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DOES AN INCLUSIVE HOUSING DEVELOPMENT DEPRESS NEIGHBOURHOOD HOUSE PRICES? A CASE STUDY OF COSMO CITY, JOHANNESBURG, SOUTH AFRICA.

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ABSTRACT

South Africa joined the global world in building inclusive housing, known as Mixed Income Housing (MIH) as a way to integrate and transform residential markets previously distorted by the discriminatory apartheid regime. However, despite the benefits of MIHs in deconcentrating poverty while boosting housing supply, these inclusive neighbourhoods often experience amplified cases of 'Not in My Back Yard' (NIMBY) for various reasons. Thus, approval processes of these inclusive housing developments get to be highly contested in courts, which causes huge delays in their completion. The paper aims to investigate the effect of NIMBY on the price of houses in a mixed-income neighbourhood. The paper used a cross sectional hedonic model on houses sold in the neighbourhood of Cosmo City MIH. The limitation is that a typical and purposely selected Cosmo city case study may not be generalizable to South Africa at large. Results show that Cosmo City had negligible effects on neighbourhood house prices. This is rather surprising given the unfavourable perception encountered during its development. The practical implication is that improving infrastructure such as roads to reduce traffic congestion, building new schools, new hospitals, security services, and new shopping centers reduce pressure on available services and amenities making inclusive housing acceptable in its neighbourhood. The social implication is that inclusive housing developments default into supplying the much-needed social housing in South Africa. Scientifically measuring perception on accepting MIH development projects in well-established neighbourhoods does contribute to understanding the plight of housing shortage by the public in ways that accepts inclusivity from an investment point of view.

KEY WORDS Hedonic modelling; inclusive housing; Johannesburg; mixed income housing; NIMBY effects; residential property prices; South Africa.

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1. INTRODUCTION

Orchestrated by apartheid that deprived black people neighbourhoods of commercial, industrial and infrastructure development, housing shortage in South Africa has persisted, and worsened due to factors such as global financial crises, increasing severity of disasters, political and religious unrest, migration, population increases, and increase in urbanisation rates (Santoro, 2019; Tomlinson, 2017; Hoekstra and Marais, 2016; Graham, 2016). Suzuki (2019), also projected that the world's population will reach 10 billion by 2050 with Sub-Saharan Africa region doubling by 2050, an expansion of nearly 10 times relative to 1960, from 227 million to 2.2 billion. Given this pressure, it is important that residential markets function properly to accommodate policies, initiatives, and programmes in the provision of housing. Inclusionary Housing Policy (IHP) is one distinctive urban policy where residential markets include multi-tenured units other than distinctive low, medium, and high-income sub-markets previously common in planning frameworks (Yan et al. 2021; Thaden, and Wang, 2017).

With the aim of deconcentrating poverty and promoting inclusive housing, Mixed Income Housing (MIH) developments comprise variate housing typologies for different levels of household affordability, arguably to enhance social integration and well-being of poor residents who already work and are 'accepted' in the neighborhood (Trillo, 2019; Nguyen, 2012). Kempen and Bolt (2009) found that MIH developments reduce malnutrition, high unemployment rates, high school dropouts and crime rates. Despite the benefits of MIHs, highlighted in literature, there are opposing views in that the only reasoning behind MIHs is the financial interests and anti-market ideologies pushed by housing advocates and the connected organisations (Ellickson, 2010). While there are other reasons for 'opposition' widely known as 'Not In My Back Yard' (NIMBY) to unfavourable changes in land uses, MIH developments are also a source of NIMBY by homeowners (Fischel, 2001). Zhang et al. (2018) observes that NIMBY is an indication to the necessity of public participation in urban development. MIHs in South Africa are mainly located in areas that were not allowed for black people during apartheid. Thus, black people through government subsidies (RDP housing) get to be in the MIH mix. This is an introduction of a different race in the previously white race dominated area. It seems that this component of household set precedence on black buyers of the market rate houses. However, the perception is that black people are likely to drive property prices down, as they are associated with crime, dirtiness, and noise which originate from high rates of unemployment and cultural differences. Thus, NIMBY is a perception that the paper sought to verify.

South Africa uses MIH developments to integrate and transform residential markets from the legacy of a discriminatory apartheid regime. As expected, these inclusive neighbourhoods often experience amplified cases of Nimbyism for reasons associated with increased crime, and overcrowding on services and amenities which depress neighbourhood property prices. Bernasco, et al (2017) suggest that individual characteristics play a much greater role in an individual's decision to commit crime in Dutch neighbourhoods. Thus, to build MIHs, approval processes of such developments are usually highly contested and obstructed through the courts (Klug et al., 2013). A considerable number of developments earmarked for MIH developments as well suffer delays due to Nimbyism in South Africa. Urban Landmark (2011) indicated that Cosmo City MIH development was delayed for four years. Jerusalem Fairlands development was approved in 2005 but the residential portion took too long to be built. Thus, home ownership in MIH developments becomes risky investments (Ellickson, 2010; Bailey and Manzi, 2008a; Delorenzi, 2006). NIMBY problem elevates the residential investment risks thereby reducing investment funds into the asset class.

2. RESEARCH AIM AND OBJECTIVES

The paper aims to investigate the NIMBY effect of an MIH built in South Africa on its neighbourhood house prices. Firstly, the study is set to determine the relation between distance from Cosmo City MIH and the neighbourhood houses prices and secondly to also investigate if there is a critical 'zero effect' point where an MIH Nimbyism stops influencing house prices unfavourably. Thirdly, the paper investigates if the NIMBY effect also varies with the quality of the receiving neighbourhood. One way to understand house prices in an area is through location theory and hedonic modelling. Hedonic modelling captures determinants of housing value such as interest rate, demand and supply, socio-economic background of the demography that determine housing pricing.

3. LOCATION THEORY

Location theory suggests property in proximity to places of business, infrastructure, good environmental quality and transport linkages fetches higher than those that are further away (Boshoff, 2013). This means that the NIMBY unfavourable effect on houses is confirmed if houses in proximity to an MIH experience decline in prices. Literature specified hedonic price modelling with the use of other control attributes and characteristics into environmental, structural, neighbourhood and locational factors (Boshoff, 2013; Du Preez, 2013; Priilaid, D, & van Rensburg, 2012; Borowiecki, 2009; Ham & Manley, 2009; Selim, 2008; Delorenzi, 2006; Garner et al. 2006; Van Wen et al. 2004; Limsombunc et al. 2004; Barker, 2003; Ball, 1973). Also, distance contours are able to capture proximity advantages in determining house prices. The closer the distance from the subject property to the nearest school, hospital, place of worship, CBD, shopping centre, the more it is expected to increase in price. However, there is need to control for informal settlements in the hedonic regressions (Simbanegavi, 2021; Boshoff and De Kock, 2013).

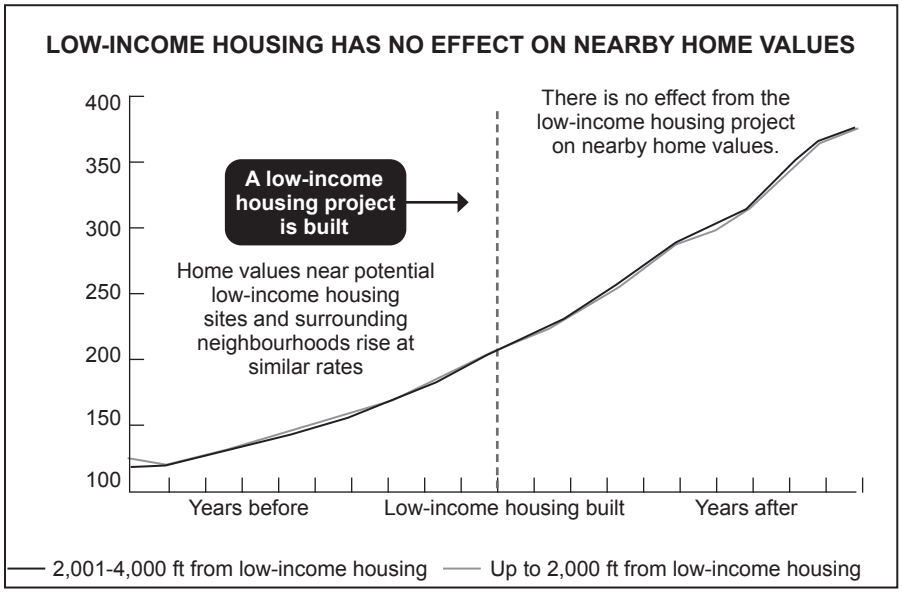
4. PREVIOUS STUDIES

4.1. Neighbourhood MIH NIMBY Effects

Research on NIMBY effects of an MIH on neighbourhood house prices is common in the developed world. The unfavorable perception of the risk associated with MIH developments cannot be under estimated although most research disproves it. As early as 1974, De Salvo investigated the effects of upgrading New York City housing projects on neighboring house prices and found that locating projects in the poorest or best quality other than the middle quality neigbourhoods produces the least benefits of an upgrade. They also found that a middle income neighbourhood makes the best case for upgrading an area. Ding et al. (1999) in Cleveland USA assessed the impact of distance to new and rehabilitated developments on single family residential values in the inner city. They also found a favorable effect due to the fact that a house could sell for about USD 5000 more because of its close proximity to a new construction and that there was a diminishing value effect just 300 feet away from it. Some studies also found the favorable impacts of the MIH on neighbourhood house prices (Pollakowski et al., 2005; Ellen and Voicu, 2008; Ding and Knaap, 2002; Thibodeau, 1990; Ding et al., 1999).

Quite a few empirical studies found unfavorable impacts on surrounding house prices (Galster et al., 2004; Gornstein and Verrilli, 2006). Using distance variable, Newell (2009) found that the Lyon Park neighbourhood was unfavorably impacting taxable values in Durham city, North Carolina. The reason cited was the increased supply levels that dampen house prices. He therefore recommended that mixed developments be located in places where demand is increasing. He found no favorable impact on house prices and argued that this nullified the politically popular view given for urban revitalization which is subsidized by government. However, he found that the impact on residential house prices is different when a nearby development is of a commercial nature. By applying a distance variable in a hedonics assessment, Thibodeau (1990) was able to gauge the impact of mixed income development on house values in Dallas, Texas which were near the Lennox Center, a newly developed high rise office building. His conclusion was that there was a favorable impact on the home values with properties within 1000 to 2500 meters of the building. Kashef (2017) cites a study done by Trulia across USA found no significant effect from 1996 to 2006 on home prices located near Low Income Housing Tax Credit (LIHTC) project as shown in Figure 1.

Figure 1: Trulia Research Finds no Effect in US Counties



Source: Kashef, 2016

After the US trend changed from mixed income developments being located in the city periphery to vacant land within city limits, McConnell and Wiley (2010) studied the trends in property prices using traffic effects and house price index before and after developments. They also complemented the study by a survey on residents. They found that there was no substantial house price variation in the area that 'received' the development. Ellickson (2010:34) contends that "inclusionary policies, such as the federal programs in the US, are mediocre in the sense that the resources devoted to them could be far better allocated otherwise." He further argues that MIH developments actually contribute to the high cost of housing in those jurisdictions where they are developed. He instead argues for a voucher system as a way of effectively dispersing people across all sub-markets.

More specifically to South Africa, Inclusionary Housing Policy (IHP) is still a debated issue in academic and policy circles as to whether such policies make economic sense or whether they should continue to be pursued. Klug et al. (2013) considers the potential of IHP policy in reshaping South African cities as inadequate unless location is adjusted to low/middle-income neighbourhoods and as a developer-led model that relies largely on government subsidies. One, therefore, wonders how the already built MIH developments in high income neighbourhoods have impacted property prices around them. This study follows Du Preez et al. (2013) by using hedonic modelling to investigate the resultant MIH developments of IHP and how the urban markets in which they are built perceive them. In South Africa, Du Preez et al. (2013) used hedonic modelling to measure the impact of Quebera Township, a low-cost housing development in Walmer, Port Elizabeth and found "the average price of a house in the neighbourhood increasing by R228.85 for every meter further away from the development" (Du Preez et al., (2013: 13). Onatu (2012: 9) used an exploratory

study of Cosmo City and concluded that "private sector participation in housing development should be encouraged as most local authorities struggle to finance housing and services". Property price analysis is, thus, in agreement with private sector participation as it is the basis for private investments (Tomlinson, 2007). Prinsloo (2008) contends that IHP effect on property prices is not negative and therefore acceptable to higher income households. Inclusive housing therefore fosters socio-economic integration if IHP policy does not become law. Questions remain as to whether the MIH concept is a race or income issue in South Africa. Notable research by Kotze (1999) found a strong unfavourable correlation (-0.69) between residential property prices and desegregation in Pietersburg using the product-moment correlation coefficient method.

The expectation is that NIMBY effect on neighbourhood house prices is unfavourable. This is because such developments are built in affluent suburbs to fulfil transformational agendas in reversing the legacy of apartheid that removed black people away from economic hubs. Economic hubs are places of employment and business opportunities. Thus, MIHs in developed markets are viewed as having the power to promote urban regeneration and hence a positive impact on property prices (van Gent and Musterd 2013; McConnell and Wiley 2010; Van Ham and Manley 2009; Voicu and Been 2008; Ellen 2008; Obrinsky and Stein 2007; Galster et al., 2006; Gornstein and Virrilli 2006; Pollakowski et al., 2005). In developing countries, most research finds less favourable impact on house prices because they are built in more affluent locations.

Academic contradictions persist as to the findings of the economic effects of MIHs. In South Africa, it holds true that the higher the level of desegregation, the greater the degree of effect on hosting neighbourhoods. The dearth of rigorous studies means there is less evidence to establish whether MIH is considered a 'bad' or a 'good' policy in economics terms and how such a policy is responsible for so much development will influence future investment in the residential markets. But the general consensus seems to be that MIHs are a bad phenomenon because of the problems associated with low income housing as highlighted in literature. In line with the above discussion, this study aims to investigate residential property values in these inclusive neighbourhoods using the case study of Cosmo City in Johannesburg, South Africa. The research gap is that the unfavourable perceptions that often lead to resistance of MIH are largely based on heuristic judgments, with no solid evidence of the purported unfavourable effects compared to the developed world, the nature of research in South Africa has largely been descriptive and desktop analysis (Onatu, 2012; Smit and Purchase, 2006; Smith et al., 1988) hence giving guidelines on MIH to a bare minimum.

5. RESEARCH METHODOLOGY

The study used a pooled hedonic technique in estimating the effect in STATA software. As literature reveals, other studies have used spatial distance to a development as a variable in a hedonic specification where holding other variables constant gives the impact of spatial distance. VCE (robust) command in STATA was used to make the pooled regression models robust to get consistent, efficient, and unbiased estimators according to the Gauss Markov's assumptions of the Ordinary Least Squares (OLS) (Gujarati & Porter, 2012; Ogwang and Wang, 2003). These tests include normality of the error terms, heteroscedasticity, multicollinearity, and autocorrelation. In order to interpret the results, the coefficient estimate should be statistically and practically significant. When interpreting results, other independent variables are held constant.

5.1. Cosmo City MIH Case Study

In order to broaden the understanding of what determines house prices in this area, a pilot study that involved site visits in Cosmo City MIH case study and its neighbourhood was done in 2014 and 2015. The area generally experienced upward trends in house prices (Business Tech, 2017). Through semi-structured interviews, three purposefully selected informants gave a broader overview of the case study area based on their experiences. A micro level (pilot) study was necessary for drawing a consensus on different localities that experience different forms of change as suburbs are location fixated (Ajibola, 2013; Briggs et al, 2009; Kotze, 1999). House price data was collected from seven suburbs to see how house prices responded to Cosmo City MIH development in Johannesburg. Because theoretical replication is needed to achieve a degree of precision, the seven suburbs were used. They included Bloubosrand, Chartwell, Dainfern Golf Estate, Farmall, Jackal Creek Golf Estate, North Riding, and Zandspruit Formal Extension 4 suburbs. Woodhill Golf Estate was included as a control suburb. Selection of these suburbs captures the fact that the effect of Cosmo City MIH on its individual neighbourhood is likely to be depended on whether the neighbourhood is low, medium, or high income. The data comprised the whole population of all houses sold from 1995 to 2016. Theoretical replication in regards to the seven suburbs had the power to show common patterns that emerge from great variations and was valuable in capturing the core experiences and shared aspects of the Cosmo City MIH case study (Yin, 1991; Shakir, 2002).

5.2. The Pooled Cross-Sectional Model

All transfers were pooled into 2016 cross sectional data by converting all house prices sold in different years to 2016 prices using the ABSA house price index shown in Table 1.

Table 1: ABSA House Price Index

Year	Index	Year	Index
31 Dec 2000	100.0	31 Dec 2009	354.9
31 Dec 2001	114.3	31 Dec 2010	381.2
31 Dec 2002	131.7	31 Dec 2011	387.9
31 Dec 2003	159.6	31 Dec 2012	390.4
31 Dec 2004	211.1	31 Dec 2013	429.3
31 Dec 2004	259.0	31 Dec 2014	469.1
31 Dec 2006	298.7	31 Dec 2015	523.9
31 Dec 2007	342.1	31 Dec 2016	524.3
31 Dec 2008	356.2		

Source: Du Toit, 2015

This reconciled houses the fact that some houses were sold in different years regarding inflation within the data set. The index is representative of the South African residential market conditions (Du Toit, 2015).

The 'pooled cross-sectional' regression model uses Ordinary Least Squares (OLS) of semi-log specification shown in equation 1.

LN (Pi) = α + β Xi + ε ……1

Where

Pi = Price for individual house (i) in surrounding suburbs of Bloubosrand, Chartwell, Dainfern Golf Estate, Farmall, Jackal Creek Golf Estate, North Riding, Zandspruit Formal Extension 4, and Woodhill Golf Estate,

Xi = is a vector of hedonic explanatory variables for house i,

βi = are the estimated coefficients (percentage increase in price per unit increase in explanatory variable),

ε = the residual component.

Hypothesis 1:

H1: β Distance Contour 1 > 0 ……2

The hypothesis stipulates that there is a statistically significant relationship (association) between house prices and MIH distance, which means the slope (β = implicit price) of a regression model captured by variable 'Distance Contours'. This is an incremental change in the price of the house representing the additional amount house buyers are willing to pay for a marginal change in the attribute while holding all the other attributes constant (Ham, 2011). This hypothesis means that the slope indicates a direct relationship that the price of a house in the neighbourhood increases as distance from Cosmo City MIH increases (+β). There is a direct relationship that when the distance from an MIH increase, the price of a house increases. This is true when an MIH is viewed favourably and this is depicted by a 'plus' coefficient (+β).

Hypothesis 2

There is a critical 'no effect' distance point

Dummy variables were created for each neighbourhood which were later converted into categorical variables. The intention was to check if differences existed across neighbourhoods regarding how these different neighbourhoods perceived Cosmo City MIH.

Hypothesis 3

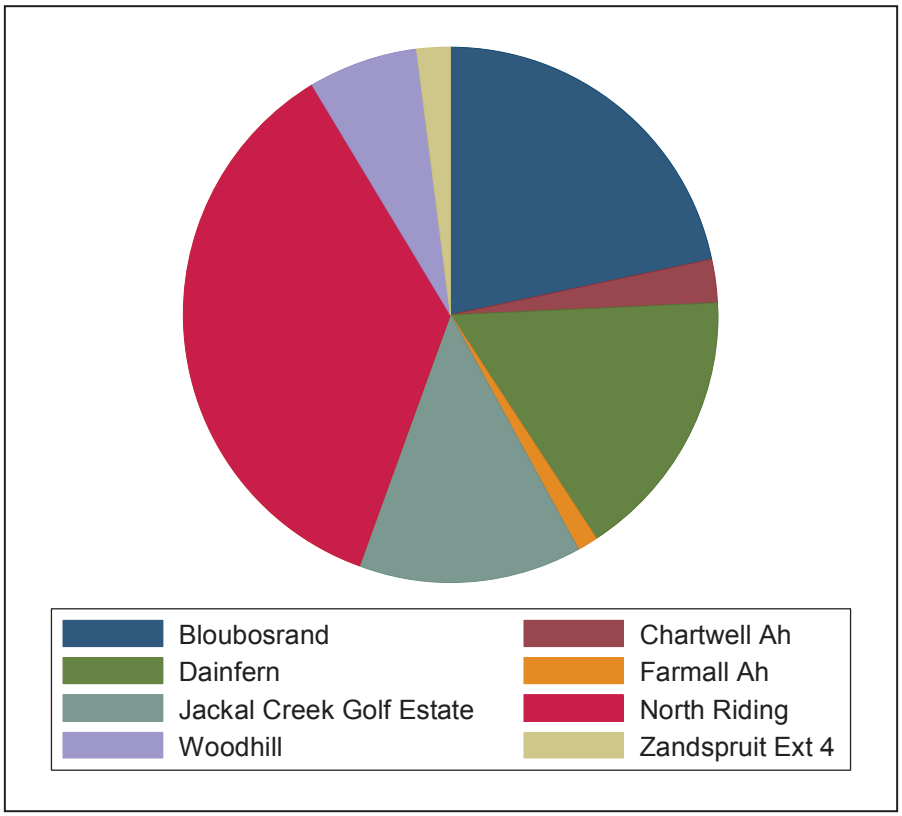
MIH NIMBY effects are dependent on the quality of a neighbourhood

The effect of Cosmo City MIH on its individual neighbourhood is likely to be depended on whether the neighbourhood is low, medium, or high income. The intention was to check if there exist differences across neighbourhoods regarding how these different neighbourhoods perceived Cosmo City MIH. This is because the current trend is that most MIHs are built in highly priced affluent neighbourhoods.

5.3. Data

Lightstone Property Company, based in Johannesburg, South Africa, provided the main data used for this study. The data set contains property prices, which were sold from 1995 to 2016 shown in Figure 2.

Figure 2: House Sales Data Contribution per Suburb



Source: Author compilation

For information that was not found in quantifiable state, extended techniques were applied using Google Maps and Google Earth to get more control variables. Data cleaning included reconciling total transaction value or purchase price of one or more properties on the same title deed after correcting for obvious 'finger trouble' and typing errors. Apart from increased crime and traffic congestion, the main challenge faced by the neighbourhood of Cosmo City MIH was that of declining house prices. Observations that were considered irregular, awkward, unlikely, or doubtful were removed from the data set. Outliers were removed in house prices that were due to typing errors, cross checking with plot sizes and number of bedrooms. This reduced the sample size to 14 927 from 15 314 total transfers. A total of 65 secondary data variables were collected for each of the 14 927 sales transactions of the 'population' other than a 'sample'. This means the normality test of the error terms was not compelling. Most data came from North Riding, followed by Bloubosrand, Dainfern, Jackal Creak, Woodhill Golf Estate, Chartwell, Zandspruit, and lastly Farmall shown in Figure 2.

5.3.1. COSMO CITY MIH NEIGHBOURHOOD HEDONIC VARIABLES

Hedonic theory maintains that a house price for each house sold (Pi) can be deconstructed into its attributes/characteristics, implicit prices that include Structural Attributes (SA), Locational Attributes (LA), and Neighbourhood Attributes (NA), Income categories (Y) and Race categories (R) (Ham, 2011; Du Preez et al. 2013). These include crime rate, income groups, number of bedrooms, number of bathrooms, distance to the Central Business District, distance to the shopping malls, race type, age and distance to informal settlement. Examples of informal settlements include Diepsloot, Kya Sands, Zandspruit, and Plastic View. Apart from variables from location theory, structural attributes of a house are considered in this study. Their presence also affect house prices favourably or unfavourably. These include; area under roof for the property from various possible sources, number of bedrooms, number of bathrooms, number of garages, number of servant rooms. When number of bedrooms increase, house prices increase, hence there is a direct relationship between house price and number of bedrooms. Erf size in South Africa represents the yard or compound size and this variable affects price favourably.

6. RESULTS

The analysis finds a statistically robust pooled cross-sectional regression model with an R-Squared of 57%. The results of the three tested hypotheses are in Table 2.

6.1. Overall results

In contrast to the developed world, this paper finds an almost negligible effect of Cosmo City MIH on its neighbourhood house prices of 0.413%. In developing countries, most research on MIH NIMBY effects find either a no substantial impact or a favourable impact on house prices (van Gent and Musterd 2013; McConnell and Wiley 2010; Van Ham and Manley 2009; Voicu and Been 2008; Ellen 2008; Obrinsky and Stein 2007; Galster et al., 2006; Gornstein and Virrilli 2006; Schwartz et al., 2006; Pollakowski et al., 2005). There are few research exceptions where there is an unfavourable impact on taxable property values and as such attributed to over supply effects rather than demand effects (Newell, 2009).

Results on hypothesis 1: Cosmo City MIH had a price depressing effect on its neighbourhood house prices

Results from hedonic modelling confirms that much of Nimbyism experienced in South Africa is empirically substantiated with a price reduction of houses sold in the neighbourhood of Cosmo City MIH (Table 2). On average, this price reduction effect was 0.413%, 0.239%, and 0.13% & within a radius of 1.281 kilometres, 2.281 kilometres and 3.281 kilometres respectively (contour 1, 2 and 3). This means that houses closest (1.281 kilometres) to Cosmo City MIH experienced 0.413% price discount. The other time dummy variable also found that houses sold after year 2005 when Cosmo City MIH was built were sold at a discount of 0.145% compared to the ones sold before it.

Results on hypothesis 2: The 'no effect' boundary

The study investigated the point at which the Cosmo City MIH did not influence house prices in its neighbourhoods with a coefficient of -0.201%, -0.296%, which meant that there was an inverse relationship at 3.281 kilometres, a 'no effect' boundary point after which Cosmo City MIH was less viewed undesirably. This is a contribution to the location theory showing a distance zone over which MIHs can be built without reducing neighbourhood house prices. This suggests that a typical MIH in an affluent neighbourhood does not have such an extreme effect on distressing the locational advantages of an affluent neighbourhood as previously purported by high levels of Nimbyism against Cosmo City MIH. Thus, from a suburb analysis point of view, Cosmo City MIH development did not affect them unfavourably. This is rather surprising as most Nimbyism comes from middle- and high-income suburbs.

Results on hypothesis 3: The effects are dependent on the quality of a neighbourhood

The study confirms the hypothesis that the effect of an MIH on neighbourhood house prices is dependent on the quality of a neighbourhood in which the development is built. Indeed, the effect of Cosmo City MIH on its individual neighbourhood was different and yet surprising. This was tested using dummy variables that picked 1 for a suburb and 0 for all others. These were converted into one categorical variable for the eight suburbs. Compared to Woodhill (control suburb), Bloubosrand and Zandspruit Extension 4 had coefficients of -0.462% to -0.605% respectively which shows that house prices actually reduced on average in the low-income neighbourhoods while the middle- and high-income neighbourhoods of Chartwell, Dainfern, Farmall, Jackaal Creek, and North Riding actually increased in prices as shown by +0.379%, +1.076%, +0.217%, +0.196%, and +0.121% respectively.

Table 2: Regression Results

MODEL	(1)	(2)	(3)	(4)	(5)	(7)	(8)
VARIABLES	**ART1**	**ART2**	**ART3**	**ART4**	**ART5**	**ART7**	**ART7**
1. Contour	0.798***	1.010***	1.039***	0.991***			0.413***
2. Contour	0.590***	0.718***	0.751***	0.710***			0.239**
3. Contour	0.481***	0.503***	0.468***	0.448***			0.130
4. Contour	0.130**	-0.154**	-0.140**	-0.115*			-0.201***
5. Contour	0.0111	-0.218***	-0.213***	-0.181***			-0.296***
6. Contour	0.230***	0.0627	0.0448	0.0661			-0.0465
7. Contour	0.289***	0.161***	0.154***	0.184***			0.106***
1. Bloubosrand		8.986***	9.426***	9.305***	-1.523***	-1.333***	-0.462***
2. Chartwell		10.39***	10.79***	10.61***	-0.291**	-0.508***	0.379**
3.Dainfern		9.277***	9.642***	9.506***	0.599***	0.468***	1.076***
4.Farmall		10.03***	10.44***	10.24***	-0.596***	-0.749***	0.217
5.Jackal Creek		17.38***	18.26***	18.03***	-0.912***	-0.509***	0.196
6. North Riding		17.47***	18.31***	18.11***	-0.768***	-0.538***	0.121
8. Zandspruit		10.13***	10.61***	10.41***	-1.358***	-1.386***	-0.605***
Distfrom info settlement	3.08e-05**	-6.10e-05***	-6.01e-05***	-4.53e-05**	-5.24e-05***	-1.59e-05	1.63e-05
Plot size	2.94e-05***	3.24e-05***	3.27e-05***	3.28e-05***	3.12e-05***	3.48e-05***	3.53e-05***
Age	0.0148***	0.00976***	0.00815***	0.0128***	0.0164***	0.0166***	0.0153***
Distance from CBD	-0.000146***	-0.000313***	-0.000303***	-0.000294***	-0.000124***	-5.92e-05***	-0.000192***
Dist Shop Center	3.86e-06	6.17e-05***	4.06e-05*	3.18e-05	-6.20e-05***	-7.04e-05***	6.29e-05***
Race Dummy	-0.129***	-0.133***	-0.119***	-0.0845***	-0.0862***	-0.0890***	-0.0853***
1.TRO_RaceType	-0.216***	-0.219***	-0.214***	-0.233***	-0.242***	-0.245***	-0.237***
2.TRO_RaceType	0.0257	0.0178	0.0148	0.0153	0.0241	0.0206	0.0169
3.TRO_RaceType	-0.0721	-0.0805	-0.0876	-0.0997*	-0.0913	-0.0990*	-0.105*
5.TRO_RaceType	0.0504	0.0514	0.0444	0.0288	0.0144	0.00860	0.0117
Crime_Total_1000hh	0.0273***	-0.257***	-0.271***	-0.271***	0.0115***		
Auto- regressive	9.78e-08***	9.38e-08***	9.14e-08***	8.88e-08***	9.19e-08***	9.25e-08***	9.14e-08***
1.income_group	1.258***	1.583***	1.537***	1.494***			
2.income_group	-0.247***						
3.income_group	0.706***						
4.income_group	0.651***						
5.income_group	-0.0936*						
6.income_group	0.541***	-7.930***	-8.341***	-8.316***			
Bedrooms			0.0577***				
Sales B/A Oct 2005				-0.150***	-0.155***	-0.152***	-0.145***
Bathrooms				0.0764***	0.0831***	0.0838***	0.0797***
Constant	10.37***	39.49***	40.79***	40.72***	13.90***	14.71***	14.83***
Observations	14,927	14,927	14,927	14,927	14,927	14,927	14,927
R-squared	**0.564**	**0.568**	**0.575**	**0.579**	**0.568**	**0.566**	**0.573**

Robust standard errors are in parentheses: *, **, *** show the levels of significance at 10%, 5% and 1% respectively.

Source: Author compilation from house sales data

7. DISCUSSION AND CONCLUSION

7.1. MIH effects on neighbourhood house prices

The minimal effects of Cosmo City MIH case study on house prices (0.413%) refutes high levels of NIMBY in South Africa as baseless as it is not empirically substantiated. This gives the hope that 'minor' adjustments on future MIH developments can reduce Nimbyism. Thus, if all residential markets embrace, inclusive housing in the form of MIH developments in all South African regions, there is a higher chance that house prices will eventually stabilise across residential markets regardless of NIMBY. In South Africa, race is expected to play a significant role to the acceptance of an MIH. However, race variable was not statistically significant in determining prices in most suburbs. This implies that high levels of NIMBY on MIHs might not be a racial issue. It is probably, the social ills that are associated with low income people that are mostly dreaded by high income people and not necessarily racial discrimination. This gives hope that if infrastructure (roads, schools and hospitals) can be improved and crime can be reduced, an MIH development can be successful in South Africa.

7.2. The 'No Effect' Critical Boundary

The study found a critical distance boundary of 3.281 kilometres where Cosmo City MIH had zero effect on its neighbourhood house prices. The coefficient of -0.201%, -0.296%, indicated an inverse relationship where house prices increased with distance from Cosmo City. This is a contribution to location theory showing a distance zone over which MIHs can be built without reducing neighbourhood house prices. This suggests that a typical MIH in an affluent neighbourhood does not have such an extreme effect on distressing house prices than its locational advantages as previously purported by high levels of Nimbyism against Cosmo City MIH. It was also important to investigate if the NIMBY effects vary with the quality of the receiving neighbourhood.

7.3. NIMBY effects on the receiving neighbourhood

Bloubosrand and Zandspruit Extension 4 had coefficients of -0.462% to -0.605% respectively, which showed that sales prices slightly reduced on average in these low-income neighbourhoods. While the middle and high-income neighbourhoods of Chartwell, Dainfern, Farmall, Jackaal Creek, and North Riding actually increased in prices as shown by positive coefficients of 0.379%, 1.076%, 0.217%, 0.196%, and 0.121% respectively. Thus, from a suburb analysis point of view, high-income suburbs were slightly affected by Cosmo City MIH. This is rather surprising as most Nimbyism come from high-income suburbs. This could be because high income people are likely to 'stay put' in their preferred locations compared to low-income people as they are able to invest in high security measures in their neighbourhoods. This concurs with early research by Ding et al. (1999) who concluded that affordable housing can be built-in middle-income suburbs without depressing property prices.

8. RECOMMENDATIONS

Given the negligible impact of Cosmo City MIH on neighbourhood house prices, the paper recommends improving infrastructure such as road to reduce traffic, building new schools and new hospitals and shopping centres to reduce pressure on services and amenities. Improving security services through new efficient police services and neighbourhood surveillance cameras may help curb fears and apprehensions towards MIHs. People who live in organized and cooperative relationships create bonds or "sense of belonging" which decreases the probability of criminal behaviors.

9. LIMITATIONS AND FURTHER RESEARCH

The limitation is that a typical and purposely selected Cosmo city used as a case study may not be generalizable to South Africa at large.

10. REFERENCES

Ajibola, O., Awodiran, O. & Salu-Kosoko, O. (2013). Effects of Infrastructure on Property Values in Unity Estate, Lagos, Nigeria. International Journal of Economy, Management and Social Sciences, 2(5), 195-201.

Briggs, X., de Souza, G., Duncan, G., Edin. K., Joseph, M., Mare, R., Mollenkopf, J., Pattillo., M., Quillian., L., Sampson, R., Solari, C., Tach, L., Venkatesh. S. (2009). Research Designs for the Study of Mixed-Income Housing. Report to the John D. and Catherine T. MacArthur Foundation. Working Paper no. 11, California Center for Population Research (CCPR), University of California, Los Angeles (UCLA).

Bernasco, W., de Graaff, T., Rouwendal, J., Steenbeek, W. (2017). Social Interactions and Crime Revisited An Investigation Using Individual Offender Data in Dutch Neighborhoods, Review of Economics and Statistics, 99 (4)

Business Tech, (2017). These Are the 16 Most Exclusive Estates in South Africa. Available at: https://businesstech.co.za/news/wealth/185873/these-are-the-16-most-exclusive-estates-in-south-africa/ [Accessed: 05 July 2018].

Boshoff, D. G. B. (2013). Influence of Transport Development Projects on Property Values in South Africa, Paper Presented at the 2nd Virtual International Conference on Advanced Research in Scientific Fields.

Boshoff, D., and De Kock, L. (2013). Investigating the Use of Automated Valuation Models (AVMs) in the South African Commercial Property Market, Acta Structilia, Vol. 2(1) pp. 1-21.

Graham, N. (2016). Financing Infrastructure for Housing Developments: Case Studies from Sub-Saharan Africa. Center for Affordable Housing (CAHF) Johannesburg. Case Study Series 4. pp. 2-22

Available at: https://housingfinanceafrica.org/app/uploads/CAHF-Case-Study-4_Infrastructure-Financing.pdf [Accessed: 21 July 2017].

De Salvo, J. S. (1974). Neighbourhood Upgrading Effects of Middle-Income Housing Projects in New York City, Journal of Urban Economics, Vol. 1(3), pp. 269 – 277.

Ding, C. and Knaap, G. J. (2002). Property Values in Inner-City Neighbourhoods: The Effects of Homeownership, Housing Investment, and Economic Development. Housing Policy Debate, Vol. 13, pp. 701–727.

Du Preez, M., Sale, M., De, L. (2013). Nonparametric estimation of a hedonic price model: A South African case study. Journal for Studies in Economics and Econometrics 37, 41–62.

Du Toit, J. (2015). ABSA Home Loans, House Price Indices. ABSA Group Research Document, South Africa.

Ellen, I.G. (2008). Spillovers and Subsidized Housing: The Impact of Subsidized Rental Housing on Neighbourhoods. Joint Center for Housing Studies, Harvard University. Prepared for Revisiting Rental Housing: A National Policy Summit, pp. 144–158. Available at: https://pdfs.semanticscholar.org/bc71/29cc0214fba5094fa65a594f1704e015f4f7.pdf [Accessed: 1 June 2015].

Ellickson, R.C. (2010). The False Promise of the Mixed-Income Housing Project. Faculty Scholarship Series. Paper 401. Available at: http://digitalcommons.law.yale.edu/fss_papers/401 [Accessed: 15 February 2017].

Fischel, W.A. (2001). Why Are There NIMBYs? Journal of Land Economics, Vol. 77(1), pp. 144-152.

Galster, G. (2004). Measuring the Impacts of Community Development Initiatives: A New Application of the Adjusted Interrupted Time-Series Method. Evaluation Review 28, 502–538. Doi:10.1177/0193841X04267090

Galster, G., Tatian, P., Accordino, J. (2006). Targeting Investments for neighbourhood Revitalization. Journal of the American Planning Association 72, 457–474. Doi: 10.1080/01944360608976766

Gornstein, A., and Virrilli, A. (2006). Mixed-Income Housing in the Neighbourhoods: Lessons from Massachusetts. Citizens Housing and Planning Association (CHAPA), pp. 108-113 Available at: https://www.chapa.org/sites/default/files/sssssssss.pdf [Accessed: 02 March 2015]

Gujarati, D., and Porter, D. (2012). Basic Econometrics Fifth Edition. McGraw-Hill Irwin. Boston.

Ham, C. (2011). Using the Hedonic Property Method to Value Federal Lands Proximate To Urban Areas: A Case Study of Colorado Springs, Colorado. Unpublished Research Report, Doctor of Philosophy, Colorado State University, Colorado.

Habitat for Humanity. (2013). Why Affordable Housing Does Not Lower Property Values. Habitat for Humanity International. INTERNET: www.habitat.org/print/how/propertyvalues.aspx, accessed 19 March 2017.

Klug, N., Rubin, M., Todes, A. (2013). Inclusionary housing policy: a tool for re-shaping South Africa's spatial legacy? Journal of Housing and the Built Environment 28, 667–678. Doi: 10.1007/s10901-013-9351-8

Kempen, R., & Bolt, G. (2009). Social cohesion, social mix, and urban policies in the Netherlands. Journal of Housing and the Built Environment 24, 457–475.

Kotze, N.J. (1999). The Influence of Residential Desegregation on Property Prices in South Africa: The Pietersburg Case Study. Journal of Consumer Sciences. Vol. 27 (2), pp. 48-54.

McConnell, V. and Wiley, K. (2010). Infill Development: Perspectives and Evidence from Economics and Planning. Resources for the Future. Available at: https://pdfs.semanticscholar.org/935e/10836c0d206e00b72d5570aa5c6e796180f1.pdf [Accessed: 22 October 2014].

Newell, T. A. (2009). Development and Neighbourhood Revitalization: The Effects of Residential Investment on Property Values in Durham, North Carolina. The Michigan Journal of Business. pp. 97–120. Available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.668.8501&rep=rep1&type=pdf [Accessed: 20 May 2015.

Nguyen, M. T., Basolo, V. and Tiwari, A. (2012). Opposition to Affordable Housing in the USA: Debate Framing and the Responses of Local Actors. Housing, Theory and Society, Vol. 30 (2). pp. 107-130. Available at: https://www.tandfonline.com/doi/abs/10.1080/14036096.2012.667833 [Accessed: 27 May 2015].

Obrinsky, M. and Stein, D. (2007). Overcoming Opposition to Multifamily Rental Housing. Joint Center for Housing Studies of Harvard University. pp. 1-27. Available at: https://www.jchs.harvard.edu/sites/default/files/rr07-14_obrinsky_stein.pdf [Accessed: 15 January 2017].

Ogwang, T. and Wang, B. (2003). Hedonic Price Function for Northern BC Community. Social Indicators Research, Vol. 61 (3), pp. 285 -296. Available at: https://link.springer.com/article/10.1023/A:1021905518866 [Accessed: 14 March 2015].

Onatu, G. O. (2012). Sustainable Land Use and Development: Perspective on Cosmo City, Johannesburg, South Africa. Sustainable Development and Environmental Protection, Vol. 2(1), pp. 67-77.

Pollakowski, H. Ritchay, D, and Weinrobe, Z. (2005). Effects of Mixed-Income, Multi-Family Rental Housing Developments on Single-Family Housing Values. Boston: Massachusetts Institute of Technology Center for Real Estate, pp.-55. Available at: https://community-wealth.org/content/effects-mixed-income-multi-family-rental-housing-developments-single-family-housing-values [Accessed: 04 May 2017].

Priilaid, D., & van Rensburg (2012). Nonlinear hedonic pricing: a confirmatory study of South African wines. International Journal of Wine research. Vol. 4 1–13

Prinsloo, B. (2008). The South African Inclusionary Housing Policy. MBA Thesis, University of Stellenbosch.

Santoro, P.F. (2019). Inclusionary housing policies in Latin America: São Paulo, Brazil in dialogue with Bogotá, Colombia. International Journal Housing Policy, 19, 385–410.

Schwartz, A.E., Ellen, I.G., Voicu, I., Schill, M.H. (2006). The external effects of place-based subsidized housing. Regional Science and Urban Economics 36, 679–707

Simbanegavi, P. (2021) South Africa Profile. Centre for Affordable Housing Finance (CAHF) (Book Chapter) https://housingfinanceafrica.org/resources/yearbook/

Smit, D., and Purchase, J. (2006). A Review of the International Experience with Inclusionary Housing Programmes: Implications for South Africa.

Available at: www.housing.gov.za/Content/Documents/Inclusionary%20Housing%20in%20SA.pdf [Accessed: 02 July 2016].

Smith, L.B., Rosen, K.T., Fallis, G. (1988). Recent developments in economic models of housing markets. Journal of economic literature, 29–64

Suzuki, E (2019) World's population will continue to grow and will reach nearly 10 billion by 2050. Accessed: 15 July 2019. https://blogs.worldbank.org/opendata/worlds-population-will-continue-grow-and-will-reach-nearly-10-billion-2050

Thaden, E & Wang, R. (2017). Inclusionary Housing in the United States: Prevalence, Impact, and Practices; Lincoln Institute of Land Policy: Cambridge, MA, USA.

Thibodeau, T.G. (1990). Estimating the Effect of High-Rise Office Buildings on Residential Property Values. Land Economics 66, 402–408. Doi: 10.2307/3146622

Tomlinson. R (2017). Urbanisation in post-apartheid, Routledge Library Editions Urbanisation. ISBN 9781351232050

Tomlinson, M. R. (2007). The Development of a Low-Income Housing Finance Sector In South Africa: Have We Finally Found a Way Forward? Habitat International, Vol. 4(4), pp. 77-86.

Trillo, C. Mixed income housing (MIH) (2019). In Sustainable Cities and Communities, Encyclopedia of the UN Sustainable Development Goals; W. Leal Filho; Springer: Berlin, Germany.

Kashef, O. (2017). Does Affordable Housing Negatively Impact Nearby Property Values? University of North Caroliner, Community and Economic Development in North Carolina and Beyond. Available at: https://ced.sog.unc.edu/does-affordable-housing-negatively-impact-nearby-property-values/ Accessed: 20 February 2018.

Urban Landmark, (2011). Urban Landmark Land Release Assessment Tool: Pennyville Case Study Report July 2011 [WWW Document]. URL https://mail.google.com/mail/u/0/#search/godwishes.simba%40gmail.com/14551f47386f77b0?projector=1 (accessed 6.1.14).

Van Gent, W.P.C., and Musterd, S. (2013). Unintended Effects of Urban and Housing Policies on Integration: "White" Discontent in the Dutch City. Geography Research Forum, Vol. 33, pp. 64–90.

Van Ham, M., Manley, D. (2009). The effect of neighbourhood housing tenure mix on labour market outcomes: a longitudinal perspective. Institute of Labour Economics (IZA), discussion papers.

Voicu, I., Been, V. (2008). The effect of community gardens on neighbouring property values. Real Estate Economics, 36, 241–283.

Yan, J., Haffner, M., Elsinga, M. (2021) Inclusionary Housing: An Evaluation of a New Public Rental Housing Governance Instrument in China. Land, 10, 305. https:// doi.org/10.3390/ land10030305

Zhang, X., Jian-Gang, X. and Jub, Y. (2018). Public Participation in NIMBY Risk Mitigation: A Discourse Zoning Approach in the Chinese Context. Land Use Policy, Vol. 77(1), pp. 559-575. Available at https://doi.org/10.1016/j. landusepol.2018.04.041 [Accessed: 03 March 2019].