Understanding housing supply: the case of Dutch housing associations

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Abstract

This paper reports on an actor-based research on housing supply. According to Denise DiPascuale this is rare in housing research, which generally focuses on aggregated supply data. We looked at the case of Dutch housing associations which together own one third of the housing stock and build another third of the total number of houses in the Netherlands. A national data-set, covering all 455 associations, was used with the housing association in combination with the location(s) of its past and current housing stock (the municipal level) as the unit of observation. This unit allows for an analysis in which both compositional and local contextual variables are taken into account. This facilitates an empirical quantitative application of the concepts structure and agency, two concepts that are often used to understand social behavior, also in housing and property research. The behavior of housing associations is the result of both their organizational propensities and the influence of local structures like the housing market, the land market and the local land use policy

Author:

Edwin Buitelaar

Contact:

Dr. E. Buitelaar

Netherlands Environmental Assessment Agency, section Demographics and Housing

Visiting address: Oranjebuitensingel 6

P.O. Box 30314

2500 GH The Hague, The Netherlands

T: +31 70 3288722

F: +31 70 3288799

E: buitelaar@rpb.nl

Introduction

To understand housing market dynamics and house price development, insight in the supply side of the market is seminal. Although the demand side of the housing market often receives the most attention, there is quite some literature on housing supply nowadays (DiPascuale, 1999). There are many that have carried out research into estimating housing supply elasticity by looking at housing supply as a function of house prices and house prices changes (e.g. Blackley, 1999; Harter-Dreiman, 2004; Green, Malpezzi & Mayo, 2005). Others have looked at the regulation of housing supply and the effects on house prices (Glaeser, Gyourko & Saks, 2005; Vermeulen, 2008).

However, some have pointed out that although new housing supply is extremely important in order to understand house price developments, we know surprisingly little of the determinants of supply (Hilber, Rouwendal & Vermeulen, 2008). Housing supply literature has focused primarily on volumes – either in terms of number of units or investment –, aggregated at the national level (DiPasquale, 1999); "Much of the literature has focused on aggregate data because there is little information where the unit of observation is the builder, investor, or landlord. We need to focus on bringing new data to bear on the decision-making processes of these important actors to build our understanding of the micro foundations of housing supply."[1] (DiPascuale, 1999: 9) The aggregation at the national level neglects the local and regional differences in housing supply, and the role of actors. There is much (comparative) case study research that does take account of these elements (see e.g. Verhage, 2002; Buitelaar, 2007), and which is extremely helpful in gaining in-depth knowledge on the causal mechanisms behind housing supply. However this does not allow for looking at the relative weight of the different explanatory factors in a large number of cases.

An additional bias in current research on housing supply is the focus on market-rate housing and hence on suppliers that generally have a commercial interest. These actors fit with the rational actor perspective of most economic models. However, there are also actors that follow a different logic, which is not necessarily an economically rational one. Housing associations or local authorities are examples of this type of housing suppliers.

In this paper, we focus on housing associations. Housing associations are important suppliers of housing in general, and even more so in times of credit crunches and market slowdowns. One third of the Dutch housing stock is owned and let by housing associations.

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[1] In addition, there is an emphasis on single-family housing for sale; only few have focused on rental housing and apartments (De Leeuw & Ekanem, 1971).

This percentage has been even close to 40% in the mid-eighties. Their share in the housing production is also substantial. They build around 23.000 houses a year on average, nearly one-third of the housing production in the Netherlands. The number of new houses built by the associations has increased over the years, particularly the share of the houses for sale (see figure 1).

Figure 1:   Housing production by housing associations 2002-2007
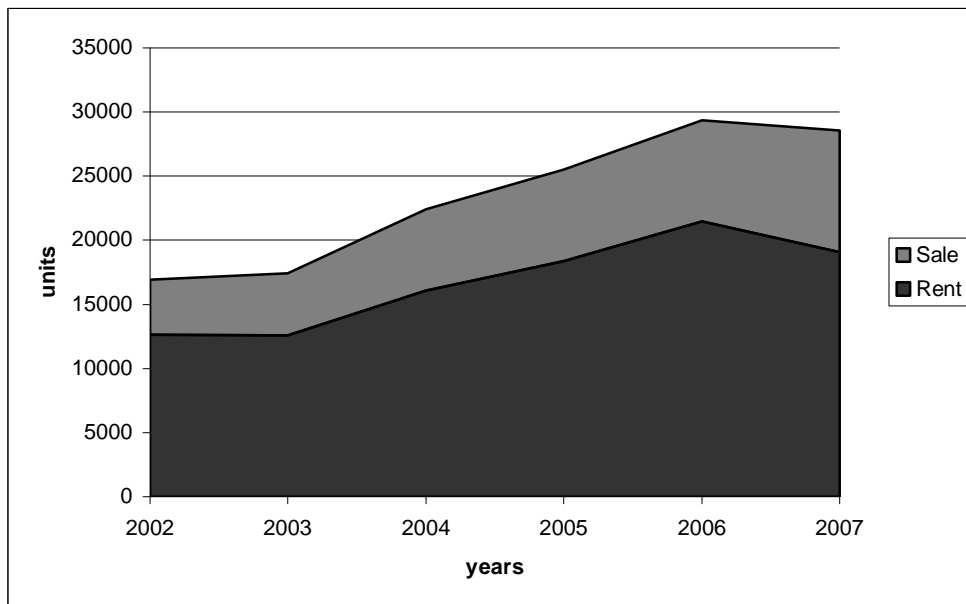
Source: CFV - BBSH

Although all 455 associations share the same national institutional context - an administrative and financial arrangement between them and the state - their production varies greatly. This leads to a diverse spatial distribution of housing supply. That has to do with both the preferences and the competences of each housing association but also with the spatial and institutional structures that constrain or enable housing production. For instance, one housing market is more receptive towards new supply than another. But also the availability of building land is very important. Therefore, we take the housing association, in combination with the locations where it owns or owned housing units – this is at the level of the municipality – as the unit of observation. Only looking at the housing associations as the unit of observation would do insufficient justice to the fact that they often operate in more than one local authority; on average they are active in four municipalities.

Notwithstanding all the differences in the way each organization acts - each has its own specific business style (Gruis, 2005) -, there might be patterns in the way housing

associations supply housing. The central question is: how can we explain the housing production by housing associations taking into account both the features of the building location and the organisational features? Again, a question like this is often dealt with in qualitative case study research. But in this paper, we estimate regressions on the basis of a dataset of housing associations (in combination with all municipalities in which they are active) in which both organizational variables and contextual variables are taken into account. The paper is structured as follows. First, we will explore the institutional context of Dutch housing associations, which is a fairly special case compared to many other countries. Then a conceptual framework and the hypotheses are set out which are used to structure the empirical research, the latter preceded by a section on the model specification and the operationalisation of the variables. The paper is concluded by a section in which we reflect on the results of the paper and the potentially useful steps in further research.

Introducing the Dutch social housing sector

The history of housing associations goes back as early as the fifties of the 19th century, when private organizations were established – out of philanthropy or compassion with the least-off - to change the poor housing conditions that lower income groups had to face. Since the Housing Act of 1901, housing associations could become eligible to state funding by becoming registered social landlords. The state would provide subsidies for every social house that was built (object subsidies). From then on, the so-called social housing sector started to increase rapidly. In the early twenties of the 20th century there were as many as over 1300 registered social landlords. The number of housing associations decreased since then, but the share of their stock in the total housing stock kept rising, reaching a peak at 39 % in 1985 (CBS). Nowadays it lies around 33%, which is still by far the highest percentage in Europe; Finland is second with just over 20%.

In the eighties, the system was seriously scrutinized. There was a decrease in demand for social rented housing. There are several social-economic and demographic reasons for that. But maybe more importantly, central government shifted towards supporting owner-occupied housing (Boelhouwer, 2002). This fits within a wider neo-liberal trend of privatisation and more market involvement in the Netherlands - the western world as a whole – that took off in the early eighties. Since the end of the eighties, housing associations were gradually becoming more independent from the state, both administratively (1993) and financially (1995).

The financial independence has had the most influence. It implied the following: "The core of this change is that existing state loans for social housing were traded off – *at once* – against state liabilities for future deficits on housing associations' socially rented estates." (De Kam, 2007: 3, emphasis mine) The only subsidy that remained was a (subject) subsidy to the tenants, on the basis of their income and the rent that that they had to pay for their home. The housing association needs to finance its production from a revolving fund; the income they receive from letting and selling houses is to be used for new investments.

It does not mean that housing associations are now free to do what they want. Together with the shift to more independence, checks and balances were set up to look after the equity of the housing associations. The ministry (and the CFV on behalf of the ministry) monitors the actions of the housing associations on a yearly basis. There are six performance areas on which they can be held accountable:

- Care for the quality of the stock;
- Guarantee financial continuity of the organisation;
- Provide privileges to the target group of social housing policy;
- Facilitate tenants' participation in policy decisions;
- Contribute to the liveability of the neighbourhoods where the housing stock is located;
- Contribute to housing provision for the elderly, the disabled or people who otherwise need help.

These areas demarcate what a housing association is allowed to do; they do not work particularly well as targets for what housing associations ought to do. Therefore, they are not concrete enough. This makes performance measurement and management almost impossible (Conijn, 2005). For the financial control of housing associations there are clearer measures, which makes it possible to assess the financial continuity of the association. If a housing association lacks the resources to carry out its tasks the help of the CFV can be called in. On the other hand, the CFV can also give an assignment to the association with regard to its financial management

Hence, as a result of the institutional changes, housing associations have become hybrid organizations with societal goals - providing houses for the least-off in society - and entrepreneurial goals - sustaining or expanding the enterprise. They are neither entirely public – they have quite some independence - nor entirely revealed to the challenges of market competition. The financial support options and the high solvability (on average) lead to soft budget constraints that increase the likelihood of inefficient behavior (Hakfoort, Van Leuvensteijn & Renes, 2002).

Understanding supply: between agency and structure

To understand how housing associations act, we first turn to a more abstract discussions on the explanation of the behavior of actors. The behavior of actors is the result of interplay between these actors and the structures that surround them. The actions of agents are embedded in these social structures (see e.g. Granovetter, 1985), and cannot simply be taken as given as many rational choice theories do. On the other hand, it is the agents that make and change those structures, albeit that not every structure can be changed by every actor to the same extent. Some structures are at a higher level or are inherited from the past from other actors and are therefore not always easily changed (Hodgson, 2004). Both the propensities of the actor and the structures are important and influence each other. For instance, each actor has its own preferences and competences (see figure 2).

In the social sciences the interplay between structures and agencies has become known as the *duality of structure* (Giddens, 1984). The implications of this perspective have been acknowledged and endorsed in land and property research also (Healey & Barett, 1990; Adams et al., 2002; Buitelaar, 2007).

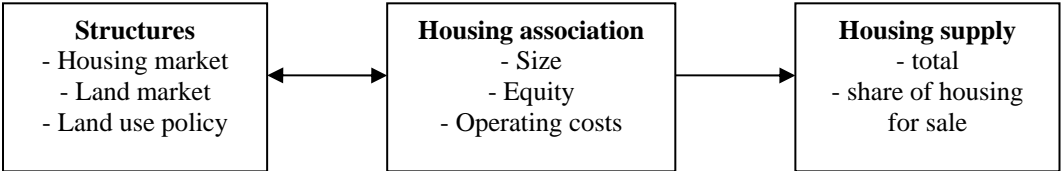*Figure 2:   Basic causal model of the behavior of actors*
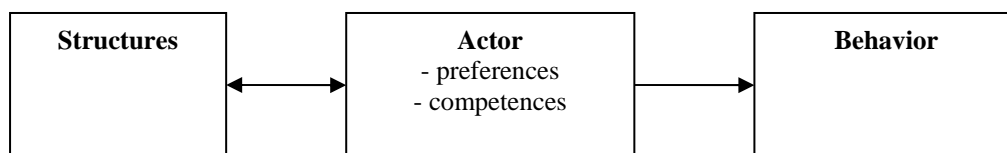
We try to explain the behavior of actors. Every actor has his own preferences, competences and his own context. As a result of that, each actor behaves differently. The same counts for housing associations, each has its own business style (Gruis, 2005); there is much heterogeneity in where and how many new houses are built by Dutch housing associations. Notwithstanding the differences, we are looking for commonalities and patterns in the explanatory factors.

In line with the general scheme on social behavior we have constructed a scheme that takes into account the duality of structure behind the housing production by housing associations (figure 3; see Adams et al., 2002 for a similar scheme). In order to be able investigate empirically, structure and agency have been analytically separated. We assume

that the differences in the housing production by housing associations are the result of both the propensities of the housing associations and the local structures within which the associations operate. Based on the available literature the most important have been included in the models.

Figure 3:   Causal model of housing supply by housing associations

Structures - Housing market - Land market - Land use policy	⟷→	**Housing association** - Size - Equity - Operating costs	→	**Housing supply** - total - share of housing for sale

As mentioned before, there has been little actor-oriented research of the supply side of the housing market (DiPascuale, 1999). Therefore, there are few behavioral hypotheses other than those from general economic theories. This is troublesome for organizations like housing associations that, as we have shown, are hybrid in nature; they have to combine their role as a market actor with one as provider of a goods that is proved below market value. This leads to situations that there are many contradictory hypotheses. For instance, do housing associations build houses particularly in high demand areas or in areas that are less interesting for commercial actors? Hence, there are no – to the best of my knowledge – theories on hybrid suppliers of housing. Therefore, this research is exploratory in nature and bases its hypotheses on international literature, national research reports and policy debates. The hypotheses have been distinguished along the lines of agency and structure, acknowledging that this is a simplification.

Hypotheses related to agency

One hypothesis is that the bigger the housing association (in terms of its housing stock) the higher the housing production. One reason is that the bigger the housing stock the bigger the challenge to keep that stock up to standard and the greater the need for the substitution of existing housing. In addition, economies of scale might help bigger association to build more; there have been many takeovers and mergers recently for reasons of risk management and financial control (Conijn, 2005). In addition, it might be assumed that housing associations build more houses for sale when they are bigger. Many bigger associations have development

companies that are specialised in developing locations and in competing with other market actors (Koolma, 2009).

Size could also matter when we look of at the spatial distribution of the housing stock. As said before, housing associations are often active in more than one local authority; on average they own houses in four different municipalities. Based on the idea that a concentrated stock offers economies of scale with regard to maintenance, management and other activities to retain or increase property values, it might be assumed that they build houses primarily in those municipalities where they have relatively (to their own stock) many houses (Kromhout & Wilkens, 2007). In addition, it might be expected that they build a higher share of houses for sale with a bigger rental stock, in line with the trend of mixing neighborhoods (Musterd & Ostendorf, 2005).

The size can also be measured in financial terms. The better the financial position and the higher the equity of a housing association the higher its housing production (Conijn, 2005). In addition, we assume that housing associations build more housing for sale when they have less equity. Housing for sale generates short term benefits without long term costs, unlike rented housing. The average net financial result of building for sale is 18.000 euro per unit (CFV, 2008).

The equity of an association might also be spent on inefficiencies or on other activities that are necessary to run the enterprise. Recently, research by the CFV has shown that these costs per unit have increased (CFV, 2008). It has been suggested that high level of operating costs are made at the expense of the housing association's production (Buitelaar, Van den Broek & Segeren, 2009). This will be tested. There is no reason to assume that these costs have and effect on the composition of the housing production, and hence on the share of housing for sale.

Hypotheses related to local structures
We assume that local structures have an effect on the housing production. Here we consider the housing market, the land market and local land use policy.

Although research has proven that price elasticity of housing supply is fairly low, and even more so in the Netherlands with its high degree of growth control (Renes, Thissen & Segeren, 2006), it might be assumed that supply is a function of houses prices (Green, Malpezzi & Mayo, 2005). Therefore, we assume that the higher the houses prices, the higher the share of houses for sale. But in total, it can be expected that housing associations build less in those areas. The reason is that because of the higher pressure on the market it becomes more

difficult for housing associations to build houses that are below the market price. The land prices are high and the competition with other developers great.

Houses prices have an effect on land prices; the latter is a function of the former (Evans, 1985). As we said, this affects the availability of land, but it is not the only factor that influences this. Other determinants of the success of land acquisition by housing associations are their own competences, financial resources and the relationship with local authorities (Needham & De Kam, 2004). It might be expected that the more land housing associations are able to acquire the higher the housing production. We also expect the share of housing for sale to be higher when more land is acquired because the higher costs[2] of land acquisition have to be covered by the housing development. The profits of selling houses can be used for that. The demand for housing and the availability of land are not the only factors that enable or constrain housing production. Another important institutional factor is the permission granted by local authorities to build houses. Land use regulations have and important negative effect on housing supply (Vermeulen, 2008). But land use regulations do not only restrict the supply of housing in general, it also affects the composition of housing supply. If local authorities emphasize the production of market-rated housing and choose not for inclusionary housing it is likely that housing associations build fewer houses (Calavita & Mallach, 2009). When they build in these areas they probably build more housing for sale than in areas where more room is given to social housing. Some have argued that the political color of local authorities has an effect on land use regulation - and land provision - towards social housing and housing associations; left-wing oriented councils are assumed to be more supportive (De Kam, 2006; Van Leuvensteijn & Shestalova, 2006).

Finally, we have not only looked at the division between housing associations and other suppliers, it is also important to take account of the level of concentration of supply among housing associations. Although the market for social housing cannot be regarded as a competitive market – the price is set artificially - it is assumed that different housing suppliers of social housing can challenge each other to increase production (Van Leuvensteijn (Shestalova, 2006). There is no reason to expect that the level of market concentration has an effect on the composition of the housing production

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[2] The costs can be higher because of an increase in investments in infrastructure and utilities.

Modeling housing supply

To model the housing production a unique data set was used, covering all 455 housing associations and all different municipalities in which they own or owned houses (including housing for sale) for the period 2002-2007. These data are collected by the CFV as a part of its task to monitor the performance of housing associations, as prescribed in the BBSH; therefore the dataset is called CFV-BBSH. The combination of associations and municipalities leads to nearly 1800 cases. The dataset was cleared from the cases in which the housing associations did neither own nor build houses in the research period – but where they did before 2002. This leaves the total number of cases at 1583 (see table 1).

When we look at the production data we notice that in many cases there is no production at all in the research period. Some housing associations produce many houses, others none or not in every municipality where they own houses. There are many that choose to consolidate the stock and confine themselves to maintaining and maybe renovating it, as opposed to those who act more as real estate developers (Gruis, 2005). Apparently, for some it is not so much the question how much they build, but whether they build at all. Therefore we have distinguished between these two different questions: one regarding the likelihood of production, one on the amount.

Four models have been estimated. Model 1 en 2 are logistic regression models, because in both cases the dependent variable is bivariate. Model 1 estimates the likelihood that houses are built, whereas model 2 focus on the likelihood of the production of housing for sale. Within the group of cases in which there was a housing production we looked at the predictors of the number of houses. Because the dependent variable is a count variable, a Poisson model (model 3) has been estimated instead of an ordinary least square model (OLS). Model 4 is an OLS model that estimates the parameters of the composition of the housing supply - more specifically, the share of housing for sale.

Operationalization independent variables

Table 1 shows all variables and the descriptive statistics. In line with the distinction between structure and agency we have made a distinction between compositional and contextual variables (Raspe, forthcoming). All variables that are not normally distributed – that have a Skewness above 1 – have been log transformed.

As said before the dependent variables have been derived from the CFV-BBSH dataset. These are average production data for the period 2002-2007. The average for this period is taken, instead of just one or two years, because the building production shows enormous fluctuations

throughout these years. Mergers and takeovers are controlled for.

For the independent compositional variables we also used the CFV-BBSH dataset but not always the same time frame. The size of the housing association ('total stock HA') is defined as the average size for the period 2002-2007. For the 'operating costs per housing unit' we also used the average of the data of 2002-2007. The 'share of the municipality within the HA's stock' is defined by the share in 2002. We chose just one year, the first year and not the whole research period, because of the danger of endogeneity. Because we look at the level of the municipality (and not the housing association), there is a danger that the housing production constitutes the share of the housing association's stock of a municipality, while we are interested in the reversed causality. Looking at just one year is less problematic with stock variables.

The financial position, the equity, is not treated the same in every model. In the logistic models we looked at the average solvability of an association between 2000 and 2005. Solvability has been defined as the equity divided by the balance total. A two year difference with the dependent variables was chosen because of a time lag between the building decision and the completion of the construction[3]. In model 3 and 4 we did not look at the solvability but at the equity per housing unit (2000-2005), because that is a more accurate determinant of the *number* of houses that housing associations build; the solvability percentage can be the same for a both a very small association and a large one.

For most of the contextual variables we used other data sets. The house price is defined as the average value of the housing stock in a municipality in the year 2002 (Statistics Netherlands). These values are appraised by local authorities as the basis for property taxes. They are derived from transaction prices in recent years. We chose these values instead of the transaction prices because there is a danger of an overrepresentation of particular houses, as a result of completed housing projects in that year. A disadvantage of using the housing or property values is that those are not only an expression of the demand-supply ratio in a local authority but also of the composition of the housing stock. Therefore we controlled for the share of social housing in the local stock (in 2002). We also controlled for the share of the local social housing stock that a particular housing association owns.

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[3] Statistics Netherlands (CBS) has calculated that it takes 18 months on average between the building permit and the completion of the building. The building decision is taken before the building application, and hence before the permit is issued. And because it takes 13 weeks between application and permission, two years between building decision and completion seems an accurate time lag.

The availability of land is based on data of the national Cadastre. We took a query of those data on the basis of subject names of current and former housing associations[4]. 1998 is the first year that those data exist on the level of the municipality. Therefore we looked at the sum of land acquisitions by housing associations between 1998 and 2002 per municipality.

To incorporate into the model the influence of land use regulations and growth controls on housing in general and for housing associations in particular, we decided to look at the housing production of all other suppliers on the housing market, among which are real estate developers and individuals. This is an indication of what and how much is allowed to be built. These data cover the period 2002-2007 (Statistics Netherlands).

The political color of the local council is depicted by the group of related political parties that has the highest share in the local council for the period 2002 and 2006. In line with Statistics Netherlands we distinguish between three groups of political parties: left-wing, right-wing and religious parties.

The last variable that we considered is the distribution of the social housing stock among housing associations. We took the Herfindahl-Hirschman index (HHI), a common index for measuring market concentration, also used for Dutch housing associations in the past (Conijn & Van der Reijden, 2000). It is the sum of squares of the market shares; it lies between 0 and 1. A number close to 0 refers to full competition, whereas 1 stands for a monopoly. Since a HHI above 0,2 is considered high, we can say that an average HHI of 0,64 (table 1) reveals a high degree of market concentration. There are many municipalities with just one or two housing associations.

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[4] Because all sorts of names occur in the database of the Cadastre it has not been to align the land transaction to all individual cases. Therefore we have aligned the data to the municipalities.

Table 1:   Descriptive statistics

	N	Minimum	Maximum	Average	Standard deviation
Dependent variables					
Housing production	1583	0	479.67	15.00	39.16
Share of housing for sale	817	0	1	0.21	0.26
Independent compositional variables					
Total stock HA	1583	4	76216	13438	15497
Share of the municipality within the HA's stock	1582	0	1	0.28	0.40
Solvability	1582	-0.10	0.94	0.17	0.10
Equity per housing unit	1583	-3161,52	124080,70	6615,57	4573,05
Operating costs per housing unit	1583	1211,40	6077,23	3133,89	483,41
Independent contextual variables					
House prices	1583	49833	258333	102547	26051
Share of social housing in the municipal housing stock	1583	0,036	0,55	0,30	0,09
Share of the HA in the municipal housing stock	1582	0	1	0,28	0,36
HHI	1583	0,15	1	0,64	0,25
Availability of land for HAs	1583	0,50	2403,67	235,29	412,10
Housing production by other suppliers	1542	0	217,44	16,26	34,74
Highest share for leftwing parties	1549	0	1	0,58	0,49
Highest share for rightwing parties	1549	0	1	0,23	0,42
Highest share for religious parties	1549	0	1	0,19	0,39

The likelihood of housing production

The empirical results of the two logistic models are to be found in table 2. Apart from the coefficients, we also calculated the odds ratios. Odds ratios are calculated raising *e* to the power of the coefficient and refer to the change in the odds or the likelihood of being in the key dependent variable (here the housing production or the production of housing for sale) resulting from the independent variable. Thus in table 2, the odds ratio of 1.226 of the total housing stock of a housing association implies that building houses is likely to be characterized by 1.226 times more houses in the stock than those with no housing production. In a similar way, the odds ratio of 0,451 for house prices implies that the likelihood that the houses are built by housing associations in areas with high house prices is 0,451 times the likelihood that housing associations build houses in municipalities with low house prices.

Table 2:   Logistic regressions

	Model 1: Housing production (total)			Model 2: Production housing for sale		
	B	S.E.	Odds ratio	B	S.E.	Odds ratio
Intercept	0,009	2,066	1,000	1,168	2,388	3,839
Individual variables						
Total stock HA	0,203***	0,074	1,226	0,332***	0,114	1,394
Share of the municipality within the HA's stock	2,272***	0,328	9,703	0,425	0,351	1,530
Solvability	0,649***	0,108	1,913	0,275	0,183	1,317
Operating costs per housing unit	0,000	0,000	1,000	0,000	0,000	1,000
Contextual variables						
House prices	-0,797**	0,378	0,451	-0,884**	0,455	0,413
Share of social housing in the municipal housing stock	-3,949***	1,307	0,019	-2,578**	1,466	0,076
Share of the HA in the municipal housing stock	4,145***	0,350	63,136	2,132***	0,351	8,428
HHI	-0,530	0,379	0,588	-0,469	0,471	0,626
Availability of land for HAs	-0,025	0,055	0,976	0,201***	0,060	1,223
Housing production by other suppliers	0,542***	0,089	1,720	0,158	0,103	1,171
Highest share for leftwing parties (r)						
Highest share for rightwing parties	0,067	0,183	1,070	-0,320	0,217	0,726
Highest share for religious parties	0,012	0,242	1,012	-0,023	0,279	0,977
N		1449			744	
Nagelkerke R²		0,572			0,215	

(r) = reference category

* p < 0.10; ** p < 0.05; *** p < 0.01

The Nagelkerke R² of model 1 is nearly 60% while model 2 is slightly over 20%. This implies model 1 explains the variance fairly accurately, while model 2 does that far less and leaves many possible determinants out of the equation.

Model 1 shows positive correlation coefficients for the total housing stock, the share of the municipality in the stock and the solvability. The likelihood that housing association build houses increases when the value of these variables increases. There is no significant relationship between the operating costs (per housing unit) and the production of new housing.

If we look at the local context, we see that house prices affect the building production by housing associations negatively. Also the share of social housing in a municipality, which we used as control variables has a negative effect on the housing production by housing

associations. From this, we can derive that in bigger cities, with a high percentage of social housing, in high demand areas (primarily the western part of the Netherlands), it is more difficult or less necessary for housing associations to produce houses. However, when these associations have a large share within that local housing stock we see an enormous positive effect on the likelihood to build.

The likelihood to build houses does not increase with a decrease in market concentration; unlike what is expected in some of the literature, there is no significant relationship. Apparently housing associations do not compete, or if they do, it does not lead to a higher housing production. On the other hand, an increase in the housing production by other suppliers than housing associations *does* lead to a significant increase in the likelihood to build. There is however not a causal relationship between these two. Like we said in the previous sections, the production of other suppliers is an indication of the degree of land use control on housing development. If other suppliers are allowed to build much, it can be assumed that local authorities provide much room for development.

There is no significant relationship between the amount of land a housing association is able to assemble and the likelihood to build. Associations with little land acquired are as likely to build houses as the bigger landowners. In addition, if local authorities facilitate land assembly and housing development for housing associations at all – they do this to a decreasing extent (Buitelaar, Van den Broek & Segeren, 2009) – they act regardless of their political color.

Model 2 shows much resemblance with model 1, but also some differences. The variance in the production of housing for sale is explained by the size of the housing stock. Bigger housing associations are more likely to build houses for sale than small ones. Unlike model 1, there is no significant effect from the solvability of a housing association. The reason might be that the production of this type of housing is not only a function of the financial possibilities, it is also the other way around, they are built to increase the solvability level. Neither has the share of a particular municipality in the stock of the housing association a significant effect on the likelihood of building houses that are sold after they are built. In other words, when it comes to the houses that are built for sale, there is no relation with the location of the current stock. A mixing policy might be subordinate to a policy of developing houses for the sake of increasing the financial reserves irrespective of proximity to the rental stock.. The effect of the contextual variables (or the lack thereof) is nearly the same as in model 1, except for two variables. One is the availability of land. The availability of land does not have a significant effect on the likelihood to build (model 1), but it does on the likelihood to build

houses that are sold. Apparently, if housing associations want to build they do not need much land or do not need to acquire land, but build on their exiting properties, but are more likely to build houses for sale when the own more land. The reason for that might be that with an increase in land the need for investments in utilities and infrastructure, costs that need to be covered.

The other variable that differs from model 1 is the housing production from other actors than housing associations. The likelihood that housing associations build houses increases when alternative suppliers build more (see model 1). But there is no significant effect on the likelihood of building housing for sale. The reason might be that this segment of the housing market is covered by these other suppliers, like real estate developers and individual owner-occupiers.

Understanding the number of houses built

Table 3 Shows the results of the multivariate regression models. The explained variance of the number of houses produced is nearly 50%. Again, housing for sale – this time the share in the total production - is more difficult to explain (model 4).

Table 3: *Models for explaining housing numbers*

	Model 3: Number of houses		Model 4: Share of houses for sale	
	B	S.E.	B	S.E
Intercept	-2,530***	1,043	-2,802*	1,191
Individual variables				
Total stock HA	0,311***	0,050	0,154***	0,064
Share of the municipality within the HA's stock	0,850***	0,154	-0,146	0,186
Equity per housing unit	0,042	0,078	-0,044	0,094
Operating costs per housing unit	3,908	0,000	2,980	0,000
Contextual variables				
House prices	-0,267	0,196	0,238	0,227
Share of social housing in the municipal housing stock	-0,047	0,644	1,405**	0,690
Share of the HA in the municipal housing stock	1,392***	0,150	-0,667***	0,199
HHI	-0,014	0,207	-0,122	0,256
Availability of land for HAs	0,050**	0,026	-0,047	0,030
Housing production by other suppliers	0,521***	0,045	-0,174***	0,057
Highest share for leftwing parties (r)				
Highest share for rightwing parties	-0,178**	0,095	0,089	0,101
Highest share for religious parties	-0,178	0,121	-0,036	0,131
N	745		430	
R²	0,485		0,151	

(r) = reference category

* p < 0.10; ** p < 0.05; *** p < 0.01

Model 3 shows that housing associations build more with an increase in size and an increase in the share of a particular municipality within their stock. Unlike model 1, the equity does not have an effect on the number of houses that have been produced. From this observation, it can be deduced that a minimum solvability level is required in order to build houses, but that an

increase in equity does not lead to an increase in housing production. The reason might be that other investments than the investment in new housing are made. Or that, since housing associations are not subject to market incentives and competition nor to tight government restrictions ('soft budget constraints'), possible surpluses are not invested at all. According to central government 77 associations have underperformed in this respect. Again, there is no relationship between the housing production and the operating costs.

The effects of the contextual variables is also different from model 1. In this model there is no relationship between on the one hand the house prices and the share of social housing in the local housing stock (control variable) and the number of new houses built by housing associations. But like in model 1, there is a strong relationship between the share of the housing association in the local (social) housing stock and the building production. In more general terms, the local attachment and path dependency seems to be very strong. The level of market concentration plays no significant role.

There is a positive relationship between the amount of land that housing associations have acquired and the number of houses they have built; the more land, the more houses. And there is a positive relationship between what other suppliers and what housing associations build. Land use restrictions seem to affect the production of different types of suppliers in a similar way.

The last model (4) shows the predictors of the composition of the housing production, or the share of housing for sale. This model has the least explained variance. Only the total housing stock and the share of social housing in the local housing stock are positively correlated with the share of housing for sale. Bigger housing associations sell more houses than smaller ones. These associations have professional daughter companies that carry out location developments, among these are mixed-use developments. A higher share of social housing has a positive effect on the share of the production that is sold by housing associations. This is not the case if we look at the share of housing association in the local social housing stock. When their share increases we see an increase in the share of rented housing. There is also a negative relationship between what other suppliers build and what housing associations build to sell.

Concluding comments

In this paper we looked at the housing supply by housing associations. An analysis of supply behavior on the basis of micro data is rare. It provided insight in some important drivers of housing supply by Dutch housing associations, which together take care of one third of Dutch housing supply. The observation unit – the production per housing association per municipality – allowed for an analysis in which not only the propensities of the housing association, like the size and the financial position, are taken into account but also the characteristics of the local context in which they act. Housing market characteristics, the availability of land and the local land use policies play an important role in understanding the supply of housing.

More research into this particular topic is needed. There are several attention points with regard to this. First, research in other countries than the Netherlands so as to gain knowledge on housing supply within a different institutional context, particularly a different housing system and land use planning system. Second, other supplies, particularly real estate developers, deserve attention. In this paper we saw that Dutch housing associations are more likely to build in areas with less pressure on the housing market. It can be assumed that it is the other way around for real estate, obviously controlled for the housing development possibilities as the result of land use regulations. This type of research allows us to obtain a closer look at the factors that determine the price elasticity of housing supply.

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