The Impact of Green Space on Dublin Property Values

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*"**Value of the local environment for health and wellbeing**"*

ESRI Conference, Dublin, January 2020

Acknowledgements: We would like to thank Ireland's Environmental Protection Agency and the Irish Research Council for financial support and the following for assistance and cooperation with data: daft.ie, the Central Statistics Office, the Office of Public Works, An Taisce, Ordinance Survey Ireland and the Sustainable Energy Authority of Ireland

Some motivation…

A quick overview

- We use a combination of a bespoke housing dataset and granular spatial data on green-space amenities
- We examine whether and how these green-space amenities – both 'proper' parks and more general open green spaces – affect property values nearby
- Results:
  - We find a 10% increase in park space within 2km of a dwelling is associated with a 5.5% increase in that dwelling's price
  - Our results suggest Dublin's parks have a value of €3.4bn capitalized into the nearby housing stock – LPT of 0.018% would mean ~€6m in revenues to Dublin's local authorities from parks alone each year
- Future work previewed today:
  - Exploiting the wealth of our dataset, we will perform a complementary analysis, seeing which park attributes (e.g. water features) are most rewarded

Motivation – theory and policy

- Our work investigates important aspects of consumer behaviour in the real estate market, the largest fraction of household spending/assets
  - What importance do households give non-market amenities, such as urban green space, when deciding where to live?
- This work has a direct relevance for policymakers – especially in setting such as Ireland's with steady growth in the urban population expected over coming generation
  - **Development:** What should the green-grey ratio be? Which types of green space are most valued by nearby residents?
  - **Government finances:** What value do urban green space amenities create? With annual property taxation, a potential direct link between non-market amenities and their funding

Dataset - Housing

- Almost 40,000 transactions in Dublin, between 2010 and 2018
- A bespoke dataset, building off four core elements:
    1. Property Price Register – transaction price, date, and address
    2. Building Energy Ratings – dwelling characteristics, including size (in sqm), type, number of floors, year of construction, and energy rating
    3. Daft.ie Archive – number of bedrooms and bathrooms; other dwelling feature (e.g. from text of the ad)
    4. Eircodes – used to locate all observations in each of the above datasets, and perform a 'join'
- We gratefully acknowledge the cooperation of the SEAI and daft.ie in building this dataset

Dataset – Urban green space

- The European Environment Agency's *European Urban Atlas* (EUA) provides land-use maps for all cities with >100,000 inhabitants
  - Higher resolution, and therefore more accurate, than the CORINE dataset, used in Mayor, Lyons, Duffy & Tol (2009, hereafter MLDT)
- We match the selection of the 22 identified parks in MLDT
  - We also make other adjustments, e.g. grouping neighbouring polygons to reflect a single park

Variables	Obs	Mean	St. Dev.	Min	Max
Price (€000s)	39,643	357	216	30	2,000
% GS within 200m	39,643	6.8%	8.5%	0%	63.4%
% GS between 200m and 2km	39,643	6.6%	2.7%	0%	14.4%
% park within 200m	39,643	0.9%	5.1%	0%	87.0%
% park between 200m and 2km	39,643	3.4%	7.1%	0%	54.9%
% of park within 2km	39,643	3.4%	7.0%	0%	54.6%
% of park/GS within 200m	39,643	7.7%	9.6%	0%	87.0%
% of park/GS within 2km	39,643	10.0%	7.1%	0%	57.4%

Our key measures of green space

Method: "Hedonic price regression"

- We estimate a dwelling's transaction price as a combination of…
  - When it was on the market (Year/quarter)
  - Its attributes (e.g. property type, size, age, energy efficiency)
  - "Fixed effects" for different markets (more below…)
  - Other location features (% unemployed/with degree, distance to centre/schools/etc)
  - **Distance to the Phoenix Park and % green space or parks within 0.2km/2km**
- How to treat location 'fixed effects' (FEs)
  - An important element of study of this kind
  - Trade-off between granularity (in principle, every dwelling could have its own FE) – and feasibility (we would need to see dwellings transacting on multiple occasions – with parks/green space nearby varying over time)
  - Three main options: 118 micro-markets (435 transactions typically), 322 Electoral Divisions (145 transactions) or 4,557 Small Areas (11 transactions)

The results of our analysis show a clear price effect of parks within walking distance of a dwelling

	FE: Micro-market			FE: Electoral Division			FE: Small Area		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<2km of Phoenix Park	-0.0338***	-0.0334***	-0.0323***	-0.008	-0.008	-0.007	-0.00255	-0.00258	-0.00248
	(-4.64)	(-4.58)	(-4.44)	(-.89)	(-.85)	(-.74)	(-.122)	(-.123)	(-.119)
% GS within 200m	-0.0181	-0.00873		-0.013	-0.006		-0.0354*	-0.0326	
	(-1.58)	(-.769)		(-1.05)	(-.522)		(-1.67)	(-1.53)	
% GS between 200m	0.0765	0.0590		0.116	0.112		-0.805**	-0.811**	
and 2km	(1.04)	(.801)		(1.22)	(1.18)		(-2.09)	(-2.1)	
% park within 200m	-0.117***			-0.094***			-0.0627		
	(-5.22)			(-3.91)			(-1.36)		
% park between 200m	0.372***			0.576***			0.339*		
and 2km	(10.5)			(10.3)			(1.68)		
% of park space within		0.339***			0.548***			0.317	
2km		(9.55)			(9.53)			(1.55)	
% of park/GS within			-0.0419***			-0.034***			-0.0371*
200m			(-3.9)			(-2.94)			(-1.88)
% of park/GS within			0.322***			0.492***			0.159
2km			(9.45)			(9.37)			(.819)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	39,203	39,203	39,203	39,203	39,203	39,203	39,203	39,203	39,203
R-squared	0.885	0.884	0.884	0.889	0.889	0.889	0.920	0.920	0.920
RMSE	0.182	0.182	0.182	0.178	0.179	0.179	0.161	0.161	0.161

What exactly do we find?

- Main result: a 10% increase in park space within 2km of a dwelling is associated with a 5.5% increase in price
- Additional results:
  - We do not find any evidence of 'non-park' green space boosting housing values nearby – the results from a specification with a combined 'parks + green space' variable are being driven entirely by the parks
  - There is some evidence of 'congestion effects': this 5.5% within 2km breaks down as 5.8% between 200m and 2km – but -0.9% within 200m
  - No evidence of an additional effect of the Phoenix Park on property prices nearby, compared to other parks – for the same amount of green space within 2km
- Our headline result is smaller than MLDT's (6.7%) – this does not appear to be driven by the control variables used
  - Likely driven instead by (1) different market conditions, or (2) selection effects in MLDT

Three strands of future work

- Firstly, we aim to examine outcomes other than transaction price
  - E.g. time-to-sell or the difference between initial list price and the transaction price
- Secondly, we will supplement the existing analysis
  - How does the green space premium vary over time and with the housing market? (Using both transactions back to 2010 and listings back to 2006)
  - What is the link between rental prices and green space? (And what can we learn from any differences with the sale price premium?)
- Lastly, we will examine whether particular green space attributes are driving the premium
  - The size and shape of the green space, its features (such as paths, woods, and water features)
  - The demographic mix nearby – e.g. income or education level, age/nationality mix…

What does this say about Dublin's parks?

- For the average property in Dublin, 3.4% of the space within 2km is green space (as we measured in this study)
- With a coefficient of 0.55, and an average property value in Dublin of €375,000, this implies that green space nearby contributes €7,000 to the value of each property in Dublin
- There are 480,000 households in Dublin – this means that summing over them all, nearly €3.4bn of the value (almost 2%) of Dublin's residential real estate comes from green space
- In a system with a 0.18% Local Property Tax, this means that Dublin's local authorities should be receiving ~€6m per year just due to green space
  - Note: this total will not reflect the specifics of how LPT is implemented (self-declared €50k bands, frozen at 2013 levels, with many exemptions)

A preview of the work-in-progress…

- A two-stage analysis
- Stage (1): give each park/green space its own ID and then ask, in the analysis, how much each of these IDs affects prices nearby
  - E.g. if there are 1,200 green spaces in Dublin (of varying types and sizes), this first stage would generated 1,200 'results', the 'price premium' for each
  - This depends on having 'enough' transactions nearby
- Stage (2): take the 'price' for each green space and run an analysis trying to explain that price using its own attributes and the characteristics of the area nearby
  - So far, we have found some evidence that (1) woodlands and (2) proximity to the coast boost the value of green space
  - Also, we have found evidence that higher incomes are associated with bigger park premiums

Wrapping up and next steps…

- As it stands:
  - Clear evidence that housing costs reflect 'green space' amenities – as measured by how much green space is within walking distance of your home
  - A 10% increase in park space within 2km is associated with a 5.5% increase in price
  - The implied aggregate value of green space - €3.4bn, or €6m in LPT revenues – is important in context of current push for 'value capture' by local/national govs
  - It is important also as Ireland is likely to face very strong housing demand, especially in its cities, over coming decades
- Next steps (once we find the resources!):
  1. Other housing market outcomes (time to sell, etc.)
  2. Examining how the premium varies across time, segment and market conditions
  3. Which green-space features are most rewarded by nearby residents?

Thank you!