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Can investments in proactive planning deliver economic benefits to private citizens?

An econometric study into the effects of planned investment in parkland in Dagenham, East London, on surrounding house prices

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Abstract

Individual demand for composite goods such as housing reveals economic preferences for the range of characteristics that comprise that good. Hedonic regression analysis can be used to try and estimate the individual implicit prices of these characteristics. By using this technique for a sample of houses surrounding a regenerated parkland in Dagenham, East London, this paper analyses the implicit economic value of a particular 'treatment' of planning intervention to improve the quality of the public realm.

Comparing regressed house prices against a range of structural and environmental housing attributes for time periods before and after the treatment intervention, the analysis finds that the investment in public realm has positive effects on house prices within distance parameters but with low relative strength compared to other more influential neighbourhood characteristics. While there is some literature that analyses the impact of natural and environmental qualities on house prices, there is very little literature analysing the economic impact of specific interventions, via positive planning mechanisms, in terms of positive outcomes on house prices. The findings of this study could therefore have some important implications for the economic benefits of investing in planning and related place-based interventions.

Introduction

What do rising house prices imply in an area?

House prices rise in part as a consequence of a lack of **supply**. Price rises as a consequence of constrained supply are occurring across the UK at present, as part of a phenomenon frequently referred to as 'the housing crisis', the result of low rates of house building. Generally considered negative, low levels of housing supply are driving up the cost of home ownership and renting for those not already on the property ladder, whilst providing some of those who are with large financial rewards.

Nevertheless, house prices are also affected by **demand**. This is why, even within the same neighbourhoods, house prices can vary widely based on specific attributes that people value, either attributes structurally related to the house itself, or in the form of the quality of the surrounding area.

In any discussion about house prices it is important to keep both of these points in mind.

This paper seeks to isolate specific area-based attributes that affect house prices within a neighbourhood, and in doing so helps to add to understanding of the attributes of an area that individuals place economic value on.

There are of course many qualities and amenities relating to an area which will affect overall demand for housing in that location. This study looks specifically at one category of amenity, that of managed green space or parkland. We look to see if there is a statistical relationship between planned investment in parkland and changes in house prices in the surrounding area, that is, do individuals place economic value on living near good quality parkland?

Why is this type of study important?

Understanding the attributes and amenities upon which individuals place economic value could have important policy implications for planning. If for example there is evidence that individuals place economic value on living near well-planned parklands, such as those ascertained by studying house price changes, then this raises important questions about the ethical and policy roles for planning and could suggest a need to rethink how we understand the relationship between planning and economics. For example, if individuals place economic value on the outcomes of positive planning, should policy-makers and analysts that seek to improve economic outcomes for individuals consequently invest more in positive planning? Further, how can we develop research that provides for a better understanding of how proactive planning investments can lead to positive economic outcomes for people *and* places?

Why might individuals place economic value on attributes, like parkland, which are traditionally are thought of as being the social benefits of 'good place'?

Planning for 'good places', including the plentiful provision of high quality parks, might from a traditional economic viewpoint be seen as something which might deliver social value but is not economic significant. However, if good places are valued by individuals *economically*, not just because they are 'nice-to-have' but because they help them to achieve better economic outcomes or better manage some economic aspect of their lives, then this view is insufficient. In this case, delivering good places via better planning could instead be regarded as an economic imperative.

Clearly, such arguments have broader potential implications. Current UK Government policy for example appears to emphasise a relatively narrow understanding of planning in helping to deliver housing and economic growth, in the sense that it neglects a more positive and proactive role for planning (see Adams and Watkins, 2014; Lord et al., 2015). This reflects a favoured academic literature which repeatedly argues that short-term growth could be delivered by the extensive liberalisation of land use regulation. In this view of land use and development, from an economic perspective delivering the space for jobs and for living are the only real things that planning should be interested in. 'Good' places are regarded as additional social and environmental benefits which may be important but which should be considered separately.

As noted however, there is an alternative perspective on planning that suggests that it play a critical role in bringing about economic benefits for places. From this perspective, what is interesting is how individuals chose to allocate their financial resources to decisions about where to live. For example, while it might be obvious that individuals will value living near stations or transport hubs that allow them to more easily access economic opportunities, they might also place an economic value (above and beyond social and environmental value) on amenities such as safe neighbourhoods, good quality green spaces and attractive public realms. In economic terms, individuals may factor into deciding where to live how the positive effects of living without say, fear of crime, being able to relax and exercise, and having spaces to socialise and be part of a community, as life factors which will spill over into economic benefits in terms of their own productivity and personal development as economic actors.

It is reasonable then to suggest that individuals place economic value on such place-based amenities, and also that there should be further research to study this relationship in order to ensure that we are developing places that can maximise economic opportunity for individuals.

If the evidence shows this to be the case, then it adds to the argument that positive and proactive planning, when considered as the coordination of the varied components that distinguish good places from bad, is something that deserves greater investment in in the UK. If we want to create sustainable and inclusive long-term economic growth paths for our towns and cities, we need to ensure that the individuals that live and work in them are supported economically by the physical environments that enable them to be as productive and economically engaged as possible.

Case study

In 2013 the regeneration of Beam Parklands public space in Dagenham, East London, received a Royal Town Planning Institute Award for Planning Excellence (RTPI, 2013). Designed and developed by Arup, a global built environment consultancy, the project radically redeveloped the parklands (which double as a flood prevention site) using modern planning techniques such as high quality, environmentally sensitive design, community consultation and participation, and accessibility and connectivity with the wider community. Before this intervention, the parklands were an undesirable area, and the focal point of a wider area suffering from deprivation and social problems.

The parklands form the focal point of this study, which analyses how such planning investments in the public realm are economically valued by individual economic agents, in this case by studying the effect of the treatment on house prices. Both parklands and planning interventions in the UK can of course vary in quality. The Award by the RTPI serves the purpose of objectively establishing that this is a high quality intervention, and hence can be used in this study to analyse positive effects of these kinds of interventions.

The paper seeks to determine if a planning intervention such as this to turn around a run-down area, an activity typically thought of as a social goal, can also be shown to have economic value.

<u>Methodological approach</u>

A 'composite good' is one which, following the analysis of Lancaster (1966), has an overall price determined by the equilibrium value of its many component but inseparable characteristics. Since Rosen (1974) and Rosen and Brown (1982) provided a methodology – the hedonic price regression – to estimate out the implicit value of individual characteristics within such composite goods, a reasonably sized literature has emerged which develops this methodology in an attempt to identify such underlying prices for various purposes.

The method has been used particularly in spatial and urban economics, where housing is the composite good, and a variety of structural, environmental, and neighbourhood characteristic goods are analysed via hedonic regression as part of the overall housing composite good. The aim of such analysis is to try and identify the economic value of both the internal (structural) and external (environmental/neighbourhood) aspects of the housing market.

In terms of analysing the effects of positive environmental amenities, some literature has focused on natural features of local environments (Luttik, 2000; Landry and Hindsley, 2011; Mahan, Polasky and

Adams, 2000), while other literature has sought to evaluate the impact of supply-side policies, especially land use regulation, on house prices (Cheshire and Sheppard, 1989; 1995; 1998; 2002 Hazilla and Kopp, 1990) or purely to study structural parameters of the housing market (Jackson, Johnson, and Kaserman, 1984). Such analysis can be useful in the development industry in terms of identifying where and how to develop land most profitably and also, in jurisdictions such as the UK and the US where established planning systems exist in statute, to dictate how and why land should be developed for the achievement of social, environmental and economic objectives.

It is on this second basis for hedonic price regression in the housing market that this paper is focused. In particular, the paper undertakes a hedonic regression analysis to try to ascertain the economic value of a specific planning intervention into public realm improvement in East London – the 2011 Beam Parklands regeneration.

A debate exists in UK built environment policy regarding the economic value of investment in the public realm. According to meta-analysis by Overman et al. (What Works Centre for Local Economic Growth, 2014) there is limited evidence for such economic value. Such an analysis says nothing as to whether such investments should be made for social or environmental goals, regardless of economic value. However, in straitened economic times where growth dominates other policy priorities and where local and central authorities rightly need to justify public expenditure decisions, there is a danger that investments that can only be justified on social or environmental grounds will be dismissed as 'luxury items' or secondary to economic priorities.

However, a lack of evidence for the benefits of these kinds of planning interventions is also surely a function of a lack of econometric research into the economic benefits of built environment initiatives, including place-improving interventions. Major studies in the UK to date, such as that undertaken by Sheffield Hallam University into the New Deal for Communities (NDC) Programme (Lawless et al., 2010), and the University of Cambridge's assessment of the Single Regeneration Budget (Tyler et al. 2003, 2005), showed mixed outcomes. This is perhaps unsurprising given the difficulty in aggregating such wide-ranging policy initiatives. The NDC programme for example took place in 39 unique and distinct locations across England and intervened in a range of policy areas including employment, crime, health, as well as the built environment.

The question of why people would place economic value on an amenity such as parklands is an interesting one. In the traditional land use economics of Alonso (1964), if land is not developable or does not contain economic opportunities such as jobs or housing (or have a strong proximity or connectivity function to such opportunities) then its economic value is considered negligible. Therefore does the additional amount, if it exists, that individuals are willing to pay to be located near green space represent a monetary measure of a social and environmental value rather than an economic one? Possibly it does, and finding monetary equivalents for these types of values is a burgeoning field of study in itself.

Then again, it might also be related to economic value in a more complex way. For example, there is a strong focus in the UK at present on productivity and how to increase it at a macro-level. Last year for example the UK Government published its 'Productivity Plan' (Fixing the Foundations, UK Government, 2015) as part of its Summer Budget. There is a developing literature which links the quality of the built environment, particularly where it can contribute to active and healthy lifestyles, with higher productivity, largely as a consequence of health benefits (for example Marmot, 2010). It is possible therefore that a rise in house prices from investment in parklands and green infrastructure could in part represent the response of rational economic agents able to factor in the health-related benefits that might be derived from such public realm investments, given that such investments might enable them to live more economically productive lifestyles.

The challenge of hedonic price methods is how they could practically be applied as a form of revenue capture to fund such projects. One difficulty is that such values cannot easily be predicted upfront. The second is that hedonic or implicit prices are only an estimate, which are subject to vary significantly depending on wider parameters involved in the regression.

Indeed, funding mechanisms that involve wider forms of value capture are increasingly in use throughout the world. Examples can be found in Hong Kong (Medda and Modelewska, 2010) and Estonia (Cocconcelli and Medda, 2013), and also in the use of Tax Incremental Financing (TIF) in Scotland (Falkirk Council, 2014) and with the Crossrail Business Rate Levy (GLA). Cheshire (2005) has noted that: "…many local public goods, overtly funded from taxation and which we think of as naturally being provided on an equal basis to all households are really much better thought of as being allocated through the housing market". Despite this, the UK Government has not yet developed a standard mechanism for capturing the value accruing to residential land owned by private citizens from the public funding and provision of public realm investments.

This paper aims to take a more focused analysis into the benefits of built environment improvements and aims to shine a light on where further research could be undertaken in order to develop a more balanced assessment of the economic value of public realm investments. An analysis is undertaken to assess the impact of a treatment effect in the form of public realm improvement to parkland in Dagenham, East London, on local house prices. By holding neighbourhood and structural characteristics of housing constant in a multiple regression analysis, the goal is to isolate the hedonic price effects of the treatment, and hence the economic value that local and incoming residents are implicitly placing on this kind of positive planning intervention.

Being able to value the economic benefit of such treatments could have important implications for investment in planning and the public realm. Whereas such projects are traditionally funded locally or from general taxation, they are often highly contested due to their economic value being disputed. Proving or disproving their economic value may go some way to resolving debates about the allocation of public funds towards such projects. Additionally, if the positive effects of such public interventions can be tracked to house price impacts, then it offers potential avenues for more efficient and fair funding mechanisms such as forms of local land value capture.

Perhaps unsurprisingly, the analysis shows that the impact of the intervention is complex and hard to isolate. There is evidence that a non-linear relationship exists between house prices and distance to the planning intervention. In particular this relationship takes the form of a third degree polynomial, where the effect is positive the closer to the park the houses are, before being overridden by other stronger variables such as transport accessibility, which is strongly negatively correlated with proximity to the parklands.

This paper proceeds by explaining how Rosen's hedonic price regression function is adapted for this particular analysis, before outlining the data collected to input into the model. The analysis of the results of the regression procedure follows, before evaluation of the complexities of the relationships between the variables is discussed and potential significances are discussed in the conclusion.

The hedonic function

Multiple hedonic regression analysis identifies discrete and continuous variables that impact housing prices and enables the estimation of implicit prices via the extraction of the partial derivatives of the regressors:

$\delta u/\delta q_i \,/\, \delta u/\delta X = \delta P/\delta q_i$

Where q_i is the amount of any particular composite characteristic of housing, P is overall price, u is individual utility and X is the income or budget constraint.

Traditional urban economic theory, such as that originally outlined by Alonso (1964), presents the value of land as a function of distance from a monocentric economic hub, often typified by a central business district, or distance to transport infrastructure which allows access to an economic hub. Whilst this is undoubtedly a key input into land value, the analysis oversimplifies the heterogeneity of land parcels, which are also influenced by myriad environmental and neighbourhood characteristics.

Therefore, the model as applied in this analysis takes the form:

$\ln P = \beta_0 + \sum\beta S + \sum\beta Q + \sum\beta N + \varepsilon$

Where:

$\ln P$ = Natural log of house prices
β_0 = Intercept value
S = Structural characteristics of housing
Q = Environmental quality of housing
N = Neighbourhood quality of housing
ε = Error term

For the purpose of this analysis, neighbourhood (N) and environmental (Q) characteristics are regarded as the same set of variables, as both are affected by public policy and the key variable of interest – 'distance to park' – can be considered as both a neighbourhood and environmental characteristic. Other typical attributes that are often regarded to affect prices may be the type and size of abode (structural), the quality of local amenities such as schooling, or quality of local green space such as parks or access to countryside (neighbourhood/environmental).

The data

Beam Parklands itself is surrounded by two main postcode areas which can broadly be distinguished as RM10 to the South and East and RM9 to the North and West. For this study, two cross-sections of house price data in the RM10 and RM9 postcodes were taken randomly. The cross sections are taken from 2003 and 2014 respectively, enabling analysis to be taken on 'distance to park' both before and after the 2011 intervention, enabling an analysis of change in this variable on the price and log-price regressand depending on treatment. This variable is denoted 'Park' in the data and is measured as time taken in walking distance between the observation and the park.

The 2003 sample has 311 unique observations of house price data, the 2014 sample has 213, both obtained from publically available Price Paid Data available from the UK Land Registry. Randomness was ensured by ordering the entire sample of available house price data in these postcode for the respective years and choosing samples based on both alphabetical order of street address. Specifically, all results were adopted for the first five streets of the sample for each letter of the alphabet from a through z. The need to reduce the sample size from the entirety of available data was due to the resource-intensive nature of selecting data on the other independent variables.

Structural variables were collected pertain to dummy variables for the type of housing: detached (D), semi-detached (S), terraced (T), and Flat (F). Neighbourhood characteristics were collected pertaining to: dummy variables for the postcode, RM9 or RM10 – generally RM9 is further west and captures the effect of being closer to London, although a more relevant variable that captures this accessibility effect is distance to transport infrastructure with links to central London ('Access'). The 'School' variable captures the latest 2014 Ofsted rating for the local primary school. There are four possible ratings provided by Ofsted and these were transcribed directly as weighted instrumental variables. Gibbons, Mourato and Mendes (2014) suggest that one of the key neighbourhood impacts on house prices is the quality of local schooling.

Gibbons et al. also discuss crime rates in the same vein, albeit as an inverse influence, and thus the variable 'Crime' captures average monthly incidences of crime as recorded by the Metropolitan Police for 2014. Dummy variables were also captured for the particular electoral ward in which each house falls, as well as the particular local fixed infrastructure transport hub and type of infrastructure (London underground or mainline overground railway) that is most accessible, denoted by walking distance as calculated by Google maps, collated under the 'Access' variable. Both the structural and neighbourhood sets of variables are captured in order to improve robustness and account for other potential wider-neighbourhood effects. One of the biggest challenges facing those researching hedonic house prices is the sheer range of potential influences that might make up an individual economic agent's demand function for housing. Therefore, the collection of a wide range of such variables is essential to reducing the potential effects of the standard omitted variables problem. For full descriptions of data see Appendix.

Data for 'School' and 'Crime' was only easily accessible for recent data and so is not captured uniquely for 2003 but the 2014 data are used as a back-logged proxy variable. Regression results for 2003 involving these variables are therefore treated with extreme caution and they are avoided where possible.

<u>Results and analysis</u>

There are two key permutations in the results. The first is that there appears to be a non-linear relationship between house prices and the distance-to-park variable. The second is that the impact of the park intervention has a significant positive impact on house prices, but is likely a small impact compared to other key neighbourhood effects such as school quality and transport accessibility.

The non-linear relationship is exhibited by the regression results in detail in the Appendix in 2.1, 2.3, and 2.5, summarised here as follows:

2014 Sample simple regressions of walking distance (as measured in minutes taken) to Beam Parklands (treated) on house prices

Sample year	Walking distance (minutes)	Coefficient	T-Value	P-Value
2014	Full Range	49.75	0.166	0.868
2014	Sub 30	-720.6	-1.715	0.088
2014	Sub 20	1468	1.456	0.15

When just regressing house prices against the 'Park' variable, the positive impact of a lower walking distance to the park on house prices becomes significant when walking distance from the observation is less than 30 minutes. This is a sensible relationship given that inevitably there exist substitutes to the treatment area in the form of other parklands in all directions away from Beam Parklands. At walking distances of greater than 30 minutes it is a reasonable but untested assumption that a substitute parkland would be a closer alternative. The fact that the impact of the treatment area is highly localised is not surprising and it is reasonable that, with few exceptions such as world-renowned beauty spots, local parks have a high elasticity of substitution with other parkland areas of a similar quality.

More surprisingly, when the walking distance drops below 20 minutes, the effect of park-closeness ceases to be significant. Nevertheless, as mentioned the effect of the treatment appears to be a weaker influence on house prices than other neighbourhood amenities. For example, at a sub-20 minute walking distance, closeness to park and closeness to transport hubs is strongly negatively correlated (-0.574 R^2). This implies that locations which are close to Beam Parklands are far from transport infrastructure, and as shown in Figure 1.1 below, Beam Parklands appears to be in a relatively isolated location from fixed transport infrastructure hubs.

The Log Price regression for the Sub 30 minutes walking distance result is as follows:

Sample year	Walking distance	Coefficient	T-Value	P-Value
2014	Sub 30	-0.003111	-1.488	0.139

Hence although this is not a statistically significant result that is rejected at a 13% confidence level it is still of economic interest, showing a negative sign that suggests that for every minute closer in walking distance terms to the park that an observation is located we can expect a 3% increase in house prices.

Figure 1 (further below) shows the relative position of Beam Parklands and nearest fixed infrastructure transport hubs. The walking distance between the houses and the nearest fixed infrastructure transport hub within the 2003 and 2014 samples forms the input for each observation under the 'Access' variable within the data. Clockwise from top left in the diagram, the hubs are Becontree, Dagenham Heathway, Dagenham East and Elm Tree (partially off-map) – all London Underground stations – preceded by Rainham (partially off-map) and Dagenham Dock mainline overground stations.

As noted, traditional urban economic theory as accorded to Alonso (1964) suggests that the value of land is a function of distance from the economic hub or a function of this distance related to accessibility of local transport options which connect to the economic hub. In this case of the samples in Dagenham, the economic hub is central London and both the London Underground – in this case the District Line specifically – and the overground mainline railway runs regular daily services into the centre of London. The District Line runs through Aldgate to Mansion House within the City of London and onto stations along the Victoria Embankment, whilst the mainline runs to a terminus at Liverpool Street within the City of London. Although the continuity of the underground and slightly more frequent service may seem a preferable transport option, the high level of connectivity within central London and especially from Liverpool Street Station is deemed sufficient to make both overground and underground options equally desirable and there is no need to differentiate between them for the purposes of this study.

The map (next page) shows that Beam Parklands is located more or less at the centre of a locus of these transport options and thus is particularly inaccessible compared to other locations within the area, making closeness to the park less desirable in terms of the 'Access' variable. This factor needs to be taken into strong consideration when considering the impact of the parklands as a benefit. As mentioned, the effect of the 'Access' may well weigh more heavily than closeness to quality parkland in the utility functions of individual economic agents, however establishing the relationships between the independent variables, or the strength of their relative influences, is not the goal of this study.

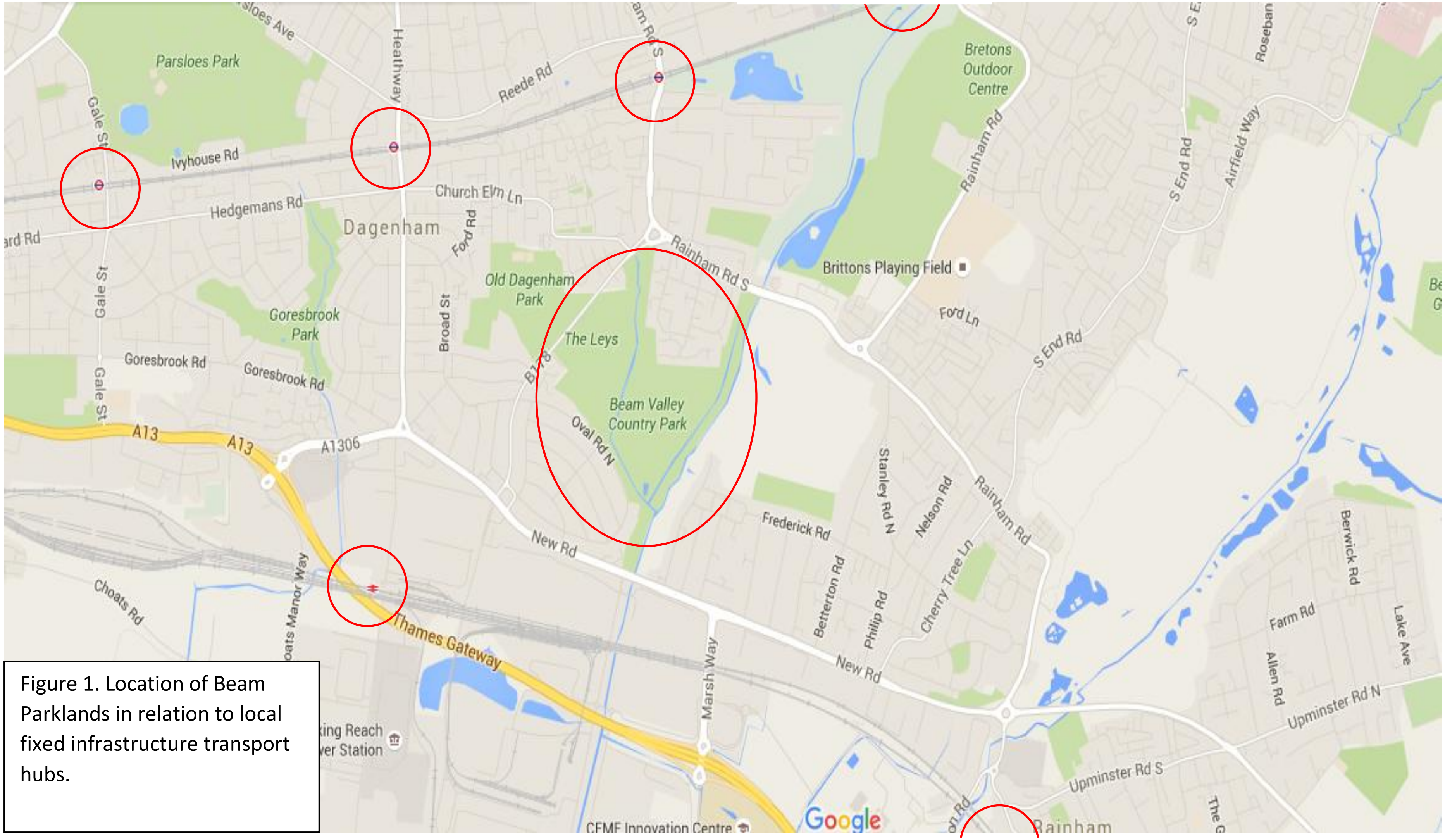

Figure 1. Location of Beam Parklands in relation to local fixed infrastructure transport hubs.

Comparing the significant and positive regression for the effect on house prices within 30 minutes walking distance of the Beam Parklands in 2014 with that from 2003 and before the treatment we see that the earlier sample regression does not show a positive impact on house prices. This supports the argument that the investment in improving the parkland has been positively assessed by individual agents within the housing market.

2003 Sample simple regression of walking distance (as measured in minutes taken) to Beam Parklands (untreated) on house prices

Sample year	Walking distance	Coefficient	T-Value	P-Value
2003	Sub 30	0.001644	1.052	0.294

In 2003, the result is statistically insignificant. According to a case study produced for the RTPI by Arup (forthcoming), the parklands before the intervention treatment were poorly designed, neglected and suffering from problems typical of the wider area including anti-social behaviour. The difference between the 2003 and 2014 simple regressions of house price against walking distance to the park is evidence for the economic value of the intervention.

However, further evidence for the influence of park closeness being dominated by the effects of other neighbourhood amenities is seen when a regression is run with more independent variables. With the inclusion of structural variables for type of house, detached (D), semi-detached (S), terrace (T) and flat (F) as well as the neighbourhood amenities for school quality (School), walking distance to nearest overground railway or underground station with direct access to London (Access) and average monthly reported crime incidences for 2014 (Crime), we see that distance to park is no longer a significant variable for effect on house prices.

2014 Sample multiple regression of structural and environmental influences on house prices for sub-30 minute walking distance to Park

Sample year	Variable	Walking distance	Coefficient	T-Value	P-Value
2014	D	Sub-30	89647	5.132	9.14E-07
2014	F	Sub-30	-63526	-7.167	3.68E-11
2014	S	Sub-30	24279.6	3.063	0.00261
2014	T	Sub-30	NA	NA	NA
2014	Park	Sub-30	-128.9	-0.285	0.77597
2014	School	Sub-30	7561	1.687	0.09374
2014	Access	Sub-30	-431.5	-0.77	0.44227
2014	Crime	Sub-30	76.2	0.371	0.71088

Not directly relevant for our goals of analysing the effects of the ‘Park’ variable, but important structural-house components of the hedonic regression, the housing ‘type’ variables perform as expected. With Terrace as the base dummy variable, Semi and Detached are more highly valued, and Flat less highly valued, all with highly significant confidence levels.

The ‘School’ variable has a statistically significant (at the 10% confidence level) positive impact on house prices, Access is not statistically significant but has a negative sign as expected. Surprisingly, crime levels seem not to have a strong impact on prices. However, as mentioned the extended area of Dagenham is characterised as one of the most deprived in Western Europe and most properties within the sub-region may suffer from perceptions about high-crime or relative high crime rates in comparison to other parts of the city. According to a 2010 report by Trust for London, the London Borough of Barking and Dagenham, within which our samples are located, was the only borough in London to be amongst the top four boroughs in four key poverty indicators: Job Seeker’s Allowance Claimants; unemployment; mortgage repossessions; and landlord repossessions (MacInnes et al. 2010).

Whilst we do not see a statistically significant value for the walking distance to park variable here, it is worth noting that the same multiple regression for both the entire sample with all walking distance ranges as well as the sub-20 minute walking distance sample has positive and strongly significant variables for ‘Park’. For the whole range sample this suggests, as proposed earlier, that above a certain walking distance threshold, the effect of the park and hence the treatment is negligible and there may well be benefits to being closer to other amenities, such as transport infrastructure. Again, as mooted with the second key permutation regarding the effect of the park as a positive amenity being weaker than other local amenities, this accords with the seeming dis-amenity effect of being ‘closest’ to the park, in the Sub-20 minute walking distance sample, as the effect of being further away from other amenities, like transport infrastructure, becomes the overriding factor.

As mentioned, we do not analyse in depth this multivariate regression for 2003 data given that we do not have historical data on crime levels or school results. The 2003 data was useful for comparing the simple regression results, whereas the multivariate regression on the 2014 sample is useful for analysing the relative strength of the influences of the various regression components.

Conclusion

The composite items and the relative strength of each item that make up an individual’s demand function for housing will vary between individuals. Some individuals, for example those with young families, may have high utility for good quality local schooling; others, such as the elderly or the young and single, may have almost no utility for this variable but may place a high priority on other factors such as good connectivity to other areas of economic or social importance via local and accessible transport links. When it comes to good quality parklands and other green infrastructure there will likely be a similar range of those individuals who place high utility on such an amenity and those who don’t. Amongst those who do place utility on such an amenity, there will again be a spectrum of strength of utility, relative to the strength of their demand for all other desired or undesired attributes of the property and its environs.

The results appear to show that, whilst there may be some individuals with a high utility function for good quality parklands in East Dagenham, at an aggregate level this effect is subsumed by other priorities, particularly schooling and accessibility. Nevertheless, when these wider effects are stripped away and within the constraints of specific distance parameters, we do see a statistically significant, positive impact of the Beam Parklands treatment on local house prices. Importantly, we also see that the statistical significance in the simple regression of walking distance to park and house prices was not existent in 2003, providing evidence for the positive economic value of the intervention.

It may well be that given the aforementioned particular social and economic challenges associated with East Dagenham, faced with more pressing needs to find and access jobs or locate good quality schooling, many individuals may reasonably place a low priority on public realm improvements. Additionally, for the same reason individuals would be unlikely to move into the area on account of good quality parkland if the area was deficient in other amenities.

It would be interesting therefore to extend this research to a range of varied localities with differing economic and social profiles to see if consumption preferences change for residents depending on these factors. Furthermore, it may be that the size and quality of the intervention is important. Although the Beam Parklands regeneration is an award-winning scheme, this might be to do with the fact that it was relatively far superior to what it replaced, but in absolute terms may not have the demand-pull factor of a 'destination' across the wider region. It may be likely that a similar kind of research near a world-renowned parkland, Hampstead Heath for example, might produce significantly different results. This could suggest that projects might need to be even more ambitious for more conclusive results to be found.

Another unique feature of the Beam Parklands case is that much of the housing most closely located to the park is social housing. The impact of social housing slightly distorts the research as price changes cannot easily be calculated, limiting the sample area from which observations can be accrued.

Indeed the challenge of how to assess the value placed by individuals who don't pay for a good (in the sense of purchasing it outright) leads on to a further point: what if the economic benefits are not valued by the individual but accrue to the wider economy? Contrary to a hypothesis presented in the introduction, it might be the case that rationality is bounded for most individuals in terms of placing economic value on amenities such as parkland. Nevertheless, the opportunity to live more active and healthy lifestyles afforded by parkland could feedback indirectly into higher productivity in the workplace, not directly assessed by the individual (for lack of a control), but a benefit to their employer and the economy generally. Studying this effect would require longitudinal research into the controlled economic outcomes of individuals with easy access to high quality green infrastructure and those without.

Should economic value remain elusive as a statistically significant influence, the debate would need to return to the question of how we value the social and environmental benefits of such amenities. Further research in this field is clearly required both to help find an outcome to the debate about under what circumstances public interventions in the public realm add economic value, and to establish how such value, where it exists, could be effectively captured.

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Appendix

1. Explanation of the data

Dummy Variables

Housing Type	Housing Type available with house price-paid data via the UK Land Registry: http://landregistry.data.gov.uk/app/ppd
Detached (D)	
Terrace (T)	
Semi (S)	
Flat (F)	

Postcode	Postcode data also ascertained from UK Land Registry
RM9	
RM10	

Ofsted Rating	Ofsted Data ascertained from London Schools Atlas: (https://www.london.gov.uk/webmaps/lsa/) Linked to housing using postcode
4 - Outstanding	
3 - Good	
2- Requires Improvement	
1 - Poor	

Other Variables

Name	**Description**
Price	Price-sold data gathered from UK Land Registry
Park	Walking distance to 'treatment' area. (Source: Google Maps
School	2014 Ofsted Ratings for school most-attended by local residents (source: London Schools Atlas, Mayor of London)
Crime	Local Crime Statistics, average monthly number of crimes committed for 2014 (Source: Police.uk)
Access	Walking distance to rail or underground station with direct routes to central London (Source: Google Maps

2. **Regression Print Outs**

N.B. All regression data analysed using R statistical package

2.1. Simple Regression, 2014 Sample, **Sub-30 Minute Park Walking Distance**, House Price Data on Walking Distance to Park

	Estimate	Std. Error	T-value	P-value
(Intercept)	227966.7	8705.9	26.185	<2e-16 ***
Park	-720.6	420.2	-1.715	0.0884 .

Residual standard error: 43270 on 150 degrees of freedom

Multiple R-squared: 0.01923, Adjusted R-squared: 0.01269

F-statistic: 2.941 on 1 and 150 DF, p-value: 0.08841

2.2. Simple Regression, 2003 Sample, **Sub-30 Minute Park Walking Distance** , House Price Data on Walking Distance to Park

	Estimate	Std. Error	T-value	P-value
(Intercept)	141865.1	3941.7	35.991	<2e-16 ***
Park	54.9	217.7	0.252	0.801

Residual standard error: 28290 on 205 degrees of freedom

Multiple R-squared: 0.0003101, Adjusted R-squared: -0.004566

F-statistic: 0.06359 on 1 and 205 DF, p-value: 0.8012

2.3. Simple Regression, 2014 Sample, **Sub-20 Minute Park Walking Distance**, House Price Data on Walking Distance to Park

	Estimate	Std. Error	T-value	P-Value
(Intercept)	209470	12450	16.825	<2e-16 ***
Park	1468	1008	1.456	0.15

Residual standard error: 43330 on 70 degrees of freedom

Multiple R-squared: 0.02939, Adjusted R-squared: 0.01552

F-statistic: 2.119 on 1 and 70 DF, p-value: 0.1499

2.4. Simple Regression, 2003 Sample, **Sub-20 Minute Park Walking Distance**, House Price Data on Walking Distance to Park

	Estimate	Std. Error	T-value	P-value
(Intercept)	144291.2	3176.2	45.429	<2e-16 ***
Park	-168.7	123.8	-1.362	0.174

Residual standard error: 26880 on 308 degrees of freedom

Multiple R-squared: 0.00599, Adjusted R-squared: 0.002762

F-statistic: 1.856 on 1 and 308 DF, p-value: 0.1741

2.5. Simple Regression, 2014 Sample, **Whole Walking Distance Range**, House Price Data on Walking Distance to Park

	Estimate	Std. Error	T-value	P-value
(Intercept)	215851.15	7766.45	27.793	<2e-16 ***
Park	49.75	299.25	0.166	0.868

Residual standard error: 45970 on 210 degrees of freedom

Multiple R-squared: 0.0001316, Adjusted R-squared: -0.00463

F-statistic: 0.02764 on 1 and 210 DF, p-value: 0.8681

2.6 Multiple Regression, 2014 Sample, **Sub 30 Minute Walking Distance**, House Price Data on D, F, S, T, 'Park', 'School', 'Access' and 'Crime

	Estimate	Std. Error	T-value	P-value
(Intercept)	197500.96	29637.72	6.664	5.27e-10 ***
D	89647.06	17469.42	5.132	9.14e-07 ***
F	-63526.43	8863.90	-7.167	3.68e-11 ***
S	24279.57	7926.21	3.063	0.00261 **
T	NA	NA	NA	NA
Park	-128.90	452.11	-0.285	0.77597
School	7561.25	4481.66	1.687	0.09374 .
Access	-431.55	560.09	-0.770	0.44227
Crime	76.24	205.28	0.371	0.71088

Residual standard error: 32940 on 144 degrees of freedom

Multiple R-squared: 0.4543, Adjusted R-squared: 0.4277

F-statistic: 17.12 on 7 and 144 DF, p-value: 2.353e-16

2.7. Multiple Regression, 2014 Sample, **Whole Range Walking Distance**, House Price Data on D, F, S, T, 'Park', 'School', 'Access' and 'Crime

	Estimate	Std. Error	T-value	P-value
(Intercept)	160494.6	20143.1	7.968	1.12e-13 ***
D	107897.0	14560.0	7.411	3.28e-12 ***
F	-66700.9	7343.0	-9.084	< 2e-16 ***
S	21336.1	7112.6	3.000	0.00304 **
T	NA	NA	NA	NA
Park	605.5	268.8	2.252	0.02536 *
School	11336.6	3996.2	2.837	0.00502 **
Access	-312.1	456.1	-0.684	0.49460
Crime	232.1	148.8	1.560	0.12041

Residual standard error: 33970 on 204 degrees of freedom

Multiple R-squared: 0.4696, Adjusted R-squared: 0.4514

F-statistic: 25.8 on 7 and 204 DF, p-value: < 2.2e-16

2.8. Multiple Regression, 2014 Sample, **Sub 20 Minute Walking Distance**, House Price Data on D, F, S, T, 'Park', 'School', 'Access' and 'Crime

	Estimate	Std. Error	T-value	P-value
(Intercept)	82968.8	56635.1	1.465	0.14782
D	59080.3	21993.3	2.686	0.00919 **
F	-72580.7	15918.0	-4.560	2.37e-05 ***
S	15273.9	11124.2	1.373	0.17454
T	NA	NA	NA	NA
Park	4269.3	1899.9	2.247	0.02809 *
School	-4431.9	7139.1	-0.621	0.53694

Access	18.4	1152.8	0.016	0.98731
Crime	1075.0	409.4	2.626	0.01080 *

Residual standard error: 33920 on 64 degrees of freedom

Multiple R-squared: 0.4563, Adjusted R-squared: 0.3968

F-statistic: 7.673 on 7 and 64 DF, p-value: 1.043e-06

2.9. <u>Significance Codes</u>

N.B:

Significance codes are as follows:

Less than 0.1% = '***'

Less than 1% = '**'

Less than 5% = '*'

Less than 10% = '.'

About the research

This report is based on research undertaken by David Pendlebury, RTPI Economic Research Officer.

Further information

The report is available on the RTPI website at: www.rtpi.org.uk/valueofplanning

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