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A HOUSING MARKET WITH COURNOT COMPETITION AND A THIRD HOUSING SECTOR

TROND-ARNE BORGERSEN

Abstract:

This paper integrates a non-profit third-housing sector (THS) into a housing market with Cournot competition. The paper analyses the indirect effects of a THS on the aggregate housing market, on a commercial housing supplier and on the market adaption of households not embraced by the THS. While beneficial for households included in the THS, a question arises related to the indirect effects of a THS. The paper argues for crowding-out and higher house prices in the commercial housing market in response to a THS expansion. In addition, a THS also affects the strategic behaviour of the commercial housing supplier. Compared to a conventional Cournot housing market, a fixed THS housing supply changes the market structure from one where the housing supply of different housing providers are alternative to one-another, to a market structure where housing supply is complementary.

Keywords:

Housing market, Cournot competition, Third Housing Sector, Indirect effects.

JEL Classification: R31, R21

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1. Introduction

This paper analyses indirect effects of a third housing sector (THS) in an aggregate housing market. Supplying houses at conditions more favourable than the commercial housing supply is beneficial for households embraced by such initiatives. A relevant question is, however, what are the indirect effects of a THS on a housing market and on households not included in such housing programmes?

As house price growth outpaces income growth, entry into owner-occupied housing is for many households contingent on higher gearing and a riskier financial position. As housing affordability deteriorates, some have called for stronger government involvement and a wider set of social housing programmes, while others argue the need for a complete structural housing market reform.

The design of housing policy in general, and social housing policy measures more specifically, have been a key concern to policymakers for decades (see Apgar (1990), Priemus and Dieleman (2002) or Scanlon et al. (2015)). A seminal paper by Arundel and Doling (2017) asked whether the fall in home-ownership after the great financial crisis was permanent. The paper argues that owner-occupied housing might come to an end as the dominant form of tenure, seen in relation to recent changes in labour markets. Discussing the edges of home-ownership and the borders of sustainability in housing markets, Haffner et al.'s (2017) conclusion relates to this, making substantial policy interventions necessary to maintain home-ownership the dominant form of tenure.

Other, more radical arguments concern the need to reform the housing market, or at least a part of the market. Some argue there is a need for a THS where housing is not only an investment object, or a supplier of housing consumption services, but also meant to achieve various social objectives. The THS objectives might be to promote self-reliance, encourage community development or poverty alleviation through providing affordable housing (Yung and Chan, 2020b).

There is little consensus on an exact definition of the THS (Prosser (2020), p.180)) and several THS definitions are, in fact, argued to be highly debatable (Yung and Chan, 2020b, p. 42). Prosser (2020) argues that the THS should be viewed as an "umbrella term" covering the housing supply of different organisations not included in either the public or private sector, i.e., charities and voluntary organisations, social enterprises and housing associations.[1]

According to Prosser (2020), some aims are common to most THS models, i.e., the models are meant to promote sustainable housing careers while providing low housing costs and ensuring flexibility to the extent that it does not create housing traps. Despite a number of differences at the individual level, the aggregate THS is argued to be value driven, non-profit focused and - despite cooperating with government institutions - represented by NGOs. In terms of the THS housing supply, the non-profit component is a particular contrast to the commercial housing supply.

[1] See also the description of the THS at http://toolkit.northernbridge.ac.uk/engagingwithpolicymakers/engagingwiththethirdsector/whatisthethirdsectorandwhatdoesitdo/

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The main objective of the THS is to ensure a given social objective, such as, for instance, improving housing affordability for the households embraced by the THS. Nevertheless, THS initiatives might have indirect effects that one should not ignore. When increasing in scale, THS initiatives might have negative effects on both aggregate housing markets and households not directly embraced by THS initiatives. To maintain public support for a THS it is important to minimise the negative effects on housing markets and on the housing careers of households not embraced by THS programmes.

This paper analyses the indirect effects of a THS in a housing market characterised by Cournot competition. Considering a housing market where the aim of a non-profit THS is to supply houses in a fixed ratio to the commercial housing supply, the paper analyses the indirect effects a THS has on a housing market, including house prices and the behaviour of the commercial housing industry.

The model presented in the paper is stylised in several respects, and the focus is on the interaction between a profit maximising housing industry and a non-profit THS. The paper finds crowding-out and higher house prices in the commercial housing market as results of the THS housing supply. The paper also argues that the THS affects the strategic behaviour of commercial housing suppliers. A non-profit THS changes the housing market structure from one where the housing supply of different housing providers is alternative to one where it is complementary.

The rest of the paper is structured as follows. The next section introduces some literature on the THS and highlights some of its characteristics, while placing it into a housing market and social housing policy context. The third section presents a Cournot model of the housing market with two housing suppliers where one maximises profits, while the aim of the THS is to supply houses in a fixed ratio to the commercial housing supply. The last part concludes the paper.

2. Some literature on the THS and the housing market

The importance of the housing market for economic development is discussed in a number of papers. Some focus especially on the US sub-prime crisis and the global housing market bust (see, for instance, Goodhart and Hoffmann (2008), Duca et al. (2010), Agnello and Schucknecht (2011)).

However, the housing market can be analysed from a number of angles. The role of different housing markets - and the interaction between segments - is discussed by Grey (2017), in a context which includes real housing market characteristics such as housing industry behaviour, the role of lenders and the business cycle. The interaction between different segments is important when analysing housing markets in general, and housing market policy more specifically. Rothenberg et al. (1991) states:

"Housing market events and government policy initiatives which impact one submarket will have their primary effects in that submarket, with secondary effects appearing in other submarkets to the extent those submarkets are linked in substitution possibilities with the original submarket" (Rothenberg, 1991, p. 48)

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The link between different housing market segments or different parts of the housing market is also important when analysing housing policy. The crowding out of the private housing supply when governments subsidise housing starts is an example of such a link. In analysing social housing, crowding-out is addressed by Murray (1983, 1999), Sinai and Waldfogel (2005), Nordvik (2006), Eriksen, and Rosenthal (2010), and there seems to be an agreement concerning some crowding-out across the literature.

Another relevant aspect when analysing policy concerns policy interventions for households only indirectly affected by such interventions. Borgersen (2019) analyses the indirect effects of social housing policy on the housing careers of households only indirectly affected by social housing policy interventions. In a housing market with equity induced up-trading across different market segments, the paper shows how the ability to trade up the housing ladder is affected if the effect on prices at different steps of the housing ladder is unequal. On the other hand, Astrup et al. (2015) argue for small indirect effects of SHP measures in a homogenous housing market.

Important when analysing the THS is interdependence and the link to other parts of the housing market. The link between the commercial housing supply, social housing supply and THS housing supply is, for instance, presented by Oslo commune (2019) as follows:

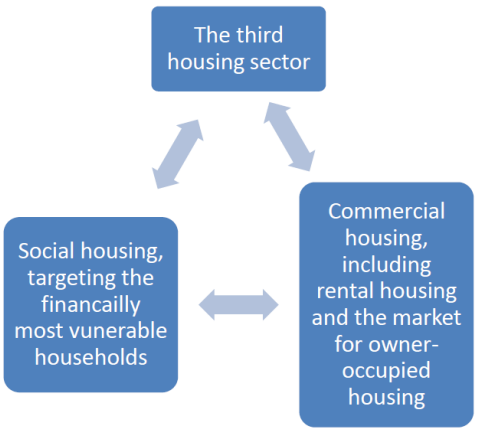

Figure 1: The links between the third housing sector, social housing and commercial housing market.

The interaction between the three types of housing supply goes both ways and might vary over time. For instance, a shock to the interest rate, or an increase in unemployment, might push some households out of the commercial market and into either social housing or a THS. More generous rates of housing support might pull some households over to the social housing sector, while THS innovations - be it in the form of more extensive rent-to-buy programmes, increased possibilities for self-construction or an increase in the ratio of homes available for home-ownership at prices below market prices - might pull some households out of the commercial housing market and over to the THS. Irrespective of the scenario, more than one sector of the housing market is affected, and there are indirect effects present.

A THS is therefore an integrated part of the aggregate housing sector. This raises the question of what kind of interaction between the THS and the rest of the housing industry will emerge. In terms of housing supply, a relevant question is whether there will be a significant crowding-out of the private commercial housing supply. How will

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the profit maximising housing industry respond to an expansion of a non-profit housing supply? Moreover, how does the THS affect the housing careers of households not embraced by the THS housing supply?

The THS might apply different strategies to ensure housing affordability and promote sustainable housing careers, and both regulatory regimes and ownership positions may be useful strategies. As affordability deteriorates, finding relevant strategies might be more pressing. Čermáková and Hromada (2022) is an interesting analysis on housing affordability, analysing the impact of the recent hike in energy prices on affordability in the Czeh republic in the period 2018-2022. The paper quantifies the impact of higher energy prices on affordability by measuring the total housing cost relative to average net household income and argues energy poverty to have a negative impact on affordability, and push middle-income families into sharing, multifamily housing or renting. The effect of higher energy prices follows a period where housing already had become more unavailable due to a higher price to income gap, especially for young adults as analysed by Čermáková and Hromada (2021) analysing developments in the Czeh Republic compared to neighbouring countries arguing the need for a massive increase in housing construction to increase affordability.

The THS might include rental-to-own models, where a lease is converted into ownership; reduced pricing, where the house is sold under market value; and self-construction, where the homes become less expensive on the basis of self-assembly to a certain degree. Some case-like studies of different THS programmes and how they contribute to, for instance, improved housing affordability are given by Mullins et al. (2001) for Ireland, Alcock (2010) for England, Milligan et al., (2015) for Australia, Rolfe et al. (2020) for Scotland and Yung and Chan (2020a) for Hong Kong.

The indirect effects of a THS initiative are related to the structure of the THS supply. Prosser (2020) considers the THS an “umbrella term” that includes different organisations excluded in either the public or private sector and amongst other charities, voluntary organisations, social enterprises and housing associations. The “umbrella structure” of the THS includes several different models, i.e., rental-to-own models, reduced pricing and self-construction. The indirect effects of these relates, for instance, to different types of government support. The three models might be positioned within a regulatory regime or in an ownership regime. The government toolbox for supporting a THS based on a regulatory regime is quite distinct from that of an ownership regime, even if affordable housing is the aim of both. The different toolboxes’ might also have different indirect effects in the housing market. Figure 2 exemplifies these two regimes for a THS model with reduced pricing.

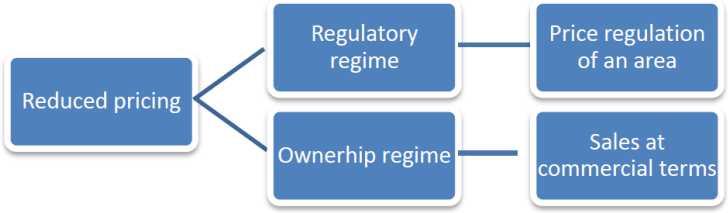

Figure 2: Regulatory regimes and ownership regimes for a reduced pricing THS model.

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The ownership regime will necessarily imply government subsidies to households entering THS home ownership. Subsidies might produce housing inefficiencies in the case of dead-weight losses or (which is most likely the case with THS) distributional gains in the merit good approach stimulating wealth (Borgersen, 2019) and schooling outcomes (Goux and Martin, 2015). In the regulatory regime, restricting the use of a particular area to a THS by law, developers will have to accept lower profits. In the case of price regulation, lower prices on land contribute to reduced house prices and housing affordability, but it represents a situation where crowding-out and strategic responses to the THS initiative by the commercial housing industry become relevant – features that will be discussed later.

While the non-profit motive is common across the THS, the type of housing models might differ. The different models might have important nuances, both in terms of institutional arrangement and the ability to ensure low cost housing and avoid housing traps. Lang et al. (2020, p. 1) refers to collaborative housing (again) using the umbrella term as one which induces a wide variety of housing (resident-led cooperatives, cohousing, Community Land Trusts (CLTs), and different types of community self-help and self-build housing initiatives).

The rise of collaborative housing is argued to contribute to wider social inclusion and cohesion, as well as affordability and higher environmental sustainability standards (Czischke et al. (2020, p.2).

Bossuyt (2021) acknowledges the variety of housing forms included in models with some collective resident control and conceptualises collaborative housing by positioning it internally and externally by a theoretical property regime perspective. The discussion is relevant to the THS aim of providing low-cost housing and avoiding housing traps. Sørvoll and Bengtsson (2020) highlight the inward looking and inward solidarity focus of cooperative housing. Thompson (2020), on the other hand, analyses CLTs and highlights external solidarity and long run housing affordability from the local collective ownership of land and assets.

While often linked to home-ownership, the non-profit aspect of renting is analysed by Matznetter (1992 and 2000) in relation to the cost-rent principle in Vienna. Matznetter (2020, p. 654)) describes the structure of the Vienna housing market and refers to four separate, but competing rental submarkets - 25% municipal, 21% non-profit, 27% private rent-regulated, 7% private unregulated - plus 20% owner-occupiers, where the interaction between the THS and the commercial housing market is significant. The comparative attributes of non-profit and profit developers in the rental market are the focus of Bratt (2008).

Some papers discuss partial aspects of a THS. Wainright and Mannning (2016) consider the financialization of third sector housing, which compared to education and social security is rather capital intensive and might be a challenge for the third sector. Alcock (2010) analyses the policy environment for the third sector in general, while Koschinsky (1998) explores the impact of federal policies on third sector housing. Chang and Yung (2020b) argue that the special nature of housing creates a need for a stable policy environment for the third sector. The long run nature of a successful THS is also the focus of Pawson et al. (2018), recognising the need to build organisational and institutional capacity within the third sector in conformity with the special features of housing management.

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3. The model

As a benchmark for the THS case, we first consider a conventional Cournot housing market duopoly where both the two housing suppliers (i=1,2) maximise profits.

3.1 A Cournot duopoly

The housing demand curve the two housing suppliers face is given as

1) $$P = A - B(Q_1 + Q_2)$$

The size of the housing market is represented by A, and B is an indicator of how strong demand responds to prices. While c_1 is the constant marginal cost of housing supplier number 1 is c_2 the constant marginal cost of housing supplier number 2. Abstracting away from fixed cost the profit function of housing supplier number 1 equals (and equivalent for number 2)

2) $$\pi_1 = (P - c_1)(A - B(Q_1 + Q_2))$$

The reaction functions of the two housing suppliers are derived from profit-maximising behaviour and, where, e.g., the reaction function of housing supplier number 1 equals

3) $$Q_1 = \frac{A - c_1 - BQ_2}{2B} \equiv R_1(Q_2).$$

The reaction function shows how the housing supply of the two housing supplies now is alternative to one another as $\frac{\delta Q_1}{\delta Q_2} < 0$ and the reaction curves are downward sloping. Solving for housing supply, we find the two equilibrium levels of housing supply as

4) a) $Q_1^* = \frac{A - 2c_1 + c_2}{3B}$ and b) $Q_2^* = \frac{A - 2c_2 + c_1}{3B}$. .

Figure 3 pictures the housing market equilibrium derived from the two reaction curves and characterised by the two profit maximising levels of housing supply (Q_1^*, Q_2^*).

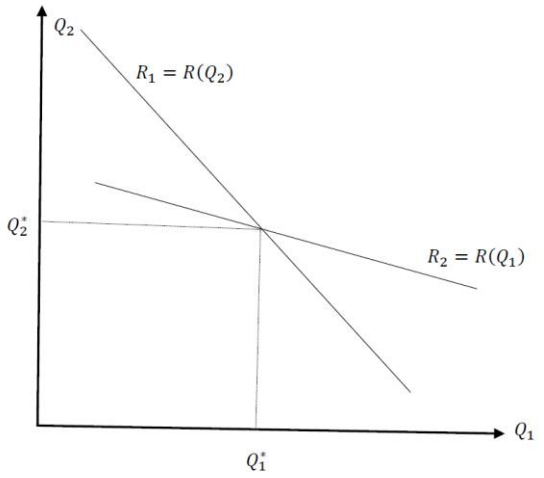

Figure 3: Housing market equilibrium with Cournot competition

As aggregate housing supply $(Q_{Total} = Q_1 + Q_2)$ equals $Q_{Total}^* = \frac{2A - c_1 - c_2}{3B}$, the equilibrium house price is equal to

5) $$P_C^* = \frac{A+c_1+c_2}{3}.$$

Conventionally, in equilibrium house prices are influenced by both cost-based and market-based aspects. Comparative statics shows how house prices are affected equally by the three factors determining house prices $\frac{\delta P_C^*}{\delta A} = \frac{1}{3}$ >0, $\frac{\delta P_C^*}{\delta c_1} = \frac{1}{3}$ >0 and $\frac{\delta P_C^*}{\delta c_2} = \frac{1}{3}$ >0. The comparative statics of a conventional Cournot housing market serves as a benchmark for the analysis of the next section where a non-profit THS is introduced.

3.2 **A THS with a fixed housing supply**

We now introduce a non-profit THS along the lines described above. The aim of the THS is not to maximise profits, but to supply a given number of houses. The THS housing supply is hence set in a fixed ratio n $(n < 1)$ to the private commercial housing supply. In the following, we refer to *n* as the mirroring parameter. The reaction function for THS housing supply makes Q_S a function of the commercial housing supply Q_P and equal to

6) $$Q_S = nQ_P.$$

A conventional profit maximising Cournot duopolist represents the commercial housing industry with constant marginal costs c_P facing the downward sloping housing demand curve that equals the one in section 3.1 as

7) $$P = A - B(Q_S + Q_P).$$

Both the size of the housing market A and the elasticity B affect housing demand. The reaction function of the commercial housing industry equals

8) $$Q_p = \frac{A-C_P-BQ_s}{2B}.$$

Solving for housing supply – using expressions 6) and 8) - gives the profit maximising quantity of commercial housing as

9) $$Q_P^* = \frac{A-c_P}{2B+nB},$$

while the THS housing supply equals

10) $$Q_S^* = \frac{n(A-c_P)}{2B+nB}.$$

Expression 9 and expression 10 shows the factors that impact housing supply of the two housing providers. The commercial housing supply exceeds the THS housing supply as *n<1.* The size of the housing market increases both equilibrium quantities, while the commercial industry cost reduces the commercial housing supply and the THS supply due to the mirroring strategy.

Another non-conventional aspect of this housing market structure is that the production cost of the THS does not affect the market solution while the production cost of the commercial housing industry does. This asymmetry is due to that the THS sets its housing supply in a fixed ratio to the commercial housing supply and does not maximise profits. The asymmetry gives the commercial housing industry a strategically beneficial market position as its production cost is the only cost component that impacts the housing supply.

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Figure 4 illustrates the housing market solution as given by the interaction between the reaction curve of the THS and the commercial housing industry's reaction curve.

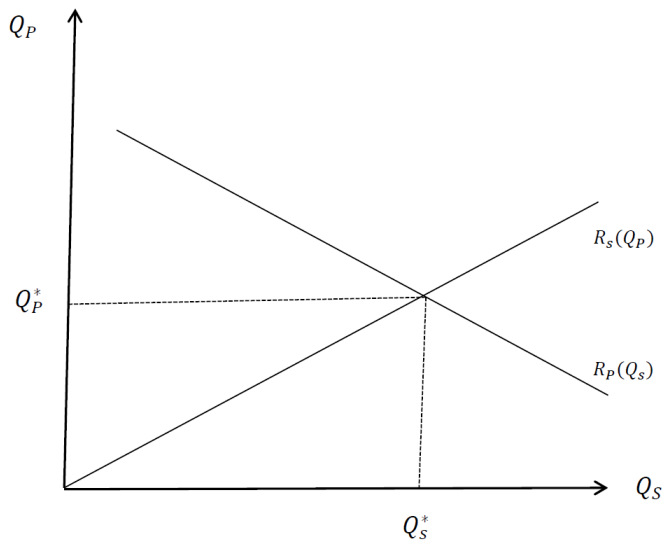

Figure 4: Housing market equilibrium when a non-profit THS interacts with Cournot competition

The THS reaction curve follows from the THS fixing its housing supply to the commercial housing supply. The two structurally different reaction curves create an interaction between the two housing suppliers, which is somewhat different from conventional housing markets with Cournot competition. The two types of housing supply are complementary to one another rather than alternatives, which is the case in a conventional Cournot market structure.

Figure 5 shows the effect of an increase in the mirroring parameter on the housing market and how the housing market is characterised by crowding-out when the commercial housing industry behaves as if in Cournot competition. An increase in the mirroring rate reduces the supply of commercial houses as the THS housing supply increases.

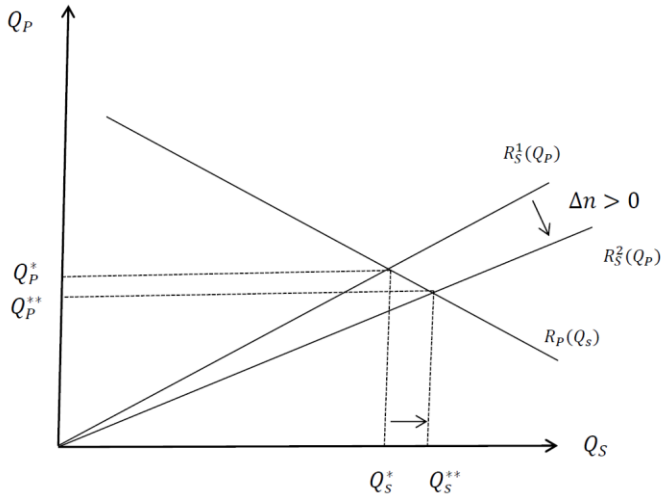

Figure 5: The effect of a THS increase on the commercial housing supply.

Solving for the aggregate housing supply we find

11) $$Q^*_{THS} = Q^*_P + Q^*_S = \frac{(A-C_p)(1+n)}{2B+nB},$$

which makes the equilibrium house price equal to

12) $$P^*_{THS} = \frac{A+C_P(1+n)}{2+n}.$$

From expressions 11 and 12 we see positive effects of a larger housing market on both house prices and aggregate housing supply. Comparative statics finds $\frac{\delta P^*_{THS}}{\delta A} = \frac{1}{2+n} > 0$ and when assuming a mirroring rate $n \in \langle 0,1 \rangle$ the effect on house prices of an increase in the size of the housing market now exceeds the effect in a housing market with conventional Cournot competition discussed in section 3.1. Even so, the THS production cost does not impact house prices. An increase in the commercial sector production cost reduces aggregate housing supply and lifts house prices. Comparative statics shows how the effect on house prices of an increase in the commercial industry production cost $\frac{\delta P^*_{THS}}{\delta C_P} = \frac{1+n}{2+n}$ exceeds the house price effect in a conventional Cournot housing market $\frac{\delta P}{\delta c_1} = \frac{1}{3}$. This stronger cost effect stimulates the incentives for strategic behaviour in the commercial housing industry to ensure higher future prices and increased profitability in the future.

When comparing the equilibrium house price in a market characterised by Cournot competition as given by expression 5, and the equilibrium house price in the presence of a THS as in expression 12, we see that $P^*_C < P^*_{THS}$ given the constraint on our mirroring parameter $n \in \langle 0,1 \rangle$. As house prices increase in response to the THS initiative, the indirect effect on households not embraced by the THS initiative is negative as housing affordability deteriorates.

The impact of the mirroring parameter on commercial house prices is

13) $$\frac{\delta P^*_{THS}}{\delta n} = \frac{1}{(2+n)^2}\left(-(A + nC_p\right),$$

which is negative, as house prices converge towards the equilibrium Cournot price in response to a higher mirroring rate. The commercial housing industry profit equals

14) $$\pi^*_P = \frac{(A-c_P)^2}{B(2+n)^2}$$

causing both production costs and the mirroring parameter to have a negative impact on the commercial housing industry profits.

The structure of the interaction between a THS with an aim of supplying houses in a fixed ratio to the commercial housing supply and a Cournot profit maximising housing industry is different from that of a conventional Cournot market structure. The seminal paper by Fudenberg and Tirole (1984) introduced four classic business strategies in markets with imperfect competition.

Conventionally, Cournot markets are structures where “Top Dog” strategies are optimal as the strategic variables are alternatives. In a housing market with Cournot competition, a housing supplier will respond to a supply increase by a competitor by reducing its housing supply. In a housing market where one housing supplier does not maximise profits, but where the aim of a non-profit supplier is to supply houses in a fixed ratio to the commercial housing supply, the strategic variables are no longer alternatives but complementary. If the commercial housing industry increases its

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housing supply, for instance in response to a reduction in its own production cost, the non-profit housing supplier will do the same.

Compared to a conventional Cournot structure, the existence of a non-profit THS housing supplier creates a different strategic environment. For the commercial housing industry, a “Top Dog” strategy is now not an optimal strategic adaption to the market for ensuring higher future prices and increased profits. As a reduction in the commercial housing supply is followed by a reduction in THS housing supply, a “Puppy Dog” strategy might instead be optimal. Holding back one’s housing supply will reduce the THS housing supply which contributes to higher house prices and increased industry profitability in the future.

A reduction in supply by the THS will (over time) reduce the number of households which may be offered a home within the THS program. In addition, as also the availability of commercial houses is reduced, commercial house prices will increase over time. Reduced housing affordability for households operating in the commercial housing market may again potentially increase the future demand for THS homes.

4. Conclusions

As house price growth has outpaced income growth in a number of western economies, the number of households in need of financial support for being able to enter owner-occupied housing has increased, and topics related to affordable housing is at the forefront of the housing policy debate. Different policy interventions may contribute to affordable housing for the not so well off.

A THS, where housing supply is not provided by neither the public nor private sector, is often argued as an advantageous supplement to prevailing housing market models. While beneficial for households embraced by THS initiatives, the indirect effects on aggregate housing markets and on the housing career of households that do not benefit from THS initiatives should not be ignored.

This paper analyses the indirect effects of a THS in a housing market with Cournot competition. A non-profit THS supplies houses in a fixed ratio to the commercial housing supply. The non-profit maximising reaction function changes the interaction between the two housing suppliers from one where the housing supply of different providers are alternatives, to one where it is complementary. Affecting both the market equilibrium and the strategic interaction between housing providers, the housing market shows characteristics when the THS is included that are different from those of a fully commercial housing market.

The relation between the THS housing supply and the supply of commercial housing is one where the commercial supply is reduced in response to an increase in the fixed THS supply ratio. The housing market is characterised by a THS expansion crowding-out the commercial housing supply, which increases house prices and has a negative impact on the housing career of households not embraced by the THS. While a “Top Dog” strategy is optimal when the housing market is characterised by conventional Cournot competition, the interaction between a non-profit THS housing supplier and a commercial housing industry makes a “Puppy Dog” strategy optimal for the commercial industry. The different strategic environment goes alongside stronger incentives for

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strategic behaviour. These incentives come about as house prices are more cost-based than in a commercial housing market with a Cournot structure.

Of course, the aim of a THS is to improve the living conditions of households not so well off. These direct effects are not the topic of this paper. When designing THS initiatives indirect effects on the housing careers of households not embraced by THS initiatives, as well as on aggregate housing markets, should be considered in order to avoid losing public support. Housing market interventions have indirect effects and, as the aim of most THS institutions is different from profit maximisation, the strategic interaction between different housing suppliers might be affected. More specifically, in our modelling THS initiatives crowd-out the commercial housing supply, lift house prices and affect the housing career of households not embraced by THS initiatives negatively.

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