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What Price Do Philadelphians Really Place On Their Parking?

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Parking has become a hot issue in Philadelphia. City Council President Darrell Clarke has recently introduced a bill that would essentially double the number of required parking spaces for any future residential construction. In South Philadelphia, a citizen activist group has filed a lawsuit against the city's parking authority to compel it to enforce the law prohibiting parking on Broad Street's median, a long-standing tradition in that neighborhood. Both initiatives have been met with a vocal public response: from ordinary citizens to developers, urban planners, affordable housing advocates and academic economists.

While these groups all have different reasons for either supporting or opposing these changes, the one thing they all agreed upon was that the root source of the problem is long-time residents' sense of entitlement to free and available on-street parking. The availability of parking was not an issue in the decades when Philadelphia was experiencing depopulation and abandonment. But the recent surge in both new residents and new construction, especially in the traditional rowhome neighborhoods outside of Center City, has led to greater competition for available spots and subsequent complaints by many residents who have lived in those neighborhoods for decades[1].

Building Industry Association (BIA) president Brian Emmons has asserted that the "real issue is the acculturated norm of free on-street parking." "The city is massively subsidizing on-street parking [by not charging for on-street parking],[2]" said Professor Gilles Durant of Wharton's real estate department. As these neighborhoods have resumed growth, an increasing number of cars compete for a limited amount of spaces that are available for free or very low rates. Friction then ensues between new and long-time residents.

Most experts agree that a market-based solution would be to charge people for parking in areas where it is relatively scarce, and hence has real economic value. But, what is both an economically sound and politically realistic amount to charge for parking? Moreover, should this cost vary by neighborhood, given relative differences in parking scarcity across the city? To answer these questions, it would be helpful to know just how much Philadelphians are

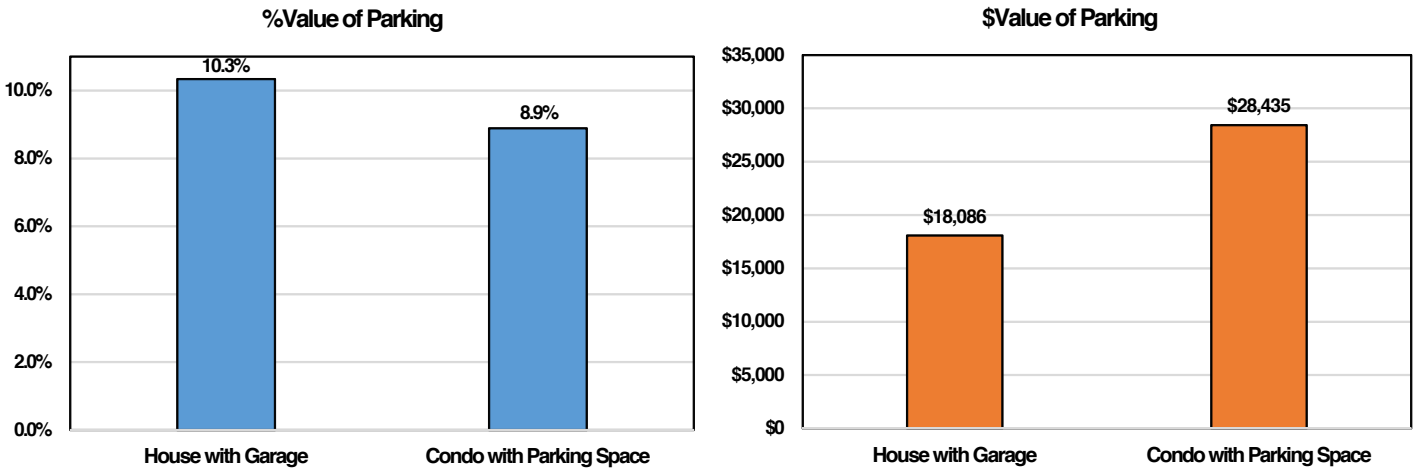
[1] Illustrative anecdote: shortly after I first moved to Philadelphia, I drove to South Philly one Saturday morning to check out the Italian Market. I parked in a public space on a side street populated by traditional two-story brick rowhomes. When I returned to my car (which had out-of-State tags), the car's passenger windows had been smashed, a bag of garbage had been thrown through the driver side window, the side of the car had been keyed and the antenna broken off. A note was left under the windshield wiper: "Don't EVER park your car in my grandmother's spot you f***in' a**hole!!! Welcome to Philadelphia"

[2] The source of both quotes is: http://planphilly.com/articles/2017/07/13/clarke-park-council-president-wants-builders-to-make-more-space-for-cars

willing—and able—to pay for parking, and how this changes for different neighborhoods in the city.

This research piece endeavors to answer just that. A regression-based approach was used to compare the sales prices of dwellings with private parking to the prices of dwellings without parking, while simultaneously controlling for any qualitative and quantitative differences between the properties; e.g. square footage, age and condition of the structure, lot size, etc[3]. The regression output then reports how much the inclusion of a parking space contributes to a home's value in percentage terms. This percentage is then converted to dollars by multiplying it times the median value of a home to obtain how much the addition of a parking space increases a dwelling's dollar value. This price can then be interpreted as how much homeowners are willing to pay for a parking space. This was done separately for houses v. condos, since they are fundamentally different types of dwellings with different types of parking: houses have individual garages, whereas condos have a designated space in either a parking garage or surface lot.

The results for the first set of regressions, which estimated the average price of a private parking space citywide, is given below[4].



The chart on the left shows the average *percent* premium that dwellings with private parking have over comparable dwellings without parking. The chart on the right shows the average *dollar* premium for the same. The results are interpreted as follows:

- In Philadelphia, houses with garages typically sell for an average price that is 10.3% higher than houses without garages. Given the current average Philadelphia house

[3] These types of regressions are termed "hybrid hedonic regressions", and are commonly deployed in the fields of urban and real estate economics. The regressions were computed using all arms-length sales of houses and condos in Philadelphia since 2012, when the local housing market began to recover. For further technical details on these types of regressions, see: Rosen, Sherwin, "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition," *The Journal of Political Economy*, Vol. 82(1), Jan.-Feb. 1974, pp 34-55.

[4] In the interest of brevity and readability, I report the regression results in visual form. The actual regression output can be found in the appendix to this paper. Technical questions about the regression procedure and its output can be directed to: Kevin.C.Gillen@Drexel.edu

price of $175,000[5], this implies a price premium of just over $18,000, which can be interpreted as the current average value of a garage in Philadelphia.

- Similarly, condos with parking spaces currently sell for an average of nearly 9% more than condos without parking spaces. Given the current average Philadelphia condo price of $320,000, this implies a price premium of $28,435, which can be interpreted as the current average value of a condo parking space in Philadelphia.

- Interestingly, the percent value of parking is higher for houses than for condos, but the opposite is true for their dollar values. There are multiple potential (but non-competing) explanations for this:

    - A garage is typically larger than a condo parking space, and is also a sheltered structure that has the possibility for greater functionality than a simple parking space. For example, it can also be used as a workshop or for storage. Hence, its percent contribution to a dwelling's value could be expected to be greater than the percent contribution of a simple unenclosed parking space.

    - Condos are disproportionately high-rise structures located in high-density areas with relatively high land costs; e.g. Center City. Since the cost of development is much higher in such locations, it would seem reasonable to expect that the dollar price of a parking space to be higher, in order to cover the cost of providing that space; esp. in a multi-story parking garage.

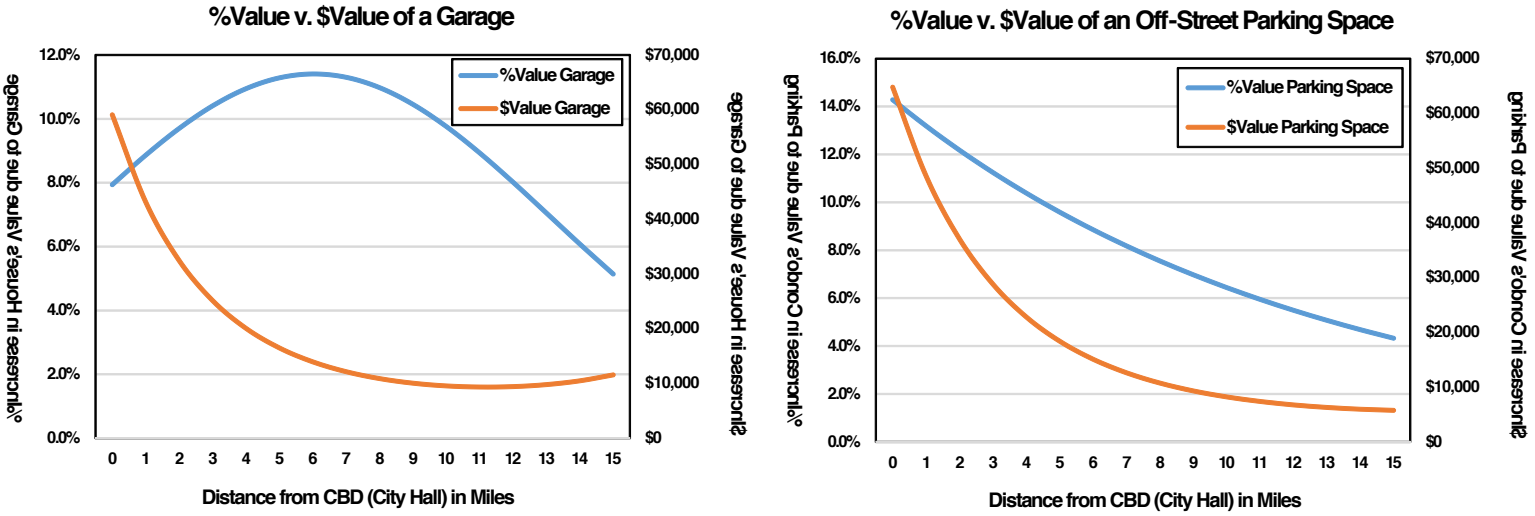
    - Houses are disproportionately located in lower-density neighborhoods whereas condos are located in higher-density neighborhoods. It may be that households who choose to live in houses choose to do because of a relatively stronger preference to own and use a vehicle, whereas condo dwellers are more likely to be drawn to the walkability and high concentration of amenities that downtown living offers, and so have either a lesser need or desire for a vehicle. Thus, the importance of parking is greater for homeowners rather than condo owners, which can explain the higher percent premium for parking that homeowners are willing to pay.

    - Lastly, the typical cost of a single-family house in Philadelphia is substantially lower than the typical cost of a condo: $175,000 v. $320,000, currently. So, even though the percent premium for parking is higher for homeowners, it still results in a lower dollar premium when multiplied against the (lower) price of a typical house.

[5] All house price data courtesy of the City's Recorder of Deeds, as-of 2017 Q1.

The results indicate that parking clearly has value to Philadelphia households. However, they also indicate that this value can have significant variation with respect to how it is measured (% v. $), the type of lifestyle (house v. condo), and the type of parking (garage v. parking space). Moreover, all of these are likely to be correlated with both the location and relative density of development, since the overall demand and supply for parking will vary significantly with these factors.

So, a second set of regressions was estimated that measure how the willingness-to-pay for parking varies with location (and thus density[6]) across the city. This was done by first creating a variable that measures the average cost of parking in core Center City, which is geographically defined as being within one mile of Philadelphia's City Hall. Then the parking variable was interacted with each dwelling's distance from City Hall, which is measured in miles. Lastly, a squared term of the latter variable was also computed and added to the regression to allow for any nonlinearity in the resulting pricing equation. The results measure how the value of parking changes with distance from Center City.



The chart on the left shows how the value of a house with a garage changes as distance from Center City increases, while the one on the right shows the same thing but for a condo with a parking space. The blue lines represents the percent change, while the orange lines represent the dollar change. Distance from the CBD (City Hall) is plotted on the horizontal axis, with distance increasing as you move from left to right. For both charts, the percent value of parking is plotted on the left-most vertical axis, while its dollar value is plotted on the right-most vertical axis. The results are interpreted as follows:

- In core Center City (<1 mile from City Hall), parking clearly has a high premium in both percent and dollar terms. It is 8% for houses and 14.3% for condos. In dollar terms, this is a price premium of nearly $60,000 for houses and nearly $65,000 for condos.

[6] The density of housing essentially declines almost perfectly monotonically with distance from Philadelphia's CBD, from high-rise condos and apartments in core center city, to attached 3- and 4-story houses in the neighborhoods immediately adjacent to it, to attached 2-story rowhomes in the next ring of neighborhoods, to semi-detached and detached homes in the most distant neighborhoods.

- In Center City, the percent premium of parking is nearly double for condos than for houses, but the actual dollar value for condo parking is only slightly higher than for a house. Note that this is the opposite of what was found citywide, where houses had the higher percent premium but lower dollar value. The reason is simple: on-street parking is very scarce downtown, and condo parking spaces are overwhelmingly likely to be in mid-to-high rise parking garages (or even underground), which is far more expensive to construct than a ground-level single-car garage attached to a house. Thus, in prime downtown locations, condo buyers not only place a higher premium than homebuyers do on parking, but are forced to pay a higher price for it as well.

- As distance from core Center City increases (i.e. as you move away from downtown), the percent value of parking actually increases for houses before beginning to decline again at further distances. From a distance of zero miles to a distance of six miles from City Hall, the percent value of a garage climbs from nearly 8% to a peak of 11.4% before reversing direction and declining to a low of 5.1% in the outermost neighborhoods of the city. This indicates that homeowners in the inner-to-middle ring neighborhoods around Center City place a greater relative value on parking than either core Center City homeowners or homeowners on the city's periphery.

- For condo properties, the relationship between the value of parking and location is much simpler: it drops steadily in percent terms as proximity to Center City declines. Each additional mile further from Center City is associated with an average decline of 8.4% in the value of a condo parking space. However, this relationship is also nonlinear: the value of a parking space drops rapidly as you move out of Center City to adjacent neighborhoods, but then begins to drop at a slower pace. For example, the percent value of a condo parking space drops from 14.3% in core Center City to 9.6% at five miles from Center City, but then drops to only 6.4% ten miles from Center City and then to just 4.3% fifteen miles from Center City.

Thus, there is a markedly different spatial pattern in the percent value of parking for houses v. condos. In the case of houses, the neighborhoods where private parking has the highest value are neighborhoods of middling-density. These areas of historically high housing density (i.e. attached rowhomes) but of relatively low population density (due to depopulation), and so on-street parking was readily available and hence many homeowners chose to own a car. But, the recent growth in both new housing and new residents has created a relative scarcity of parking, and this has driven up the market value of private parking.

But, unlike Center City, these neighborhoods do not have a high enough density of jobs, amenities or transportation options to make a car-free lifestyle desirable or even possible. And, there is also the possible historical and cultural inertia of vehicle ownership: many of these long-term residents have been accustomed to owning a car, and although recent developments have made it relatively more difficult and expensive to do so, it has not been enough to make them willing to relinquish their vehicles altogether.

But this is not the case for condos, for which the percent value of parking steadily declines with distance from downtown. This can be explained by the fact that—regardless of their location—condo projects tend to be of relatively higher-density than single-family homes.

While this might initially seem to suggest that condo dwellers should always place a higher, and not lower premium on parking, this overlooks the location and design of condo properties: in contrast to single-family houses, condos tend to be more likely to be located very close to major transit stops (esp. rail) and on commercial corridors where retail and dining options are relatively plentiful. Moreover, many condo projects are of sufficient scale that they can support their own on-site grocery store, drugstore and dry cleaner, thus reducing the need for a car. Consequently, the desire for walkability and the relatively greater and accessible supply of amenities and transit options reduce the relative demand for parking for condo residents, regardless of their location; e.g. Center City or outer neighborhood.

In the case of the dollar value of parking, however, both homeowners and condo dwellers exhibit much more similar willingness-to-pay for parking:

- The prices of both garages and parking spaces decline steadily as distance from Center City increases.

- From a peak of just over $59,000 in core Center City, the value of a garage declines by an average of about $4,500 per mile with each mile from Center City, although this decline is more rapid for the first few miles than for the later ones.

- From a peak of nearly $65,000 in core Center City, the value of a condo parking space declines by an average of just under $4,000 per mile with each mile from Center City. Like garages, this decline is larger for the first few miles than for the subsequent ones.

- However, the dollar value of a garage hits its low of $9,349 at mile eleven, and then begins to modestly rise again to a value of $11,566 at mile fifteen, which is the maximum distance from Center City.

- By contrast, the value of a condo parking space declines continuously with distance from Center City, bottoming out at $5,767 at mile fifteen.

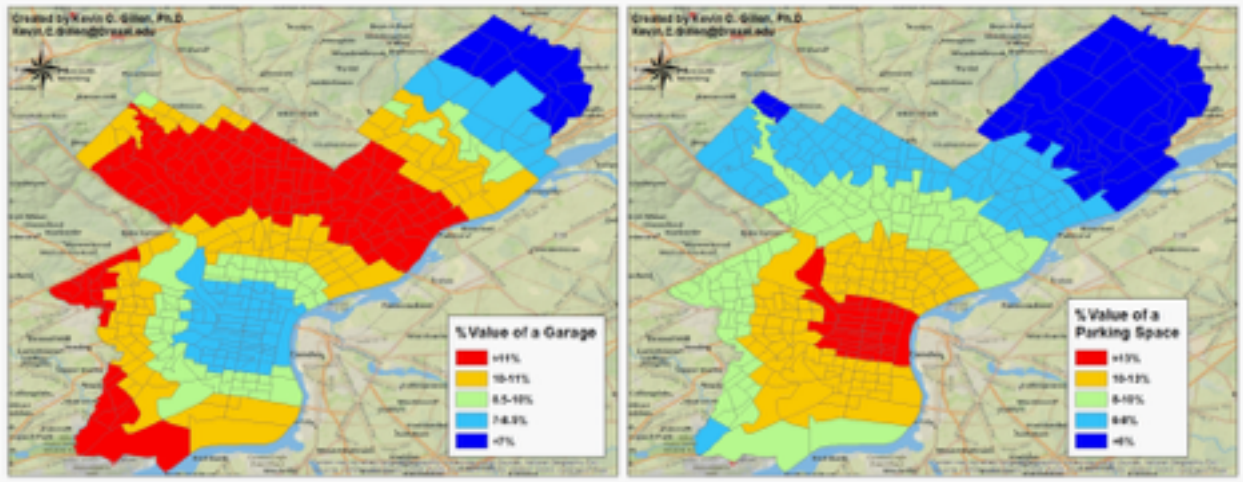
The fact that the dollar value of parking steadily drops with distance from downtown should not be surprising: land values—and hence the cost of providing parking—generally decline with distance from downtown. Moreover, the density of housing development also declines with distance from Center City (which is also driven by declining land costs). With lower density, there is greater availability of free or low-cost on-street parking. Hence, since there is both a greater supply of public parking and a lower cost of providing it, its price falls.

The fact that the price of parking actually starts to increase again for garages in the outermost neighborhoods but not for condos simply has to do with the difference in property prices between the two. The price of housing in far Northeast or Northwest Philadelphia is significantly higher than in the middle neighborhoods of North, West or South Philadelphia. Eight miles from Center City, the average price of a house is $91,000, but at mile fifteen it is $219,000. For these same distances, the comparable numbers for condos are $137,000 and $130,000, respectively. Although homeowners at a distance of fifteen miles have a higher

percent preference for parking compared to condo owners (5.1% v 4.3%), the substantially higher price of houses over condos at this distance results in a mathematically higher dollar value of parking. Hence, the fact that garages have a dollar value that is approximately double that of condo parking spaces simply reflects the higher overall house prices in these outermost neighborhoods, rather than because of a strong preference for parking by homeowners v. condo owners.

To provide a more geographically explicit depiction of how the value of parking varies across individual neighborhoods, the following maps color-code each Census Tract in Philadelphia by the percent value of a garage and parking space, respectively, based upon the distance of each Tract from City Hall and the median price of dwelling at that distance[7]:

Percent Value of a Garage **Percent Value of a Parking Space**



The map on the left shows the typical percent increase in the price of a house that has a garage, while the one on the right shows the same for a condo with a parking space. A temperature color ramp is used to color-code each Tract by the percent increase, with warm colors (orange, red) denoting neighborhoods where parking has a relatively high percentage value and cool colors (light and dark blue) denoting neighborhoods where parking has a relatively low percent value[8].

The maps clearly show the different spatial patterns in the percent value of garages v. parking spaces. In Center City and its immediately adjacent neighborhoods, the inclusion of a garage to a house typically increases the home's value by 7-8.5%, as denoted by the light blue Tracts in the center of the map on the left. By contrast, the inclusion of a parking space to a condo in Center City increases its value by more than 13%. Moreover, the data indicates that the geographic definition of Center City is much more stringent for the condo market than for

[7] These maps implicitly assume that house prices in Philadelphia follow an isotropic process: that is, they vary with distance from downtown, but not with direction; e.g. north v. south v. west. While dwelling prices in general decline as distance from Center City increases, the particular rate of decline can indeed change with respect to what direction is being examined. Future research should address this.

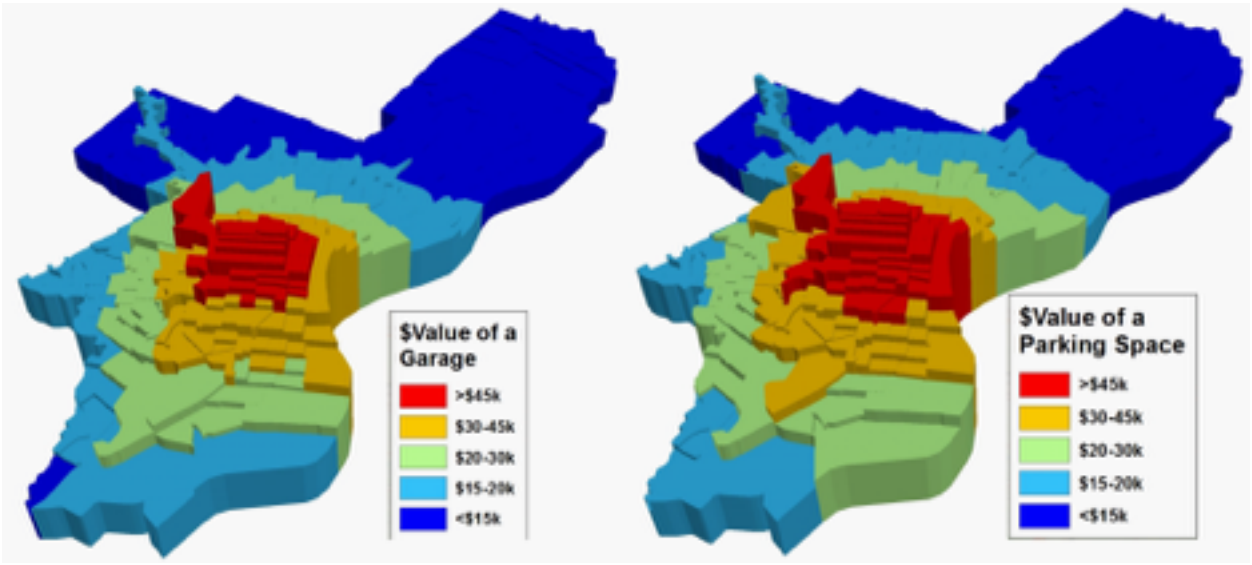
[8] The break points in the color ramp are based upon the quintiles of the distribution of %value; i.e. they are chosen such that exactly 20% of all Tracts fall into one of the five color categories.

the housing market, as denoted by the red area in the map on the right being smaller than the light blue area in the map on the left.

As you move outwards from Center City, the percent value of a garage increases for houses, as Tracts transition from light blue to green to orange and then to red, which denotes those areas where the percent value of a garage is highest: >10% of a house's value. The opposite is true for condo parking spaces, which decline continuously in percent value as distance from core Center City increases, before hitting their bottom of less than 6% in the outermost (and low-density) neighborhoods of Northwest and Northeast Philadelphia.

To demonstrate how this variation changes when percent values are converted to dollar values, the following maps show the typical dollar value of a garage v. parking space, using the same color scheme as in the percent value maps. However, for extra visual impact, the height of each Tract is extruded by the dollar value of its parking, with taller Tracts representing areas where the dollar value of a garage or parking space is relatively high.

Dollar Value of a Garage **Dollar Value of a Parking Space**



As expected, the high red tracts in Center City are those neighborhoods where parking (whether garage or space) commands the highest dollar premium. However, this dollar value for condos appears to be somewhat higher than for houses, as evidenced by the fact that the red Tracts in the map on the right appear to be higher than the red Tracts in the one on the left. And, this dollar value for condos also appears to decline more slowly than for houses as distance from downtown increases. This likely reflects the fact that providing parking for condo dwellers in Center City is more expensive than providing garage spaces for houses: condo parking spaces in Center City are overwhelmingly located in mid-to-high-rise parking ramps—or even underground—which are both far more expensive structures to build than a single one-story ground-level garage. However, despite the fact that condo parking seems to command both a higher and (geographically) broader price than garage parking does for houses, both types of parking steadily decline in their dollar value as distance from Center City increases, as evidenced by the drop in the height of each Census Tract as this distance increases.

In summary, the results strongly indicate that Philadelphians do place a real value on parking, and are willing to (implicitly) pay a real dollar price for it. However, this value can vary significantly by type of parking, density and the location of the dwelling that the parking is attached to. While the dollar price of parking is highest in the high-density and expensive location of Center City, the highest preference for parking is actually from homeowners in the traditional (but transitioning) working-class rowhome neighborhoods that are between three and eight miles from core Center City. For condo owners, the willingness-to-pay for parking declines steadily in both percent and dollar value with distance from Center City. This willingness-to-pay can be interpreted as how much residents are willing to pay for a parking space, and can thus help to inform how much the city can charge for parking and what homebuilders can expect homebuyers to pay for a dwelling that includes a parking space.

What further implications does this have for the proposed bill mandating additional parking for any new housing development? The effects of this bill, if implemented, are likely to be most strongly felt by four groups: developers, existing residents, future residents and city (elected) officials:

- **For developers:** these results present clear and explicit numbers for what buyers of houses and condos in Philadelphia are willing to pay for private parking. If these prices exceed what it costs you to provide a parking space, then you can pass the cost of the bill's mandate onto the eventual buyers or renters of your project. If not, then there will be a strong incentive to build fewer—but larger and more upscale units—at a given site, in order to both reduce the number of parking spaces you are obligated to provide while simultaneously amortizing the cost of parking over a higher-priced dwelling. In the extreme, if there is no feasible price point at which the cost of the parking mandate can be passed on to buyers, then the project may have to be foregone altogether. Which choice you make will affect the other three stakeholders.

- **For existing residents:** If developers can easily and completely pass on the cost of additional parking to consumers, then the direct impact on you will be minimal. However, if this cannot be done, and they elect to build fewer, but larger and more upscale units in your neighborhood, this will have the desirable result of reducing parking congestion in your neighborhood, but at the undesirable consequence of increasing and accelerating gentrification. There will be fewer residents moving in than otherwise, but their higher incomes and higher property values will likely cause your property tax bill to go up and many traditional neighborhood retailers to be replaced by more upscale ones (goodbye McDonald's and Shop-Rite, and hello Starbucks and Whole Foods). This in turn will increase the desirability of your neighborhood for other high-income households, resulting in another round of upscale homebuilding, and further making the neighborhood less affordable and more gentrified. At the other extreme, if this mandate is onerous enough to kill any sizable new homebuilding altogether, this will drive down land values—and hence all property values—in these neighborhoods. While this may solve the problems of gentrification and parking congestion, it will be at the price of reducing your home's value, and perhaps leading to neighborhood decline and disinvestment altogether as existing homes continue to depreciate away without being replaced by new homes.

- **For future residents:** Developers will try to pass this cost on to you, and perhaps rightly so since it is your decision to move into these neighborhoods that is straining the supply of existing parking. If so, then future new housing in Philadelphia will cost more than it would otherwise because of the mandated addition of parking. Housing will thus consume a greater percentage of your total income, thus reducing your disposable income and thus leading to an overall lower quality of life as you are forced to reduce expenditures on other categories of spending. If you can't pay for this cost, or are just unwilling to, then this will drastically reduce the flow of future new housing in Philadelphia, and hence the flow of new residents.

- **For city officials:** The best case scenario is that future residents and homebuyers are both willing and able to pay the higher cost of housing that this bill will necessitate. Although this will leave them with less disposable income than otherwise, the fiscal impact is likely to be small; e.g. revenues from sales or liquor taxes being less than otherwise. The second-best case scenario is that developers can fully absorb the cost of the mandate themselves. However, considering that we have the highest poverty rate (25%) of any large U.S. city, the fourth-highest construction costs (source: RS Means) and a very modest inflow of new residents compared to other large U.S. cities, it seems likely that at least some of the costs of this mandate cannot be completely covered by outside parties and must be passed on to both new and existing residents. In this case, the next-best scenario is one where developers will build fewer total units, but what they do build will be larger and more upscale than they would otherwise, in order to cover the additional cost of providing parking. A consequence of this will be that Philadelphia will not only attract fewer new residents than it would in the absence of this mandate (since there will be fewer new homes and the ones that are built will be less affordable) but also that there will likely be further gentrification, and at an accelerated pace (since new home construction will be skewed to larger, more upscale and hence higher-priced units). In the worst-case scenario, in which the cost of providing parking puts any new housing projects into the red, then development will cease altogether in these neighborhoods (especially outside of Center City). The short-term outcome of this will be reduced housing wealth for existing residents, and under-investment and outright dis-investment in the housing stock of affected neighborhoods. The long-term outcome will be a reduced population, a depreciated housing stock, reduced property values and eventually a reduced tax base.

Finally, while a full review of the existing academic literature on the economics of parking mandates is outside the scope of this paper, it may be worth summarizing the main findings from one of the first and most prominent research papers[9] in this literature: In 1961, the City of Oakland, CA changed its zoning code to mandate that developers of new residential construction build one off-street parking space per each new dwelling unit they constructed. In 1964, a researcher at the University of Berkeley decided to examine the effects of this mandate. He collected data on construction costs, unit size, density and rents for apartment buildings constructed in Oakland between 1957 and 1963. Of these buildings, 45 were developed before the zoning change and 19 were developed afterward. He computed the average values of the property characteristics separately for

[9] Bertha, Brian A. In Smith, Wallace F.: The Low-Rise Speculative Apartment. University of California, Berkeley: Center for Real Estate and Urban Economics.

pre- and post-zoning change properties and then compared them. His findings were as follows:

1) The median construction cost per dwelling unit was 18% higher for properties built after the zoning change.
2) In response, developers built fewer but larger units, resulting in lower housing density: for post-zoning change properties, the median number of units per acre dropped 30% and the median number of units per building declined 36%.
3) The average dwelling rent was higher for the post-change units.
4) Profit margins for new development were substantially reduced: the median profitability for post-change buildings was 52.2% lower than for the pre-change buildings.
5) Because of the reduced profit margin, construction of new housing in Oakland became skewed towards more upscale higher-priced product, and thus higher-income households, which resulted in less workforce and affordable housing being developed, and by implication, increased gentrification.

At the time of the change in its zoning law, Oakland was a predominately blue-collar city with a housing stock disproportionately composed of modest attached rowhomes of workforce housing. In other words, it was very similar to the Philadelphia neighborhoods that this bill is intending to help.

For any questions or suggestions for future research topics, please contact Kevin.C.Gillen@Drexel.edu.

Although Dr. Gillen holds a position as a Senior Research Fellow with the Lindy Institute for Urban Innovation at Drexel University, the findings and opinions presented in this paper are solely those of the author and do not necessarily reflect the views or opinions of either the Lindy Institute or Drexel University.

APPENDIX

Regression 1: Citywide regression measuring the average value of a parking space:

Variable	Description	Est. Coeff.	t Value	Adj. R-sq.	%Value	$Value
Garage	=0 if house has no garage, =1 if it has a garage	0.09835	10.49	84.81%	10.3%	$18,086
Parking Space	=0 if condo sale doesn't include a parking space, =1 if it does include a parking space	0.08513	1.97	80.14%	8.9%	$28,435

Regression 2: Citywide regression measuring the average value of a parking space as a function of distance from the CBD[10]:

Variable	Description	Est. Coeff.	t Value	Adj. R-sq.
Garage in Center City	=0 if house has no garage, =1 if it has a garage and is located in CC	0.07639	2.14	74.81%
Dist_CBD*Garage	=Distance from City Hall (in mi.) interacted with Garage variable	0.11998	6.45	74.81%
Dist_CBD_sq*Garage	=Dist_CBD squared interacted with Garage variable	-0.00993	-2.93	74.81%
Parking Space in Center City	=0 if condo sale doesn't include a parking space, =1 if it does include a parking space and is located in CC	0.13351	2.97	77.10%
Dist_CBD*Parking	=Distance from City Hall (in mi.) interacted with Parking variable	-0.07959	-3.46	77.10%
Dist_CBD_sq*Parking	=Dist_CBD squared interacted with Parking variable	-0.03289	0.25	77.10%

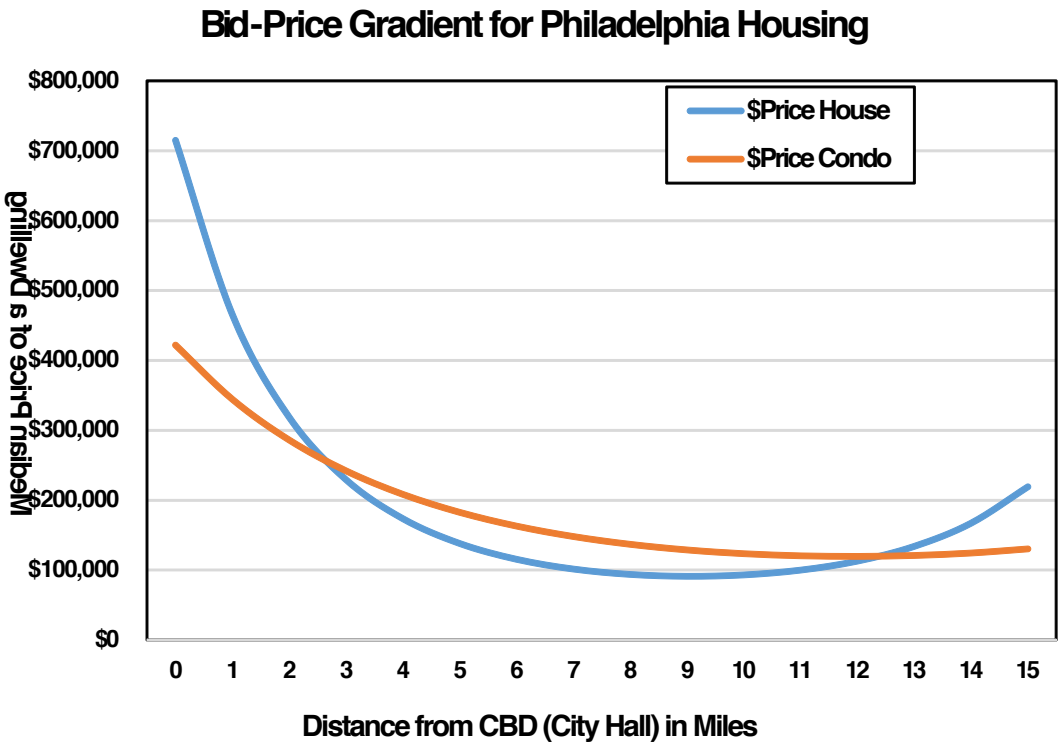
The dataset used to estimate the value of a garage contained 19,933 arms-length sales of single-family homes that occurred since 2012.

The dataset used to estimate the value of a parking space contained 9,061 arms-length sales of residential condo units that occurred since 2012.

Note: Because a semi-log regression specification was used and the fixed effects for parking took values of zero or one, the resulting coefficients for these effects had to be exponentialized and then have one subtracted for them to obtain the true percent value of parking. For example, the coefficient for the simple citywide value of a garage is 0.098355. Exp(0.098355)-1=0.103354=10.3%, which is what the regression results indicate how much the inclusion of a garage increases the average price of a house in Philadelphia. For details, see: Kennedy, P. E. (1981). Estimation with correctly interpreted dummy variables in semilogarithmic equations. *American Economic Review*, 71, 801.

[10] "CBD"=Central Business District, the center of which is designated as Philadelphia's City Hall.

Regression 3: Bid-Price Gradient for Philadelphia Housing



This plot shows the median price of a house or condo at different distances from City Hall. It was computed via regression using the same home sales data as the previous regressions. The values in this chart were used to convert the percent values of parking to dollar values.