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Why Is Manhattan So Expensive?

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EXECUTIVE SUMMARY

Over the past 20 years, the price of apartments in Manhattan has increased twice as fast as the rest of the nation. This has not been the case historically. Between 1950 and 1980 real prices in Manhattan remained relatively flat.

This study finds that the difference between pre-1980 Manhattan and today is increased regulatory constraints on housing supply. From 1980 onwards, there has been a marked drop off in the number of new apartments in Manhattan—despite a growing economy, robust demand, and escalating prices. By restricting the supply of new apartments, these regulations exert a "zoning tax" on housing prices that is responsible for much of the high cost of housing in Manhattan.

This study estimates the amount of the zoning tax by measuring the gap between real estate prices and housing construction costs. It finds that:

- The physical cost of construction for high-rise apartment buildings in Manhattan ranges from $150 to $200 per square foot (ft^2).
- Prices for both owner-occupied and rental units in Manhattan are two to three times above construction costs. Between 1984 and 2002, the mean and median condominium sales prices in Manhattan were about $468 / ft^2 and $455 / ft^2, respectively (in 2002 dollars). Prices were higher still during the last year of the study sample, in which the median price was $606 / ft^2 and the mean price was $621 / ft^2. The prices for cooperative units were $382 / ft^2 during the 1990s.
- 50% or more of the total price of the median Manhattan condominium—or $200+ / ft^2—is attributable to the zoning tax. For cooperative units the zoning tax is $110 / ft^2 for the median unit, and $182 / ft^2 at the mean. This translates into a tax of 25% and 48%, respectively.
- Half of the condominium owners in our study incur capital costs from the zoning tax ranging from $5,000 to over $25,000 per year.
- Some restrictions on development are beneficial, since they can prevent overcrowding, traffic congestion, or a severe drain on local services. In that sense, the zoning tax should be set equal to the additional costs new residents impose on a community. But analysis shows that the cost of current zoning regulations on Manhattan housing prices far exceeds any benefits that they might confer. On net, the study finds that an efficient zoning tax for Manhattan condominiums should be less than 20%. The current zoning tax in Manhattan is 50% on average, roughly three times the social costs generated by new development.

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WHY IS MANHATTAN SO EXPENSIVE?

Introduction

To many, the high price of Manhattan real estate may seem like a permanent feature of the city's economy. But this static view of the city is false. The past 20 years have seen a remarkable explosion in the price of Manhattan apartments. In 1980, according to the U.S. Census, the median value of an owner-occupied housing unit in Manhattan in 2002 dollars was $245,633. In 2000, the median value was $377,246, implying an average annual compounded real appreciation rate of 2.2 percent. This is roughly double the national average real appreciation rate on the widely-used Freddie Mac Repeat Sales Price Index. Figure 1 shows that such rapid price growth has not always been the norm, as real prices were relatively flat between 1950 and 1980.[1]

Why has Manhattan in particular become so expensive? Strong demand, of course, is a prerequisite for high prices. The financial services sector is a key driver of demand, and the past two decades have been remarkably good for Wall Street and finance more broadly. In 2002, 40 percent of the wage payroll in Manhattan was generated by the financial sector, broadly defined. This industry has stayed in the city to a surprisingly large degree, instead of moving to office parks in the suburbs. Manhattan's comparative advantage has always been proximity and as information has become even more valuable, the benefits of being in this densely populated financial capital appear to have remained strong. In addition, the New York area has been a beacon for immigrants, and Manhattan undoubtedly has benefited from this. Between 1983 and 1997, there were 1.65 million legal immigrants into the New York metropolitan area, about 20 percent more than the 1983 population.[2]

While the benefits of urban centralization and attractiveness to immigrants help explain the robust demand for Manhattan residences, high prices do not just reflect higher demand. During an earlier era, economic expansion had a much smaller impact on housing prices. Indeed, throughout vast areas of the U.S., housing prices have remained moderate despite massive economic growth.

The difference between New York in 1950 and New York today, or between New York today and the high growth areas of the Sunbelt today, is housing supply. The key to keeping housing prices down in a growing local economy is to allow developers to build new units.[3] As Figure 1 makes clear, during New York's earlier heyday tens of thousands of new units were built. Throughout the 1990s, there were only 21,000 new units permitted in Manhattan. In contrast, there were over 13,000 new units permitted in Manhattan in 1960 alone.

Two Economic Theories of Housing Development

Why have developers not built new apartments in Manhattan? Roughly speaking, there are two candidate theories to explain this behavior. First, is the classic economic theory that emphasizes the role of construction costs and land prices. According to this perspective, the constraints on development are available land and the physical cost of construction. If a fundamental scarcity of land or a technical constraint pertaining to building tall structures caused an increase in production costs, then new units would not generate enough profit to warrant the risk of bringing them to market.

The second theory is the regulation model of housing markets. According to this framework, restrictions on supply are not natural, but are the result of government policies that make it extremely difficult to build new homes. From this perspective, there is not a fundamental scarcity driving up prices, but a man-made one. While limits on construction can take many forms, we will use the general term “zoning” to refer to all such limits whether they involve actual zoning laws or other regulatory restrictions on supply.

Manhattan is an island. Is there a fundamental scarcity of buildable space that has developed over time that, when coupled with strong recent demand, is responsible for today’s high prices? This is unlikely. Even if vacant land is rare, new units can be supplied by ‘building up’. This possibility leads us to a simple test to distinguish between competitive and regulated housing market values—namely, whether price is equal to the marginal cost of production. One of the strongest implications of the classic theory (indeed, of any economic theory) is that in an open, competitive, unregulated market, the price of a commodity will not be greater than the marginal cost of producing that commodity. If such a gap did exist, then suppliers would face strong incentives to produce more of the commodity in question. Competition among suppliers would ensure that prices are pushed down to marginal costs. This logic holds as strongly for Manhattan housing as it does for hot dogs.

Given the difficulties of accurately measuring or estimating the value of land, this makes Manhattan, a market dominated by multi-story residential buildings, an excellent laboratory for our analysis. Because additional land is not required on the margin, the production costs of an extra housing unit in this market can be well approximated by the physical costs of adding an extra floor of space. Land shortages may limit certain types of development in Manhattan, but builders always can add one extra story if new housing units are needed. Thus, our primary test to distinguish between the classic free market model and the regulation model is to compare the price of Manhattan housing units with construction costs, as reflected in the physical costs of building up.

Overview

Using a rich dataset on condominium sales in Manhattan, we find that the mean and median prices per square foot over the 1984-2002 period are about $468 and $455, respectively (in 2002 dollars). Prices are higher still during the last year of the sample, in which the median price is $606 / ft^2 and the mean price is $621 / ft^2. The values of cooperative units are lower, but still are high, with the mean price during the 1990s being $382 / ft^2. We also examined the rental sector, but do not focus on those results for measurement-related issues discussed below. In any event, we estimate the value of a rental unit in Manhattan from the perspective of a landlord to be quite high, at nearly $340 / ft^2 for free market units.[4]

How do these market prices compare to construction costs for an additional square foot of space? Our primary source on apartment construction costs is the R.S. Means Company. Their data indicate that the physical cost of construction among high-rise apartment buildings in Manhattan is about $160 per square foot. While data on construction costs are less reliable than data on apartment prices, a variety of other sources (described below) largely confirm the accuracy of the Means information, with construction costs ranging from $150 to $200 per square foot depending upon the underlying quality of the structure and various other factors. In any event, the gap between construction costs and apartment prices is so vast that it is hard to believe that measurement error in building costs can be responsible for the difference in any meaningful way.

By any measure, Manhattan apartment prices have risen far above construction costs. Asset values are roughly double physical production costs even if one uses the high end of the construction cost estimates. This gap implies that high home prices today have much more to do with regulation than with the economics of a free market in land and buildings.

We then turn to two different sources of data to provide corroborating evidence on whether Manhattan is better characterized as a free or regulated market. One is on the homogeneity of building heights for new construction. In a free market, the height of a building is determined by demand for apartments, the price of land, and the cost of building up. Developers facing the same incentives, in the same neighborhoods, should build similar structures. As such, buildings that are close to one another should have the same height. In Manhattan, however, heights (even of new buildings and ones that are quite physically close) are extremely variable, a fact that further supports the importance of zoning.

In addition, we look to the relationship between price and quantity changes in the housing market. We show that permitting activity was strongly positively correlated with lagged price changes in the 1960s and 1970s, a pattern we would expect in a well-functioning, unregulated market. However, overall permitting levels have dropped significantly since then, even as overall economic activity has surged. In fact, there is no correlation between price changes and future permitting activity in the 1980s or 1990s. Seemingly, developers were prohibited from entering the market even when prices were (and remain) quite high. This is consistent with our conclusion that regulation accounts for the significant gap we find between prices and construction costs in recent years.

We conclude this paper by asking whether the current zoning tax could be efficient. This is highly unlikely, given the enormous impact of the tax. Our study finds that 50% or more of the price of the median Manhattan condominium—\$200+ / ft^2—is attributable to the zoning tax. For cooperative units the zoning tax is \$110 / ft^2 (25% of market value) for the median unit. For example, this means that the annualized cost of the zoning tax for Manhattan residents is enormous. Half of the condominium owners in our study incur increased costs from the zoning tax ranging from \$5000 to over \$25,000 per year.

Of course, allowing new development would entail its own costs. For example, valuable views may be destroyed if unlimited ‘building up’ is allowed. In addition, increased building may result in more urban congestion, thereby undermining local amenities. Finally, zoning restrictions can help local workers by keeping competition out of the local labor markets. Nonetheless, the zoning tax ought to be equal to the social costs new residents impose to ensure that housing costs do not act as a net drain on the Manhattan economy.

While convincing welfare analyses of zoning are notoriously difficult to perform, Manhattan provides perhaps the best possible laboratory imaginable. Adding (say) 50,000 housing units and the workers in them would not change the nature of the local economic or social environment in this case. Some admittedly back-of-the-envelope calculations of the impacts of zoning on views and congestion externalities lead us to conclude that the current level of zoning restrictions is inefficiently high—and by a fairly wide margin. Our best estimate is that the current gap between an efficient zoning tax and the current zoning tax is three times the social costs that would be generated by new development.

The Zoning Tax

In this paper, we measure the gap between real estate prices and housing production costs, and use that differential to argue for the presence of large distortions in the housing market.[5] That said, a gap between prices and costs can arise for other reasons.[6] For example, the presence of natural scale economies can result in a natural monopoly (or oligopoly) in an industry, resulting in price markups over marginal costs. However, the housing production industry is extremely competitive, with no natural barriers to entry. The *1997 Economic Census* reports that there were 138,850 builders of single-family homes. While there are a huge number of small, ‘mom and pop’-type operations, there also are more than 1,700 builders with revenues in excess of \$10 million. The multifamily housing industry is only slightly less concentrated. In 1997, there were 7,544 builders in this industry and more than 1,000 in New York State alone. In the absence of land use controls, it is hard to doubt that residential construction would come as close as possible to the economic ideal of a perfectly competitive industry.

After ruling out imperfect competition in the home construction sector, we will begin using the term "zoning tax" [7] to refer to the difference between unit production costs and prices so that

(1) Zoning Tax = Market Price of a Housing Unit – Production Cost of that Unit.

While this paper will focus on multifamily dwellings, especially those in Manhattan, the next subsection reviews the evidence for a zoning tax on single-family houses in markets around the country. Our empirical strategy of comparing market prices to production costs is more difficult to implement for suburban, single family markets due to the absence of controls for heterogeneity in land quality. For single-family units, the cost of bringing an additional unit to market equals the sum of land costs and the physical costs of construction. While data on construction costs are always debatable, there exist reasonable measures of the cost of putting a physical structure in place. The absence of high quality land cost data poses greater difficulty, which we will discuss more fully below.

We then turn to a more detailed analysis of the New York City market, and of Manhattan in particular. As discussed in the Introduction, construction costs for the marginal unit in this market equal the cost of building up, and those costs can be estimated much more reliably via knowledge of physical costs alone. Our focus on Manhattan also is helpful because we also believe that the welfare consequences of zoning in New York are more straightforward to estimate than the welfare consequences of zoning elsewhere.

The Zoning Tax Across U.S. Metropolitan Markets:
Construction Costs and Prices of Single Family Housing Outside of New York

The housing price data used in this subsection come from the metropolitan area surveys of the *American Housing Survey* (*AHS*). More specifically, we use the data for 21 metropolitan areas tracked in the 1998-99 special Metropolitan files of the *AHS*. The house price data employed are for single unit residences that are owner occupied.[8] Thus, the typical house in these samples is a single family, suburban unit. The *AHS* data include self-reported home values, lot size, and a number of other physical attributes of the housing unit including living area square footage. Because the *AHS* contains no information on building costs, we turn to the R.S. Means Company for data on that variable. This firm surveys local developers and reports construction costs per square foot of living area. Their data on construction costs include material costs and labor costs, but not costs associated with land.[9]

The Means data contain information on four qualities of homes—economy, average, custom, and luxury. The data are broken down further by the size of living area (ranging from 600ft^2 to 3,200ft^2), the number of stories in the unit, and a few other differentiators. In our comparisons with house prices from the metropolitan files of the *AHS*, we presume that construction costs are those associated with the mean of economy and average quality homes. Holding constant the size and other physical traits of the unit, construction costs for an average quality home are about 40 percent higher than those for an economy quality home according to the Means data. Thus, our estimates of construction cost reflect modest quality, but not the lowest possible quality that meets building code requirements.[10]

While there are various adjustments that need to be made to the data before comparing house prices to construction costs[11], the biggest difficulty with this procedure is in inferring the free market price of land. While it is obvious that a large zoning tax implies high land prices, the converse need not be true. Although subtracting physical construction costs from total house value certainly does provide a measure of land value, it does not inform us about the size of the zoning tax. For example, this estimate of land value will only equal the free market price of land if the implicit zoning tax is zero. Hence, to estimate total production costs for housing units that use land, we need an independent estimate of the free market price of land.

The discussion above can be more readily understood by rewriting the expression for the zoning tax for the typical suburban home in the *AHS* samples as

(2) Zoning Tax = House Price – Physical Construction Cost – 'Free Market' Land Value.

Subtracting physical construction costs from house value yields the value of land. Further deducting our best estimate of the free market price of land leaves us with the amount of overall house value that can be attributed to the zoning tax. Stated differently, the extent to which the value of land exceeds what it would cost in a truly free market reflects the impact of zoning and other regulatory constraints on home building.

The *AHS* data can provide an estimate of 'free market' land price via a standard housing hedonic that expresses the value of a house to a buyer as a function of its various characteristics, including the amount of land on which it sits. The estimated coefficient on land area will reflect the degree to which the market valuation of a house increases with lot size. However, there are two reasons to suspect that this estimate may not actually reflect the true, free market price of land on the margin.

The first issue arises from the fact that the very existence of zoning regulations implies that there is not a free market for land. In this case, the relevant cost of land is its opportunity cost, which reflects the amount of utility that will be lost by current landowners if their land is used for new homes. Since hedonic estimates are meant to capture the extent that consumers value attributes, the land coefficient still can reasonably be thought of as estimating the cost of land. However, it should be understood that the price of land that is being estimated is the opportunity cost of land to current homeowners, not the free market price of land. The second problem involves specification bias arising from the possibility that the amount of land may be correlated with omitted housing characteristics. If houses on bigger lots tend to be of higher quality (in ways that we cannot explicitly control for), the resulting specification error will bias the coefficient upwards for land value. On the other hand, omitted characteristics will bias the coefficient downwards if houses on bigger lots are built where land is cheap.

Hedonic estimates of the value of land per square foot (in 2000 dollars) for the 21 metropolitan areas surveyed in the two most recent waves of the metropolitan files of the *AHS* are reported in Table 1 (see column 3).[12] The metropolitan area files provide a relatively large number of observations, thereby allowing us to estimate attribute prices fairly precisely, and cover a fairly wide cross section of places in the most recent survey years.[13]

The results from column three of Table 1 indicate a wide range of prices across metropolitan areas, ranging from 13-15 cents per square foot in Birmingham and Houston to about $4 per square foot in the Bay Area communities of San Francisco and San Jose. While there clearly are some high price places, these data suggest that consumers in most areas place a relatively low value on land on the margin. In 16 of the 21 metropolitan areas, the estimated price is below $1 per square foot. In the two lowest price areas of Birmingham and Houston, the hedonic land values imply that a typical homeowner would be willing to pay no more than $1,400-$1,600 for an extra quarter acre of land.[14] Even in the Baltimore and Salt Lake City metropolitan areas, in which we estimate the price of land to be from $0.83–$0.88 per square foot, a quarter acre of land is valued at no more than $9,040. On the other hand, the hedonic price of land is much higher on the West Coast. Using the $4 per square foot average of the prices in the two Bay Area metropolitan areas surveyed implies that a quarter acre is valued at well over $40,000.

While these calculations obviously take some liberty with the meaning of a small change in the quantity of land, they do illustrate that the value of land as measured by these hedonic prices is not likely to constitute the bulk of the total value of the typical home in most of these metropolitan areas. This is evident by comparing the quarter acre land values discussed above with the mean home prices (in 2000 dollars) reported in column four of Table 1.

The final column in Table 1 reports our estimate of the zoning tax as a percentage of average house value in the metropolitan area. The tax itself is calculated as in equation (2), with the Means Company data used to proxy for physical construction costs and the hedonic estimates used to proxy for the free market price of land. Note that the zoning tax is zero or negligible (defined as less than 10 percent) in over half the markets.[15] However, the tax exceeds 10 percent of average home price in nine market areas (Boston, Los Angeles, New York, Newport News, Oakland, Salt Lake City, San Francisco, San Jose, and Washington, DC). While the 12 percent figure for the New York metropolitan area is interesting for comparison purposes with the results we find below for Manhattan, the impact of regulation on land values is much higher in other markets, especially those on the west coast. In Los Angeles, Oakland, San Francisco, and San Jose, the zoning tax amounts to from one-third to one-half of the mean home value. In Boston, Newport News, and Washington, DC, the zoning tax constitutes about one-fifth of total property value.[16]

Thus, the evidence suggests a very significant role for zoning restrictions in accounting for high single-family housing prices in a select set of primarily coastal markets, identified from a diverse set of metropolitan areas recently tracked by the *American Housing Survey*. Of course, given the assumptions that are needed to estimate land costs, some skepticism is warranted. To address this concern, we now turn to an analysis of apartments in Manhattan.

Construction Costs and Prices across Manhattan Residences

How Expensive is Manhattan Real Estate?

Our first set of information on prices comes from condominium sales records in Manhattan from the First American Real Estate Corporation. These originate from deeds records and represent actual transaction prices over the period 1984 to 2002. All sales prices reported in this section are converted into 2002 dollars using the Consumer Price Index. And, as our construction cost data are generally on a per square foot basis, we will also convert our price data into per square foot measures.

We have a large sample of 23,060 condominiums spread throughout Manhattan. While there is considerable variation in the data, the basic numbers suggest that Manhattan condo units have been selling for around $460 per square foot over the past two decades. Prices are generally high, and the small difference between the median value of $455 per square foot and the mean value of $468 per square foot indicates relatively little skewness in the distribution (see the top row of Table 2). While there is a considerable upper tail reflecting apartments that cost much more than $500 per square foot, the high mean value is not being driven by a few outliers.

The variation in prices reflects both differences in the physical infrastructure of the apartments and the difference in neighborhood amenities. Since our goal is to compare condominium prices with construction costs, we obviously are concerned about our inability to measure all aspects of physical apartment quality. However, unless neighborhood attributes specifically impact construction costs, the variation in prices that is related to neighborhood amenities will not bias our results. Indeed, in a truly free market, these amenities would not create a gap between construction costs and prices. More attractive neighborhoods would have higher demand, and would simply end up having taller buildings.

In the second and third rows of Table 2, we report data from the *New York City Housing and Vacancy Survey* (NYCHVS) for comparison purposes. Our *NYCHVS* sample combines all independent observations in Manhattan from the years 1991–1999. This widely-used data set has two failings relative to our condominium sales data. First, it is much smaller. We have only 156 observations of condominiums in Manhattan and 165 for the outer boroughs. Second, the price data relies on self-reported market values, not actual sales data. Even given these issues, the Manhattan data from the *NYCHVS* look remarkably similar to the condominium sales data. The mean price per square foot is $500, which is only slightly higher than what actual transactions show (and which corresponds well with our priors and the literature on the upward bias of self-reported values). The median price per square foot is $461, which is extremely close to the $455 value that we observe in the condominium sales data.

However, the data on condominiums in the outer boroughs suggest that the housing market outside of Manhattan is extremely different (row 3, Table 2). The mean price per square foot in the outer boroughs is $149 / ft^2, with the median value even lower at $120. These results do not call into question the Manhattan data, but they do remind us that New York's hot housing market is a very localized phenomenon. The outer boroughs are still full of much less expensive housing.

In the remaining panels of Table 2, we examine prices by apartment size, building height, number of units in the building, and over time. Interestingly, there is little relationship between apartment size and value per square foot except among the largest apartments, which are more expensive. All else being equal, larger apartments should be somewhat cheaper to build on a square foot basis because they have a fixed amount of some forms of infrastructure. Of course, all else is not equal and we believe these differences reflect omitted quality factors. The largest apartments almost certainly are nicer along other dimensions, so that it is likely that higher prices also reflect higher quality.

Not surprisingly, there is a tendency of prices to rise in value with building height. The average price per square foot for condos in buildings with between 10 and 20 stories is $400, while the average price per square foot in buildings with more than 40 stories is $573. These price differences presumably reflect two factors. First, apartments in taller buildings have better views. Second, taller buildings will tend to be more modern and perhaps be of higher quality.

We also see a pattern whereby prices are higher in larger buildings. The price per square foot is around $400 in the smaller buildings (i.e., those with <20 units), but rises to over $500 for units in large buildings (i.e., those with >200 units). Again, it is unclear if this price differential reflects better views or other characteristics that might be related to building size.

Finally, we find large increases in the price per square foot during the latter few years of our data set. Prices were high in the 1980s and fell a bit during the recession in the 1990s. They then recovered—rising steadily in the second half of the 1990s and ending up at a level more than $100 / ft^2 above the previous high in the 1980s.

In Table 3 we look at the distribution of condominium prices by geographic location within Manhattan. Eighty-three percent of our sales occur in four neighborhoods that are closest to the midtown business district: the Upper East Side, the Upper West Side, Turtle Bay / Stuyvesant and Midtown. Approximately 10 percent of our sales also occur in the Greenwich Village / Financial District neighborhood. Less than five percent of the sales occur in the Lower East Side, Harlem, Morningside Heights and Washington Heights.

The most expensive area in the data set is the Midtown area where prices per square foot averaged $515, with the median unit selling for $490 / ft^2. The Upper East Side was the next most expensive area with a mean price of $509 / ft^2. The Upper West Side was only slightly less costly with a mean value per square foot of $494. Stuyvesant / Turtle Bay had the biggest representation in our sample, with over 6,000 units. The mean price in that neighborhood was $436 per square foot. Units in the financial district and Greenwich Village were somewhat cheaper with an average cost per square foot of $416. The Lower East Side apartments were cheaper still, valued at an average of $373 dollars per square foot, which is still expensive but almost one-third cheaper than the top price neighborhoods. The remaining three neighborhoods, Morningside Heights, Washington Heights and Harlem, appear to be quite different. In these neighborhoods, prices were generally below $250 / ft^2, and often well below $200 / ft^2. Indeed, values in these neighborhoods look more like the outer boroughs than the rest of Manhattan.

This neighborhood level evidence suggests that there is variation in prices across Manhattan, with the uptown areas being considerably cheaper. Nonetheless, there is a fair amount of uniformity across large parts of the borough. Prices are regularly above $400 per square foot and, in many neighborhoods, almost one-half of the apartments cost more than $500 / ft^2.

Next, we turn to less exhaustive data sources to examine the prices of cooperative and rental apartment units. Within the owner-occupied sector, we have focused on condominiums rather than cooperatives because we are concerned that sales prices of cooperatives may not reflect the true cost of ownership due to their more complex ownership structures and allegedly high maintenance fees. Nevertheless, they do represent a significant fraction of the city housing stock so they clearly warrant study despite concerns about data quality.

Information on the distribution of self-reported market value per square foot using Manhattan coops in the *NYCHVS* is reported in the top row of Table 4. The mean value is $382 / ft^2, with the median sale price being $310 / ft^2. These values are lower than the reported values of condominiums, but they still are quite high compared to housing in the outer boroughs. Holding unit and building quality constant, we would expect the absence of a straightforward, fee simple ownership status to result in lower values for cooperatives because property rights are valuable. Furthermore, the average reported monthly fee associated with these coops is $600 / month, which is about $200 more than the average reported for condominiums in our sample, and at least partially reflects the fact that coop buildings have independent debt.[17] Even with our concerns that reported values for cooperatives do not fully reflect the cost of owning the unit, these results clearly indicate that high prices are pervasive throughout the owner-occupied sector of the Manhattan real estate sales market, and are not confined solely to condominiums.[18,19]

The Costs of Production

We now turn to our data on the costs of production. Our primary source for construction cost data is the R. S. Means Company, which surveys developers throughout the United States. Given that no data source is perfect, we supplement the information from Means with three other sources. One is Marshall & Swift, a rival construction cost service. Second, we use estimates from the New York University (NYU) Center for Real Estate and Urban Policy. The ultimate source of their data is Zaxon, a third construction cost service. Finally, we use data on condominium costs outside of New York City using the *American Housing Survey*. It should be emphasized that, in this section and throughout the remainder of the paper, these construction cost data pertain to multifamily and condominium / cooperative-type product (i.e., these are different from the single family cost data discussed in a previous section).

The top panel of Table 5 reports construction costs for apartment buildings by height that are specifically adjusted for the geographic area of Manhattan by the R.S. Means Company. Consistent cost data are available for structures of less than 25 stories. Physical construction costs range from $140–$160 per square foot for structures up to 24 stories tall. Taller buildings are modestly more expensive to build, although the Means data indicate that marginal costs are constant within a wide range of heights above seven stories.[20] If we interpret the Means data as applying to buildings shorter than 30 stories, these estimates apply to 88 percent of the buildings in our condominium sample. The *NYCHVS* topcodes building height at 20 stories, with 80 percent of the observations in multifamily structures within Manhattan having fewer stories. Thus, the vast majority of Manhattan residences are in a building type that is comparable with the Means cost estimates, and it appears that the marginal cost of increasing the height of a typical residential structure is about $160 / ft^2.[21]

As an initial check on the reliability of these data, we turn to a separate set of estimates provided by the Marshall & Swift Company (see the next panel in Table 5). These costs also are specific to Manhattan, but this firm provides a bit more detail with respect to the different qualities of apartment buildings. Overall, these estimates span the results from the R.S. Means Company. Costs for an average or good quality apartment building are about $50 per square foot less than the costs reported by Means; costs for what is termed an average quality, luxury apartment are about the same as Means reports; and costs for a high quality, luxury apartment are about $50 per square foot higher than Means calculates. Using this data, the maximum construction cost per square foot is about $220 per square foot for a high-end residential building in Manhattan.

Yet another source of construction costs comes from a report prepared by Salama, Schill and Stark for the NYU Center for Real Estate and Urban Policy in 1999. They report evidence from Zaxon Inc., another construction cost estimator. These estimates, adjusted to 2002 dollars, indicate a construction cost of about $193 dollars per square foot for a 15-story apartment building, and $134 per square foot for a six-story building. These data are very much in line with the Means numbers, although the marginal cost for an extra floor appears to be somewhat higher in these data. In addition, the NYU numbers are slightly below the cost of a high quality unit according to Marshall & Swift.[22]

Our final piece of evidence on construction costs relies on condominium prices from the *American Housing Survey* for areas outside of New York City. As long as the property market has not been trending downward (which is the case for most of the 1990s), sales prices should represent an upper bound on construction costs because developers also need to turn a profit.[23] The *AHS* data for Chicago indicate that the average price per square foot of condominiums is $144 / ft^2. In buildings with more than 10 stories, the price per square foot is $148. In the rest of the United States, the price per square foot of condominiums is $129. This estimate rises to $176 / ft^2 if we look only at buildings with more than 10 stories.

Although part of the price differential across locations may be attributable to differences in construction costs, the R.S. Means data suggest that the difference in construction costs across metropolitan areas is relatively small. For example, Means estimates that construction costs are 19 percent higher in the New York area than in Chicago. As such, 1.19 times sales prices in Chicago represents yet another estimate of construction costs in New York. Of course, to the extent that there might be a “zoning tax” in other areas as well, this method will overstate construction costs.[24] Taken together, these data strongly suggest that something near $200 / ft^2 is a reliable upper bound on construction costs for the vast majority of Manhattan apartments.

The Zoning Tax in Manhattan

Consequently, in computing the zoning tax as the difference between construction cost and asset price, we will use $200 per square foot as our estimate of construction costs. We recognize that there will be a small number of apartments that actually cost more than this amount to build, but in most cases this value will overstate, not understate, true construction costs. When combined with the fact that reported asset values of older units are not adjusted for depreciation (see footnote 22 for those details), we believe these assumptions make it highly unlikely that any estimate of the zoning tax will be biased upwards.

Figure 2 begins the comparison by plotting the distribution of price-to-construction cost ratios for condominiums in Manhattan. Note that very few units have price-to-construction cost ratios below one. In fact, 93 percent of our sample is valued at more than construction costs, with nearly two-thirds (63 percent) being worth more than twice construction costs. For an overwhelming majority of Manhattan condominium owners, this suggests that zoning (and other regulation) has meant that their cost of housing is more than double what it would be under a free market development policy.[25]

Figure 3 charts the same information for our smaller sample of cooperative units. Nearly three-quarters of these units have price-to-cost ratios above one, and one-third of this group is valued at more than double construction costs. Thus, it is clear that the zoning tax is meaningfully positive for this segment of the housing stock in Manhattan as well.[26]

For the median Manhattan condominium in our sample, the zoning tax amounts to well over half of the total price of the unit.[27] Even for a condo from the 25th percentile of the price distribution, the zoning tax makes up just over 40 percent of the \$339 / ft^2 total cost. For cooperative units, the measured zoning tax is smaller on average, but still is economically significant. The tax is \$110 / ft^2 for the median unit and \$182 / ft^2 at the mean. As a percentage of overall unit value, the tax amounts to 25 and 48 percent, respectively, for the median and mean cooperative units in Manhattan. [28]

Translating these zoning tax figures into annual capital cost terms can help illuminate the economic impact of these results. For simplicity, we presume the annualized cost can be approximated by the multiple of the real cost of capital (or the real interest rate) and the component of housing prices that we estimate to be the result of zoning (i.e., the zoning tax).[29] While real rates of interest currently appear to be quite high by some calculations[30], we use a more conservative estimate of 3 percent for the real cost of capital to current borrowers. The top panel of Table 6 reports the distribution of the annual zoning tax burden for owners in our condominium sample. For half of the sample, this estimate of the annual flow cost of the zoning tax to condominium owners exceeds \$5,500 per year, or about 9 percent of mean annual wages in Manhattan. A quarter of the sample is paying at least \$9,668 per year, with the mean flow value of the zoning tax being \$7,382. At a more detailed level, for 31 percent of our sample the zoning tax burden appears to lie between \$5,000 and \$10,000 per year. For another 12 percent, the burden lies between \$10,000 and \$15,000 per year. Yet another 8 percent of the sample pays between \$15,000 and \$25,000 per year. Finally, 3 percent of the sample has a zoning tax burden that is greater than \$25,000 per year.[31, 32]

Is Other Data Also Consistent With a Zoning Explanation?

Finally, we examine two additional pieces of data to see if they exhibit patterns consistent with our zoning-based explanation of the gap between market prices and production costs. First, we investigate the relationship between changes in prices and changes in quantities in the housing market. Second, we look to the degree of homogeneity in the heights of buildings constructed in the same neighborhood of Manhattan within a given decade.

Permitting and Prices

In a free market, one would expect increases in housing prices to lead to more new construction, but this need not be the case in a regulated market where zoning chokes off new supply. Figure 1 already suggests that there has been a marked drop off in permitting in Manhattan over the past two decades, a period over which real house prices rose in excess of 2 percent per annum. In order to look at the relationship between prices and quantities a bit more closely, we regressed the number of permits issued in Manhattan in a given year on the change in prices during the previous year.[33] Figure 4 then plots the data and the regression line for four different time periods dating back to 1955.

The 1955–1969 period was a time of relatively modest real price changes, but any meaningfully positive appreciation typically was associated with a high level of permitting activity the following year. A similar, but less strongly positive correlation is observed for the 1970s in the adjacent plot. The variability in real price changes was greater between 1970-1979, but the association of larger price appreciation with higher future permitting activity is still clearly evident.[34] Were this pattern to hold during the 1980s and 1990s, it clearly would be at odds with our conclusions that this is a market in which zoning restrictions play an important role. However, the bottom two graphs in Figure 4 document that changes in prices are not correlated with future permitting activity in the 1980s and 1990s.[35]

Although these simple regression plots obviously do not concretely identify a supply-demand framework (something that is well outside the scope of this study), they do strongly suggest that the supply side of the housing market was able to respond much more flexibly to higher demand in earlier decades. One indication that housing demand continued to be strong in the 1980s and 1990s is per capita income, which skyrocketed during the past two decades. The decennial census reports that real per capita income in Manhattan increased by 74 percent from $26,703 to $46,349 (in 2002 dollars) between 1979 and 1999. Thus, an examination of changes in prices and quantities is consistent with rising housing demand that was not met by changes in supply. These conditions could easily have led to the present situation in Manhattan in which the market price of the typical unit is at least double its production cost.

Heterogeneity of Building Heights

Our final piece of supporting evidence comes from an examination of the heterogeneity of heights of buildings in Manhattan. Consider the starkly simplified problem of a developer facing a fixed price at which he can sell each square foot of living space.[36] The total living space that is built by the developer will equal the base of the property (again measured in square feet) times the height of the building. The cost of construction is a function of height times the square footage of interior space. This maximization problem is fundamental to the basic Alonso-Muth-Mills model (as in Brueckner (1986)) and takes the form:

(3) Profits=Price*Base*Height-Land Cost*Base-C(Height)*Base*Height

where the cost of construction per square foot, C(Height), is function of height. Profit maximization implies that the developer will choose base and height to satisfy the following two conditions:

$$(4)\quad \text{Price} = \frac{\text{Land Cost}}{\text{Height}} + C(\text{Height})$$

$$\text{Price} = C(\text{Height}) + C'(\text{Height}) * \text{Height}$$

These conditions equate the marginal returns to new space (i.e. the price) with the marginal cost of that space. There are two ways of increasing the amount of space: building up or building out, and profit maximization requires that the marginal cost of the two should be equal.[37] If this were not true, and (say) the construction costs associated with developing a slightly taller building were less than the costs associated with expanding horizontally (e.g., buying the land and putting up a series of short structures), then profit-maximizing developers would begin bringing taller high-rises to market.

Equating the two conditions implies that Land Cost = C'(Height). This result has powerful implications for building heights within a given neighborhood or local market area because it implies that developers facing the same land prices and physical cost function will construct their buildings to roughly the same height. Stated differently, if it makes economic sense to build to 20 stories on one block, it typically will make good economic sense to build to the same height on the adjacent block.

Table 7 sheds light on the distribution of building height by neighborhood using our data for condominiums that were constructed in Manhattan during the 1980s.[38] Even with this small sample, it is clear that uniformity of height is not common within neighborhoods. For example, our sample contains eight buildings that were erected in Midtown during the 1980s (see column two). The heights of these buildings range from 4 stories to 70 stories. In the Upper East Side, there were seven buildings put up during this time period, and they range from 1 to 32 stories. While this represents only a cursory look at new construction, a stroll around Manhattan makes our basic point plain: there is a tremendous amount of variability in the heights of buildings that are in close proximity to one another. This is the case even if we compare buildings that were constructed within a fairly narrowly defined time period.

The heterogeneity of building heights we observe is hard to square with a pure free market view of housing supply, but it is not necessarily inefficient. It is to that issue—whether the current level of zoning is economically appropriate—that we now turn.

Land Use Controls: A Welfare Analysis

In the preceding sections, we have documented the existence of a large zoning tax in New York, and in other expensive parts of the U.S. The existence of such a tax is not necessarily inefficient. Indeed, much of the literature on zoning (see Fischel, 1985) has argued that land use controls are absolutely necessary to get developers to internalize the social costs of their actions. In a nutshell, the zoning tax should be set equal to the marginal social cost of a new resident on a community.

In New York City, the zoning tax should incorporate at least three elements. First, and most obviously, the zoning tax should reflect the fact that a new apartment may eliminate views of existing apartments. Indeed, most current height restrictions exist for exactly that reason. Second, the new development should be taxed for the externalities created by extra crowding or agglomeration economies. Pure wage effects (i.e., the fact that more workers will depress wages) are pecuniary, not real, externalities and the usual economic logic suggests that these effects should not be part of the zoning tax. Third, the zoning tax should reflect the fiscal burden of the new resident. The fiscal burden should be defined as the difference between government expenditures on the new resident and the taxes that the resident will face. We will address all of these components of the ideal zoning tax in turn.

While welfare analyses of zoning are inherently difficult to perform, Manhattan provides perhaps the best possible laboratory for estimating social costs. Adding even a large number of housing units and people will not change the basic nature of the place, a factor that makes our evaluation much more straightforward. That said, our results are most properly viewed as educated guesses, not precise estimates.

Estimating the Value of Views Destroyed by New Construction

The view-related externality is perhaps the most straightforward to estimate. For each new apartment, the view-related externality equals the number of views blocked by a new apartment times the welfare cost of blocking a view. The number of views blocked should reflect the marginal impact of a single new apartment given the existing structure of apartments in New York.

In a world with homogeneous consumers, the welfare value of a view should equal the current market price of a view, which can be estimated by comparing apartments with or without views.[39] Benson, et. al. (1998) have recently reviewed the existing literature on hedonic estimates of the price of a view. Estimates vary, but a typical result suggests that a good view raises the value of the property by about 10 percent. However, most of this literature uses cross sectional data on single family homes and often estimates the value of a view associated with some type of natural resource such as the ocean or a mountain range. Hence, the relevance for our problem of the value of an urban view is somewhat limited.

Consequently, we decided to compare the prices of condominiums in the upper and lower floors of the same building using our sample of Manhattan condos, which covers 20,426 units in 518 apartment buildings. We regressed price (in log form) on the square footage of the unit (also in log form) and a series of dummy variables controlling for the floor of the unit and a measure of unit size. Specifically, we included a dummy variable (I_{11-20}) that takes on a value of one if the unit is on floors 11–20, another dummy variable (I_{21-30}) that equals one if the unit is on the 21st-30th floors, and yet another (I_{31+}) for units on or above the 31st floor of their buildings. The regression results were as follows

$$\text{(5)}\quad \text{Log(Price)} = \underset{(.006)}{.08} \bullet I_{11-20} + \underset{(.009)}{.16} \bullet I_{21-30} + \underset{(.01)}{.23} \bullet I_{30+} + \underset{(.008)}{1.00} \bullet \text{Log(Square Footage)}$$

The regression also includes building-specific fixed effects and year-of-sale fixed effects that are not reported here. Standard errors are in parentheses and the R^2=0.59.

We are most interested in the coefficient on the I_{31+} indicator variable that effectively captures the difference in the prices of condos on the bottom ten floors of the building relative to those above the 30th floor. Fully recognizing that this coefficient of 0.23 is likely to overstate the value of a view[40], the results suggest that the difference in value between being really high up in a building and being on the first ten floors is about 25 percent of unit price, which we use as our estimate of the value of a view.[41]

How many apartments' views does a new apartment block? No economic literature on this topic exists. To us, it seems like one should be an upper bound on this number. After all, the worst outcome possible is that no apartments have any views, and this would mean that on average each apartment blocks one other apartment's view. Of course, it is easy to contemplate lower numbers. For example, it is also possible to imagine tall buildings spaced far enough from one another (perhaps in the Corbusier Radiant City) so that no views are blocked. We take 0.5 as a reasonable middle ground and we will use this value as our estimate.

Given the assumptions, each new apartment destroys one-half of a view of some other apartment. Since the loss of one complete view would reduce the value of the apartment by 25 percent, each extra dollar of tall building will lead to about 12.5 cents of lost view.[42] This finding suggests that lost views are not likely to amount for more than 10–15 percent of the total value of new housing. As such, views alone suggest that apartments should face a construction related "zoning" tax equal to approximately 12.5 percent of their value.

Congestion Externalities

The second possible source of externalities that could justify a large zoning tax is crowding. If people find living in a crowded place distasteful, or if crowds make it difficult to commute to work, then it is sensible to tax new residents for the costs they impose on current residents. There is a question about whether the appropriate zoning tax should be based on the gross or net congestion. Gross congestion can be thought of as the social costs imposed on New Yorkers created by one more apartment in New York. Net congestion is the social costs imposed on New Yorkers by having one more apartment minus the social costs alleviated by having the apartment located somewhere else. If the population density in this alternative location is much lower, the social cost of congestion generated by adding an extra apartment there will be lower than the social cost of congestion in New York. Thus, net congestion will be positive. Perhaps in an ideal system, all localities would charge fully for the gross congestion cost to that locality. However, if some localities are not charging (as Table 1 suggests is the case) then it seems like the appropriate tax should be based on net congestion costs.

There are many reasons to think that the net congestion cost imposed by an extra apartment in New York might be positive. Given New York's specialization in high density, we suspect that congestion externalities might actually be lower in Manhattan than anywhere else in the country. First, the island does not have a bucolic, rural character that would be spoiled by new residents. Second, residents of Manhattan overwhelming take public transportation or walk. Indeed, only 11 percent of Manhattan residents in the 2000 census reported driving alone or carpooling to work. Congestion does matter on the sidewalks or the subways, but it is far less important than when driving, mostly because people without cars take up so much less room than people with automobiles. If one accepts these arguments, then it seems quite likely that the relative congestion effect of moving to New York (versus whatever alternative locale) is likely to be negative. By turning a car driver into a subway rider, congestion on net is reduced rather than increased. Moreover, urban residents of Manhattan move there in part to be around other people. This is a congestion amenity, not a disamenity.

While we suspect the net congestion externality may be positive, we do not try to estimate it, especially since it would be determined by the relevant alternative locale. Instead, we will attempt to estimate the size of gross congestion externalities, which should be thought of as the cash value of the total loss of utility on everyone in Manhattan created by a new resident. The natural means of estimating this value is to see whether rents, holding income constant, rise or fall with city population. If people demand a compensating wage differential for living in a more densely populated city, then a natural measure of urban amenities is the real income in the metropolitan area. In this case, income will be low in cities where amenities are high and high where amenities are low. As such, if the distaste for crowding is large, then we should expect to see a strong relationship between real income and city size.

Using the 193 cities in 1990 with population levels greater than 100,000, we estimate the following regression:[43]

$$\text{(6)}\quad \text{Log(Median Rent)} = \underset{(.64)}{-3.4} + \underset{(.06)}{1.04}*\text{Log(Per Capita Income)} - \underset{(.016)}{.05} * \text{Log(City Population)}$$

Standard errors are in parentheses, and the R^2=0.58.[44] The –0.05 coefficient on log population indicates that rents fall only modestly with increases in population, income held constant. The fact that a one percent increase in population causes a .05 percent decrease in rents suggests that people are paying less (holding income constant) in more populated places. This supports the idea that there is a modest-size gross congestion externality.[45]

While there certainly are reasons to question these estimates (e.g. the endogeneity of the variables discussed just above in footnote 47), they strike us as reasonable benchmarks for the value of the congestion externality in New York. Using this estimate, a 1% percent increase in city population reduces the utility level (measured as a share of housing costs) by one-twentieth of one percent. Another way to phrase this to say that with an extra 1% of population in New York, the value of all homes will drop by one-twentieth of one percent due to congestion externalities. This argues for an additional five percent zoning tax on new apartments due to these congestion externalities.

Wage Effects

An additional issue involves the impact of new apartments on wages in New York. There are some reasons to think that this impact should be ignored. First, if it is driven through standard labor market effects, then these are pecuniary rather than real externalities. Second, in many cases, new apartments will lead to a redistribution of population from the suburbs to the central city and will not change the total size of New York's labor force.

The very direction of the impact of additional workers on wages in Manhattan is not at all clear. Although standard estimates in the labor economics literature find the slope of the demand curve to be steeply downward-sloping[46], those estimates do not pertain to our analysis because they hold output and capital constant. In our case, it is not reasonable to assume that more workers would be simply dumped into Manhattan with no reallocation of capital or additional local output.[47] Effectively, adding more people to the area will cause the demand for labor to shift out. Furthermore, urban agglomeration theory suggests that productivity also may increase, with firms passing on some of the gains to workers. Thus, the diminishing marginal productivity of labor notwithstanding, wages might well rise with city population.

In fact, empirical work by Ciccone and Hall (1996) and Glaeser and Mare (2001) finds that increasing population levels are associated with increasing—not decreasing—wage rates when one looks at the relationship across cities. If agglomeration economies were dominant as these results indicate, then zoning restrictions would impose an additional cost in terms of limiting city size. Our experimentation with a number of models sometimes yielded a negative impact on wages, but it never was large (in absolute value) or statistically significant.[48] Given this and the fact we cannot be sure that this reflects a real, not a pecuniary, externality, we include no labor market effects in the welfare analysis.

Fiscal Externalities from New Construction

The third and final category of social costs due to new construction comes through government taxation and expenditure. If new residents require far more in local government expenditures than they pay in taxes, then this would be yet another reason for potentially taxing new construction. Of course, one could argue that a sensible response to these fiscal externalities is just to charge new residents directly for the services that they use, instead of relying on the zoning tax. Still, it is worthwhile asking whether new residents in Manhattan condominiums create a net fiscal drain on New York City.

While compelling statistics do not exist, there are a number of good reasons to believe that new residents in Manhattan condominiums would represent a considerable fiscal transfer to, not from, the city. First, these residents tend to be rich. People living in apartments that cost more than $500,000 will tend to be far richer than the average New Yorker. As such, they are likely to increase the average income in the city. Second, these residents tend to have small numbers of children. On average, 23 percent of the residents of Manhattan are enrolled in school, as opposed to 27 percent for the city as a whole. The residents of expensive condominiums are also disproportionately likely to have smaller families and to enroll their children in private schools. These individuals are paying taxes for the use of schools and not using them, to the benefit of the government's budget. Finally, a number of government expenditures entail large fixed costs. For these expenditures, new population is an unqualified improvement since it allows those expenditures to be spread over a larger base. Altogether, we are quite confident that the residents of new condominiums in Manhattan, even if those apartments were priced at $200/ft^2$ rather than $500/ft^2$, are likely to be a fiscal boon, not a fiscal drain on the city. In a conservative spirit, we will just ignore these effects rather than put a dollar value on this effect.[49]

On net, our estimate is that the zoning tax for Manhattan condominiums should be about 17.5 percent—12.5 percent from blocking views plus 5 percent from crowding. The current zoning tax in Manhattan is roughly three times that amount. Even if one believes we have grossly underestimated the social cost of lost views or crowding by a factor or two, the zoning tax still is inefficiently high. And, when one recalls that we have been very conservative in not adjusting market values for depreciation, it is hard to escape the conclusion that zoning in Manhattan is far too restrictive.

Why is this so? Why has the city built far too few apartments? We can only speculate on these questions at this time, but there are at least three motivations for excessive zoning. First, current residents may behave like monopolists: current homeowners have strong incentives to reduce supply to boost their own home values. They are local monopolists protecting the place-specific amenities of their own neighborhoods. This will always lead localities to provide too few housing units to meet demand. Second, there may not be a mechanism for new builders to compensate current homeowners for any negative effects of construction. Even if the surplus created by a new home is positive, it still might not be possible for new buildings to compensate the losers from the construction in an appropriate manner. Third, there might be very poorly defined property rights that make it impossible to strike bargains that would get construction closer to the Pareto frontier. Hopefully, future work will help us to understand why the zoning tax in New York City is so much higher than it should be.

Conclusion

Housing supply is an enormously competitive industry with virtually no natural barriers to entry. Price markups over construction costs, therefore, are a strong indication of artificial barriers to new construction. In the bulk of the United States, the costs of producing housing are hard to estimate because of the lack of reliable data on the cost of land. Nevertheless, the data that are available strongly suggest that in expensive coastal areas especially, there often is a substantial gap between the price of housing and construction costs. This gap suggests the power of land use controls in limiting new construction.

In this paper, we measured the effects of barriers to construction by focusing primarily on condominiums in Manhattan. Since the cost of building an apartment is always the cost of building up, construction costs for apartments are much easier to estimate. Because building up does not involve using more land, we can use the physical costs of construction to determine the costs of building an extra apartment without knowing the underlying cost of land. After examining several sources, we find that $210 per square foot is about the maximum conceivable value of those construction costs in Manhattan. This level is high, but it is far below most condominium prices in Manhattan, which are now routinely two times that amount. As such, perhaps one half or more of the price of most condominiums in Manhattan can be thought of as the result of zoning preventing the construction of new housing. Other evidence also supports the importance of zoning. Over the past 40 years, we have seen a substantial contraction in the number of residential building permits. And, the remarkable heterogeneity of heights of new buildings within neighborhoods in the city also is consistent with a strong role for zoning.

We also attempt to address the welfare consequences of zoning. In principle, zoning need not be economically inefficient. However, our calculations imply that the “zoning tax” (i.e., the gap between housing prices and construction costs) is about three times greater than the social costs generated by new development.

Table 1: Hedonic Land Prices and Zoning Taxes, Select Metropolitan Areas from American Housing Survey Metropolitan Files

Metropolitan Area	Year	Hedonic Price of Land ($/square foot)	Average House Value	Zoning Tax/ House Value
Baltimore	1998	$0.88	$154,143	0.018
Birmingham	1998	$0.13	$114,492	0
Boston	1998	$0.68	$236,231	0.186
Chicago	1999	$1.62	$187,669	0.057
Cincinnati	1999	$0.40	$133,050	0
Detroit	1999	$0.37	$144,686	0
Houston	1998	$0.15	$103,505	0
Los Angeles	1999	$2.59	$260,744	0.339
Minneapolis	1998	$0.38	$144,719	0
New York	1999	$1.38	$253,232	0.122
Newport News (VA)	1998	$0.48	$127,475	0.207
Oakland	1998	$2.34	$284,443	0.321
Philadelphia	1999	$0.81	$135,862	0
Pittsburgh	1995	$0.70	$100,060	0
Providence	1998	$0.56	$148,059	0
Rochester	1998	$0.21	$109,050	0
Salt Lake City	1998	$0.83	$167,541	0.119
San Francisco	1998	$4.10	$418,890	0.531
San Jose	1998	$3.92	$385,021	0.469
Tampa	1998	$0.37	$103,962	0
Washington, DC	1998	$0.64	$213,281	0.219

Notes:
1. Hedonic prices of land were estimated using data from 1998 and 1999 metropolitan area surveys of the *American Housing Survey*. In some cases, areas were over sampled and included in the 1999 national file of the AHS. Four hedonic models were estimated. See the text and footnote 11 for those details. The prices reported here reflect the average of the prices associated with the second and third highest estimates across all four specifications (i.e., we discarded the highest and the lowest estimates and report the mean of the two remaining estimates).
2. The house price for each metropolitan area is the mean for the sample of single-unit homes with lot sizes less than two acres.
3. The computation of the zoning tax as a fraction of mean house value is as follows for each area j:

$$\frac{\text{Zoning Tax}_j}{\text{MeanHouseValue}_j} = \frac{\left\{ \dfrac{\text{MeanHouseValue}_j - CC_j}{\text{MeanLotSize}_j} - \text{HedonicLandPricePerSqft}_j \right\} * \text{MeanLotSize}_j}{\text{MeanHouseValue}_j}$$

Mean House Value and Mean Lot Size are metropolitan area-specific and pertain to the sample of single-unit, owner-occupied residences with less than two acres of land. See the first note for more on the hedonic price of land.

Table 2: Distribution of Price Per Square Foot for Condominiums in Manhattan

	# Obs.	Mean	25th Percentile	Median	75th Percentile
Manhattan[1]	23,060	$468	$339	$455	$572
Manhattan[2]	156	$500	$271	$461	$664
Other Boroughs[2]	165	$149	$89	$120	$177
By Unit Size[1]					
≤600 sq.ft.	5,460	$434	$311	$432	$534
600≤sq.ft. ≤800	6,722	$445	$339	$439	$542
800≤sq.ft. ≤1200	6,729	$472	$346	$460	$580
1200≤sq.ft.	4,149	$542	$378	$519	$680
By Building Height[1]					
≤10 Stories	3,686	$377	$252	$365	$474
10<Stories≤20	5,760	$400	$269	$385	$500
20<Stories≤30	3,199	$497	$396	$482	$577
30<Stories≤40	5,227	$498	$384	$489	$589
<40 Stories	4,788	$573	$438	$543	$678
By Building Size[1]					
<20 Units	1,063	$406	$256	$380	$526
20≤Units<100	5,548	$415	$285	$398	$513
100≤Units<200	5,729	$458	$338	$447	$562
≤200 Units	10,720	$506	$383	$488	$603
By Year[1]					
1984	700	$373	$221	$359	$488
1985	982	$451	$305	$450	$550
1986	1105	$467	$371	$482	$584
1987	1616	$507	$420	$505	$591
1988	2032	$518	$419	$498	$586
1989	1535	$515	$391	$484	$586
1990	911	$443	$340	$434	$516
1991	722	$421	$310	$383	$499
1992	755	$363	$273	$343	$426
1993	41	$385	$284	$379	$463
1994	87	$369	$279	$341	$431
1995	232	$354	$267	$342	$408
1996	1044	$353	$272	$331	$409
1997	952	$384	$284	$357	$433
1998	2114	$410	$315	$392	$476
1999	2484	$460	$366	$446	$533
2000	1873	$557	$451	$553	$652
2001	1642	$601	$503	$592	$696
2002	972	$621	$529	$606	$706

1. Source: Condominium sales records from First American Real Estate Corporation. Nominal sales prices are converted to real 2002 dollars using the Consumer Price Index.
2. Source: New York City Housing and Vacancy Survey. Price is the reported market value for owner-occupied condos. Unit square feet is imputed from the number of rooms using the average square feet/room from condos in the New York MSA of the American Housing Survey.

Table 3: Distribution of Price Per Square Foot by Geographic Area

	# Obs.	Mean	25th Percentile	Median	75th Percentile	Average Height[1]
NYC Condos						
Manhattan	23,060	$468	$339	$455	$572	27
By Neighborhood in Manhattan						
Greenwich Village/ Financial District	2,703	$416	$309	$405	$501	16
Lower East Side / Chinatown	711	$373	$240	$378	$474	7
Chelsea / Clinton / Midtown	4,086	$515	$355	$490	$648	34
Stuyvesant Town/ Turtle Bay	6,534	$436	$330	$443	$539	31
Upper West Side	3,913	$494	$361	$476	$592	24
Upper East Side	4,759	$509	$372	$490	$611	29
Morningside Heights / Hamilton Heights	18	$162	$130	$141	$190	5
Harlem	131	$277	$191	$245	$371	6
Washington Heights / Inwood	128	$169	$91	$162	$210	6

Source: Condo sales records. All nominal values are converted to real 2002 dollars using the CPI.
1. Average number of stories.

Table 4: Distribution of Cooperative Prices for Apartments in Manhattan

	# Obs.	Mean	25th Percentile	Median	75th Percentile
Owned Cooperatives					
Value per Square Foot	794	$382	$176	$310	$501

Table 5: Construction Costs

	Cost/sq.ft.
RS Means: Apartments in New York City	
8-24 story	$160
4-7 story	$144
1-3 story	$142
Marshall & Swift: Apartments in Manhattan[1]	
High-quality luxury apartments	$218
Average-quality luxury apartments	$156
Good-quality apartments, 3+ stories	$123
Average-quality apartments, 3+ stories	$96
NYU Center for Real Estate and Urban Policy[2]	
15 story luxury high-rise	$193
6 story mid-rise	$134
AHS Condos in Apartment Buildings[3]	
Chicago	$144
10<Stories	$148
US excl. NY MSA	$129
10<Stories	$176

1. Costs per square foot are from the Marshall & Swift Commercial Cost Estimator. Values are the average of reported costs for building classes A, B, C and D in November 2002.
2. Cost estimates are from Zaxon, Inc and converted to real 2002 dollars using the CPI.
3. Reported values are average price per square foot. Price is reported market value of owner-occupied units. Values are converted to real 2002 dollars using the CPI.

Table 6: The Distribution of the Estimated Zoning Tax in Manhattan, Annual Flow Cost Estimates for Condominium Owners

	# Obs.	Mean	25th Percentile	Median	75th Percentile
Manhattan Condos[1]	23,060	$7,382	$2,927	$5,554	$9,668

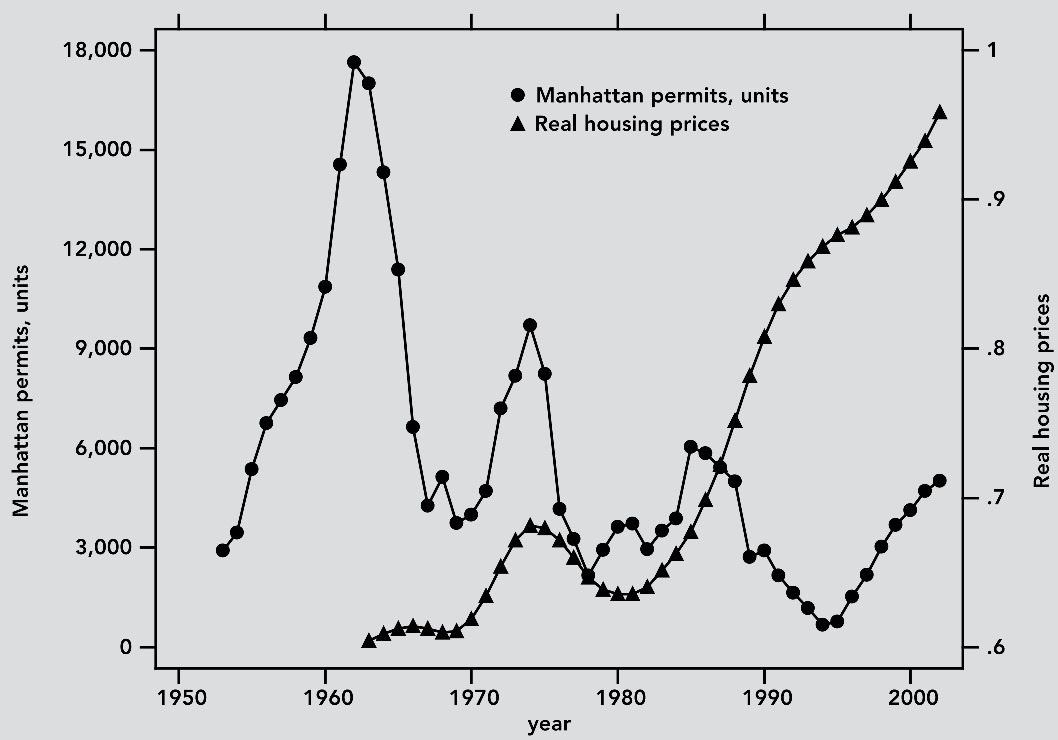
1. Source: Condo sales data from First American Real Estate Corporation. The zoning tax is calculated as the cost of capital times the difference between the sales price of a unit and estimated construction costs, where the cost of capital equals .03 and constructions costs equal $200/square foot times the size of each unit.

Table 7: List of Buildings by Height[1] in Neighborhoods of Manhattan, 1980s

Greenwich Village/ Financial District (#=4)	Chelsea/ Clinton/ Midtown (#=8)	Stuyvesant Town/ Turtle Bay (#=9)	Upper West Side (#=6)	Upper East Side (#=11)
6	4	5	4	1
16	21	13	5	4
18	30	21	9	5
44	35	24	11	12
	42	27	31	14
	53	29	35	15
	56	30		15
	70	35		18
		44		19
				31
				32

Source: Condo sales data from First American Real Estate Corporation.
1. Number of Stories.

Figure 1: Housing Permits in Manhattan and Prices
(Four-year moving averages)



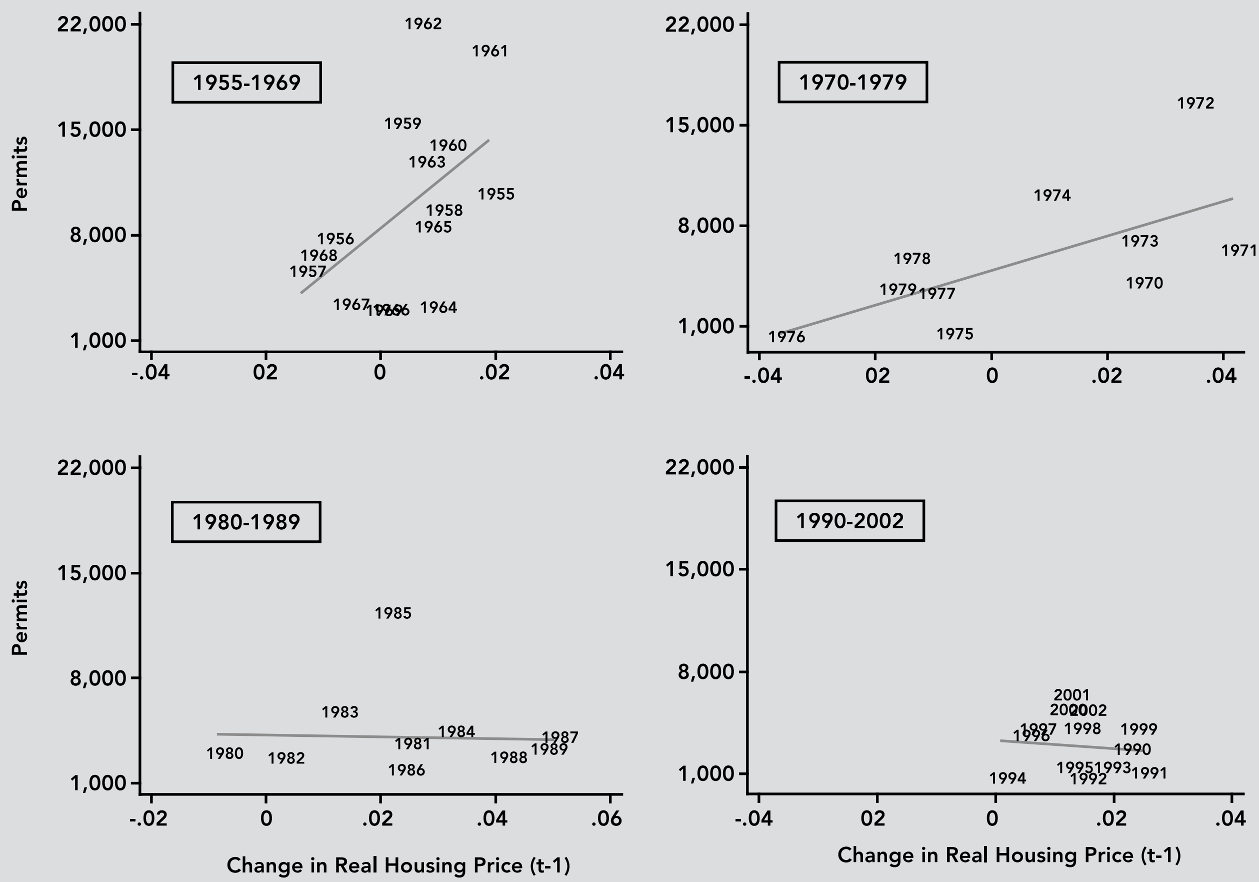
Source: Building permits are combined single- and multi-family permits for Manhattan from the US Department of Commerce. Real housing price series is the NY-NJ-LI MSA Consumer Price Index for Shelter, deflated by the GDP deflator from the National Income and Product Accounts and rescaled to equal 1 in 2002.

Figure 2: Distribution of Price-to-Cost Ratio, Manhattan Condominiums

Source: Prices are from condominimum sales records and costs are $200 per square foot.

Figure 3: Cumulative Distribution of Price/Cost Ratio for Cooperative Apartments in Manhattan

Figure 4: Changes in Manhattan Permits and (Lagged) House Prices, by Decade



Source: Building permits are combined single- and multi-family permits for Manhattan from the US Department of Commerce. Real housing price series is the NY-NJ-LI MSA Consumer Price Index for Shelter, deflated by the GDP deflator from the National Income and Product Accounts and rescaled to equal 1 in 2002.

ENDNOTES

1. The price data plotted in Figure 1 are for the metropolitan area as a whole. See the notes to the figure for the details.

2. See Saiz (2003a,b) for estimates of the impact of immigration on rents.

3. See Glaeser and Gyourko (2003) for evidence consistent with housing supply being very elastic in growing cities with new construction. Large population increases are not associated with large house price increases in most of these areas.

4. It is noteworthy that these prices are not even adjusted for the age of the building. A rough accounting for the depreciation on older structures suggests that 'as if new' values would be from 25-40 percent higher. In terms of the condominium sample, mean and median values are in the $600-$625 per square foot range.

5. Our research is part of a distinguished literature on the impacts of regulation on property markets. The interested reader should see Fischel (1985) for an extensive economic analysis and review of the likely motivations for and effects of zoning. Hamilton (1978) was among the first to view zoning as a tool of public sector monopoly power, and he also provided early empirical evidence supporting the contention that such restrictions could raise house prices throughout a given metropolitan area. Much of the other empirical work in this area focuses on the interjurisdictional effects of local land use controls on values. Katz and Rosen (1987) estimated that house prices were from 20-40 percent higher in San Francisco Bay Area communities that had enacted growth moratoria or imposed growth management control plans. Speyrer (1989) and Pollakowski and Wachter (1990) followed with confirmation of significant capitalization of land use controls into property prices in other market areas. In addition, the impacts of Portland's unique (for the US) growth boundary have been widely studied and discussed. See the recent article by Downs (2002) and the cites therein for a review of this market and an analysis of recent conditions. Finally, there have been a variety of studies of specific types of regulation, often with the goal of identifying influences on developers or a specific type of development. Fu and Somerville (2001) and Thornes (2000) are two recent examples.

6. Of course, as Glaeser and Gyourko (2002) emphasize, there is no reason why housing prices cannot fall below construction costs in declining areas. In those places, there will be no new building in the market.

7. Recall from above that the use of this term is for ease of exposition only. Government intervention that creates real limits to construction activity can take many forms. See Salama, Schill, and Stark (1999) for a recent study of the myriad zoning rules and other restrictions applicable in New York City.

8. Condominiums and cooperatives in buildings with multiple units are excluded from this particular analysis.

9. Two publications are particularly relevant for greater detail on the underlying data: *Residential Cost Data*, 19th annual edition, (2000) and *Square Foot Costs*, 21st annual edition (2000), both published by the R.S. Means Company.

10. This assumption of modest, but not really low, quality is also reflected in our assumptions that the costs are for a one-story house with an unfinished basement and the average costs associated with four possible types of siding and building frame. In addition, we develop cost estimates for small (<1,500ft2), medium (1,550-1,850ft2), and large (>1,850ft2) homes in terms of living area.

11. Two adjustments are made to the *AHS* data before comparing house prices to construction costs. These are to account for the depreciation that occurs on older homes and to account for the fact that research shows owners tend to overestimate the value of their homes. To account for the latter factor, we follow Goodman and Ittner (1992) and presume that owners typically overvalue their homes by 6 percent. Empirically, the more important adjustment takes into account the fact that the vast majority of homes are not new and have experienced real depreciation. Depreciation factors are estimated using the *AHS* as follows. First, house value per square foot (scaled down by the Goodman & Ittner correction) in the relevant year is regressed on a series of age controls and metropolitan area dummies. The age data are in interval

form so that we can tell if a house is from 0-5 years old, from 6-10 years old, from 11-25 years old, from 25-36 years old, and more than 45 years old. As expected, the coefficients on the age controls are each negative and represent the extent to which houses of different ages have depreciated in value on a per square foot basis. We then adjust the reported values to account for the estimated depreciation so as to compare the value of a unit as if it were new with its replacement cost. See our 2002 working paper for more detail on this procedure.

12. Four different hedonic specifications were estimated. Generally, the specifications are of the following form: House Price = p*Land Area + z*Other Controls, where the model is estimated separately for each metropolitan area. The other controls include the number of bedrooms, the number of bathrooms, the number of other rooms, an indicator variable that takes on a value of one if the home has a fireplace, an indicator variable that takes on a value of one if the home has a garage, an indicator variable that takes on a value of one if the home is in the central city of the metropolitan area, an indicator variable that takes on a value of one if the home has a basement, an indicator variable that takes on a value of one if the home has central air-conditioning, and the age of the home. Two of the specifications use the logged value of house price, while two are purely linear in nature. In addition, two of the models (one logged, the other not) use the data on interior square footage to capture the size of the home, while the other two use the detail on the number of bedrooms, bathrooms, and other rooms. In general, the results were quite consistent, although there is some variability in estimated land prices across the different hedonic models. The land prices in Table 1 are the mean of the values from the two specifications yielding the second and third highest prices (i.e., we rank the specifications from lowest to highest implicit land prices estimated and report the average of the prices from the second and third specifications). The key conclusions regarding the zoning tax are not sensitive to this choice. All the underlying results are available upon request.

13. Our 2002 paper performed a similar analysis using the 1999 national file of the *American Housing Survey*. The results are similar quantitatively, with the coastal metropolitan areas having much higher marginal prices of land. However, the estimates here tend to be smaller and much more precisely estimated. Given the far fewer number of observations at the metropolitan area level in the national file, we are much more confident of the reliability of the results reported in Table 1.

14. There are 43,560 square feet in an acre of land, so $0.13*10,890=$1,416 and $0.15*10,890=$1,634.

15. We assigned a value of zero for the zoning tax if physical construction costs exceeded the average house price in the metropolitan area. In those cases, the computed zoning tax would be negative. We would not expect to see new construction in areas with production costs above market prices. In all areas but Philadelphia and Pittsburgh, a positive zoning tax results if we assume construction costs associated with the lowest quality units (i.e., economy homes) tracked in the Means Company data. Effective house quality may, in fact, be lower than we presume in these areas, but we think it preferable to employ assumptions that lead our zoning tax estimates to be conservative rather than aggressive.

16. In general, we took every possible precaution to guard against our zoning tax estimates being biased upward. For example, we restrict the underlying samples from the *AHS* to homes with no more than two acres of land (i.e., with less than 87,120 square feet of lot). Including observations with larger amounts of land reduces estimated land prices below those reported in Table 1, suggesting that there is some downward bias of the hedonic estimates associated with large lot residences being developed in parts of the metropolitan area with cheap land. In addition, as discussed above, the hedonic estimate of land value will overestimate the free market value in markets with binding zoning constraints.

17. Thus, the fee differentials are not due entirely to different maintenance levels or requirements.

18. None of the prices reported in Tables 2-4 reflect values 'as if new'. Ideally, these prices should be adjusted (upward) to account for the depreciation that occurs on older units before any comparison with replacement costs. Unfortunately, the condo sales data from the First American Real Estate Corporation do not include any information on the age of the buildings in which the units are situated. The *NYCHVS* does report age in discrete form, including the following five categories:

(a) built in the 1990s;
(b) built in the 1980s;
(c) built between 1960-1979;

(d) built between 1930-1959;

and (e) built prior to 1930.

To try to estimate the impact of depreciation on older structures, we regressed reported condo value in the *NYCHVS* on a set of age dummies to determine the average impact of age on value. Adjusting the reported prices to reflect the regression estimates of depreciation yielded a mean of \$625/ft^2 and a median of \$601ft^2 for the 156 Manhattan condominiums in the *NYCHVS*, which is 20-25 percent higher than the reported values. However, the R^2 from the regression was only 0.04, not all the coefficients were statistically significant, and it was not the case that average values were monotonically lower the older the structure. Similar analyses with the cooperative unit and rental unit observations for Manhattan from the *NYCHVS* yielded slightly higher upward adjustments (in percentage terms), as the apartment sample in particular tends to be a bit older. However, these regression results also were somewhat imprecise. Given these uncertainties, we decided not to work with adjusted (i.e., higher) prices. While 'as if new' prices must be somewhat higher than the values we use, this decision is a conservative one in the sense that it guards against any upward bias in our estimates of the zoning tax.

19. We also used the NYCHVS to examine the rental market and comment briefly on those results below. Because we only observe monthly rents on those units, their asset values must be imputed. We did so utilizing the so-called 'cap rate' methodology employed in the real estate industry. Excluding the small fraction of fully rent controlled apartments for which rents in no way reflect market forces, we transformed data on monthly rents for rent stabilized and truly free market units into asset values from the landlord's perspective. Specifically, the value of the rental unit was calculated as the annual rental payment adjusted for operating costs and divided by the capitalization (or cap) rate. [This is the inverse of the price-to-eamings ratio on a stock.] We assumed that operating costs were 30 percent of gross operating income, a figure that is standard among equity real estate investment trusts which own and operate apartments throughout the country. Based on some published data on apartment builders and owners in New York City and our own admittedly informal survey, we chose a cap rate of 7 pecent to convert the observed net rental flow into an asset price.

Empirically, the distribution of imputed values of rental apartments is somewhat cheaper than the values we found for owned units, but that should not be surprising. It often is the case that rental buildings are not as high quality as condominium structures, and standard agency issues may lead to more rapidly declining quality in rental structures. Nonetheless, the landlord's value of free market apartments typically is well above \$300 per square foot, and 75 percent of free market rental units are estimated to be worth at least \$202 per square foot. While there is not a thick upper tail of extremely high value rental apartments, the typical unit still is quite valuable. Even though we have tried to be conservative when making these estimates, the very need to impute market prices for rental units introduces measurement error that inevitably renders the results less reliable for this sector of the housing market. Hence, our focus on owner-occupied units.

20. It is not clear from these data whether costs are higher or lower for taller buildings. The Means Company notes that larger buildings tend to have lower costs per square foot, primarily due to economies of scale and the decreasing contribution of the exterior walls. However, it is possible that buildings much taller than 24 stories could have higher costs since they may require stronger structural reinforcements and higher quality materials.

21. One can obtain a slightly higher marginal cost by making different assumptions regarding the underlying cost function. For example, if we were to begin by assuming the average costs reported by Means pertain to the 2nd, 5th, and 15th floors (i.e., to the midpoints of the three height categories), and then presumed that the average cost function is quadratic and goes through those midpoints (i.e., \$142,2; \$144,5; \$160,15), the total and marginal cost functions can be derived. In this particular example, marginal costs rise from around \$140/ft^2 on the lower floors to about \$180/ft^2 for floors 10-15. To be conservative in our zoning tax calculations, we will use a value of \$200/ft^2 value for construction costs in the analysis below.

22. As a point of reference, physical construction costs above \$150/ft^2 are at least as high as those pertaining to the highest quality single-family residences. In its single family construction cost files, the Means Company estimates that a large 2,200 square foot, custom quality home with an unfinished basement

would have cost about $132 / ft^2 to build in the New York metropolitan area. The analogous figure for a luxury quality home, which is the highest quality category in the Means data, is $159 / ft^2. [No land costs are included in these figures.] Hence, the per square foot physical construction costs associated with the average Manhattan apartment are at least as high as those for the best quality single family structures anywhere in the metropolitan area.

23. There are too few observations on units in newly constructed buildings to create statistically meaningful samples.

24. As another source, we also turned to data from the New York City permit office. This office reports an estimate of the total value of structures put in place by builders along with the total number of units. Dividing the value per unit by the average square footage per unit from our condominium data yielded an average cost of $89 / ft^2. While this price is not totally implausible, especially if many of the units were somehow controlled or stabilized, it seems quite low. One explanation for this low value is that builders must pay taxes based on the value of construction they report. Therefore, they have an incentive to underestimate true construction costs. In any event, we take the permit data as further confirmation of our view that $200 per square foot is a reasonably generous estimate of construction costs for luxury apartment buildings in Manhattan.

25. The picture is quite different for condominiums in boroughs outside of Manhattan. Only 20 percent of the condo units in the outer boroughs have values above construction costs. Clearly, the zoning tax does not have a large impact in these areas. Those results are available upon request.

26. The analogous plot for rental units finds 75 percent of the apartments in the free market sector are valued above construction costs. Despite the fact that rent stabilized apartments are much cheaper, it still is the case that 42 percent of them have implied asset values in excess of construction costs. This result is particularly striking given that our estimate of construction costs is almost surely an overestimate for older, lower quality buildings. Details regarding our findings for the rental sector are available upon request.

27. From the top row of Table 2, we know that the median condominium price is $455 / ft^2. Assuming $200 / ft^2 in construction costs, the implied zoning tax is $255 / ft^2. The ratio of 255 / 455 equals 56 percent.

28. The results for the rental sector depend upon whether the unit is stabilized or not. In the free market sector, it is clear that the zoning tax is economically meaningful for the typical unit. For the median rental unit in that sector, which we estimate to be worth $325 / ft^2 to the building owner, the zoning tax of $125 / ft^2 amounts to nearly 40 percent of total value. There is no meaningful zoning tax for the typical rent-stabilized unit, as the $168 / ft^2 price is less than our presumed construction costs. That said, 42 percent of these units have price-to-cost ratios above one. Therefore, the magnitude of the zoning tax still could be meaningful for a significant fraction of units in this sector. In addition, it seems likely that construction costs for stabilized units generally will be below the $200 level we assume in our calculations.

29. A more sophisticated analysis might compute the user cost of owning (e.g., see Poterba (1984) for example). This term includes factors such as local property taxes and maintenance expenses (along with a liquidity premium possibly) that also are thought to influence the cost of owning. For simplicity alone, we assume these costs are orthogonal to the zoning tax and exclude them from our analysis. To the extent they are positively correlated, our annual zoning cost estimates are lower bounds.

30. As we write, the current interest rate on 30-year, fixed rate mortgages is approximately 5.6 percent (depending upon factors such as points paid and the like) while inflation over calendar year 2002 was only 1.4 percent according to the annual average personal consumption expenditures chain-price index published by the Bureau of the Economic Analysis. The simple difference between these two figures is 4.2 percent.

31. These results are sensitive to the values of the real cost of capital and true construction costs used in the calculation. However, absent much higher construction costs (e.g., $100 per square foot higher) or much lower real interest rates (e.g., Japanese levels of near zero), the annual cost to condominium owners is substantial. In addition, housing prices in part reflect expectations about future prices. If future prices are expected to rise dramatically, then this might explain some of the high prices in New York and would suggest that our simple calculation of multiplying the gap between housing prices and construction costs with the cost of capital overstates the true zoning tax. Of course, if by chance, New York City apartment

prices were expected to fall (a not totally implausible possibility) then our calculation understates the true zoning tax.

32. A similar calculation can be made for renters in the free market sector. Using the imputed asset values of rented units, we follow the same procedure outlined above to find the annual cost of the zoning tax. We then divide this figure by twelve so that it will be comparable to a monthly rental payment. The average burden on renters in the free market is estimated to be $156 per month, with a wide interquartile range running from $6 per month to $306 per month. Since many of the rent stabilized apartments had imputed asset values below our $200/ft^2$ cost estimate, we compute a negative zoning tax for a significant portion of this sample. Nonetheless, a full quarter of renters in subsidized units face a zoning tax burden of more than $84 per month. The figures for the rent stabilized sector are available upon request.

33. We use lagged prices on the right-hand side on the assumption that it takes some time for developers to be able to respond to price changes, even in an unregulated market. The house price series is for the New York metropolitan area. See the notes to Figure 4 for the details. There is not an analogous price series for Manhattan proper (i.e., for New York County).

34. Both of the regression-line slopes are significantly different from zero at the 95 percent confidence level. However, the estimation error is large enough that we cannot confidently conclude the slope is greater for the 1955-69 period. All regression results are available upon request.

35. While both slopes are slightly negative, we cannot reject the null that each is zero.

36. The assumption of a fixed price for each square foot of space is purely for analytical convenience. All our key conclusions hold if (say) price is an increasing function of building height (which one might reasonably expect), as long as price is the same function of height for all buildings in the same neighborhood.

37. This will not be exactly true if people have a taste for views, in which case, developers will build up beyond the degree that would be predicted by this condition.

38. We focus on recently built structures because it is primarily since the 1980s that we believe limits on supply to have had a significant effect. The dataset includes too few structures that were built in the 1990s, so we cannot reliably use that time period.

39. In principle, this will be true with heterogeneous consumers as well as long as there are enough apartments of differing types. If a new apartment blocks the view of someone who values his view more than the market does, this person can just move apartments and acquire a new (identical) apartment with a view paying the market cost of a view. Of course, we recognize that urban housing markets are rarely that fluid.

40. Unit quality is not fully captured by controlling for unit size (and we do not have other variables in our data set). If interior quality is superior on higher floors, as we suspect is the case, our estimate of view is biased upward. We are largely unconcerned by this because our goal is not to provide a precise measure, but to determine whether views and other externalities could reasonably justify the gap between values and costs that we currently see in Manhattan. An overly generous estimate of the value of a view serves that purpose well.

41. Because the indicator variable is not continuous, the derivative relating price to floor is not well defined. Using the adjustment suggested by Halvorsen and Palmquist (1980) for such cases yields the 25 percent figure.

42. The upper bound on the loss occurs when a new apartment blocks one view completely. In that case, the value of lost views accounts for 25 cents per dollar of new construction.

43. This sort of specification will generate the elasticity that we are interested in if, for example, $U=W/P + A$ across cities, where U is reservation utility, W is wages, P is the price level (which will be proxied for with rents) and A equals the amenity level.

44. The regression also included a control for the percent of residents over the age of 25 with less than 9 years of schooling.

45. That said, other specifications indicated a smaller negative or even positive effect of population. For example, controlling for land area turns the population coefficient positive, although not statistically significantly so. [The coefficient on land area is significantly negative, as expected.] We also tried controlling

for density directly and found denser areas had higher prices. At face value, this suggests that crowding is good. However, this probably reflects omitted variables having to do with supply constraints or local amenities. In addition, attempts to instrument for population and density in the crowding regressions yielded slightly positive coefficients on population. In any event, all the analyses we have done indicates that –5 percent is an upper bound on this particular externality.

46. In a comprehensive survey of the literature, Hamermesh (1993) concludes that the elasticity of employment with respect to wages lies in the range of -0.15 to -0.75. These values imply an elastic response of wages with respect to employment.

47. One would have to make an extreme assumption about the share of tradeable goods across areas to get no local output effects.

48. Empirical work in this area is fraught with various potential specification biases, so accurately pinning down an impact is very difficult. For example, regression estimates of the population-wages relationship using cross-sectional variation may be upwardly biased because more productive places (with higher incomes) end up attracting more people and, therefore, have larger populations. Regressions using changes in population and income may also be biased if increases in urban population are driven by increases to the productivity of the metropolitan area.

49. This conclusion does suggest that there are benefits to the New York City budget from allowing new entrants into Manhattan. Such a detailed calculation is beyond the scope of this paper, but it is worth doing given the current fiscal situation in the city.

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