2040 plan allows denser uses but does not prevent—and certainly does not outlaw—less-dense single-family development. If no one wants to live in triplexes, the change will have little effect on single-family housing prices and residential densities across the city.

R1 regulations have teeth in areas where there is demand for denser uses. Boosters of the 2040 plan argue that there is demand for more housing in Minneapolis. Indeed, one of the city's goals in removing R1 zoning regulations is to increase the density of future development. There is little undeveloped residential land left in Minneapolis; thus, substantially growing the city's housing stock requires increasing the density, not just the rate, of new development.

Nevertheless, some may find it counterintuitive that a policy designed to address rising housing prices will (and, as I argue, must) first increase the price of affected houses. It is important that one not confuse the price of individual single-family houses with housing prices more broadly. R1 zoning in areas where there is demand for denser housing subsidizes the cost of the permitted land use.[2] Single-family housing is cheaper but only because there is less competition for the land on which those houses sit (Monkkonen, 2019).

R1 zoning, however, raises the price of denser housing across the city by limiting where developers can build such units. Changing the permitted uses in high-demand areas will increase the price of individual parcels, but as long as it leads to some eventual denser redevelopment, it will relieve the upward pressure on housing prices more generally (or so follows the logic). If developers begin replacing single-family houses with triplexes, the three new units will be relatively less expensive than they would be when (prior to the land use change) there was less land on which the city permitted such buildings.

Regulations and the Development Option

Although I focus on the impact of the 2040 plan changes on single-family housing prices, it is a change in the value of land that drives this effect (also sometimes described as the development option for land), not a change in the value of the houses themselves. When there is a shortage of developable land, or regulations limit how intensely property owners can develop land, prices rise. For example, scholars studying the effects of urban growth boundaries, including perhaps most famously those required by Oregon state law, show consistently that constraining developable land raises land values (Ding & Knaap, 2002; Nelson, 1986; Segal & Srinivasan, 1985).

In related research, Glaeser and Ward (2009) argue that by decreasing allowable densities, regulations on development lower land values from their socially optimal maximum. Using data from greater Boston (MA), they find that cities with restrictive regulations do indeed have higher housing prices, but that development densities are much lower than they must be to maximize land values.

Ihlanfeldt (2007) studies how land use regulations affect the prices of housing and undeveloped land across 100 cities in Florida. He finds that tighter development restrictions increase the price of the existing housing stock but lowers the value of undeveloped land. It follows that if formerly restrictive cities in Florida were to institute zoning rules that make it easier to build, it will lead to a short-term increase in the value of undeveloped land and a longer run moderation of the prices of existing units.

Kok et al. (2014), however, find the opposite relationship between regulation and land prices in the San Francisco Bay (CA) area. While controlling for local amenities and topographic features, they find that restrictive land use regulations increase the sales price of undeveloped land. Although this seems to contradict Ihlanfeldt's (2007) findings, they suggest that in the Bay Area the amenity-related benefits of restrictive zoning (access to natural amenities, high-quality public services, well-funded schools, low-density neighborhoods, etc.) and a lack of similar nearby municipalities are sufficiently different from those in Florida to explain their observed positive relationship.

When considered together, these studies paint a complicated picture of the relationship between land use regulations and property values. They suggest that strict development regulations place upward pressure on marketwide housing prices. But how regulations affect the value of individual properties (particularly undeveloped land) differs based on characteristics of the larger housing market.

Price Changes and Neighborhood Context
It is possible, however, that regulations affect land values differently within cities, as they do between them. In the context of my study, depending on the neighborhood, restrictive single-family zoning could either increase or decrease the value of houses bound by these regulations. In other words, in some neighborhoods the upzoning could affect housing prices like in the Florida cities Ihlanfeldt (2007) studied, whereas in others it may cause changes like those Kok et al. (2014) identify across Bay Area communities.

Consider two hypothetical neighborhoods, one filled with large, well-maintained Victorian homes and a second where the housing stock is already relatively dense with diverse land uses. In the Victorian neighborhood, the R1 zoning may preserve the amenity that a homogeneous, low-density housing stock confers on current residents. These residents may fear that any new development will degrade public services, generate traffic congestion, increase racial and economic diversity, or in some other way alter the neighborhood's character. Just as it appears to do in highly restrictive Bay Area communities, R1 zoning in these neighborhoods would increase (or at least preserve) the high value of the housing stock.

In the diverse neighborhoods, however, the amenity-related benefits of the R1 zoning are less clear. Because this neighborhood is already dense, replacing some single-family units with triplexes will have a less noticeable impact on the already heterogeneous built environment. As long as people want denser housing, restricting land to single-family housing in these neighborhoods limits their redevelopment potential. In these places, R1 zoning should lower the value of affected houses and removing the regulations raise property values.

In their study of historic preservation districts in New York City (NY), Been et al. (2016) find that neighborhood context affects how development restrictions affect property values. Although different from the single-family restrictions I study here, historic designations similarly place restrictions on how property owners can alter existing housing units and develop new buildings. Outside high-density Manhattan, designations raise property values, which is consistent with much of the previous research on historic district designations (Coulson & Leichenko, 2001; Ford, 1989; Heintzelman & Altieri, 2013; Leichenko et al., 2001; Listokin & Hattis, 2005; Noonan, 2007). In these places, designations preserve the amenity-related benefit of a historically consistent built environment. But on Manhattan, they find no clear relationship between designations and property values. Where there is strong demand for density, the lost redevelopment potential outweighs, or at least mitigates, the amenity benefits of the designation.

Within-Neighborhood Differences in Land Use Distortions
It is the difference in the underlying development pressure between neighborhoods that causes the heterogeneous impact of historic designation on property values. This raises the question: If development pressure (and thus the value of a redevelopment option) differs between neighborhoods, might it also differ within them? Lost development potential depends, after all, on the extent to which a property is already developed: Buildings that are already high-valued and intensely developed have less development potential to lose.

Rather, owners of relatively small and undervalued buildings will feel the constraint of development regulations the strongest.

This seems to bear out, at least in the extreme. Recall that in Ihlanfeldt's (2007) study, they find that strict development regulations decrease the value of raw land but raise the price of already-developed single-family homes. Undeveloped residential parcels have little value expected as an input in future housing development. No researchers, to my knowledge, have studied how changes in regulations affect existing houses based on their relative redevelopment potential. Perhaps development regulations are most constraining for owners of housing units that are small and undervalued relative to their neighborhoods. As with raw land, the value of these houses depends more on their potential for future redevelopment than their current use.

In this study, I examine the impact of the 2040 plan's proposed R1 changes in three ways. First, I present models examining how the 2040 plan's proposed land use changes affected the price of R1-zoned housing units in Minneapolis compared with a group of similar units in nearby cities. Second, following Been et al. (2016), I examine whether the effect of the plan differs based on the characteristics of the unit's neighborhood. Finally, I test whether the characteristics of a house relative to others in its neighborhood changes the price effect of the land use changes. After a brief description of the 2040 plan, I describe each of the models and the data I use to specify them in the sections that follow.

The Minneapolis 2040 Plan

In December 2018, the Minneapolis City Council approved by a 12–1 vote a new comprehensive plan that dramatically altered how the city regulates land use. The plan contains several notable features, including increasing allowable densities in mixed-use transit corridors and removing off-street parking requirements. However, perhaps the most substantial change, and the focus of my current study, is its elimination of single-family zoning. The 2040 plan allows owners of residential parcels to develop, by right, triplexes on any parcel that the city's previous land use plan restricted to single-family residential.

Although the city council first approved the plan at the end of 2018, it did not officially go into effect until January 1, 2020. It first required review and approval from the Twin Cities regional government, the Met Council. The city council adopted an amended version on October 25, 2019, although the final plan was substantively consistent with the December 2018 version (Halter, 2019).

It is important to note that my analysis takes place in the interim between the highly publicized announcement of city's initial adoption of the 2040 plan and its formal implementation. State law in Minnesota gives preference to the comprehensive plan in instances where there is a conflict between a comprehensive plan and zoning requirements (Minnesota Statutes, 2019).

Data and Empirical Strategy
How to Measure the Effect of the 2040 Plan Change

In this project, I examine whether a plan change that eliminates R1 zoning regulations increases property values of affected properties. In a perfect experimental setting, I would test this by randomly changing the zoning on a subset of otherwise indistinguishable single-family properties. I would then compare how prices changed in the upzoned treatment group with those in the control. No city has undertaken such a randomized controlled trial of zoning changes. And if even one had, several practical limitations (e.g., property owners assuming that the change in land use was temporary) would make such a trial difficult in this context.

Given the impracticality of an experiment, I instead compare how property values changed in Minneapolis in the year before and the year after the city adopted the 2040 plan with a comparison group of continuously R1-zoned houses in cities just across the Minneapolis border. Using a data set of zoning restrictions, property assessment records, and residential sales, I compare the quality-controlled prices of residential sales that occurred before the city approved the plan with those that occurred after. The DiD design I use in my base models is similar to that used by Been et al. (2016) in their study of historic districts and Freemark's (2019) analysis of Chicago's rezoning of parcels near transit.

I expect that two factors will mitigate (or enhance) the effect of the 2040 change on property values: overall neighborhood characteristics and the relative position of individual housing units within their neighborhood. In expensive, homogenous single-family neighborhoods, R1 zoning may act to preserve the amenity value of a low-density built environment, although in inexpensive (and already heterogeneous) places the amenity benefits of R1 zoning are weaker. Similarly, small houses relative to their neighborhood may benefit from the increased development potential more so than relatively large ones. I examine these differences by comparing the effect of the plan change between relatively expensive and low-priced neighborhoods and by controlling for the relative size of houses compared with their immediate neighbors.
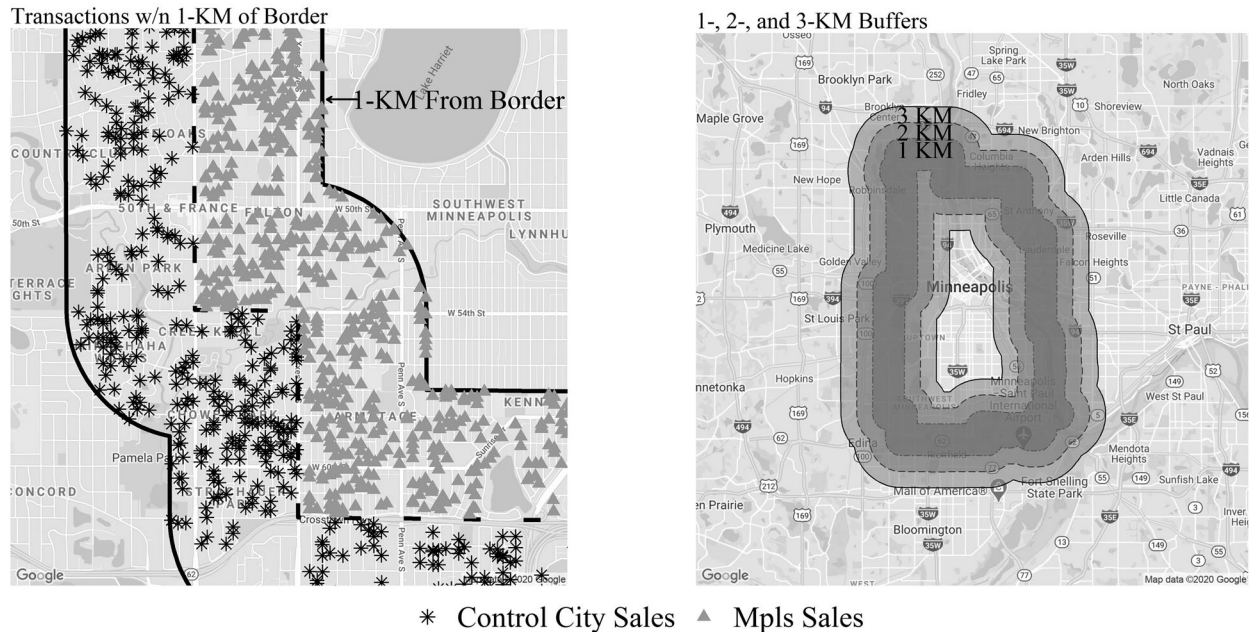
Figure 1. Buffers around the Minneapolis border.

Data on Zoning and Property Transactions

My primary data source for this project comes from Zillow, a real estate database company.[3] As a backend for their online platform, Zillow collects and standardizes assessment and transaction records for properties across the country. They make these data available to academic researchers through their Zillow Transaction and Assessment Dataset (ZTRAX) database. ZTRAX includes information on property location, physical characteristics of individual properties—including age, size, and style—as well as information on the timing and value of sales (Zillow, 2020).

In addition to the ZTRAX data, I created a spatial database of current and pre–2040 plan zoning regulations for Minneapolis and bordering cities. To create this data set, I contacted individual planning offices requesting their current zoning maps, as well as maps representing any changes to zoning designations since December 2018. I next reviewed each city's municipal ordinance to create three general zoning districts: those that allow only single-family homes, 2- or 3-unit structures, and denser multifamily residential. Finally, I merged the simplified zoning maps with the ZTRAX data, creating a series of variables indicating each property's zoning both before and after Minneapolis adopted the 2040 plan.

I used the ZTRAX data to compare transactions in the year after the city adopted the plan with the year prior. I used the date when the city council first approved the 2040 plan: December 2018. Although the plan did not go into legal effect until a year later, I use

this early date because it was a clear (and highly publicized) signal to property owners that the land use changes were on the horizon.

I limited the ZTRAX data to housing units in Minneapolis and zoned single-family residential prior to December 2018 or in a bordering city and consistently zoned single-family throughout 2018 and 2019. In addition, I ran two falsification tests. First, I reran my models examining whether there was a price effect for buildings zoned for 2- or 3-family units prior to the 2040 plan adoption. Second, I re-created my analysis using the arbitrary treatment date of December 2014. I estimated these models with three different geographic control groups based on whether the transaction was within 1, 2, or 3 km of the Minneapolis border. In Figure 1, I show these three buffers and an example snapshot of transactions within 1 km of the Minneapolis border.[4]

Empirical Strategy

I used a hedonic DiD method to examine the impact of the proposed plan change on housing price. Instead of tracking changes in prices across multiple transactions of the same property, I pooled transactions and controlled for differences in observable property characteristics. In addition, I included dummy variables measuring the property's zip code and month the sale occurred. These variables control for difference in sales values based on static (at least during my study period) neighborhood characteristics and when in the year the sale occurred.

I measured the effect of the 2040 plan approval on sales prices using a DiD estimator. Essentially, this method allowed me to measure the effect of the 2040 plan approval by comparing how prices changed in Minneapolis after the city council approved the 2040 plan with changes in sales values of nearby houses unaffected by the plan change. To do so, I included dummy variables measuring whether a property was located in Minneapolis (1 if yes, 0 if no) and whether the sale occurred before the city adopted the 2040 plan (between January and December 2018) or during the same period in the following year (1 if after, 0 if before).

The DiD estimator is the interaction between the two variables, which only takes a value of 1 for sales located in Minneapolis after the council approved the 2040 plan. If the interaction term is positive and significant, it suggests that the plan's adoption increased sales values above pre-existing trends in the full sample and level differences between Minneapolis and its suburbs.

Finally, I compared the effect of the plan approval based on neighborhood and individual-property characteristics with two additional tests. First, I split the sample into relatively high- and low-income neighborhoods to examine whether the plan's impact varied across neighborhoods. Second, I estimated a model using a third interaction term measuring how each sale compares with those in its immediate neighborhood. Essentially, this allowed me to examine whether the impact of the plan's approval varies with neighborhoods based on a property's relative position. I provide a detailed explanation of my regression model in the Technical Appendix.

How Do Minneapolis Transactions Compare With Those in Bordering Cities?

In Table 1, I compare the composition of transactions within 1 km of the Minneapolis border before and after Minneapolis adopted the 2040 plan. In both Minneapolis and the control cities, there is little difference in the characteristics of property sales before and after Minneapolis adopted the 2040 plan. In Minneapolis, houses are generally smaller, older, and less expensive than those in the control cities.

In DiD models, the composition of the treatment and control groups need not match (but any differences must be consistent between the treatment and control periods; Angrist & Pischke, 2009). However, an important assumption when using DiD designs is that the growth trend in the outcome variable before the treatment, in my case logged sales values, is the same between the treatment and control groups. If it is not, it is impossible to know whether the change in the outcome is due to the policy or whether the pre-existing trend caused both the policy change and the effect on the outcome variable.

Table 1. Characteristics of property transactions within 1 km of the Minneapolis border.

	Minneapolis		Control cities	
	Pre	**Post**	**Pre**	**Post**
N	3,167	3,362	1,138	1,182
Logged sales price	12.48	12.55	12.74	12.81
Unit size (ft^2)	1,266	1,284	1,456	1,514
Lot size (acres)	0.14	0.14	0.21	0.21
No. of beds	2.8	2.82	3.18	3.14
No. of baths	1.18	1.19	1.42	1.41
No. of stories	1.33	1.33	1.3	1.35
Age (years)	81.76	82.33	72.67	73.21
% Attached garage	13	11	5	3
% Detached garage	81	83	93	94

To test for this, I estimated quality-controlled hedonic price models for single-family transactions within 3 km of the Minneapolis border in the 2 years prior to the plan adoption. I included a time trend variable measuring the month in which the transaction occurred. I then estimated the average monthly sales value in Minneapolis and the control cities while controlling for a standard set of observable property characteristics. These estimates along with linear trend lines are plotted in Figure 2. Although logged prices are higher in the control cities than in Minneapolis and there is clear seasonal variation in prices, the general trend in price growth between the two groups is similar.

Results
Did the 2040 Plan Change Increase Sales Prices?

I turn now to my examination of whether the plan's approval increased the sales price of affected houses. I start with the simplest version of my model, which I present in Table 2. In each model, I limited the sample to housing units in Minneapolis that the city zoned exclusively single-family prior to their adoption of the 2040 plan or those that the control cities zoned single-family consistently during the 2 years of my study. In these specifications, I control for a full set of property characteristics as well as month of sale, city, and zip code fixed effects.

In Model 1, I limited the sample to transactions within 1 km of the Minneapolis border, in Model 2 I expanded the buffer to 2 km, and in Model 3 I used the widest 3-km buffer. In all three models, the coefficient on the Minneapolis/post-interaction term is positive and
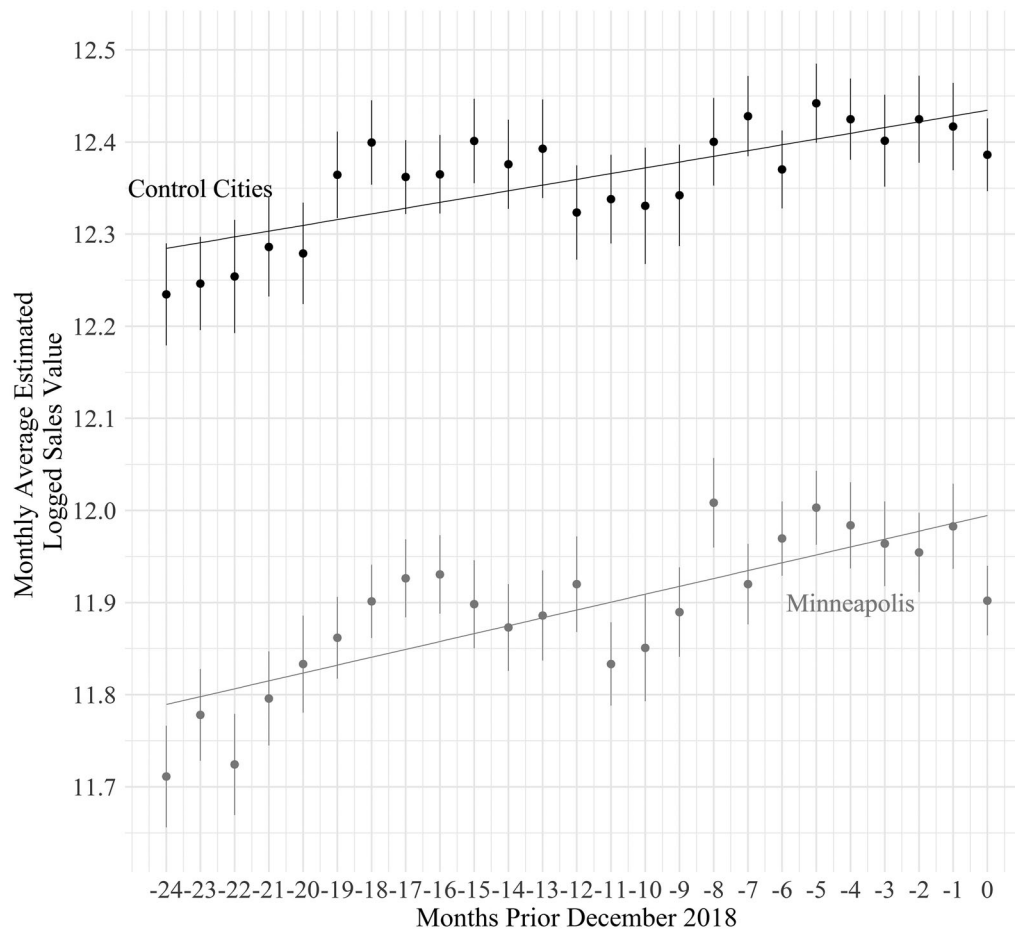
Figure 2. Price trends in Minneapolis and control cities.

Table 2. Simple DiD models with all observations.			
	1 km from border	**2 km from border**	**3 km from border**
	(Model 1)	**(Model 2)**	**(Model 3)**
Minneapolis	−.176***	−0.077**	−.0.054*
	(0.034)	(0.031)	(0.029)
Post-2040 adoption	0.022	0.023**	0.027**
	(0.014)	(0.010)	(0.008)
Minneapolis * Post	0.057***	0.035***	0.029***
	(0.017)	(0.013)	(0.011)
Property controls	Yes	Yes	Yes
City fixed effects	Yes	Yes	Yes
Zip fixed effects	Yes	Yes	Yes
Month-of-sale fixed effects	Yes	Yes	Yes
N	5,558	9,526	12,229
R^2	0.662	0.645	0.626
Adjusted R^2	0.659	0.643	0.624

Note: *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

statistically significant. Although it remains significant, the size of the interaction coefficient declines as the buffer increases. With the 1-km buffer, my model suggests that the plan's approval increased property sales values by approximately 5% relative to nearby, continuously single-family-zoned housing units. The estimated effect declines to around 3% in the model with the widest (3-km) buffer.

Does This Effect Vary Based on Neighborhood Housing Prices?

Next, I examined whether the effect of the 2040 plan upzoning differs based on underlying neighborhood characteristics. Here I estimated each model twice, once for houses that are located in relatively expensive neighborhoods (which I define as those where the median assessed value of the tract is greater than their respective cities) and again for those in relatively inexpensive tracts. I present these models in Table 3. In all models, the interaction coefficient was larger when I estimated the model with transactions from the less-expensive neighborhoods. It is only significant, however, in the model that I specified using the 3-km buffer.

Do Relatively Small Homes Benefit More From the Plan Change?

In my final test, I examined whether a property's relative size within its immediate neighborhood affects the impact of the 2040 plan's proposed upzoning on property values. I expected that the impact of the upzoning would be positively associated with an individual housing unit's redevelopment potential. Although imperfect, I used a transaction's size relative to other houses within 200 m as a proxy for this. If property owners raze and redevelop existing single-family houses using the provisions of the 2040 plan, we should expect that they would target the smallest and lowest valued house in a particular neighborhood.

I present these results in Table 4, again using the 1-, 2-, and 3-km buffers. I included a third interaction term measuring a transaction's percentile size rank (measured by total square footage) among houses within a 200-m buffer. In each model, the coefficient on the triple interaction is negative and significant in the model using the 1- and 3-km buffers. This suggests that the effect of the 2040 plan upzoning is smaller for housing units that are relatively large compared with nearby houses. Or, put differently, the increased development potential of the upzoning redounds more directly to relatively small homes.

Testing the Reliability of My Models

I tested the robustness of these results in several ways. As I mention above, I specified my models controlling for city, census tract, and city/census tract fixed effects, instead of 5-digit zip codes as I report here. Although the size of the coefficients changed slightly in these models, the results are generally consistent.

I also conducted two falsification tests, which I present in the Technical Appendix. First, I examined whether the positive association between the approval of the 2040 plan and sales prices persists when I specify the models using houses that their respective cities had already zoned for 2 or 3 units. Second, I tested whether the results are similar when I use the arbitrary treatment date of December 2014. These models are the same as those I present in Table 2, but instead I compare transactions that occurred in 2014 with those in 2015.

I present the results of these two tests in the Technical Appendix. When I re-create the models using either houses consistently zoned for 2 or 3 units or with the placebo treatment date, the interaction between the Minneapolis and 2040 dummy variables is not significant in any of the models.

Discussion and Conclusions

I examined whether the Minneapolis 2040 comprehensive plan raised the price of formerly single-family-zoned houses by increasing citywide development minimums from one detached to three attached units per parcel. To do so, I used a DiD design to compare the change in sales prices of houses upzoned in the 2040 plan with similar housing units in neighborhoods just over the Minneapolis border. My models suggest that the plan's approval increased the property values by around 3% to 5%. The impact of the change was not uniform across all housing units, however. I find that the price increases were largest in relatively low-valued neighborhoods and among houses that are relatively small compared with their immediate neighbors.

It is worth reiterating that I examined the price effect of the plan change during the interregnum between when the city first approved the plan and when they fully implemented it. In this way, my analysis measures the potential value of the upzoning if the implemented version lives up to the comprehensive plan's radical but somewhat vague promises.

Although my results suggest that, at least in the short term, buyers value the development option provided by the future upzoning, it will take time to see whether and on what scale this leads owners to redevelop their houses. Although the 2040 plan allows property owners to, by right, develop up to 3 units on their parcel, when the city initially updated the zoning to conform to the 2040 plan, they continued to

Table 3. Difference-in-differences models by neighborhood income.

	1 km		2 km		3 km	
	< City median	> City median	< City median	> City median	< City median	> City median
	(Model 1)	(Model 2)	(Model 3)	(Model 4)	(Model 5)	(Model 6)
Minneapolis	−0.380***	−0.036	−0.291***	0.148***	−0.271***	0.0143***
	(0.056)	(0.051)	(0.055)	(0.043)	(0.050)	(0.040)
Post-2040 adoption	0.036	0.020	0.040**	0.018	0.033**	0.023**
	(0.025)	(0.017)	(0.020)	(0.011)	(0.014)	(0.010)
Minneapolis * Post	0.047	0.036	0.032	0.006	0.036**	0.001
	(0.030)	(0.023)	(0.023)	(0.017)	(0.017)	(0.015)
Property controls	Yes	Yes	Yes	Yes	Yes	Yes
City fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Zip fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Month-of-sale fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	2,634	2,838	4,410	4,971	5,822	6,260
R^2	0.515	0.582	0.521	0.556	0.557	0.546
Adjusted R^2	0.507	0.575	0.517	0.552	0.553	0.542

Note: *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

constrain development in these neighborhoods with various bulk, form, and parking restrictions. Some owners may find it difficult to build 3 units while maintaining a floor–area ratio of 50% and complying with other specific zoning requirements. Although owners can seek relief through variances, navigating this process is often cumbersome and can increase project costs through delays and legal expense (Einstein et al., 2019).

Perhaps the price increases I identify are only temporary, driven more by speculation than by buyers earnest in their intention to develop denser housing. Although some property owners may be able to take advantage of the increase in prices and extract value from speculative buyers, we should expect the price bump to moderate over time as the reality of the updated zoning becomes apparent. Nevertheless, it is notable that the approval of the 2040 plan resulted in even a temporary increase in property values. It suggests there is demand for denser housing and illustrates the complex maze of regulations that affect new development.

In my alternate specifications, I find that the price effect of the upzoning is largest in inexpensive neighborhoods (measured by the median assessed value of the tract relative to the citywide median) and with houses that are small relative to their immediate neighborhoods (measured by its percentage rank among houses within 200 m). Taken together, these results suggest that relatively small houses and those in low-valued neighborhoods experience the largest price increases from the proposed upzoning. There are two reasons these results may be of interest to policymakers

considering similar land use changes. On one hand, they suggest that the upzoning is not just a windfall gain to owners of large, expensive homes. Although uniformly applied, the financial benefit of the upzoning accrues most directly to houses with higher redevelopment potential.

But these results may also raise concerns from those concerned about neighborhood change, displacement, and, particularly, the availability of affordable single-family homes. If developers use the upzoning to replace existing single-family homes with attached 2- or 3-unit structures, it should not be surprising that they will start with relatively inexpensive (and small) houses. Because most single-family homes are owner occupied (87% in Minneapolis, according to the 2014–2018 5-year American Community Survey estimates), it is unlikely that the changes I identify here will substantially displace lower income renters.[5] But it is difficult to predict whether this will reduce the number of lower cost, owner-occupied units available in the city. Although it could reduce the supply of detached, affordable homes, depending on the characteristics of the 2- and 3-unit structures that replace them, this type of upzoning could lead to a net increase in affordable, for-sale housing options.

Understanding whether the price increases I identify here actually result in new housing development, documenting where it occurs, and measuring the impact this has on displacement and marketwide housing prices are all important topics for future research. Not only will this information be useful as Minneapolis officials consider future changes to their land use and

Table 4. Impact of relative house size on upzoning price effect.

	1 km from border (1)	2 km from border (2)	3 km from border (3)
Minneapolis	−0.250*** (0.038)	−0.176*** (0.033)	−0.142*** (0.030)
Post-2040 adoption	0.007 (0.026)	0.013 (0.018)	0.008 (0.015)
Size rank	−0.282*** (0.040)	−0.331*** (0.028)	−0.311*** (0.023)
Mpls * Post	0.109*** (0.032)	0.053** (0.023)	0.054*** (0.020)
Mpls * Size	0.196*** (0.043)	0.161*** (0.032)	0.140*** (0.027)
Size * Post	0.045 (0.048)	0.032 (0.033)	0.044* (0.027)
Mpls * Post * Size	−0.146** (0.060)	−0.060 (0.044)	−0.068* (0.038)
Property controls	Yes	Yes	Yes
City fixed effects	Yes	Yes	Yes
Zip fixed effects	Yes	Yes	Yes
Month-of-sale fixed effects	Yes	Yes	Yes
N	5,444	9,319	11,976
R^2	0.684	0.67	0.651
Adjusted R^2	0.681	0.668	0.649

Note: *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level. Mpls = Minneapolis.

housing policies but it will help improve our general understanding of the impact of restrictive single-family zoning and the impact of ending these land use practices. As more cities and states scale back or fully eliminate single-family zoning, it becomes more important for planners and policymakers to understand how to maximize the effectiveness of these changes.

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SUPPLEMENTAL MATERIAL

Supplemental data for this article can be found on the publisher's website.

NOTES

1. For example, in a July 2019 article (Meyer, 2019), *The New York Times* issued a correction on an earlier version that stated that the Minneapolis 2040 plan banned single-family housing. The correction reads, "An earlier version of this article misstated the nature of an effort in Minneapolis to encourage construction of multifamily housing. The city eliminated single-family zoning, it did not ban single-family homes" (Meyer, 2019).

2. In a CBC interview, Tom Davidoff cleverly suggested that this subsidy amounts to "socialism for the rich" (Meuse, 2016).

3. Data provided by Zillow through the Zillow Transaction and Assessment Dataset (ZTRAX). More information on accessing the data can be found at http://www.zillow.com/ztrax. The results and opinions are those of the author and do not reflect the position of Zillow Group.

4. I used the *R 4.0.2* (R Core Team, 2020) to clean and analyze the data. I used several packages in the "tidyverse" suite (Wickham et al., 2019) to prepare those data for my analysis. I used the "sf" package (Pebesma, 2018) to conduct the spatial analysis, "tidycensus" to download American Community Survey data and boundaries (Wickham et al., 2019), and "stargazer" to create formatted tables (Hlavac, 2018).

5. Although redeveloping single-family houses into denser 2- and 3-unit structures may do little to directly displace lower income families, if these changes alter patterns of investment and development across the city, they could contribute to larger trends in neighborhood change and, ultimately, displacement of people with low incomes from the city. Though outside the scope of my present analysis, this question is indeed an important topic of future research. Although some researchers have studied the impact that redevelopment plays in neighborhood change and displacement (Helms, 2003), and others have studied the impact that government-led transportation investment (Dawkins & Moeckel, 2016), there has been little empirical research on how zoning reforms affect neighborhood change and investment. This is an important question, particularly because some of the most trenchant

opposition to upzoning concerns the potential of such changes to lead to displacement of people with low incomes.

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