Developers' price setting behaviour in urban residential redevelopment projects

Rolf Barlindhaug
Norwegian Institute for Urban and Regional Research, Department for Housing-, Place- and Regional Research (NIBR), Oslo and Akershus University College, Oslo, Norway, and

Berit Irene Nordahl
Faculty for Landscape and Society, Norwegian University of Life Sciences, Ås, Norway

Received 22 March 2017
Revised 17 August 2017
12 November 2017
17 November 2017
20 November 2017
Accepted 21 November 2017

Abstract

Purpose – This paper aims to investigate whether developers' ask lower prices on homes in redevelopment sites than they do on similar units in smaller developments completed over a shorter time span. It also investigates whether developers price units differently at different stages of the redevelopment process. The development of designated redevelopment areas often consists of multiple projects spread across several years, some in parallel, some sequential. New units are put on the market in a piecemeal fashion, and infrastructure, shared green spaces and shared facilities are installed successively.

Design/methodology/approach – A hedonic price model is used to analyse sales prices of 7,000 new apartments in Oslo sold between 2011 and 2015, all else being equal. The paper distinguishes between infill as one-stage projects, and multi-staged competitive and multi-staged monopolistic redevelopments.

Findings – Dwellings in redevelopment projects sell at a lower price than similar dwellings in infill projects. In competitive redevelopments, those in charge of the last projects put a slightly higher price on apartments. In redevelopments involving only one developer, the last stages ask the lowest prices.

Research limitations/implications – This research expands our understanding of developers' pricing behaviour. Developers supplying housing for the private market through redevelopments land are willing to take risks particularly in the initial stage.

Practical implications – The findings indicate that credit institutions financing developers' projects need to take into account the structure of selling prices, including lower prices and higher risk of pursuing redevelopment projects.

Social implications – Gaining a better understanding of developers' pricing behaviour deepens our insights into the dynamics of market-led urban brownfield developments; this knowledge may moreover inform policies on sustainable urban growth.

The authors would like to acknowledge funding from Norwegian Research Council, RCN, the research project "220561 Urban Plan". The research project is administered by NMBU, led by a Prof Berit Irene Nordahl.

The two authors have contributed equally to this paper. They are presented in alphabetical order.

Journal of European Real Estate Research
Vol. 11 No. 1, 2018
pp. 71-86
Emerald Publishing Limited
1753-9269
DOI 10.1108/JERER-03-2017-0014

Originality/value – An original investigation of housing transactions in urban brownfield sites in Oslo provides fresh insights into developers' pricing behaviour.

Keywords Pricing, Housing supply, Pre-sale, Staging, Urban redevelopment

Paper type Research paper

Introduction and background

Public authorities in growing cities welcome the redevelopment of centrally located land. However, judging from the academic literature, the process of developing market housing on derelict urban land is considered far more challenging than developing greenfield land and small infill projects. The size of the areas is larger; the time horizon longer (Adair *et al.*, 2003); the structure of lots and owners more complex (Adams *et al.*, 2001); and the market more unknown (Alberini *et al.*, 2005). Profitability is further influenced by substantial up-front investments in infrastructure, outdoor areas and common amenities (van der Krabben and Jacobs, 2013).

There is a comprehensive body of literature on policy measures and incentives tailored to encourage redevelopment. One example is Adams *et al.* (2000) discussing economic incitements to stimulate capital flows to derelict urban land. Under a similar understanding, Savini and Aalbers (2015) and Guironnet *et al.* (2015) discuss partnerships between planning authorities and developers. Both highlight the negative side effects these arrangements may have on the cityscape and urban development. The study by Turk *et al.* (2015) on the effects of incentive planning as a means to promote large-scale redevelopments adds to these findings.

Malizia (2003) applies an investor's perspective. Referring to US experiences, he identifies redevelopment areas characterised by high equity and long holding periods, which are, therefore, not mainstream investment products. The expected cash flow and timing of equity infusion were important for the investors, and Malizia (2003) describes the difficulties of having to spread the portfolio over many years.

Scholars have also focused on the high cost of developing brownfield areas and pointed to the need for financial instruments to fund necessary infrastructure so that high up-front costs do not dissuade developers from developing such areas (Hutchison *et al.*, 2015). Other studies, like Adair *et al.*'s (2007), confirm the high level of uncertainty associated with redevelopments, the low liquidity, long time horizons and problems of securing revenue in the different redevelopment phases. Adair *et al.* (2007) identify three steps in the redevelopment process with slightly different characteristics. In the initial phase, where actors identify the redevelopment potential, assemble land and position themselves, the investments stand out as "long haul, opaque and illiquid" (Adair *et al.*, 2007, p. 230). In the second "development phase", developers commence the actual redevelopment. This phase also requires investments under high uncertainty, but with high potential returns. Uncertainties in this phase relate mainly to planning and market volatility. High levels of capital are required, and the income stream is generally low or nil (Adair *et al.*, 2007, p. 234). The development phase, the study finds, when house-builders are entering the area, require attention to the long-time horizon and high sums invested, along with the possibility of securing some cash flow. Hutchison *et al.* (2012) characterise brownfield redevelopments as opaque, long-haul processes, with a series of uncertainties. While developers' strategies in handling these uncertainties are compound, two elements stand out, presale and staging the development (Hutchison *et al.*, 2012).

Studies of urban redevelopments in Norway confirm these international findings: brownfield developments involve higher risk than infill and greenfield developments

(Barlindhaug and Nordahl, 2005, 2011), and the development control decisions are more complex and take longer (Nordahl, 2006; Nordahl *et al.*, 2011). Further, in Norway, presale and stage-wise division of the development process are widely used strategies for handling uncertainties.

This paper seeks to improve our understanding of the economics of urban redevelopment processes by looking at developers' income from the sale of homes. We investigate their price setting behaviour in major redevelopment projects, and compare these prices to asking prices for units in smaller infill projects. We also investigate the effects of staging and the redevelopment process itself on asking prices. Do developers ask for higher prices for units sold in the initial phase than in the completing phases? Do developers add a premium on dwellings in the later stages, when the redevelopment project is coming to an end? Or do they follow other pricing strategies?

The next section describes the practice of presale and the role of staggering large redevelopment projects over multiple stages. This is followed by a brief presentation of the literature on developers' pricing behaviour and some thoughts on the pricing behaviour to expect in large redevelopment projects. Part 4 describes our data and analytical methods, while Part 5 presents the results of the analyses. In the concluding section, we discuss and comment on the results.

Staging and pre-selling in large redevelopments

Development staging is the sequencing of construction activity at a specific site. Staging is a common procedure in larger developments where market absorption is limited and developers divide the construction of new units into smaller chunks spread over a period. The number of stages depends on the number of units in each stage and total number of units in the project.

Presale is the selling of new units "off the plan". House seekers sign a contract with a commercial developer committing them to purchasing a particular unit before it is actually built. The unit is described in detail, with its location in the new development carefully visualised by maps and models. The contract specifies the completion and moving in dates, among other things. The developer puts a fixed price on each unit, there are no auctions or negotiations; it's a "take it or leave it" and "first come, first served" setup. Buyers pay a 10 per cent deposit when they sign the contract, the rest on completion.

Staging reduces developers' market risk in large development projects, whereas presale is a kind of risk-sharing arrangement between developers and buyers. Presales give the developer an income before construction actually starts and staging secures the sale of the units in one part of the development project before spending starts on the next. These income streams are particularly important, as developers in Norway are also responsible for much of the upgrading and expansion of infrastructure (Nordahl and Falleth, 2011). Start-up costs, in other words, can be substantial (Barlindhaug and Nordahl, 2011; Nordahl *et al.*, 2015).

Developers, financing bodies and local governments are all interested in these staging and presale procedures. Credit institutions or investors financing the construction of homes generally require closed pre-sales of 50-70 per cent of the new units in a specific development stage before allowing the developer to start building. The percentage of units that need to be sold remains in force in all stages of the development project, but most credit institutions are more relaxed in the later stages as the project matures. Presales indicate interest in the market and staging allows developers to postpone elements of the project should housing prices fall.

Staging is increasingly used as a strategy to handle interruptions such as a market collapse. After some negative outcomes in the early 2000s (Ruud and Nordah, 2004), staging is now linked to planning permission today. A zoning plan, providing planning consent and the right to develop, usually consists of specifications such as "number of homes in an area", "floor space ratio for the site", "maximum/minimum floor space", "building lines and heights" and "the composition of dwellings sizes". Conditional planning consent includes the percentage of the costs of upgrading technical infrastructure and providing common amenities and facilities shouldered by the developers (Nordahl and Falleth, 2011; Barlindhaug and Nordahl, 2011; Nordahl *et al.*, 2015). In the planning permit, these specifics are expressly linked to the different development stages.

Perspectives on pricing behaviour

In principle, developers need to adjust prices to total supply in the local market (Hui *et al.*, 2016), and comparison of sales is a widely used instrument in price setting (Pagourtzi *et al.*, 2003). In performing these comparisons, the developer has to adjust the asking price to differences in size, age, quality of construction and location. Location primarily refers to the distance to CBD and public transport nodes but also to proximity to a fixed set of amenities such as sun exposure, views, parks and lakes, rivers or seafronts. An area's reputation is also likely to influence price levels.

Wong *et al.* (2011) present one of many hedonic price studies. They assess the impact of the vertical dimensions of a residential building on prices in Hong Kong and found that floor-level matters. They also found a positive premium on units in low-rise buildings over those in high-rise.

When there are few transactions in a neighbourhood, which may be the case in urban brownfield and grey field areas, traditional hedonic price modelling is less reliable. One solution is to perform a rigorous spatial analysis of house prices using terrain and surface models to illuminate spatial price interpolation (Pagourtzi *et al.*, 2003). The surface gives a three-dimensional representation of house price levels at any point in the area studied. The method helps developers set the right market prices in new projects with thin markets.

Developers can use this information, and other hedonic price modelling, to fine-tune differences in fixed prices for different units within one development project, and prices at different development stages of a redevelopment project. When the start-up of a redevelopment project depends on securing a given volume of presale contracts, the developers may choose sites with the most impressive scenery and best amenities for the first project stage, if technically feasible, in the hope of selling units as quickly as possible.

Our discussion employs a price-taking perspective, where developers are assumed to work in fully competitive environments. In the supply of new houses, especially on brownfield sites, this particular assumption may not be completely true. According to Ong *et al.* (2003), real estate developers often operate in oligopolistic environments because local markets for new housing tend to be dominated by a few large developers. Based on experimental economics they found that oligopolistic developers look at the actions of their competitors more than at the second-hand markets. Hui *et al.* (2003) also studied the local dimension and showed that a *presale discount* was given when new projects were located in close proximity. The closer the projects, the larger the presale discount.

The research by Hui *et al.* (2003) and Ong *et al.* (2003) reveals variations in the competitiveness of the environment. Some developments may have monopolistic elements, which may affect price setting. Łaszek and Olszewski (2015) analyse larger market housing projects in Poland. Developers always operate in local markets, they write, characterised more often by monopolies than by free competition. In their perspective, developers compete

to offer an individual and unique product, and companies more or less move along a specific part of an aggregated demand curve in certain areas, supplying similar but different products. This uniqueness allows developers to use bargaining strategies to identify consumers' reservation point in a bid to maximise sale revenues for a project. This behaviour, Łaszek and Olszewski (ibid.) suggest would not be possible in the case of products that are more homogeneous. Each development area is characterised by monopolistic competition where market prices rise significantly compared to free market prices, creating the possibility of extraordinary profits. The authors use this line of argument to explain why prices for some products stabilise at extraordinarily high levels.

Other studies show that developers' price estimates in redevelopment projects are generally conservative compared to the actual selling price (Leishman *et al.*, 2000). In later studies, Leishman (2015) found that as the volume of a nearby competing development rose, the probability that a site with planning permission began the construction work declined. He urges parties to pay greater attention to the microeconomics of the house building industry, as explanatory factors for low price response.

The scholarship of Leishman (2015), Łaszek and Olszewski (2015), Hui *et al.* (2003) and Ong *et al.* (2003) shows that a pure price-taker perspective may fail to explain fully developers' pricing behaviours. Developers operate in local markets with varying degrees of monopolistic competition, and this factor needs to be included to fully explain price-setting behaviour.

Pricing rationales in large redevelopment areas

When developers determine the fixed prices of new housing units, they will generally investigate the market prices in the area. As discussed, price setting in large redevelopments is more complex. First, as the internal amenities change as the area is (re)developed, area-internal dynamics should not be ignored. Second, there is no clear local market; particularly brownfield sites tend to be "black holes" in cities until redeveloped. Pricing behaviour in brownfields should, therefore, be interspersed with price-taking perspectives with the hallmarks of price setting. Area-internal amenities change as the development progresses, and consumers' willingness to pay is likely to be affected by the inconvenience of living near a construction site for several years. The developer must convince the first potential buyers that an area, which may still be a derelict industrial area, a collection of empty harbour shacks, under-maintained workshops and the like, will eventually turn into a high-quality residential area. Different sales pitches should be considered, one being an offensive strategy to aggressively brand the new development and "shower" buyers with artists' impressions of coming qualities. The developer can add to this by starting with the most favourable spot. A second option is a more passive approach where first buyers are offered a *price discount* to compensate for incompleteness and construction works.

Translated into pricing behaviour, the first approach would result in keeping asking prices flat as the area develops. This is because the developer maximises stage one, in the sense of intensive branding but also more objectively as the first homes to be marketed are in the best-located blocks – homes built in the second, third and later stages will obviously be in less attractive blocks. The second approach gives rising price levels as the homes and outdoor areas near completion. With this approach, developers are likely to put the highest price on the last-built units in a large redevelopment. In the following, we term the first approach "first-stage optimising" and the latter "first-stage discount, last-stage premium".

Developers work in competitive environments. On some brownfield and greyfield sites, one developer may control all development rights. In other areas, many different developers may have a stake in the area (Nordahl and Eika, 2016). The number of different owners and

developers in each redevelopment area varies from place to place. A developer's chances of adding a premium onto the value of their work on outdoor areas, infrastructure and amenities might be affected by the level of competition in the redevelopment area. If one developer follows the "first-stage discount, last-stage premium" strategy, competing developers on adjacent lots may put *their* first units on the market just as the first developer is launching his last stage. This may reduce the premium on the first developers' asking price. Redevelopment areas with multiple developers thus entail a competitive risk that is not present in single-developer areas, undermining the appeal of the "first-stage discount, last-stage premium" strategy.

In what follows, we investigate developers' price setting behaviour[1]. We start by comparing asking prices in large, staggered and redevelopment projects, with those in small infill projects. We then look at the differences in asking prices across stages, for example, whether the first-stage has lower asking prices than later stages, which would indicate a "first-stage discount – last-stage premium" rationale, or whether the first stage sells at higher prices, indicating the "first-stage optimising" strategy. We also compare competitive and monopolistic redevelopment areas to see whether the two types affect asking prices. In competitive areas, many landowners will be developing their own lots to their own schedule, whereas in monopolistic areas, there is only one developer, and thus, only one project, in our definition, divided into many stages.

Data and methodology

The data consist of fixed asking prices on 6,932 new homes in 69 redevelopment projects in Oslo from 2011 to 2015[2]. The prices are exclusive parking facility charges, as not all homes have garages. All units have a balcony or terrace. Building standards are generally the same in each unit. Most of the projects were completed by 2016. In most cases, developers offer post-purchase upgrades at an extra cost. They are not included in the initial asking price for a specific unit, which is analysed here. Only a few projects had homes where the actual selling price deviated from the asking price.

Based on municipal statistics of yearly approved projects and dwellings in Oslo, our data consist of two of three new dwellings in Oslo in the period 2012-2014. When comparing the data with spatial municipal statistics, all large developments in central Oslo are included. Small densification projects on the outskirts are not.

If sales remain slow, the developer can cancel the sales procedure, alter the project slightly, rebrand it and put it on the market again under a new name. Reducing the price seems to less of an option (Dale, 2014). Presale asking prices are almost identical to actual selling prices in our data, but we have no information on added features, if any, to speed up the sales.

Projects without construction stages constitute 34 of the 69 projects in our data. In this paper, we term these projects infill developments. Table I shows the distribution of infill and staged brown and greyfield redevelopments in the different city districts, and the average number of units in each stage. The size of the greyfield and brownfield sites varies, as do the number of developers on each site, and the number of stages. Eight of the projects had two stages, 9 had three stages, 5 had four stages and 13 had five or more stages. The two waterfront developments in Oslo, Tjuvholmen and Bjørvika, were both divided into five or more stages. Tjuvholmen, developed by a single company, is a high-end waterfront project in the inner city West, completed in 2014 (950 dwellings), while Bjørvika, on another waterfront site, in Old Oslo, was built by several developers. Different owners own the lots in one area, whereas a single developer manages a large project on mainly reclaimed land at the South-Eastern end of the former harbour area.

The 4,540 dwellings built in the inner city East districts (Grunerløkka, Old Oslo and Sagene) constitute 65 per cent of all dwellings in the data. The table indicates lower levels of new home construction activity in the inner city West. In outer Western districts, construction during these years has mostly been of the small infill type, as indicated in row 2, Table I.

Table II categorises all dwelling units in the data by stage at which they were constructed, independent of the number of stages in the project to which the units belong. The bottom line in Table II shows the average size of each stage, 48 units being mean for all projects. The figures do not vary much by stage number. Infill developments have fewer dwellings throughout the whole project than any stage of a multistage project.

In our observation period, the yearly supply in the three inner city East districts was approximately 1,000 new units. With around 50 units in each presale stage, competition between the projects in these districts was quite hard.

A weakness of our dataset is the relatively short duration of our observations compared to the length of brownfield and greyfield development projects. Our data cover the

	No. of stages						
District	Infill	2 Stages	3 Stages	4 Stages	5+ Stages	Sum	No. of dwellings
Bjørvika*				1	2	3	884
Tjuvholmen*					1	1	180
Grunerløkka**	7	2	1	3	3	16	1,646
Old Oslo**	7	1		1	4	13	1,502
Sagene**	4	2	2		2	10	1,392
Oslo West	10		1			11	539
Oslo South	3	2	2		1	8	388
Oslo North-East	3	1	3			7	401
All	34	8	9	5	13	69	6,932

Notes: *Central, close to the waterfront; **inner east districts

Table I. Projects by number of stages and location: 2011-2015, number of dwellings by district

	Stage no.						No. of dwellings
District	Infill	Stage 1	Stage 2	Stages 3-4	Stage 5+	Sum/All	–
Bjørvika *		15	9	28	48	100	884
Tjuvholmen*				32	68	100	180
Grunerløkka**	17	19	21	34	10	100	1,646
Old Oslo**	20	7	1	3	69	100	1,502
Sagene**	18	29	30	19	4	100	1,392
Oslo West	71	7	14	8		100	539
Oslo South	15	37	20	15	12	100	388
Oslo North-East	28	32	19	21		100	401
All	20	18	16	20	27	100	6,932
Mean number of dwellings in stages	41	50	52	52	47	48	–

Notes: The bottom line shows mean number of dwellings per stage; *central, close to the waterfront; **inner east districts

Table II. Dwellings by stage number and district: 2011-2015, per cent and number of dwellings

period 2011-2015, whereas the actual project lifetimes were significantly longer. Some of the projects started before 2011, some are still ongoing, and some started before 2011 and won't be complete until 2019 and 2020. To adjust for these variations, each stage in our dataset reflects the actual stage of the redevelopment process of the particular project in the particular area, ignoring the possible inclusion of first stages in our data. We, therefore, gathered information on the total number of past and future stages in each development in all redevelopment areas where construction had taken place in 2011-2015. In other words, if the earliest stage *in our dataset* is the third in the actual redevelopment project, all units from this stage are labelled "Stage 3". The number of stages in each project shown in Table I also includes post-2015 stages as well[3].

Some projects are the first in a redevelopment area; some are in the middle of a long redevelopment process; and some are the very last project in their redevelopment area. To accommodate for these differences, we introduce an *early* versus *late* variable. Thus, when analysing price setting behaviour, we distinguish between dwellings constructed at different stages versus infill projects, and at what time in the whole redevelopment process the unit is built. We also distinguish between infill in the existing built up area and infills located close to the large redevelopment sites (NBUA). The latter refers to sites in which a developer owns a small block close to a large redevelopment area. These lots only accommodate a small number of units, border existing neighbourhoods, and thus may draw on the amenities of these areas.

Our data have no information of the natural quality of the particular site at each stage like views, sun exposure and natural beauty. The location of the different lots within the redevelopment area may, therefore, disturb our hypotheses.

In our analyses, we control for sales year, size of unit in square metres and floor on which the unit is located. Asking prices vary with price fluctuations in the second-hand market. If house prices are falling, it will take longer to sell new houses at the pre-determined prices or the developer will have to cut prices. In 2013, the Norwegian Government instructed banks to employ stricter capital requirements than their foreign competitors. At the same time, Norway decided to subject bank operations to the same solidity requirements as in the country where the business was run (Barlindhaug, 2016). Banks became more reluctant to offer mortgages and house prices fell. House builders had to lower the selling prices of new units. Based on our data, we have estimated a selling price index[4].

Until 2013, the price of new homes in Oslo followed prices in the second-hand market. In the second half of 2013, the new-home sales prices began increasingly to deviate from second-hand prices. Comparing sales in 2012 with sales in 2013, we find that one in two dwellings put up for sale in 2012 was sold in the first six months. In 2013, this share was 40 per cent (ibid). Twenty per cent of dwellings put up for sale in 2012 took more than a year to sell, compared to 30 per cent of dwellings put on sale in 2013. Although the sale process took longer in 2013 than in 2012, we find the difference between these two years negligible for the purpose of our analyses.

Eight floor variables enter the regression; see Floor variables entering the regression model.

Description:

- Ground floor in buildings with 5+ floors;
- second floor in building with 5+ floors;
- ground floor to second floor in buildings with maximum 4 floors;
- all floors from third floor and next to the two top floors in buildings with 6+ floors;
- next to the top floor in building 5+ floors;

- top floor in buildings with 5-6 floors;
- top floor in buildings with 7+ floors; and
- top floor in buildings with 4 floors.

They are all dummy variables distinguishing between storeys in high- and low-rise buildings, as suggested by Wong *et al.* (2011).

Except for the dwelling size, all variables are dummy variables. Our analyses reveal that dwellings constructed during Stage 5 and above were concentrated in the high-end waterfront districts. We, therefore, introduced two variables to remove this correlation because it would have led to much higher prices for Stage 5+ dwellings.

The dependent variable is log sale price. The hedonic pricing model is written as follows:

$$Ln(P_{it}) = \alpha_0 + \beta_j X_{i,j} + \delta_y StageProsject_{i,y} + \gamma_z District_{i,z} + \theta_t Time_{i,t} + \varepsilon_i \quad (1)$$

P_{it} is the sale price in year t, α_0 is the constant term, β_j the coefficients for the unit's features X_j, like square metre, floor space and story, γ_z is the regression coefficient for the different districts, θ_t the coefficients for the selling year and ε_i the error term. δ_y are the coefficients for the different stages and also for projects coming early, in the middle or late in larger brownfield areas. Except from square metre floor space, all other variables are binary variables.

Analyses

Model 1 estimates the asking price level of new houses in redevelopments and infill projects based on all observations in the data, controlling for stage number, city district, dwelling size, floor location and if the project belongs to the first (early in the process) or the last stage (late in the process) in an area with multiple developers and selling years. The second column in Table III describes the distribution of the units on different categories of the independent variables for all observations used in Model 1.

Some redevelopment areas consist of many landowners; in others, a single company owns all development rights. Market housing in Norway is not under the control of any external regulative authority which can specify when a particular developer has to start developing the land. Therefore, in redevelopments with multiple ownership, developers follow their own schedules and preferences. Multiple ownership areas provide a more "competitive" environment than areas with one developer. Model 2 in Table III only includes projects in competitive redevelopment areas. We do not expect to find any stage effects in Model 2, but we do expect to find rising prices between units sold early and units sold in the middle or at the end. Model 3 focuses solely on redevelopment areas where a single developer company commences the entire redevelopment. In these "monopolistic environments", there is no competition from other developers within the area, and the developer can decide to offer early-stage discounts and start on the best-located sites. Any stage effects in Model 3 would then be the net effect of these two decisions. In "monopolistic" redevelopments, later stages are equivalent to late in the redevelopment of the whole area.

Infill projects in existing structures are not included in Models 2 and 3.

Table III shows the results of the regression analyses. When introducing stage and project variables in Model 1, Stage 1 dwellings are the reference category. As the dependent variable is logarithmic in form, the coefficients show the percentage change in the selling price of introducing a dummy other than the reference category.

In Model 1, dwellings in redevelopments sell at a nearly 6 per cent lower rate than in infill projects. This confirms our hypotheses that purchasers are willing to pay more for homes in

Variable	Frequencies	Model 1 All	Model 2 competitive	Model 3 monopolistic
Intercept		9.0261	8.9229	9.1344
Oslo North	0.06	−0.2072***	−0.0982***	−0.1085***
Oslo South	0.06	−0.1886***		−0.2566***
Old Oslo	0.22	−0.1165***	−0.0743***	−0.0491***
Grunerløkka	0.24	−0.1022***	−0.0936***	0.0207
Oslo West	0.08	0.0351***		0.0147
Bjørvika	0.13	0.2615***	0.3014***	–
Tjuvholmen	0.03	0.4912***		0.6263***
Ref: Sagene	0.20			
Log square meter		0.9622***	0.9696***	0.9382***
Ground floor in buildings with 5+ floors	0.12	−0.1166***	−0.1140***	−0.1328***
1st or 2nd floor in buildings with 5+ floors	0.30	−0.0622***	−0.0553***	−0.0728***
Ground floor to 2nd floor in buildings with maximum 4 floors	0.07	0.0297***	−0.0760***	0.1213***
Next to the top floor in buildings with 5+ floors	0.12	0.0511***	0.0613***	0.0308***
Top floor in buildings with 5-6 floors	0.04	0.0984***	0.0941***	0.0598***
Top floor in buildings with 7+ floors	0.05	0.1268***	0.1139***	0.1699***
Top floor in buildings with 4 floors	0.02	0.1791***	0.0552***	0.3853***
Ref: All floors from third floor and next to the two top floors in buildings with 6+ floors	0.38			
Infill project in existing housing structures	0.17	0.0593***		
Infill project in new housing structures	0.05	0.0129	0.0185*	
Stage 2	0.15	−0.0107*	−0.0036	−0.0315***
Stage 3	0.10	0.0080	0.0404***	0.0121
Stage 4	0.09	−0.0059	−0.0085	−0.1246***
Stage 5+	0.26	−0.0298***	−0.0112	−0.1225***
Ref: Stage 1	0.18			
Stage 5+ * Bjørvika		0.0903***	0.1464***	
Stage 5+ * Tjuvholmen		0.1648***		0.1552***
Early in the process	0.14	0.0006	−0.0634***	
Middle	0.30	0.0016		
Late in the process	0.11	−0.0265***	0.0204**	
Ref: All other projects				
A2011_1	0.01	−0.2269***	−0.0791***	–
A2011_2	0.02	−0.1889***	−0.0846***	–
A2012_1	0.17	−0.1777***	−0.0980***	−0.2061***
A2012_2	0.14	−0.1456***	−0.0387***	−0.1748***
A2013_1	0.13	−0.0930***	−0.0656***	−0.0378***
A2013_2	0.11	−0.0448***	−0.0421***	−0.0179
A2014_1	0.09	−0.0533***	−0.0036	−0.0541***
A2014_2	0.14	0.0024	0.0002	0.0418***
Ref: A2015_1	0.19			
N =	6,932	6,932	3,586	2,126

Table III.
Regression results

Notes: Dependent variable: Log selling (asking) price; Model 1: All observations, *R*-square = 0.9192. Model 2: Only competitive area projects, *R*-square = 0.9342. Model 3: Without competitive area and infill projects (monopolistic competition), *R*-square = 0.9317 *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$[6]

familiar, well-established neighbourhoods. Model 1 shows that Stage 2 dwellings have slightly lower selling prices than Stage 1, and that last-stage dwellings, surprisingly, sell at about 3 per cent *less* than first-stage dwellings. The anticipated rise in prices from early to later stages is not confirmed, undermining our hypothesis that developers grant "first-stage purchasers" a discount compared to later-stage purchasers. A discount is given, compared to infill, but we find no "last-stage premium". This finding is strengthened by an analysis of the early versus middle and late process variables. The model found no price differences between early and middle stage units. Furthermore, and contrary to our expectation, the model shows that dwellings in projects finished late in the whole redevelopment process sell at *lower* prices. These findings are contrary to our hypothesis of a "first-stage discount, last-stage premium", but consistent with a "first-stage optimising" strategy.

City district has the strongest effect on the asking price, according to Model 1. The waterfront developments in Tjuvholmen and Bjørvika are priced 47 per cent above the reference alternative. A combination of the very central location of these developments, substantial investment in technical and cultural infrastructure[5], and no competition from other central waterfront projects, may explain these prices. Price premiums for waterfront dwellings are well documented. Dumm *et al.* (2016), for instance, find that all types of waterfront properties had a 7.2 higher price premium than non-waterfront properties.

Storey is also important to the variation in selling prices. Compared to our reference category, top floor apartments cost significantly more. The asking price for top floor apartments in low-rise (four-storey) buildings is 8 per cent higher than the reference category.

Wong *et al.* (2011) also found highest prices in smaller buildings, all else being equal. "Crowdedness" in high-rise buildings is an explanatory factor, they suggest. The higher the building, the higher the number of residents sharing the same entrance facilities. Most residents would prefer to live in less crowded buildings, they write, and hence are willing to pay more for it.

In the analyses, we control for sales year, using dummies for each half year. During the period from 2011 to the first part of 2015, prices for new apartments in Oslo rose 29 per cent.

Models 2 and 3 explore whether these patterns change when we control for internal competition. As discussed above, Model 2 only includes dwellings in redevelopments with several competing developers. In other words, multiple developers are developing lot(s) in the same redevelopment area but acquired individually and to their own specifications, without any external coordinating body overseeing the projects start-up. Oslo south, and Oslo west and Tjuvholmen are missing in Model 2, as none of them has more than one developer.

Some coefficients in Model 2 deviate from those in Model 1, especially the coefficient of the floor variable "top floor in buildings with four floors", which has a lower value in projects in competitive redevelopments. There are no significant differences in asking prices between the first and the latest stages of these projects. Contrary to the results of Model 1, the competitive redevelopments model shows significantly *lower* asking prices for early stage units, and significantly higher prices in the latter stages. These results conform to our "first-stage discount, last-stage premium" hypothesis, but only within the redevelopment area as a whole, not across stages in one individual project. Thus, the individual developer cannot balance a first-stage discount with a last-stage premium, although individual developers who develop their lots late in the overall redevelopment process, do place a small but significant premium on their late units.

Model 3 isolates single developer areas, here termed "monopolistic". In "monopolistic" developments, the later stages are equivalent to later stages in multiple developer projects,

while Stage 1 comprises putting the very first units on the market, marking the start of a long redevelopment process. In "monopolistic" redevelopments, it is the same developer who takes the risk of being first the market, and who harvests any premium in the last stage(s). Model 3, however, shows a significant *decrease* in asking price from the first to the second stage, and again from Stages 4 to 5 and later. Late-stage asking prices are as much as 12 per cent lower than prices in the first stage. In other words, in "monopolistic" redevelopments, first-stage units have the highest asking prices and prices fall steeply as the development proceeds. It is not possible to identify any first buyer discount to compensate for years of living in an ongoing construction area. In addition, it is definitely not possible to identify any premiums as the areas near completion. The model offers no support of the "first-stage discount, last-stage premium" price hypothesis, but it does support the idea that businesses behind large redevelopment projects follow the "first-stage optimising" strategy. An important factor for this interpretation is the opportunity for single developers holding all development rights in redevelopment designated area to choose which part of the area to start building.

Discussion

Developers involved in large redevelopments split the construction process into stages, feeding new units onto the market stepwise over the years until the area is fully redeveloped. The analysis started with two contrary hypotheses on how developers behave when setting the prices of similar units in the same location but at different times in a redevelopment process. A "first-stage discount, last-stage premium" hypothesis was contrasted to a "first-stage optimising" hypothesis. Under the first, the developer offers a discount for units sold early in the process, but is expected retrieve this discount by selling the last units at a higher price near or at the end of the transformation. The contrasting hypothesis anticipates flat price levels, and assumes that developers will find ways to optimise the first-stage units.

The picture is more complex than these hypotheses suggest. We find a "first-stage discount" in redevelopments compared to infill projects, particularly in competitive redevelopments, but none of the models lend any support to the latter part: i.e. the first-stage discount is not followed by a "last-stage premium". There is no stage effect in competitive redevelopments, although there is a premium on the last project(s). This indicates that developers who delay construction starts on their lots obtain a late stage premium. In "monopolistic" redevelopments, the stage effect is negative and the latest units are priced lower:

- One explanation could be that developers in monopolistic projects start building blocks in the best-located positions, in an attempt to establish as high a price level as possible. Being the sole developer, it is more manageable than in areas were different lots are developed by different companies. That being the case, one should not ignore the possibility that the first stage(s) actually help make the less favourite lots marketable, that there is a hidden last-stage premium in making less favourable spots sellable.
- Lower asking prices for later-stage units may also be explained by firm-internal considerations: Developers' project leaders are expected to work within a cost and revenue budget. If first-stage units sell well, the project leader can balance the risk of extracting a premium on later stages against the risk of slower sales. Once construction has started, investments are irreversible and if the budget ceiling is

reached, rapid selling may mean more than a possible extra premium. Particularly in a rising market, developers may ask modest prices for last-stage units.

- Finally, there is also an alternative explanation where buyers are disappointed with the whole area relative to their expectations. Despite discussions about the quality of new urban redevelopments in Oslo (Smith, 2014; Børrud, 2005), short selling times may actualise this explanation.

In monopolistic redevelopments (Model 3), the stage-effect has a negative sign, although the figure also shows that in these developments, developers are more likely to vary the asking prices, that is, they ask higher prices for top floor apartments in high-rise and ground floor apartments in low-rise buildings. Having full control of the entire redevelopment area leaves operators with greater discretion and options to decide on a physical layout for the area. The findings indicate that single-owning developers have more success in extracting slightly higher premiums independent of stage and early/late dimension.

Conclusions

The findings indicate that developers supplying housing for the private market on brownfield and greyfield land are willing to take risks, *particularly in the initial stage*. They maximise the asking price, indifferent to ongoing building activities and incomplete landscape and infrastructure when the first units are put on the market. This strategy would appear to succeed not only because developers sell at lower prices than infill units but also offer the best-located blocks first, when possible. This behaviour may be caused or strengthened by external factors such as demands by finance institutions that a certain percentage of units are presold before releasing funding. If insufficient units are pre-sold, the whole project can still be postponed. Therefore, the developers put prices as high as possible to start with to optimise price level. Consistent with this logic, lower asking prices in the latter stages are explained by developers' estimates of progress and completion relative to possible premiums in the later stages, particularly if the business is the sole developer about to start building works on a large redevelopment site.

The findings add to the already documented difficulties when brownfield and greyfield sites are redeveloped by market actors. Adams *et al.* (2000, 2001) and Somerville *et al.* (2003) believe complex landowner setups can prevent the development of brownfield sites. Others have pointed to funding difficulties (Alberini *et al.*, 2005; Adair *et al.*, 2007; Hutchison *et al.*, 2012). Our research shows us that redevelopment projects result in lower unit prices, compared to infill projects, that developers are risk takers in the initial stages, and that both factors change as the construction work proceeds.

Our findings indirectly support what British studies have found about the difficulties of financing brownfield redevelopments. Credit institutions financing both infill projects and redevelopment projects should pay attention to the asking prices in multi-staged projects in large redevelopments. It is more than likely that the revenue from such units will be lower than from similar units in infill projects. This is particularly evident if the project is located in a redevelopment area with several competing developers starting projects at more or less the same time. One should also consider the degree of competition facing the individual developer.

This study has shown the importance of a better understanding of developers' pricing behaviour to policy makers and council officials overseeing urban redevelopments, as well as credit institutions and developers themselves.

Notes

1. In the rest of the analysis, we do not distinguish between landowner and developer: "Developer" refers to the firm with the development rights to a particular area who has actually commenced the development of that land.
2. A real estate agent and advisor, Røisland & Co AS (www.roislandco.no/) collected the data and allowed the research team to use the data for a scientific analysis, as a part of the "220561Urban Plan" research project.
3. Information was available at developers' homepages and Oslo planning authority.
4. Model 1 in the later analyses was used.
5. The areas are under comprehensive reconstruction with many new cultural institutions in the area: Located just next to the central rail station the new opera house (2008), the new Astrup-Fearnley Gallery (2012), new main public library (2019) and the new Munch Museum (2020) are all located there. The area has new traffic solution and a 1-km-long new avenue that include a tramline.
6. A nqq and npp plot of residuals show that they are approximately normal distributed in all three models.

References

Adair, A., Berry, J., Hutchison, N. and McGreal, W.S. (2007), "Attracting institutional investment into regeneration: necessary conditions for effective funding", *Journal of Property Research*, Vol. 24 No. 3, pp. 221-240.

Adair, A., Berry, J.M., McGreal, W.S., Hutchison, N., Watkins, C. and Gibb, K. (2003), "Urban regeneration and property investment performance", *Journal of Property Research*, Vol. 20 No. 4, pp. 1-16.

Adams, D., Disberry, A., Hutchison, N. and Munjoma, T. (2000), "Mind the gap: taxes, subsidies and the behaviour of brownfield owners", *Land Use Policy*, Vol. 17 No. 2, pp. 135-145.

Adams, D., Disberry, A., Hutchison, N. and Munjoma, T. (2001), "Ownership constraints to brownfield redevelopment", *Environment and Planning A*, Vol. 33 No. 3, pp. 453 -477.

Alberini, A., Longo, A., Tonin, S., Trombetta, F. and Turvani, M. (2005), "The role of liability, regulation and economic incentives in brownfield remediation and redevelopment: evidence from surveys to developers", *Regional Science and Urban Economics*, Vol. 35 No. 4, pp. 327-351.

Barlindhaug, R. (2016), "Housing finance in Norway: the last 25 years", in Lunde, J. and Whitehead, C. (Ed.), *Milestones in European Housing Finance*, January, Wiley-Blackwell, Hoboken, NJ.

Barlindhaug, R. and Nordahl, B. (2005), "Fra feltutbygging til transformasjon – markedsstyrt boligbygging I Osloregionen", in Barlindhaug, R. (Ed.), *Storbyens Boligmarked*, Spartacus, Oslo.

Barlindhaug, R. and Nordahl, B. (2011), "Boligbyggingens prisrespons: for mange hensyn eller for lite tilrettelegging?", NIBR report 31/2011.

Børrud, E. (2005), "Bitvis byutvikling: møtet mellom privat eiendomsutvikling og offentlig byplanlegging", Phd Thesis 17, AHO.

Dale, I.S. (2014), "Byggeprosjekter trukket fra markedet", Master thesis, NMBU, available at: https://brage.bibsys.no/xmlui/handle/11250/92927/discover

Dumm, R.E., Sirmans, G.S. and Smersh, G.T. (2016), "Price variation in waterfront properties over the economic cycle", *Journal of Real Estate Research*, Vol. 38 No. 1.

Guironnet, A., Attuyer, K. and Halbert, L. (2015), "The financialisation of property markets and its implications for city governments in the Paris city-region", *Urban Studies*, Sage, Thousand Oaks, CA, pp. 1-23.

Hui, E.C.M., Liang, C., Wang, Z. and Wang, Y. (2016), "The roles of developer's status and competitive intensity in presale pricing in a residential market: a study of the spatio-temporal model in Hangzhou, China", *Urban Studies*, Vol. 53 No. 6, pp. 1203-1224.

Hutchison, N., Squires, G., Adair, A., Berry, J., Lo, D., MacGreal, S.L. and Organ, S. (2015), "Financing infrastructure development: time to unshackle the bonds?", *Journal of Property Investment and Finance*, Vol. 34 No. 3.

Łaszek, J. and Olszewski, K. (2015), "The behaviour of housing developers and aggregate housing supply", NBP Working Paper No. 206, Economic Institute Warsaw, Narodowy Bank Polski, Education & Publishing Department, available at: http://ssrn.com/abstract=2642756

Leishman, C. (2015), "Housing supply and suppliers: are the microeconomics of housing developers important?", *Housing Studies*, Vol. 30 No. 4, pp. 580-600.

Leishman, C., Jones, C. and Fraser, W. (2000), "The influence of uncertainty on house builder behaviour and residential land values", *Journal of Property Research*, Vol. 17 No. 2, pp. 147-168.

Malizia, E.E. (2003), "Structuring urban redevelopment projects: moving participants up the learning cure", *Journal of Real Estate Research*, Vol. 25 No. 4, pp. 463-478.

Nordahl, B. (2006), "Deciding on development", PhD Thesis 96, NTNU.

Nordahl, B. and Eika, A. (2016), "Urban redevelopment and the (mixed) blessing of multiple ownership", in Hepperle, E., Dixon-Gough, R., Mansberger, R., Paulsson, J., Hernik, J. and Kalbro, T. (Eds), *Land Development*, Hochscholverlag, Zürich.

Nordahl, B. and Falleth, E. (2011), "Why fallow land in core urban areas? Planning or market deficits for sustainable development in Norway", *Paper at 7th International Conference of Virtual Cities, Lisbon*.

Nordahl, B., Barlindhaug, R., Havnen, E., Nørve, S. and Skogstad Aamo, A. (2011), "Utbyggerstyrt byutvikling?", NIBR report 21, NIBR, Oslo.

Ong, S.E., Cheng, F.J., Boon, B. and Sing, T.F. (2003), "Oligopolistic bidding and pricing in real estate development: experimental evidence", *Journal of Property Investment & Finance*, Vol. 21 No. 2, pp. 154-189.

Pagourtzi, E., Assimakopoulos, V., Hatzichristos, T. and French, N. (2003), "Real estate appraisal: a review of valuation methods", *Journal of Property Investment & Finance*, Vol. 21 No. 4, pp. 383-401.

Wong, S.K., Chau, K.W., Yau, Y. and Cheung, A.K.C. (2011), "Property price gradients: the vertical dimension", *Journal of Housing and the Build Environment*, Vol. 26 No. 1, pp. 33-45.

Further reading

Arrow, K.J., Harris, T. and Marschak, J. (1951), "Optimal inventory policy", *Econometrica*, Vol. 19 No. 3, pp. 250-272.

Badcock, B. (1989), "An Australian view of the rent gap hypothesis", *Annals of the Association of American Geographers*, Vol. 79 No. 1, pp. 125-145.

Barlindhaug, R. and Langset, B. (2014), "Flytteanalyser i Drammen", NIBR-notat 2014:102.

Barlindhaug, R., Børrud, E., Langset, B. and Nordahl, B. (2012), "Nye boliger i storbyene. Hvem kjøper og hva slags bokvaliteter tilbys", NIBR-rapport 2012:31.

Eiendom, N. (2016), "Price statistics", available at: http://eiendomnorge.no

Fanning, S.F. (2005), *Market Analysis For Real Estate: Concepts and Applications in Valuation and Highest and Best Use*, Appraisal Institute, pp. 1-184, Part I, available at: www.apprisalinstitute.org

Nordahl, B. (2012), "Boligutvikling og boligutviklere", in Nordahl, B. (Ed.), *Boligpolitikk Og Boligmarked*, Akademika forlag, Trondheim.

Schmidt, L. (2014), "Kompakt by, bokvalitet og sosial bærekraft", NIBR rapport 12, NIBR, Oslo.

Turk, S. and Demircioglu, E. (2013), "Use of market-led measures for land assembly in Turkey", *Habitat*, Vol. 40, pp. 201-210.

Corresponding author
Berit Irene Nordahl can be contacted at: berit.nordahl@nmbu.no