Internet Appendix for
"Robbing Peter to Pay Paul?
The Redistribution of Wealth Caused by Rent Control"
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This Internet Appendix contains additional material to support the results presented in the main text. Section I presents a simple valuation model of real estate with rent control that is calibrated to the data to provide numerical support for our empirical estimates in the main paper. Section II discusses selection bias concerns. Section III presents two different theoretical models of rent control that help explain how deadweight loss and transfers are related to the elasticities of supply and demand. Section IV discusses additional tests not reported in the main paper. Section V provides additional figures and tables referenced in the main text and also in the Internet Appendix.

I. Simple Model of Housing Value

In this section, we develop a simple pricing framework, with two aims: 1) to verify whether the magnitudes of the price drops that we observe in the data can be rationalized, and 2) to provide a benchmark for the relative contribution of direct capitalization effects and indirect externalities to the price drops, as in Equation 1 in the paper.

Following a Gordon growth model, the price of a property at time t is:

$$P_{s0,t} = \left(\sum_{n=1}^{N} \frac{E_t \left[Inc_0 (1 + g_{sn,e})^n \right]}{(1+r)^n} \right) + \frac{E_t \left[Inc_0 (1 + g_{sN,e})^{N+1} \right]}{(1+r)^N (r - g_{sN,e})}$$

where the first term of the right accounts for the income stream earned by the owner over the following N years, and the second term is a terminal value; Inc_0 is the current income of the property if rented, r is the discount rate, and $g_{sn,e} = g_{sn} + e$ is the stochastic growth rate of income. It has two components: g_{sn}, which is the expected growth rate depending on the state at time $t+n$ (sn), and a mean zero noise component e, perfectly correlated over time. We include the shock e to reflect the fact that, even conditional on the state s, the true growth rate of income is unknown.

At each future time $t+1, ..., t+N$, the state $sn \in \rho, \omega$ is equal to either rented (ρ) or owner-occupied (ω). The expectation $E_t[\cdot]$ is computed based on the probability that, at each future date, the property will be rented or owner-occupied, and on the distribution of the shock e. Transitions between the rented and owner-occupied states are governed by a Markov process with positive probabilities placed on the transition from owner-occupied to renter and vice versa.

While owner-occupied properties do not earn income, they provide implicit income to their owners in the form of housing services. Though it is frequently assumed in the literature that the implicit income offered to the owner is larger than the financial income that can be extracted from rental, due to the unique consumption value of owner-occupied housing (the "warm glow"), for simplicity we assume that the implicit value of owner-occupancy is the same as the value of rents.

Next, we make the stylized assumption that, in the absence of the rent control reform, the growth rate of income and the growth of housing services would be the same, as would be the realizations of the shock e, so that: $g_{\rho n,e} = g_{\omega n,e} = g_e$. Thus, before rent control, the only relevant source of uncertainty on future growth is e, and is perfectly correlated between rentals and owner-occupied.

We use this model to predict the direct capitalization effects of the rent control proposition on both properties that are currently rented and owner-occupied. We model the effects of rent control as follows. Rent control does not affect the growth rate of housing services for owner-occupied housing, so that $g_{\omega n,e} = g_e$. However, rent control does affect the growth rate of income for rental properties. In particular, rent control sets a threshold $\bar{g}$ such that if $g_e > \bar{g}$, then $g_{\rho n,e} = \bar{g}$ and $g_{\rho n,e} < g_{\omega n,e}$. Instead, if $g_e \leq \bar{g}$, then $g_{\rho n,e} = g_{\omega n,e} = g_e$.

Thus, rent control reduces the future expected growth rate of income for rental properties. Since properties transition probabilistically between the rental and owner-occupied state, both rentals and owner-occupied properties experience a price decline with rent control. Note that this model does not include indirect externality effects. It only includes the direct capitalization effects of rent control.

I.A. Calibration Results

We calibrate the simple model presented in the previous section to the data. First, a crucial aspect in the calibration of our framework is the modeling of transitions between owner-occupied and rentals. To model these transitions, we collect data on the use of residential parcels in St. Paul from administrative data over the years 2010 to 2020. In particular, we use a flag for whether the property claims a homestead tax exemption as a proxy for owner-occupied properties. In

Minnesota, owners may only claim this exemption for one property per year. The average annual transition probability from owner-occupied to rental is 3.18%. For transitions from a rental to owner-occupied, the average is 13.25%. Since our transition probability estimates are based on a 10-year period, and 10 years is frequently the horizon used by real estate investors in their cash flow projections to model property prices and internal rates of return, we also choose the horizon of our pricing model to be equal to 10 years ($N = 10$).

We set the discount rate r to be 8%. We believe this value is reasonable based on two different back-of-envelope calculations. First, the CBRE Cap Rate Survey for the summer of 2020 estimates a capitalization (cap) rate of 4.75%–5.25% for suburban multifamily properties in the Minneapolis-St. Paul metro area. Therefore, we set the cap rate at 5%. If we assume expected income growth rates between 3% and 4% (3% is the historical growth rate of rents in the metropolitan area over the last 10 years based on the American Community Survey, and rent growth over the year from January 2021 to January 2022 was roughly 5%), and rely on the fact that cap rates in a simple dividend discount model would be roughly equal to the difference between the discount rate and expected growth, we then obtain an estimate of the discount rate equal to roughly 8%. Second, given that the 10-year Treasury was roughly equal to 2% at the time of the rent control ballot, a discount rate of 8% implies a beta of roughly 0.75, which is in line with estimates of unlevered betas for multifamily Real Estate Investment Trusts (REITs).

We can then calculate the price drops generated by the rent control provision for different values of the expected growth rate. The "uncontrolled" expected growth rate is the same for rented and owner-occupied properties. The shock e, which captures the fact that the true expected growth rate is unknown by investors, has a truncated normal distribution, with mean 0, an upper bound equal to 8% (expected growth cannot exceed the discount rate), and variance equal to 0.7%, which is equal to the standard error of the average growth rate of rents in Minneapolis and St. Paul in the 10 years preceding the ballot. Rent control is equivalent to setting the rent growth cap $\bar{g}$ equal to 3%.

Internet Appendix Figure IV shows the price drop generated by rent control for rentals and owner-occupied properties. More precisely, we calculate, for $s0 = \rho$ and $s0 = \omega$, the percentage drop from $Ps0, t$ to $Ps0, t'$, where the former is the uncontrolled market price, and the latter is the price with rent control. On the horizontal axis, we have different values of the uncontrolled annual expected growth rate of income (ranging from 2% to 5%), which in the pre-ballot period is the expected growth rate for both rental-income and owner-occupied housing services, and after the ballot period is the expected growth rate for owner-occupied housing services. The model, in spite of its stylized form, generates a variety of interesting effects.

First, we can see that price drops take place even when the uncontrolled expected growth rate is below 3%. This is because the true growth rate is not known, as captured by the stochastic component e, and rent control constrains the right tail of the distribution of the growth rate. Of course, as the expected growth rate increases, the likelihood that rent control will constrain growth increases, and the price drops become larger.

Second, and most importantly, the model generates price drops of different magnitudes for rental and owner-occupied housing. The drop is larger for rentals, and the gap in price changes between rentals and owner-occupied increases with the expected uncontrolled growth rate. For instance, when the uncontrolled expected growth rate is 3.5%, the model predicts a drop in prices of 4.75% for rentals, and close to 2.5% for owner-occupied. When the expected growth rate is 4.5% the drops are roughly 10% for rentals and 5% for owner-occupied, close to what we observe in the data.

Thus, the model highlights that even in the absence of externalities, capitalization effects alone can generate non-negligible price drops for owner-occupied, while at the same time matching the difference in the responses of rental and owner-occupied housing.

I.B. Decomposing the Effect on Owner-Occupied Housing

We use the model developed in the previous sections to decompose the observed price drop for owner-occupied properties into direct capitalization and indirect externality components. The model predicts the size of the direct component based on the calibrated parameters. To infer the size of the indirect component, we compare the observed price drop to the model-implied direct effect. Assuming that indirect externalities are equivalent for rentals and owner-occupied properties, the indirect externalities are estimated as the empirically observed value loss minus the model-implied direct value loss.

To discipline the model, we identify the growth rate required to match the difference in the price drop between renter occupied and owner-occupied properties in the empirical results. Since the model-implied spread between the loss of owner-occupied and rental properties is monotonically increasing in the uncontrolled expected growth rate, the value of the spread uniquely identifies a value of the expected growth rate. At this growth rate, we calculate direct and indirect losses. We conservatively set the spread to be 5%. A larger spread would generate even larger capitalization effects for owner-occupied properties.

We first run this exercise keeping transition probabilities fixed at pre-ballot values. However, it is likely that the introduction of rent control will make rental housing in St. Paul less attractive, and thus will endogenously reduce the likelihood that properties transition into the rental market. Thus, we repeat the exercise over a grid of different values for the probability of owner-occupied properties transitioning into rentals. We choose the range from 3.18% (the historical value) to 1.70%. This range is centered around the value of 2.45%, for which the steady-state fraction of rental would experience a relative drop of 20% with respect to the pre-ballot fraction. This is roughly the magnitude of the contraction in rental supply that is measured by Diamond, McQuade, and Qian (2019) in response to rent control expansion in San Francisco.

Figure IV in the main paper reports the results from this exercise. We can see that for the historical value of the transition probability (3.18%), we can rationalize approximately 90% of the drop in the data as driven by direct capitalization effects. However, as we move to the left, and reduce the likelihood of owner-occupied properties transitioning into the rental market, the fraction attributable to externalities increases. The vertical line in the middle of the figure corresponds to the value of the transition probabilities that would generate long run effects consistent with Diamond, McQuade, and Quian (2019). For this value, roughly two thirds of the effect in the data can be explained by the model as a capitalization effect. Finally, for the lowest value of the probability, equal to 1.7%, only 45% of the effect can be explained by capitalization, and the majority of the price drop for owner-occupied is potentially tied to externalities. This decomposition is similar to what Autor et al. (2014) report for Cambridge, Massachusetts.

In unreported tests, we find that while changes in transition probabilities generate substantial differences in the magnitude of capitalization effects, they generate limited variation in the corresponding expected growth rates, which range from 4.15% (for the 1.7% transition probability) to 4.35% (for the 3.18% transition probability).

Overall, our calculations suggest that the capitalization effects induced by the law can be sizable even for owner-occupied housing. Our simple model can rationalize between 45% and 90% of the price drop for owner-occupied properties as capitalization-driven. While this is a large range, we believe that the mid-point estimate of roughly 67% could be a reasonable benchmark.

I.C. Direct Effects and Externalities in the Cross-Section

We use the quantitative model of the prior section to identify direct capitalization effects and indirect externality effects at the Census Block Group-level. We start by constructing block group level estimates of expected growth rates. We estimate Census Block Group-level rent-to-price ratios for 209 blocks, using information on sales and rental listings over the period from June 2018 to June 2021. These ratios are larger than cap rates (earnings-to-price ratios) of real estate properties for several reasons. First, they are based on listed rents, which are likely higher than actual rents. Second, landlords may face vacancies. Third, rents are gross of recurring expenses faced by landlords, such as periodic maintenance and property taxes. To convert rent-to-price ratios into cap rates, we first apply a 10% downward adjustment, which accounts for the discount between listed and actual rents, and for vacancies (annual vacancies are frequently approximated to be 5% of rents, and we assume a 5% spread between listed and actual rents). Then, we assume that expenses account for a third of the remaining gross rent, consistent with the estimates constructed by Demers and Eisfeldt (2022). Given the block group level cap rates, we calculate expected growth rates as the difference between discount rates, which we again set equal to 8%, and cap rates. We find an average expected growth rate across block groups of 4.1%, with a standard deviation across the city of 1%.

Using the estimated expected growth rate for each block group, we obtain block group specific projections of capitalization-driven price drops for both rentals and owner-occupied properties. We calculate the weighted average of direct effects using the fraction of parcels that are rentals and owner-occupied in each block group to construct an average model-implied direct effect at the block group-level. As before, we estimate the indirect effect by subtracting the model-implied direct effect from the observed value loss at the block group level.

Consistent with our conjecture that the law is generating transfers at odds with its aims, Internet Appendix Figure V shows that the model-implied direct losses, which proxy for transfers, are strongly positively associated with the log income of tenants and negatively associated with the difference between owner income and tenant income.

In Internet Appendix Table XII, we explore more in depth the relationship between the block group level losses estimated in the data, the model implied direct effects (the transfers), and the income of tenants and owners. We restrict the sample of block groups to the 209 for which we have constructed model-based estimates. In columns 1 and 4, we replicate the regressions in Table Table VIII of the main paper, in which the dependent variable is the loss observed in the data. We find a positive relationship with the log income of renters, and a negative relationship with the difference in income between owners and renters, with slopes similar to the ones estimated over the entire sample of block groups. In columns 2 and 5, the dependent variable is the model-implied loss, which we can interpreted as the expected transfer. Consistent with what is shown in Figure V, this variable is positively correlated with tenant income, and negatively correlated with the income difference.

In columns 3 and 6, the dependent variable is the difference between the loss estimated in the data, and the loss predicted by the model, for each block group. These difference can be interpreted as the component of the loss that is not explained by transfer effects, and is instead potentially related to negative externalities. Interestingly, while this residual component is positively correlated with tenant income, the coefficient is not statistically significant. Thus, to the extent that the model implied effects do capture transfers in the data, the relationship between losses and tenant income appears to be mainly driven by cross-sectional differences in transfers. The magnitude of the sensitivity of the transfer to income is also non-negligible. The standard deviation of tenant income across block groups is 46%, so that a one standard-deviation difference in income is equal to a 2% difference in transfers, relative to an average of 6%.

When looking at the relationship with the income delta, in column 6, the residual has a negative and significant coefficient. Thus, the residual component of the loss appears more strongly related to the income delta, rather than the income of tenants alone. Nonetheless, as mentioned above, there is a strong relationship between our estimate of the transfers and the income delta. Since the standard deviation of the delta is roughly 45%, a one standard deviation smaller delta leads to a 1.5% larger transfer.

II. Selection Bias Tests

A threat to our identification strategy is that the passage of the rent control provision may create selection in the kind of properties transacted in St. Paul after the ballot. In particular, the properties transacted after the passage of the provision may be of lower quality. Then, lower prices after the ballot may not reflect lower valuations, but rather a change in the composition of transacted properties. Note that this is a concern to the extent that the ballot induces changes in characteristics that are unobservable in our data, since our controls already account for key observable features, such as micro-location, size, and age.

We address this concern with a range of empirical strategies. First, we show that there is no change in the composition of sold properties based on observable characteristics. We begin by using the difference-in-difference setup in our main regression, to run a battery of tests in which the dependent variable is set equal to one of the main property characteristic: log square feet size, log number of bedrooms or bathrooms, log age, and dummies equal to one for single family residences, townhouses, and other properties. In all regressions, we include year-month and census block group fixed effects. When the dependent variable is log square feet size, log number of bedrooms or bathrooms, and log age, we also include dummies for the different property types. Our results are reported in Internet Appendix Table VI. We find a statistically significant coefficient for the interaction term between the St. Paul and the post ballot dummy only when the dependent variable is log size. However, in this case the effect is positive, suggesting that properties transacted after the ballot are larger than before, which would suggest higher, rather than lower prices. Moreover, the magnitude of this effect is relatively small, equal to only 1.6%. For all other variables the effects are not statistically significant, and their point estimates are small.

We then directly inspect the entire distributions of characteristics for properties transacted in St. Paul, and how they changed around the ballot. In Internet Appendix Figure III, we show the mean, median, 25th, and 75th percentile of size, number of bedrooms, number of bathrooms, and construction year for properties sold in St. Paul in the two quarters preceding the ballot, and in the quarter following the ballot. The distributions appear nearly identical across quarters. In Figure III, we also show the fraction of sales that were single family residences, townhouses, multifamily buildings, and condos. Also these fractions are stable when comparing the two quarters before the ballot and the quarter after the ballot.

Finally, we turn to the methodology developed in Oster (2019). The procedure is analogous to, 1) estimating regressions with progressively more controls, starting from a "short regression" with only a limited set of controls, and 2) measuring how much the coefficient of interest shrinks as the R-square increases, subject to an assumption on the maximum R-square attainable (typically assumed to be 100%) in a regression that controls for all relevant observable and unobservable factors. The key statistic is the sensitivity of the magnitude of the coefficient of interest to changes in R-square, called δ. If $|\delta| = X$, then including all unobservable controls would shrink the coefficient of interest to zero, if the sensitivity of the coefficient to unobservables is at least X times the one to observables.

When we apply this framework to our data, the short regression only includes year-month fixed effects, a dummy equal to one for sales in St. Paul, and an interaction between the St. Paul dummy and the post ballot dummy. Our estimate of $|\delta|$ is approximately 11. This suggests that, in order to shrink our estimates of the effect of St. Paul ballot to zero, unobservables would need to have an impact on prices which is 11 times the one of observables, which already include micro-location, property size and property age. We interpret this as evidence that our estimates are robust to even large amounts of unobservables bias in the data.

III. Theoretical Models of Rent Control: Transfers vs. Deadweight Loss

III.A. Textbook Model of Rent Control

In Figure VII we consider a stylized representation of the rental market in St. Paul, with a downward sloping demand curve and an upward sloping supply curve. Assume that there are only two periods, that quantity can adjust instantly, and that the market is in equilibrium at time 0 with rent R_0 and supply of rentable space Q_0. If an investor purchases a rental property at time 0, after the first rental payment R_0, the price of the property equals the discounted rent received in period 1. Also, assume that in period 1 there will be an increase in demand, shifting the demand curve to the right. This will lead in period 1 to larger supplied quantity ($Q_1 > Q_0$) and higher rent prices ($R_1 > R_0$).

We then introduce a rent control provision that will take effect in period 1. For simplicity, we assume that rent control imposes that $R_1 \leq R_0$. Then, in period 1 we will still have $R_1 = R_0$ and $Q_1 = Q_0$. Rent control generates at time 1 a transfer, from the landlords that were already in the market at time 0, to their tenants. Moreover, it generates a deadweight loss, due to foregone supply that is no longer added to the market at time 1. However, notice that, for the supply that was already present at time 0, the only effect of the rent control policy is the lower rent at time 1. This will in turn determine a drop in property prices already at time 0, which is going to be proportional to the difference between the controlled and the free market rent at time 1. Thus, drops in the prices of existing properties do not internalize future supply deadweight losses.

III.B. A Model of Heterogenous Quality

As an alternative to the textbook model, in this section, we extend the model of rent control with heterogeneous quality presented in Frankena (1975). As Frankena argues, rental housing is not homogenous across units of housing. Instead, for each housing unit, various levels of housing services may be provided, which can be thought of as the quality of housing. With heterogeneous quality, rent per unit varies because the amount of housing services (quality) varies across units. Therefore, Frankena argues that rent is a revenue payment equal to price times quantity. The price is the price per unit of housing services, not per housing unit, and the quantity is the amount of housing services provided by the landlord. This distinction allows for landlords to supply heterogeneous housing at different price levels.

To make this framework more tangible, we assume linear supply and demand curves as follows:

$$P_d = \alpha - \beta Q_d, \qquad \text{(IA.1)}$$

where Q_d is the quantity of housing services demanded by renters at price P_d per unit of housing services and β represents the slope of the demand curve. Likewise, the supply of housing services is defined by

$$P_s = \delta + \gamma Q_s, \tag{IA.2}$$

where γ represents the slope of the supply curve.

In a free market equilibrium, the market-clearing quantity supplied is $Q^\star = \frac{\alpha-\delta}{\beta+\gamma}$ at the market price of $P^\star = \alpha - \beta Q^\star = \delta + \gamma Q^\star$. The producer surplus is $\frac{1}{2}\gamma(Q^\star)^2$. See panel (a) of Internet Appendix Figure VIII for a graphical representation of this equilibrium.

In this setting, the textbook treatment of rent control would state that rent control caps the price per housing services below the market price. However, if a rent control law does not force landlords to maintain a certain quality, the rent control actually caps the revenue received by the owner, not the price per unit of housing service provided. Thus, if a landlord reduces the quantity supplied of housing services by allowing the property to deteriorate in quality, but still receives the same total rent, the price per service increases. Even with rent control provisions that attempt to require landlords to maintain quality standards, the enforcement of such a requirement is infeasible. When features of the housing wear out and need to be replaced, such as flooring, windows, or appliances, the landlord can replace them with lower quality features. It is unlikely that a rent control law could prevent a landlord from replacing a double-paned window with a single-paned window, or hard-wood floors with carpet.

Instead, Frankena argues that because rent control limits rent revenue, instead of prices, the limit imposed by rent control is represented by a rectangular hyperbola such that the maximum rent payment is $\bar{R} = pq$, as shown in Internet Appendix Figure VIII. When rent control is imposed, we assume that the price for housing services is constrained to be ω below the market price, which fixes the hyperbola $\bar{R}$ in the (p, q) space. Frankena argues that after rent control is imposed, the new supply curve will be the backward-bending rent control hyperbola, moving from more quantity at lower prices to less quantity at higher prices per housing service. After a transition period, the new short-run equilibrium will be at $\bar{E}$ in panel (d) of Internet Appendix Figure VIII.

In particular, as shown in panel (a), immediately after rent control is imposed, the price per service falls to $(1-\omega)P^\star$, but quantity is fixed. This generates a transfer from the landlord to the renter, represented by the green rectangle. At this price, the landlord is oversupplying housing services. Because the quantity did not decrease, there is no deadweight loss. However, over time, as landlords allow their properties to deteriorate (panel b), the quantity of housing services decreases and the price per housing service increases. This has two effects. First, the transfer from the landlord to the renter decreases. Second, there is a deadweight loss borne by renters and landlords caused by the reduction in housing, as illustrated by the yellow triangle. This reflects the lost surplus from the provision of housing services that are now foregone by allowing properties to deteriorate.

As time continues and quality decreases further, the price per services exceeds the market price $P^\star$ and there is a transfer from renters to landlords, indicated by the blue rectangle in the figure. This is because renters who previously enjoyed a relatively low price for housing services relative to their willingness to pay, now pay a higher price. Second, as the provision of housing services decreases, the deadweight loss grows. Finally, at point $\bar{E}$, the supply equals demand, and the market attains a new equilibrium. Landlords maintain their properties at the lower level of housing services and renters pay a higher price per service than in the free market equilibrium. In addition, both renters and owners suffer a deadweight loss.

As Frankena argues, this new short-run equilibrium is not sustainable in the long-run if new entrants face the same rent control policy. New entrants are motivated to supply housing because landlords receive abnormal profit in the new short-run equilibrium. As new entrants increase supply, the long-run equilibrium will return to the original equilibrium before rent control was imposed by an increase in the quantity of low-quality supply.

Because the abnormal profit earned by landlords in the short-run is created by the slow deterioration of the quality of properties, it is not easy to predict the dynamics of the transition from the pre-rent control equilibrium to the new short-run equilibrium, and then to the long-run equilibrium. Immediately after rent control is passed, and before the price rises above the free-market price, landlords lose value in every period. After the price rises above the free-market price, landlords gain value because the transfer is larger than the deadweight loss borne by the landlords. Because we observe empirically that the present value of real estate falls after the imposition of rent control, for the theory to hold, the first phase of the transition must have more weight than the second phase. This could happen for at least two reasons: a large discount rate or new entrants keep the price low.

First, if discount rates are high enough, the positive gains received by landlords from a higher price per quality in later periods could be discounted enough that the losses from transfers to renters in the early phase account for the lion's share of the effects of rent control. In simulations using linear supply and demand curves or constant elasticity supply and demand curves, where we attempt to calibrate the model to the data, we find that the discount rate alone would need to be infeasibly large to explain the negative effect on prices in the data.

Second, it is possible that landlords never receive transfers from renters because new low-quality supply increases at the same rate as the depreciation of existing units. It is reasonable to assume that though rent control can be implemented quickly, existing landlords are unlikely to quickly decrease the quality of their properties to capture higher rents. Instead, existing units will naturally deteriorate. However, new, low-quality supply may enter the market to try to capture the gains created by rent control. Depending on the speed of new supply, the introduction of new lower-quality units is likely to occur at such a rate that the price per quality never rises above $P^\star$. Therefore, the first phase in the transition, when prices are less than the free-market price, is the most relevant for predicting losses caused by rent control.

To understand how rent control affects the value of rental real estate, we analyze the aggregate value of real estate as the present value of future producer surplus. We allow quality to deteriorate at the rate of λ per unit of time t. This provides a parameterization of quantity and price as follows:

$$Q(t) = Q^\star - \lambda t \tag{IA.3}$$

$$P(t) = \frac{(1-\omega)Q^\star P^\star}{Q^\star - \lambda t} \tag{IA.4}$$

for $t = 0, \ldots, \bar{t}$, where $\bar{t}$ is such $P(t) = P^\star$. This is found as $\bar{t} = \frac{Q^\star \omega}{\lambda}$. Intuitively, $\bar{t}$ is decreasing in λ because if depreciation is faster, the market will reach the low-quality equilibrium sooner. Also, $\bar{t}$ is increasing in ω because the more restrictive is the rent cap, the longer it will take to return to the market price.

The transfer from landlords to renters at time t is as follows:

$$Transfer(t) = (P^\star - P(t))\, Q(t) \tag{IA.5}$$

$$= \omega P^\star Q^\star - \lambda P^\star t. \tag{IA.6}$$

Therefore, the size of the transfer is linear in time.

The deadweight loss of rent control to landlords at time t is as follows:

$$DWL_s(t) = \frac{1}{2}\,(P^\star - P(Q(t))\,(Q^\star - Q(t)) \tag{IA.7}$$

$$= \frac{1}{2}\gamma\lambda^2 t^2. \tag{IA.8}$$

Similarly, the deadweight loss to renters at time t is:

$$DWL_d(t) = \frac{1}{2}\beta\lambda^2 t^2. \tag{IA.9}$$

In contrast to the transfer, the DWL is increasing exponentially with time. The deadweight loss for owners increases as the supply curve become steeper and more inelastic. Similarly, the deadweight loss for renters increases as the demand curve becomes steeper.

The present value of the transfer is

$$PV(Transfer) = \int_0^{\bar{t}} e^{-rt}\,(\omega P \star Q^\star - \lambda P^\star t)\, dt, \tag{IA.10}$$

and the present value of the deadweight loss to landlords is

$$PV(DWL_s) = \int_0^{\bar{t}} e^{-rt}\left(\frac{1}{2}\gamma\lambda^2 t^2\right) dt. \tag{IA.11}$$

Notice that for a given free-market equilibrium $(Q^\star, P^\star)$, the shape of the demand curve is unrelated to transfers or deadweight losses to landlords in this model. The only determinants of the size of transfers and deadweight loss are the shape of the supply curve (γ), the constraint imposed by rent control (ω), and the depreciation rate (λ).

We simulate this market by setting parameters to match the data from St. Paul. Specifically, we assume $P^\star = 1,375$ and $Q^\star = 6,875$, which match the rent price and number of rental units in small properties in St. Paul.[1] We set the rate of depreciation $\lambda = 3.636\%$ to match the IRS depreciation schedule for rental real estate. We assume that rent control constrains rental prices by 4%, which is based on current inflation of about 7% and a rent cap of 3%. We assume the discount rate is 5%. We allow the slope and intercept of the supply curve to vary, while holding constant the free market equilibrium $(Q^\star, P^\star)$. This allows us to show how changes in supply elasticity influence the losses experienced by landlords, holding all else fixed.

Panel (a) of Internet Appendix Figure IX presents a graph of the present value of losses attributed to deadweight loss and transfers for changes in the slope of the supply curve. For supply curve slopes of zero to 0.2, transfer losses constitute the majority of losses. Second, the present value of deadweight losses increase linearly with the steepness of the supply curve. In contrast, transfers are unrelated to supply curve inelasticity.

Steeper supply curves affect not only the change in surplus, but they also affect the free-market surplus. Therefore, in panel (b), we normalize losses by the present value of the landlord surplus in the free-market equilibrium. This provides a simulation that more closely matches our empirical evidence on percentage changes in property values. Normalizing the losses, we see that deadweight loss is constant across supply curves slopes. This is because the deadweight loss is proportional to the size of the landlord surplus. In contrast, as the slope of the supply curve decreases (more elastic), the total losses increase. Because surplus is increasing with the slope of the supply curve, in relative terms, the losses caused by transfers decrease as the supply curve becomes more inelastic.

Though linear supply and demand curves are easy to visualize, their elasticities are not constant. Therefore, to provide an alternative simulation, we compute the same comparative statistics assuming constant elasticity supply and demand curves. In particular, we assume the following:

$$P_d = \alpha Q^{\frac{1}{\beta}} \tag{IA.12}$$

$$P_s = \delta Q^{\frac{1}{\gamma}} \tag{IA.13}$$

$$Q^\star = \left(\frac{\alpha}{\delta}\right)^{\frac{\beta\gamma}{\beta-\gamma}} \tag{IA.14}$$

$$P^\star = \alpha \left(\frac{\alpha}{\delta}\right)^{\frac{\gamma}{\beta-\gamma}}, \tag{IA.15}$$

[1]We use data on unit prices and quantities as a benchmark, but the model uses units of housing services (quality) which are not directly observable.

where $\beta < 0$ is the elasticity of demand and $\gamma > 0$ is the elasticity of supply. Internet Appendix Figure X presents the results using the constant elasticity supply and demand curves, assuming the same parameters.

The constant-elasticity simulations generate results consistent with the linear supply and demand analysis. Transfers dominate deadweight losses; deadweight loss is nearly flat for elasticities above 0.4; and transfer losses, relative to landlord surplus, increase with the elasticity of supply.

In conclusion, whether we use linear supply and demand or constant-elasticity supply and demand curves, we find that transfers are much larger than deadweight losses and that deadweight losses vary relatively little with supply elasticity. In contrast, transfers increase as supply becomes more elastic. This analysis supports our assumption that our empirical estimates of changes in property values proxy for transfers from landlords to renters.

IV. Additional Tests

IV.A. Estimates of the effect of rent control on current rents

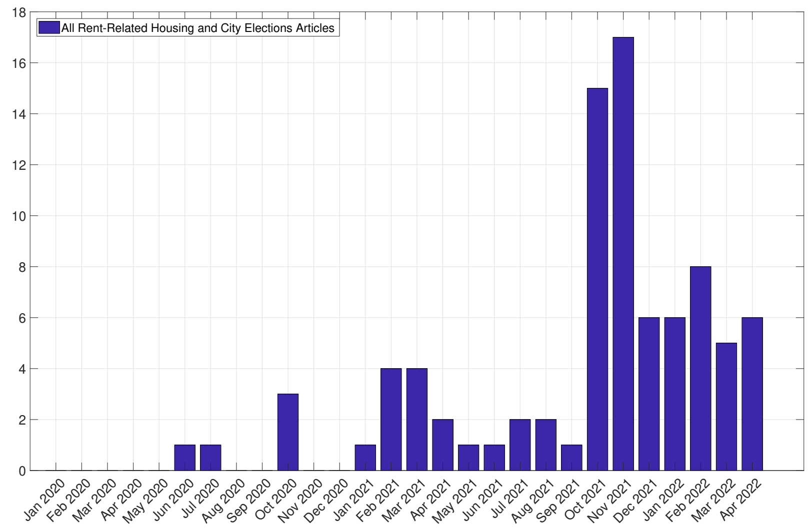
We test whether asked rents changed around the passage of rent control. While there was conflicting information on the date of enactment of the law, in the weeks following the referendum it was announced that the law would be enacted starting from May 2022. Thus, owners may have raised rents after November 2021, to counteract the effects of the cap on future rent growth. However, the extent to which landlords are able to attenuate the effects of the law by increasing rents depends on the competitiveness of the rental market, and on the demand for rental space. Higher rents may translate into higher vacancy, thus not necessarily leading to higher income.

Internet Appendix Table IV presents estimates of a differences-in-differences model where the dependent variable is logged monthly rent. Controlling for location using city fixed effects, we find that rents are statistically lower in St. Paul following rent control. However, when we use ZIP code or block group level fixed effects, the estimate shrinks and becomes statistically insignificant. Thus, it appears that there is no significant change in rents following the passage of the ballot proposal.

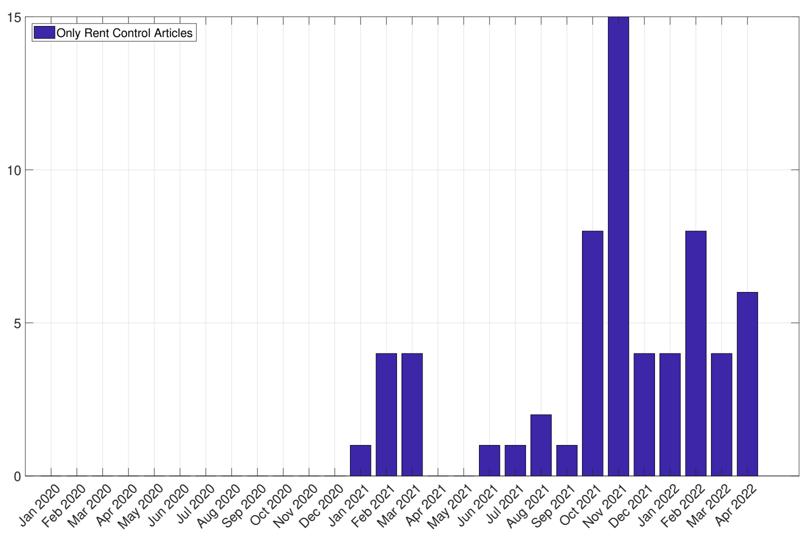
IV.B. Estimates of the effect of rent control on transaction volumes

We test whether rent control affected the volume of transactions in St. Paul. In particular, we estimate Equation 3, but replace the dependent variable with the logged number of transactions. Internet Appendix Table V shows that transaction volume significantly increased following the passage of rent control. Compared to the suburbs, the volume of transactions in St. Paul increased on average by approximately 13% in the quarter from November 2021 to January 2022. The combination of lower prices and higher transaction volumes implies that the net for-sale inventory increased following the passage of rent control.

V. Additional Figures and Tables



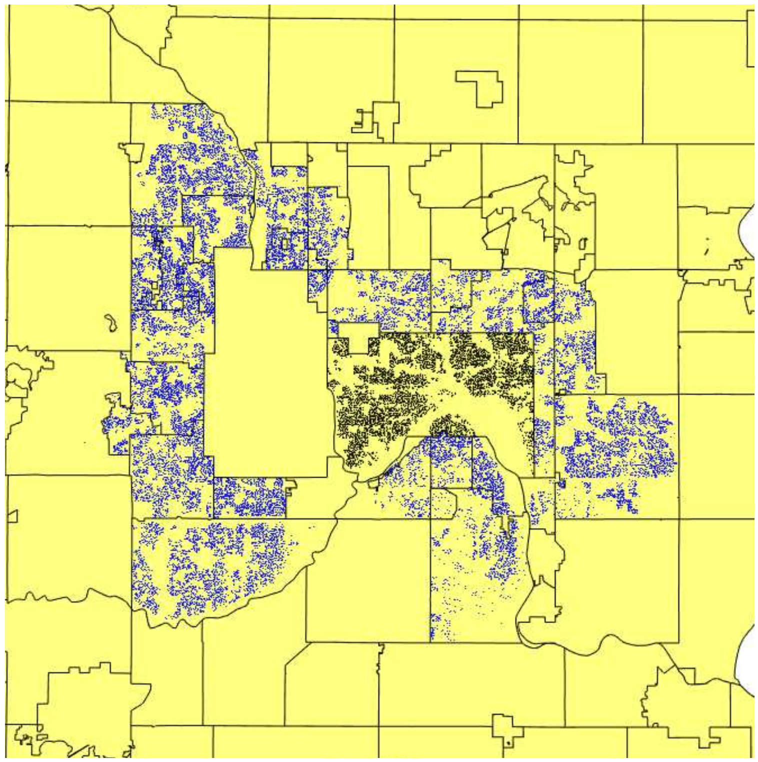
(a) Rent Control Articles



(b) Rent-related and Election News

Internet Appendix Figure I
Media Coverage of Rent Control and Elections

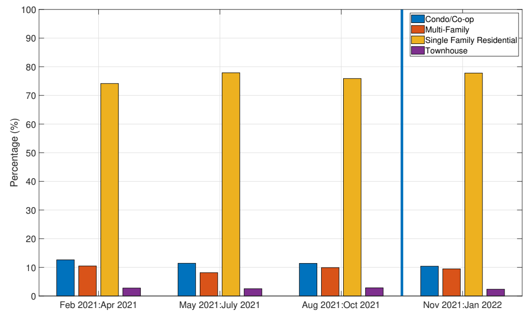
This figure presents time series counts of the number of news articles per month from Factiva that mention issues related to elections or rent control. Panel (a) includes searches for articles on mayoral elections, housing, and rents. Panel (b) includes searches that specifically discuss rent control.



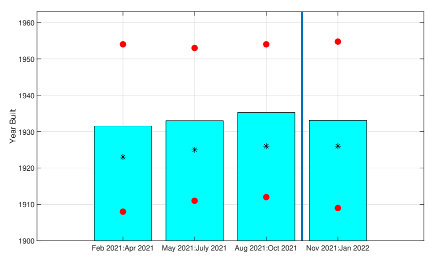
Internet Appendix Figure II

Location of House Sales in St. Paul vs. Suburbs: Adjacent Cities

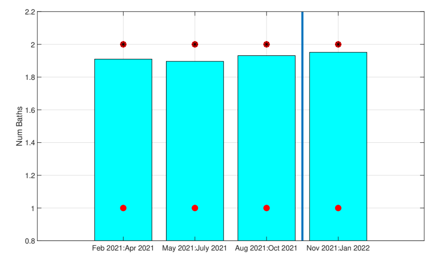
This figure shows the location of house sales in the Redfin sample for St. Paul and its close surrounding cities (Brooklyn Park, Woodbury, Brooklyn Center, Fridley, Bloomington, North Saint Paul, South Saint Paul, New Brighton, Crystal, Hopkins, Edina, Saint Louis Park, Maplewood, Saint Anthony, Roseville, Columbia Heights, Robbinsdale, Inver Grove Heights, New Hope, Golden Valley, Oakdale, West Saint Paul, Little Canada, Richfield, Lauderdale, Lilydale, Newport, Mendota Heights, Sunfish Lake). The data cover the period from January 2018 to January 2022. Sales within the city of St. Paul are highlighted in black, while sales in the surrounding cities are highlighted in blue.



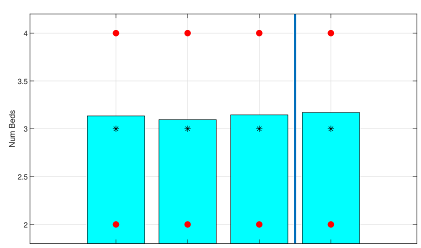
(a) Property Type



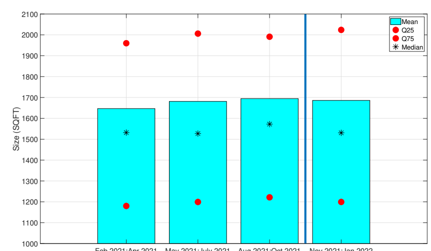
(b) Year Built



(c) Number of Bathrooms



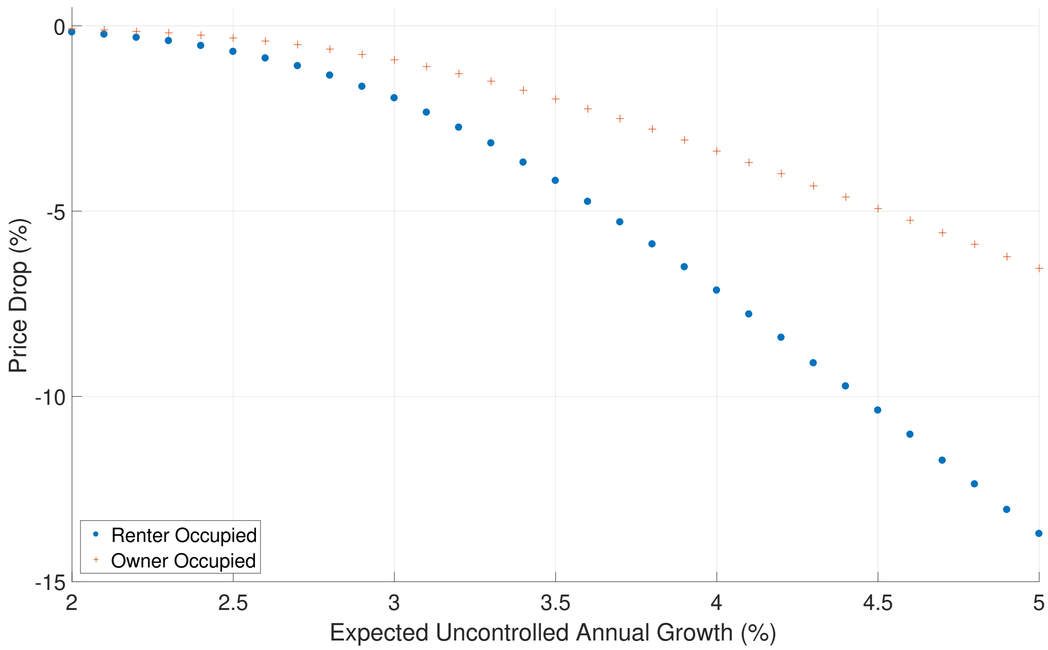
(d) Number of Bedrooms



(e) Size

Internet Appendix Figure III
Sample Comparison: Pre vs. Post-Rent Control

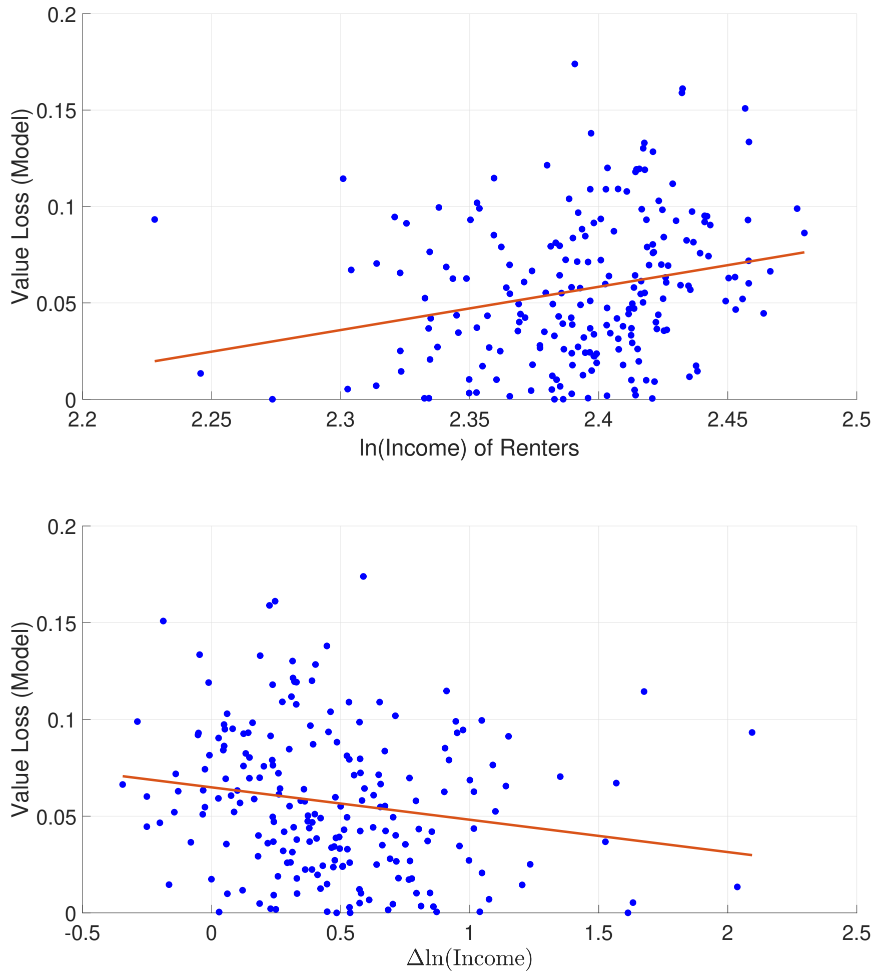
This figure presents summary statistics of properties transacted within the city of St. Paul in the three quarters before and in the quarter after the passage of the rent control provision.



Internet Appendix Figure IV

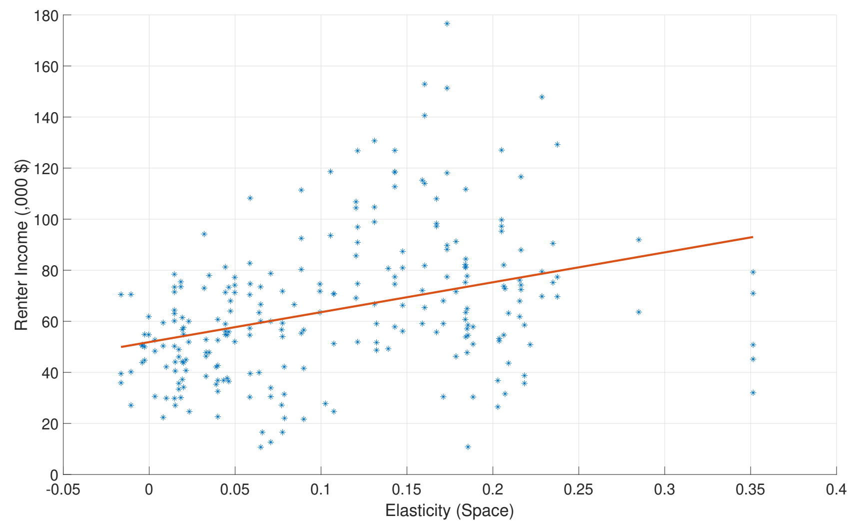
Model Implied Price Changes of Rental and Owner-occupied Properties

This figure presents the price drops predicted by the calibrated pricing model for rental and owner occupied properties, for different values of expected net rental income growth in the absence of controls.

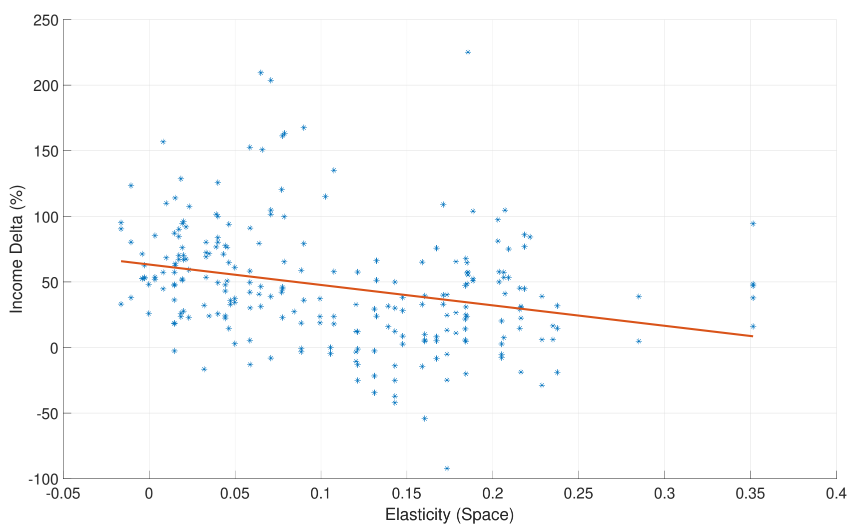


Internet Appendix Figure V
Model-Implied Value Loss and Block Group Income

This figure presents bloc group level scatter plots, depicting the relationship between the average value loss due to the capitalization effects predicted by the pricing model, and the log income of renters (top panel), or the difference between the log income of owners and the log income of renters (bottom panel).



(a) Supply Elasticity and Income of Renters

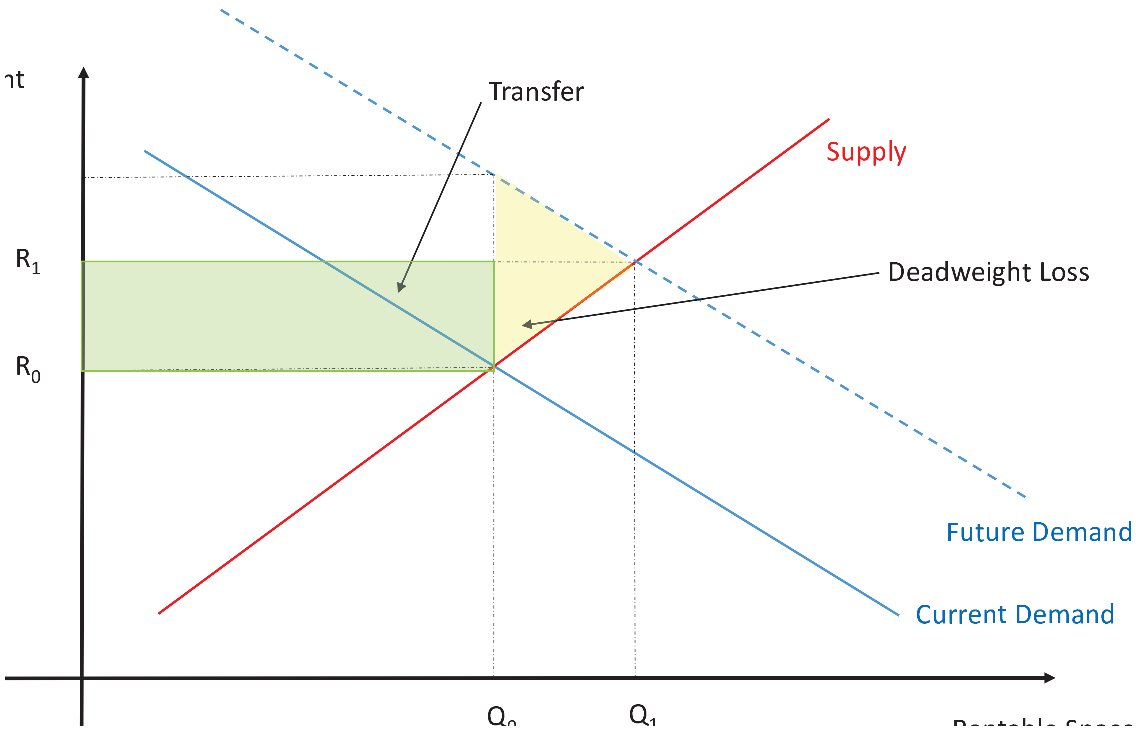


(b) Supply Elasticity and Income Delta

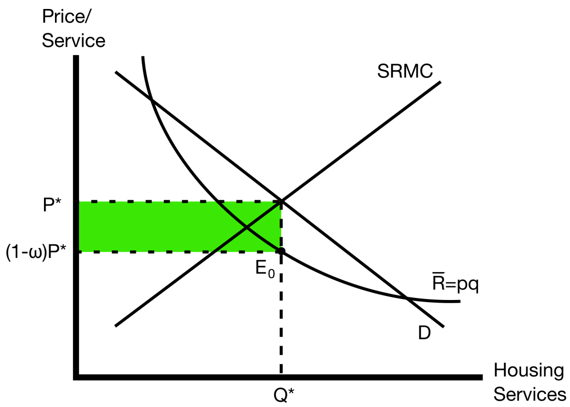
Internet Appendix Figure VI

Supply Elasticity and Income Distributions across St. Paul

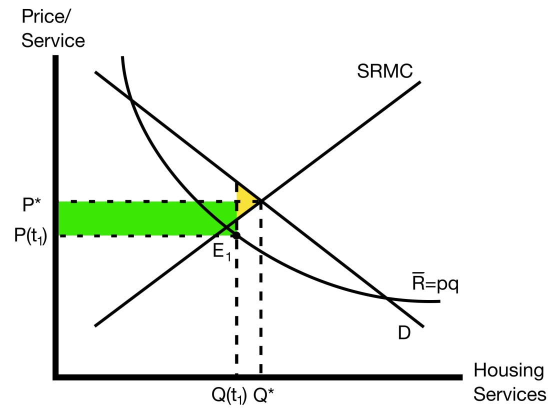
This figure shows, across block groups within St. Paul, the association between supply elasticity (measured in terms of floorspace, using the methodology in Han and Baum-Snow, 2021), and, respectively, renters' income (panel a), and the income delta between renters and owners (panel b).



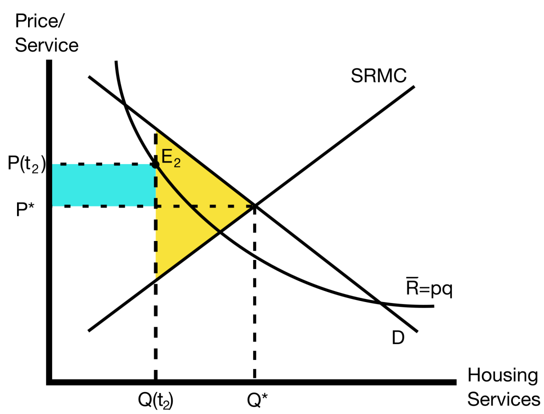
Internet Appendix Figure VII
Graphical Analysis: Supply Elasticity and Rent Control
This figure presents the effects of price controls on future rents, transfers and deadweight losses, in a simple textbook framework.



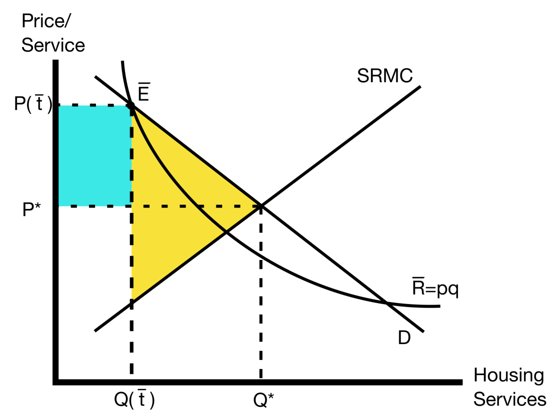
(a) Rent control imposed at $t = 0$



(b) At $t = 1$



(c) At $t = 2$

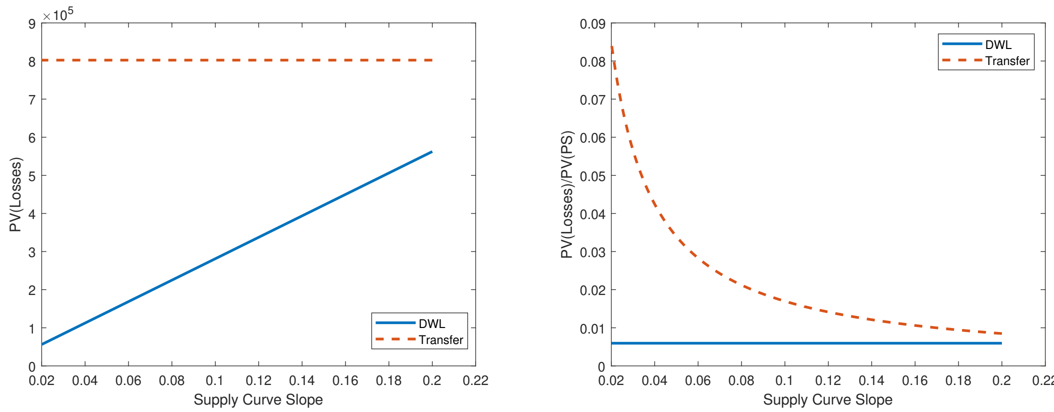


(d) New equilibrium at $t = \bar{t}$

Internet Appendix Figure VIII

Deadweight Loss and Transfers Following Rent Control

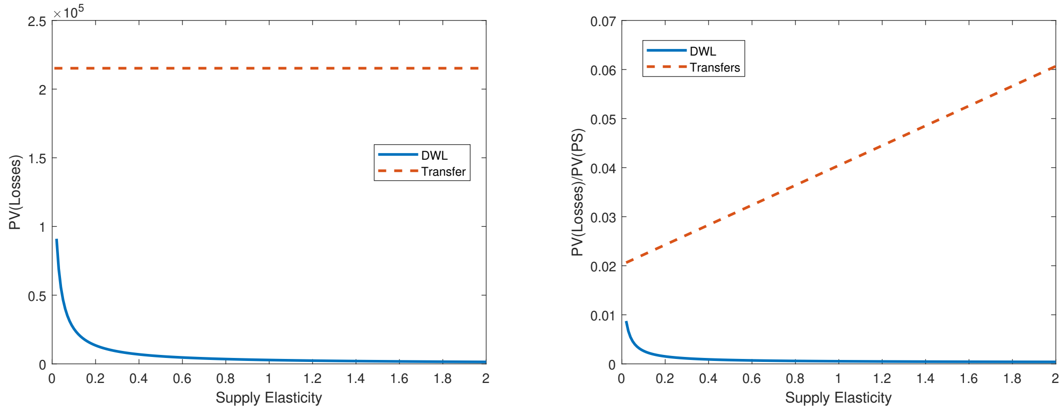
This figure presents the change over time in price, quality, deadweight loss, and transfer following rent control. The horizontal axis represents housing services, or quality of housing. The vertical axis is the price per housing service. $SRMC$ is the short-run marginal cost curve of providing housing services. D is the demand for housing services. $\bar{R} = pq$ represents the rent controlled maximum rent per housing unit and replaces the $SRMC$ as the supply curve of the landlord. We assume landlords can only reduce housing services over time. In panel (a), rent control lowers the price for housing services from the market price $P^\star$ to $(1 - \omega)P^\star$. The green rectangle is the transfer from landlords to tenants. Over time, the landlord will reduce quantity supplied and the price increases. Panel (b) represents the market at $t = 1$, as housing services decline. The yellow triangle is the deadweight loss caused by rent control. Panel (c) represents a continuation in the transition to a new equilibrium. The blue rectangle represents a transfer from renters to landlords because $P(t_2) > P^\star$. Panel (d) represents the steady-state equilibrium at $\bar{E}$ in which the landlord has no incentive to reduce housing services.



(a) Losses by Supply Curve Elasticity (b) Losses Normalized by Producer Surplus

Internet Appendix Figure IX
Present Value of Landlord Losses: Linear Supply

This figure presents the present value of losses in the form of transfers and deadweight loss. Panel (a) presents raw losses. Panel (b) presents losses normalized by the free-market landlord surplus. Parameters are set such that $Q^\star = 6,875$, $P^\star = 1,375$, with $\alpha = 4,125$, $\delta = 0$, $\beta = 0.4$, and $\gamma = 0.2$. Rent control is assumed to reduce the market price by $\omega = 4\%$. The discount rate $r = 5\%$. The quality depreciation per year is set to 3.636% of $Q^\star$.



(a) Losses by Supply Curve Elasticity (b) Losses Normalized by Producer Surplus

Internet Appendix Figure X

Present Value of Landlord Losses: Constant Elasticity Supply

This figure presents the present value of losses in the form of transfers and deadweight loss. Panel (a) presents raw losses. Panel (b) presents losses normalized by the free-market landlord surplus. Parameters are set such that $Q^{\star} = 6,875$, $P^{\star} = 1,375$, with a supply curve of $P_s = \delta Q^{\frac{1}{\gamma}}$, where δ is a scaling factor and γ is the elasticity of supply, which both adjust to maintain the same $Q^{\star}$ and $P^{\star}$. Rent control is assumed to reduce the market price by $\omega = 4\%$. The discount rate $r = 5\%$. The quality depreciation per year is set to 3.636% of $Q^{\star}$.

Internet Appendix Table I
Sales by Sample Cities in Minnesota*

City	Sales	City	Sales	City	Sales
Afton	152	Grey Cloud Island Twp	11	Orono	596
Andover	2,084	Ham Lake	780	Osseo	102
Anoka	951	Hampton	54	Other	3
Apple Valley	3,558	Hampton Twp	5	Other City Value - ..	1
Arden Hills	390	Hanover	42	Otsego	1
Bayport	211	Hastings	1,519	Pine Springs	17
Baytown Twp	44	Hilltop	2	Plymouth	5,487
Bethel	42	Hopkins*	860	Ramsey	2,109
Birchwood Village	51	Hugo	1,520	Randolph	34
Blaine	4,734	Independence	196	Randolph Twp	4
Bloomington*	4,544	Inver Grove Heights*	1,842	Ravenna Twp	17
Brooklyn Center*	1,682	Lake Elmo	1,122	Richfield*	1,973
Brooklyn Park*	4,697	Lake Saint Croix Be..	62	Robbinsdale*	1,130
Burnsville	3,719	Lakeland	95	Rockford	20
Cannon Falls	21	Lakeland Shores	14	Rogers	953
Castle Rock Twp	7	Lakeville	5,173	Rosemount	1,981
Centerville	236	Lauderdale*	93	Roseville*	1,916
Champlin	1,545	Lexington	67	Saint Anthony*	430
Chanhassen	60	Lilydale*	67	Saint Bonifacius	166
Chisago City	2	Lino Lakes	1,392	Saint Francis	630
Circle Pines	404	Linwood Twp	128	Saint Louis Park*	3,441
Coates	5	Little Canada*	458	Saint Mary's Point	19
Columbia Heights*	1,275	Long Lake	108	Saint Michael	4
Columbus	187	Loretto	61	Saint Paul	14,813
Coon Rapids	3,996	Mahtomedi	447	Saint Paul Park	341
Corcoran	404	Maple Grove	5,441	Scandia	206
Cottage Grove	2,826	Maple Plain	93	Sciota Twp	1
Crystal*	1,596	Maplewood*	2,154	Shoreview	1,577
Dayton	956	Marine On Saint Croix	87	Shorewood	565
Deephaven	231	Marshan Twp	5	South Saint Paul*	1,364
Delano	8	May Twp	59	Spring Lake Park	370
Dellwood	65	Medicine Lake	8	Spring Park	62
Denmark Twp	23	Medina	539	St. Paul	2
Douglas Twp	3	Mendota	9	Stacy	116
Eagan	3,782	Mendota Heights*	636	Stillwater	1,615
East Bethel	650	Miesville	2	Stillwater Twp	34
Eden Prairie	3,949	Minnetonka	3,433	Sunfish Lake*	29
Edina*	3,482	Minnetonka Beach	48	Tonka Bay	95
Elk River	9	Minnetrista	745	Vadnais Heights	695
Empire Twp	27	Mound	809	Vermillion	10
Eureka Twp	13	Mounds View	512	Vermillion Twp	7
Excelsior	124	New Brighton*	1,043	Victoria	6
Falcon Heights	201	New Hope*	1,159	Waterford Twp	1
Farmington	2,144	New Trier	7	Wayzata	332
Forest Lake	1,370	Newport*	306	Welch	3
Fridley*	1,574	Nininger Twp	6	West Lakeland Twp	113
Gem Lake	40	North Oaks	358	West Saint Paul*	1,042
Golden Valley*	1,459	North Saint Paul*	756	White Bear Lake	1,584
Grant	183	Northfield	146	White Bear Twp	504
Greenfield	166	Nowthen	166	Willernie	37
Greenvale Twp	3	Oak Grove	485	Woodbury*	5,882
Greenwood	48	Oak Park Heights	200	Woodland	31
Grey Cloud Island Twp	11	Oakdale*	1,710	Wyoming	36

Notes: Cities in the adjacent subsample are indicated by *.

Internet Appendix Table II
Sales by Counties in Full Sample

County	Sales	County	Sales
Minneapolis-St. Paul		*Denver*	
Anoka County, MN	22,480	Adams County, CO	34,185
Dakota County, MN	27,216	Arapahoe County, CO	42,385
Hennepin County, MN	53,909	Boulder County, CO	19,251
Ramsey County, MN	27,048	Broomfield County, CO	3,648
Washington County, MN	18,828	Denver County, CO	40,167
Total	149,481	Douglas County, CO	29,595
		Jefferson County, CO	38,709
Indianapolis		Weld County, CO	26,631
Boone County, IN	4,814	Total	234,571
Hamilton County, IN	27,677		
Hancock County, IN	5,675	*Kansas City*	
Hendricks County, IN	11,943	Clay County, MO	15,395
Johnson County, IN	10,911	Jackson County, MO	37,811
Madison County, IN	6,660	Johnson County, KS	37,012
Marion County, IN	56,618	Platte County, MO	6,117
Morgan County, IN	4,103	Wyandotte County, KS	6,154
Shelby County, IN	2,089	Total	102,489
Total	130,490		
		St. Louis	
Nashville		Madison County, IL	13,709
Cheatham County, TN	2,545	Monroe County, IL	1,498
Davidson County, TN	51,710	St. Charles County, MO	15,830
Robertson County, TN	4,607	St. Clair County, IL	18,751
Rutherford County, TN	27,151	St. Louis City, MO	12,618
Sumner County, TN	15,011	St. Louis County, MO	49,340
Williamson County, TN	21,738	Total	111,746
Wilson County, TN	12,636		
Total	135,398	Grand Total	864,175

Internet Appendix Table III
Difference-In-Difference Effect of Rent Control on Transaction Prices
Restricting to Adjacent Cities

	Dependent variable: ln(price)		
	(1)	(2)	(3)
St. Paul × Post	−0.043**	−0.050***	−0.044***
	(0.018)	(0.013)	(0.010)
ln(square feet)	0.699***	0.747***	0.609***
	(0.029)	(0.061)	(0.011)
ln(building age)	−0.095***	−0.087***	−0.101***
	(0.008)	(0.016)	(0.007)
Property type: Multi-family	0.221***	0.083	0.350***
	(0.056)	(0.161)	(0.025)
Property type: Single-family	0.326***	0.221*	0.400***
	(0.048)	(0.128)	(0.023)
Property type: Townhouse	0.134***	0.046	0.189***
	(0.039)	(0.105)	(0.022)
Location fixed effects	ZIP code	City	Block group
Time fixed effects	Year-month	Year-month	Year-month
Adjusted R^2	0.835	0.785	0.878
Observations	63,407	63,413	63,401

Notes: Observations include real estate transactions from the Twin Cities Metro Area, excluding Minneapolis, and restricting control cities to those adjacent to St. Paul and Minnesota, as depicted in Internet Appendix Figure II, over the period January 2018 to January 2022. *St. Paul* is a dummy variable equal to one for properties in the city of St. Paul. *Post* is a dummy variable equal to one for transactions that occur in November 2021, December 2021, or January 2022, after rent control is passed in St. Paul. The omitted property type category is Condo/Co-op. Block group is the 2019 Census block group geographic area. Standard errors double-clustered at the year-month and location level are presented in parentheses. Statistical significance of differences in means at 0.10, 0.05, and 0.01 is indicated by *, **, and ***.

Internet Appendix Table IV
Difference-In-Difference Effect of Rent Control on Rents

	Dependent variable: ln(rent)		
	(1)	(2)	(3)
St. Paul × Post	−0.012	−0.034***	−0.015
	(−0.79)	(−5.78)	(−1.04)
Property type: Condo	−0.031	−0.018	0.002
	(−1.53)	(−0.47)	(0.13)
Property type: Duplex	0.005	−0.049**	0.058***
	(0.38)	(−2.42)	(5.44)
Property type: Single Family Home	0.032	0.013	0.066***
	(1.60)	(0.45)	(4.68)
Property type: Townhouse	0.062***	0.049***	0.070***
	(3.91)	(2.82)	(4.82)
Location fixed effects	ZIP code	City	Block group
Time fixed effects	Year-month	Year-month	Year-month
Adjusted R^2	0.552	0.508	0.7108
Observations	73,953	73,945	73,860

Notes: Observations include real estate transactions from St. Paul and the Twin Cities market, excluding Minneapolis, over the period January 2018 to January 2022. *St. Paul* is a dummy variable equal to one for properties in the city of St. Paul. *Post* is a dummy variable equal to one for transactions that occur in November 2021, December 2021, or January 2022, after rent control is passed in St. Paul. The omitted property type category is Condo/Co-op. Block group is the 2019 Census block group geographic area. Standard errors double-clustered at the year-month and location level are presented in parentheses. Statistical significance of differences in means at 0.10, 0.05, and 0.01 is indicated by *, **, and ***.

Internet Appendix Table V
Difference-In-Difference Effect of Rent Control on Sales Volume

	Dependent variable: ln(1+quarterly sales)	
	(1)	(2)
St. Paul × Post	0.136***	0.128***
	(10.55)	(5.33)
Location fixed effects	City	Zip code
Time fixed effects	Year-Quarter	Year-Quarter
Adjusted R^2	0.838	0.971
Observations	1,837	1,860

Notes: The dependent variable is the log transaction volume by Zip code and quarter. Observations include real estate transactions from St. Paul and the Twin Cities market, excluding Minneapolis, over the period January 2018 to January 2022. *St. Paul* is a dummy variable equal to one for properties in the city of St. Paul. *Post* is a dummy variable equal to one for transactions that occur in November 2021, December 2021, or January 2022, after rent control is passed in St. Paul. Standard errors double-clustered at the year-quarter and location level are presented in parentheses. Statistical significance of differences in means at 0.10, 0.05, and 0.01 is indicated by *, **, and ***.

INTERNET APPENDIX TABLE VI
DIFFERENCE-IN-DIFFERENCE EFFECT OF RENT CONTROL ON SOLD PROPERTY CHARACTERISTICS

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(square feet)	ln(building age)	ln(beds)	ln(baths)	SFR Dummy	TWNH Dummy
St. Paul × Post	0.016*	−0.016	0.008	0.016	0.015	−0.013
	(0.009)	(0.032)	(0.007)	(0.010)	(0.023)	(0.010)
Property type: Multi-family	0.885***	0.373***	0.946***	0.604***		
	(0.027)	(0.045)	(0.026)	(0.025)		
Property type: Single-family	0.739***	0.296***	0.747***	0.496***		
	(0.021)	(0.042)	(0.013)	(0.021)		
Property type: Townhouse	0.394***	0.006	0.348***	0.350***		
	(0.023)	(0.051)	(0.014)	(0.022)		
Location fixed effects	Block group	Block group	Block group	Block group	Block group	Block group
Time fixed effects	Year-month	Year-month	Year-month	Year-month	Year-month	Year-month
Adjusted R^2	0.511	0.566	0.497	0.392	0.354	0.345
Observations	149,494	149,472	149,344	149,494	149,494	149,494

Notes: Observations include real estate transactions from the Twin Cities Metro Area, excluding Minneapolis, over the period January 2018 to January 2022. *St. Paul* is a dummy variable equal to one for properties in the city of St. Paul. *Post* is a dummy variable equal to one for transactions that occur in November 2021, December 2021, or January 2022, after rent control is passed in St. Paul. The omitted property type category is Condo/Co-op. Block group is the 2019 Census block group geographic area. Standard errors double-clustered at the year-month and location level are presented in parentheses. Statistical significance of differences in means at 0.10, 0.05, and 0.01 is indicated by *, **, and ***.

Internet Appendix Table VII
Building Permits and Supply Elasticity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	ln(Num)	ln(ResNum)	ln(NewResNum)	ResPerParcel	ln(Num)	ln(ResNum)	ln(NewResNum)	ResPerParcel
New Space Elast	1.597***	1.786***	1.702**	1.308***				
	(3.99)	(3.57)	(2.20)	(6.06)				
New Units Elast					1.763***	2.057***	1.773**	1.514***
					(3.94)	(3.78)	(1.98)	(6.28)
Constant	5.880***	5.309***	2.340***	0.750***	5.954***	5.398***	2.412***	0.815***
	(181.56)	(125.66)	(41.32)	(38.80)	(134.77)	(96.47)	(30.18)	(31.38)
Adjusted R^2	0.047	0.034	0.015	0.091	0.048	0.038	0.013	0.101
Observations	246	246	246	246	246	246	246	246

Notes: Observations include total block group-level permitting activity from St. Paul, over the period from October 2018 to October 2021, and census tract level supply elasticity. We measure permitting activity as the log of the total number of issued permits (Columns 1 and 5), the log of the total number of issued residential permits (Columns 2 and 6), the log of the total number of residential new construction permits (Columns 3 and 7), the total number of residential permits per residential parcel (Columns 4 and 8). We measure census tract level elasticity using the floorspace and unit elasticity measures constructed by Han and Baum-Snow (2021). Standard errors adjusted for heteroskedasticity are presented in parentheses. Statistical significance of differences in means at 0.10, 0.05, and 0.01 is indicated by *, **, and ***.

Internet Appendix Table VIII
Price Effects and Supply Elasticity

Dependent variable:	Value Loss		
	(1)	(2)	(3)
New Units Elasticity	0.287**		
	(2.01)		
New Space Elasticity		0.275**	
		(2.09)	
Development Elasticity			0.510*
			(1.72)
Constant	0.062***	0.050***	0.034***
	(4.57)	(5.11)	(3.54)
Adjusted R^2	0.012	0.014	0.008
Observations	249	249	249

Notes: Observations include block group-level estimates of the value loss following the passage of the provision, and census tract level supply elasticity. *Value Loss* is the estimated loss in the average parcel in a block group caused by rent control. We measure supply elasticity at the census tract level using the floorspace and unit elasticity measure, and the land development elasticity measure, constructed by Han and Baum-Snow (2021). Standard errors adjusted for heteroskedasticity are presented in parentheses. Statistical significance of differences in means at 0.10, 0.05, and 0.01 is indicated by *, **, and ***.

Internet Appendix Table IX
Robustness: Supply Elasticity Results

Dependent variable:	Value loss			
	(1)	(2)	(3)	(4)
New Space Elasticity	0.283^{**}	0.312^{**}	0.312^{**}	0.288^{**}
	(2.10)	(2.28)	(2.28)	(2.09)
Housing that is rental (%)	0.014	0.035	0.026	0.018
	(0.38)	(0.84)	(0.68)	(0.37)
ln(Sales Volume) 2018Q1:2022Q1		0.021^{*}		
		(1.68)		
ln(Sales Volume) Post RC			0.032^{**}	
			(2.56)	
Fraction of 4+ Apt.				−0.046
				(−0.11)
Constant	0.044^{**}	−0.049	0.004	0.044^{**}
	(2.24)	(−0.77)	(0.13)	(2.23)
Adjusted R^2	0.010	0.013	0.023	0.006
Observations	249	247	247	247

Notes: Observations are at the block group level in St. Paul. *Value loss* is the estimated loss in the average parcel in a block group caused by rent control. *New Space Elasticity* is the measure of supply elasticity for new floor space developed by Han and Baum-Snow (2021). *ln(Sales Volume) 2018Q1:2022Q1* and *ln(Sales Volume) Post RC* are equal to the log of the number of transactions per block group, respectively, over the period from January 2018 to January 2022, and over the period from November 2021 to January 2022. *Fraction of 4+ Apt.* is, for each block group, the fraction of parcels that are occupied by apartment buildings with 4 or more units. T-statistics based on standard errors adjusted for heteroskedasticity are presented in parentheses. Statistical significance at 0.10, 0.05, and 0.01 is indicated by *, **, and ***.

Internet Appendix Table X
Robustness: Renter's Income Results

Dependent variable:	Value loss					
	(1)	(2)	(3)	(4)	(5)	(6)
ln(Income) of renters	0.078***	0.076***	0.081***	0.064**	0.062**	0.071***
	(3.08)	(3.02)	(3.33)	(2.39)	(2.36)	(2.79)
Housing that is rental (%)	0.117**	0.113**	0.120**	0.112**	0.106**	0.123**
	(2.30)	(2.27)	(2.04)	(2.20)	(2.10)	(2.04)
ln(Sales Volume) 2018Q1:2022Q1	0.009			0.014		
	(0.76)			(1.12)		
ln(Sales Volume) Post RC		0.024*			0.028**	
		(1.94)			(2.15)	
Fraction of 4+ Apt.			−0.103			−0.209
			(−0.25)			(−0.50)
New Space Elasticity				0.221	0.228	0.210
				(1.51)	(1.57)	(1.45)
Constant	−0.898***	−0.866***	−0.899***	−0.762**	−0.713**	−0.778***
	(−3.18)	(−3.03)	(−3.18)	(−2.57)	(−2.37)	(−2.64)
Adjusted R^2	0.024	0.032	0.023	0.030	0.039	0.028
Observations	245	245	245	245	245	245

Notes: Observations are at the block group level in St. Paul. *Value loss* is the estimated loss in the average parcel in a block group caused by rent control. *New Space Elasticity* is the measure of supply elasticity for new floor space developed by Han and Baum-Snow (2021). *ln(Sales Volume) 2018Q1:2022Q1* and *ln(Sales Volume) Post RC* are equal to the log of the number of transactions per block group, respectively, over the period from January 2018 to January 2022, and over the period from November 2021 to January 2022. *Fraction of 4+ Apt.* is, for each block group, the fraction of parcels that are occupied by apartment buildings with 4 or more units. T-statistics based on standard errors adjusted for heteroskedasticity are presented in parentheses. Statistical significance at 0.10, 0.05, and 0.01 is indicated by *, **, and ***.

Internet Appendix Table XI
Robustness: Δln(Income)

Dependent variable:	Value loss						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δln(Income)	−0.075**	−0.070**	−0.078**	−0.072**	−0.067**	−0.076**	−0.061*
	(0.031)	(0.031)	(0.030)	(0.031)	(0.031)	(0.030)	(0.032)
ln(age) of owners	−0.000	−0.000	−0.000	−0.000	0.000	0.000	0.000
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Owners that are white (%)	0.306	0.292	0.301	0.284	0.269	0.281	0.312
	(0.314)	(0.311)	(0.312)	(0.316)	(0.312)	(0.314)	(0.327)
Owners with bachelors degree (%)	−0.141	−0.134	−0.104	−0.207	−0.196	−0.155	−0.197
	(0.401)	(0.398)	(0.401)	(0.400)	(0.394)	(0.397)	(0.402)
ln(age) of renters	0.000	0.000	0.000	0.000	0.000	0.000	−0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Renters that are white (%)	0.018	0.026	0.022	0.015	0.022	0.019	0.016
	(0.079)	(0.079)	(0.076)	(0.078)	(0.078)	(0.075)	(0.086)
Renters with bachelors degree (%)	−0.043	−0.038	−0.044	−0.065	−0.060	−0.064	−0.132
	(0.129)	(0.130)	(0.129)	(0.130)	(0.131)	(0.130)	(0.151)
Housing that is rental (%)	0.131**	0.126**	0.146**	0.136**	0.126**	0.148**	0.058
	(0.055)	(0.053)	(0.062)	(0.055)	(0.053)	(0.063)	(0.057)
ln(Sales Volume) 2018Q1:2022Q1	0.009			0.016			
	(0.017)			(0.018)			
ln(Sales Volume) Post RC		0.024*			0.027**		
		(0.013)			(0.013)		
Fraction of 4+ Apt			−0.254			−0.292	
			(0.436)			(0.431)	
New Space Elasticity				0.205	0.201	0.183	
				(0.160)	(0.153)	(0.153)	
Constant	−0.209	−0.202	−0.187	−0.205	−0.178	−0.165	
	(0.180)	(0.178)	(0.177)	(0.179)	(0.177)	(0.177)	
Zip Code FE	NO	NO	NO	NO	NO	NO	YES
Adjusted R^2	0.024	0.032	0.024	0.027	0.035	0.026	0.026
Observations	244	244	244	244	244	244	244

Notes: Observations are at the block group level in St. Paul. *Value loss* is the estimated loss in the average parcel in a block group caused by rent control. *New Space Elasticity* is the measure of supply elasticity for new floor space developed by Han and Baum-Snow (2021). *ln(Sales Volume) 2018Q1:2022Q1* and *ln(Sales Volume) Post RC* are equal to the log of the number of transactions per block group, respectively, over the period from January 2018 to January 2022, and over the period from November 2021 to January 2022. *Fraction of 4+ Apt.* is, for each block group, the fraction of parcels that are occupied by apartment buildings with 4 or more units. T-statistics based on standard errors adjusted for heteroskedasticity are presented in parentheses. Statistical significance at 0.10, 0.05, and 0.01 is indicated by *, **, and ***.

Internet Appendix Table XII
Owners and Renters' Income and the Transfer of Wealth

Dependent variable:	Loss	Model Loss	Residual	Loss	Model Loss	Residual
	(1)	(2)	(3)	(4)	(5)	(6)
ln(income) of renters	0.074***	0.043***	0.031			
	(0.028)	(0.009)	(0.028)			
Δln(Income)				−0.086***	−0.032***	−0.054*
				(0.027)	(0.009)	(0.027)
Housing that is Rental (%)	0.085	0.062***	0.023	0.091*	0.044***	0.047
	(0.053)	(0.017)	(0.053)	(0.051)	(0.016)	(0.050)
Constant	−0.804**	−0.442***	−0.362	0.042*	0.052***	−0.010
	(0.320)	(0.109)	(0.320)	(0.023)	(0.005)	(0.023)
R-Square adj	0.018	0.126	−0.004	0.027	0.065	0.005
N	209	209	209	209	209	209

Notes: Observations are at the block group level in St. Paul. *Loss* is the estimated loss in the average parcel in a block group caused by rent control, *Model Loss* is the loss predicted by the pricing model, and *Residual* is the difference between the two. Δln(Income) is ln(income) of owners minus ln(income) of renters. Standard errors adjusted for heteroskedasticity are presented in parentheses. Statistical significance at 0.10, 0.05, and 0.01 is indicated by *, **, and ***.