VALUING SUNSHINE

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Beams of light and warmth
Make a house desirable,
and we value them.

INTRODUCTION

It is a truth commonly acknowledged that a house that gets more exposure to sunlight is more attractive, especially in 'temperate' climates like New Zealand. Until now, however, the value of that sunshine has not been calculated.

This creates a difficulty when a building is designed in a way that will shade its neighbour, decreasing the value of the existing building. At present this is controlled by often inflexible regulations that specify building parameters. This research is designed to put a value on sunlight, so that the change can be priced, potentially enabling compensation for affected owners and better valuing development sites.

WHY WELLINGTON?

We test our ideas using Wellington, as the city is small, so housing heterogeneity with respect to access to services and amenities is low compared to large cities. In addition, its local economy and housing market have been stable, with no important shocks over the study period.

Perhaps the most important attribute of Wellington for our analysis, however, is its geographical topography and intensification. It is not difficult to find houses that, while located in the same neighbourhood, have very different exposure to direct sunlight due to the effects of hills, valleys and nearby buildings.

Our estimates may be city-specific; nevertheless, our approach can be used to estimate the value of sunlight in other cities where there is reason to believe that circumstances would yield a different valuation of sunshine than that estimated here.

METHODOLOGY

We use data provided directly to us by the Real Estate Institute of New Zealand (REINZ). The dataset included detailed data on characteristics and sale price for houses sold across the city of Wellington for six years –from January 2008 to December 2014. These data include variables capturing properties' sale price, location, number of bedrooms, total floor area, the decade when the house was built, access to off-street parking and the date of sale.

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We then took information on the geographical coordinates of the property sales in the REINZ data and calculated zenith angles, viewspan and elevation using fine-resolution topographical models from Wellington City Council. This enabled us to determine how much sun a given property receives throughout each day of the year, assuming a clear sky. Subsequently, we computed the average daily hours of direct sunlight received during the year by each house in our database.

Our final dataset consisted of 5,584 property sales across Wellington City from Ngaio to the South Coast.

DATA

The average house sale value in our data is $632,000, with a standard deviation of $293,000. The average number of bedrooms is 3.3, while mean total floor area is 148 square metres.

The average house in our sample received 8.7 hours of sunlight per day, on average, across the year. However, as expected, our sunlight data varies considerably across the sample with houses receiving as low as 3.7 hours of sunlight on average across the year, while some houses received more than 11 hours. Also as expected, there is a difference between summer and winter months, with a higher variation in the latter (standard deviation of 1.6 hrs/day), compared to the former (0.9 hrs/day).

KEY FINDING

Each additional hour of direct sunlight exposure for a house per day (on average across the year) adds 2.4% to a dwelling's market value according to our econometric hedonic model. This estimate is robust to a variety of specifications that investigate whether the value is conditional on other factors relating to the characteristics of the house (specifically view and elevation) or its suburb.

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POLICY IMPLICATIONS

At a policy level, our estimates may be used to facilitate price-based instruments rather than regulatory restrictions to deal with overshadowing caused by new developments.

For instance, consider a new multi-storey development that will block three hours of direct sunlight exposure per day (on average across the year) on two houses, each valued at $1,000,000. The resulting loss in value to the house owners is in the order of $144,000 ($1,000,000 x 2.4% x 3 x 2). Instead of regulating building heights or the site envelope for the new development, the developer could be required to reimburse each house owner $72,000. In return, the developer would be otherwise unrestricted (for sunlight purposes) in the nature of development. If the development cannot bear the $144,000 then the efficient outcome is that the development does not proceed. Conversely, if the development can bear that sum, then the socially optimal outcome is for the development to occur and, from an equity perspective, the neighbours are compensated for their loss of sunlight exposure.

Knowing whether the dwelling on a site will receive full-day sun or only limited sun exposure will also help the developer in their bid for the underlying land.

CONCLUSION

Our 2.4% estimate of value (for each hour of sunlight per day on average through the year) is context-specific. Elsewhere, the value may be higher or lower depending on factors such as climate, topography, city size and incomes. Nevertheless, our approach can be replicated in studies for other cities to help price the value of sunlight in those settings.

With the ability to calculate sunshine exposures, and the value placed on those exposures, the policy apparatus for dealing with sunlight provision issues in an urban setting can henceforth be shifted from a regulatory to a price-based approach.

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