A Role for Non-profit Companies

on

Rental Housing Markets

by

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Abstract

The Cournot-Nash equilibrium in a market where both profit and non-profit companies operate is studied. Presumably, some Nordic rental housing markets fulfil the assumptions made. It is shown that the introduction of a number of non-profit companies in the market can correct the Cournot-Nash equilibrium into an efficient, perfect competitive equilibrium. This gives non-profit companies a potential useful role in such markets. Like profit companies, non-profit companies have to be controlled by competition authorities. Not only external market behaviour, but also the inclination by non-profit companies to seek profits should be observed as this changes the impact on the market equilibrium.

JEL: R310, L130, L300

Key words: Housing, Non-profit, Mixed markets
1. Introduction

Following American economic literature, non-profit institutions seem most common in the health and old age care sector, but are also widespread in education, research and art, see Hansmann (1980)\(^1\). In Europe, non-profit institutions also cover a large fraction of rental housing markets. Among the Scandinavia countries Denmark and Sweden have a long tradition for rented housing provided by non-profit institutions. In Denmark, if one adds private collective ownership to the rented sector, the per cent is close to 60. Without this, 47 per cent of the housing market is rental with around 43 per cent let by non-profit institutions. In Sweden, the rental sector covers 34 percent of the housing market and has 53 per cent let by non-profit housing companies normally owned by municipalities\(^2\). In Finland, the rental sector covers 6 of the housing market, in Norway only 1 per cent and in Iceland the sector is mainly for students, elderly and social groups. As in other European countries, non-profit companies originally and still typically have an obligation to provide housing for low income households, so-called social or affordable housing. But the big non-profit sector on rental markets in Denmark and Sweden show that the in these countries companies not only supply social housing, but also offer housing for “ordinary income”

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\(^1\) Consumer cooperatives in retail sale are not non-profit companies as they pay dividend to their members. But with many members, dividend per member becomes negligible and because of this they may in practise operate like non-profit companies.

\(^2\) The numbers do not fully correspond with numbers given by other authors. For Finland, Norway and Iceland, the source is Lujanen (2004). For Denmark, 47 per cent is calculated as (homes occupied by tenant/all occupied homes), 43 per cent as (“almene” homes/ homes occupied by tenant) corrected for “unexplained”. Close to 60 per cent as (“almene + andels” homes/ homes occupied by tenant) corrected for “unexplained”. The year is 2005 and the source Statistics Denmark. For Sweden, 34 per cent is calculated as (apartments with “hyresrätt”/calculated number of homes ”bostadsbestand”), 53 as (“allmännyttiga” with “hyresrätt”/apartments with “hyresrätt”). The year is 2004 and the source Statistics Sweden.
households, and nothing excludes high income households from their supply. Hence, rental housing markets in Denmark and Sweden have both non-profit companies and private profit companies competing with each other. The obligation for non-profit companies to cover social housing has been the reason for public financial support to these companies, and moreover rent regulation, being the response to the after war shortage of housing supply, has created unequal conditions for suppliers in the market. However, today’s trend in housing policies is to give market forces more influence on rent setting on markets with equal terms for all suppliers. A description of Scandinavian housing markets can be found in Martti Lujanen (2004 a).

Economic literature on non-profit companies or institutions explains the economic rationale behind their existence on markets where ordinary profit companies also operate. Fama and Jensen (1983) describe how the best way for donors to secure that their donation increases output instead of owners’ profit is a non-profit organisation. Also, an altruistic non-profit company may survive because it creates more income from donations than obtainable from the sale of output. Another rationale follows from the difficulties consumers may have in observing the quality of a service or product, in which case a non-profit organisation can be an optimal contract, see Hansmann (1980) and Weisbrod (1988). Moreover, Glaeser and Shleifer (2001) shows that if non-profit companies reliable commit themselves to – unobservable - high quality products, consumers may pay higher prices, which outweighs the costs of retrieving the profit in form of employee perquisites rather than cash. The sociologist Kemeny (1995) is intrigued by the observation that rental markets seem to be bigger and have higher housing quality in countries like Sweden with “unitary” markets where profits and non-profit companies compete than in countries where renting is dominated by public

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3 In Sweden rents are guided by a type of collective agreement between the Tenants Union and non-profit companies, but with increasing influence from the market, see Turner and Whitehead (2002).
“affordable housing”. The present paper does not try to explain why non-profit companies exist, but take their existence as given on rental housing markets and look at the effect they may have on the market equilibrium. Non-profit companies are understood to be companies without owners that retrieve profit as cash for private use; but the definition does not exclude that non-profit companies earn positive profit.

The model intends to describe essential elements of a rental housing market where the number of housing square meters cannot be expanded\textsuperscript{4} and where the number of suppliers is fixed by history\textsuperscript{5}. It is assumed that all housing square meters are let. One reason for this could be that city authorities make it illegal to keep empty housing square meters. It could also be the result of a maximum rent for standard square meters imposed by a city authority, which secures that all square meters are let; or it could be the result of a possibility for renters to complain (with success) whenever they pay a rent over the average rent paid by others for similar square meters, combined with an attempt to price discriminate by suppliers. If suppliers take the rent for let square meters for given and are free to reduce the rent for new contracts, they will do so until all square meters are let (assuming rents always are above the marginal costs of letting). But lowering the rent in new contracts will – through the complain system – gradually give an equilibrium rent for square meters that secures “full letting”. With the number of square meters given, the only possible variation in the housing supply is by changing the housing quality. Housing quality can be raised by adding an elevator

\textsuperscript{4} A city core may be an example of such a housing market. As the geographical position of housing square meters, i.e. whether square meters are inside or close to the city core, or more distant, is important, a possibility for expanding the number of housing square meters in the periphery does not invalidate the entry barrier and the assumption of a fixed supply. However, if there is no limit on the height of buildings, the number of square meters can be expanded in the sky.

\textsuperscript{5} Of course, the presented model can be used for any market that complies with the assumptions.
tower to a multi-storey building, through renovation of kitchens and bathrooms, adding balconies etc. Companies in the market will improve quality in order to attract customers and to let the square meters at higher prices. However, changing quality has to be planned in advance, implemented subsequently, and finally offered to the market, which makes suppliers price takers. Both profit companies and non-profit companies may operate in the market with non-profit companies having a weighted average of quality and profit as their target, but without an obligation to supply (cheap) social housing. The market will establish a Cournot-Nash equilibrium if each supplier takes the quality of other suppliers as given when planning his supply. If only profit companies are in the market, the equilibrium will be potentially far away from the efficient, perfect competitive equilibrium. The paper shows that in this framework, “a drop” of non-profit companies in the market can correct the equilibrium so that an efficient equilibrium is reached. An assumption of revenue maximisation for non-profit companies does not change the picture and is relegated to an appendix. It is interesting to note that non-profit companies are perfectly viable in mixed markets, and they may enter the market with a first mover’s advantage which gives higher profit than profit companies’.

The present paper does not include empirical research. The most relevant empirical paper seems to be Atterhög (2005), where the effect of selling part of Swedish non-profit housing companies (owned by municipalities) to private profit companies on rent levels and quality is studied. As expected, the increase in the number of companies in the market tends to lower the rent. However, the model of the paper also predicts that quality will tend to fall where non-profit companies are changed into profit companies in mixed markets. Atterhög (2005) studies only four cases (municipalities) where three have outcomes in the expected direction and one turns out opposite to
expectations when compared to a control municipality. Atterhög (2005) concludes that the effect seems to depend very much on the company that takes over.

The next section presents the model and section 3 looks at pure markets with either solely profit companies or non-profit companies. After this a mixed market with profit and non-profit companies is treated in section 4. Section 5 concludes.

2. The model

The model describes a rental housing market where it is impossible to increase the number of square meters, and where the demand for housing is high because of amenities (e.g. a city core). Consequently, companies supplying the square meters are assumed to reap a non-negative profit from the letting of standard square meters. The number of supplying companies is given from history and new companies are unable to enter the market and compete with incumbents. The only way to change housing output is by changing the quality of the square meters let. Both profit and non-profit companies may operate in the market. Profit companies seek maximum profit, whereas the aim of non-profit companies is less obvious. Gleaser and Shleifer (2001) assume that the management of such companies maximise profit and use it for perquisites for some or all employees. However, as non-profit companies are allowed to earn profit they may have an inclination for earning a (modest) profit as insurance against “bad” times. Moreover, it is plausible that non-profit companies also aim for products and services of high quality for their customers. In

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6 Withdrawing profit for personal use from non-profit companies is illegal and is therefore typically hidden as production costs in the accounting, but is now and then revealed in the press and in courtrooms.

7 The model is static. In a growing economy, an increasing quality level requiring profit financed investments would be natural also for non-profit companies.
the following both elements are captured in a non-profit target function, which combines quality and profit maximisation, in the flowing called *combined target*.

Formally, each housing company, indexed with an $i$, supply quality in the number of $q_i$ homogenous quality units. The total number of companies in the market $n$ is composed of $p$ profit companies ($p \leq n$), who seek maximum profit, and $n - p$ non-profit companies assumed to seek maximum combined target. The companies are assumed to be identical within their respective group. Profit companies all supply the same amount of quality $q^k$ and non-profit companies all supply the same amount of quality $q^h$; in both cases with quality assumed to be evenly spread over square meters$^8$. A linear market demand schedule for quality is assumed$^9$ where the price $P$ for renting one quality unit is

$$P = a - b(\sum_{i=1}^{p} q_i^k + \sum_{p+1}^{n} q_i^h)$$  \hfill (1)

In (1), $a$ and $b$ are positive parameters. Quality units are produced to the cost $\beta < a$ per period in both types of companies. Thus, no difference in production efficiency between profit and non-profit companies is assumed; but this does not preclude that costs in company accounting differ as management and employees in non-profit companies have a strong incentive to let possible profit consumption be hidden as costs in the accounting. Each company takes the supply of quality from other suppliers in the market as given and, based on this, optimises its output of quality. A reaction

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$^8$ This assumption is further discussed in section 4.

$^9$ The linear specification of the demand schedule makes the math easier, is “text book standard” for the Cournot case, and secures a unique and stable equilibrium.
rule like this seems reasonable on a housing quality market where it takes time to produce quality and, hence, suppliers have to accept the price that clears the market. A profit company has profit $\pi_i$:

$$\pi_i = Pq_i^k - \beta q_i^k. \quad (2)$$

Insert (1) in this and differentiate with respect to $q_i^k$ to get

$$\frac{\partial \pi_i}{\partial q_i^k} = -2bq_i^k + a - \beta - b(\sum_{j=1}^{p} q_j^k + \sum_{p+1}^{n} q_p^k) = 0.$$

in order to maximise profit. The reaction function for profit companies is thus

$$q_i^k = \frac{a - \beta - b(\sum_{j=1}^{p} q_j^k + \sum_{p+1}^{n} q_p^k)}{2b}. \quad (3)$$

The combined target of non-profit companies is $T$:

$$T_i = \sigma q_i + (1 - \sigma)(Pq_i - \beta q_i). \quad 0 < \sigma < 1. \quad (4)$$

The parameter $\sigma$ is the weight non-profit companies put on quality versus profit. A high $\sigma$ indicates that non-profit companies are eager to produce and demonstrate high quality, whereas companies with a low $\sigma$ have management and employees that are more interested in profit either as an insurance against unforeseen bad times or as perquisites flowing from the company. To model the Cournot-Nash equilibrium, it is assumed that all non-profit companies have the same $\sigma$. Maximising
the combined target with respect to \( q_i \) leads to the following reaction function for non-profit companies:

\[
q_i^h = \frac{a + \frac{\sigma}{1-\sigma} - \beta - b(\sum_1^\mu q_i^k + \sum_{j \neq i, p=1}^n q_j^h)}{2b}.
\]  

With the reaction functions (3) and (5), output quantities in the Cournot-Nash equilibrium becomes

\[
q_i^k = \frac{a - \beta - \frac{\sigma(n-p)}{1-\sigma}}{1+n}.
\]  

\[
q_i^h = \frac{a - \beta + \frac{\sigma(1+p)}{1-\sigma}}{1+n}.
\]

In equilibrium, non-profit companies supply a positive amount of quality and more than profit companies, which may supply a negative amount of quality. If non-profit companies put more weight on quality (a higher \( \sigma \)) this increases their equilibrium quality output and reduces quality output by profit companies. Total market supply of quality \( Q \) is

\[
Q = p q_i^k + (n-p) q_i^h \Rightarrow
\]
equilibrium market supply is

\[ Q = \frac{n(a - \beta) + (n - p) \frac{\sigma}{1-\sigma}}{(1+n)b}. \]  

Equation (8) shows that total quality output also rises when non-profit companies put more weight on quality.

3. Pure markets

Before proceeding with mixed markets, an illustrative comparison of pure markets, i.e. markets with solely profit or solely non-profit companies is interesting. It is well known that a market with profit companies, i.e. with \( p = n \), will have a Cournot-Nash equilibrium that approaches perfect competition as the number of companies in the market grow. This is illustrated in Figure 1, panel a to c, which shows the development in the quality output, the price per quality unit, and total market profit shared evenly among companies, as dashed lines. Parameter values where chosen to give easily readable figures; they are \( a = 10000 \), \( b = 70 \), and \( \beta = 3000 \).

The thick lines in the figure show the efficient, perfect competitive market price and output levels, i.e. a price \( P \) equal to the cost of producing a quality unit \( \beta \), which gives demand and production of 100 quality units. Using this as reference values, Figure 1 shows a low output and a high price when few companies operate in the market, gradually converging to efficient levels as the number of companies grows. At the same time profit is squeezed to zero. In a market like this, competition
authorities should be reluctant to accept mergers as this reduces competition, and so the housing quality, and raises the price.

Figure 1: Quality, price and profit in a pure profit market

Panel 1.a

Panel 1.b

Panel 1.c

Figure 1 can be compared with a market with only non-profit companies who are combined maximisers, depicted in Figure 2, panel a to c\textsuperscript{10}. Panel a shows that quality output increases with more companies in the market and ends far above the efficient level of 100 units. As in Figure 1 panel b, the price is reduced with more companies in the market, but now it falls below the efficient price of 3000. Typically, too much quality will be produced and sold at a price that does not cover production costs; but note that (too) few companies in the market will give an inefficient

\textsuperscript{10} The chosen value of the quality weight $\sigma$ in the combined target function is 0.9995.
combination of high price and low quality also in this market. In spite of the fact that quality output
is always higher in the non-profit case for a given number of companies, few non-profit companies
in the market may have negative welfare consequences that are similar to the negative effects in
oligopolistic markets with profit companies.

Clearly, if non-profit companies choose to sell quality at a price below production costs they incur a
negative profit from this. But with an assumed non negative profit on the sale of (standard) square
meters they may have room for a negative profit on quality without endangering a non-negative
overall profit constraint.

Figure 2: Quality, price and profit in a pure non-profit market

Panel a

Panel b

Panel c
Figure 2 panel a to c indicates that competition authorities have a more difficult task in the case of a pure non-profit market since both too few and too many companies in the market will create an inefficient outcome. If, as in the depicted numerical example, authorities know all the parameter values they can calculated the efficient number of companies in the market. Set $\beta$ equal to in $P$ equation (1) to get the efficient (reference) output $Q^*$:

$$Q^* = \frac{a - \beta}{b}. \quad (9)$$

Change equation (8) to get total output in pure non-profit market ($p = 0$), set $Q = Q^*$ and solve for the efficient number of non-profit companies $n_h^*$:

$$n_h^* = \frac{1 - \sigma}{\sigma} (a - \beta). \quad (10)$$

Not only market parameters, but also attitudes of non-profit companies versus profit and quality ($\sigma$) must be known by competition authorities\textsuperscript{11}. Note however, that the more quality oriented the non-profit companies are (a higher $\sigma$), the fewer companies will be efficient in the market. A realistic value of $\sigma$ is not known, but the numerical example may indicate that at least some non-profit companies are always needed to avoid too low housing quality, and that many companies in pure non-profit markets can easily give an inefficiently high quality level.

\textsuperscript{11} The optimal number of companies is app. 3.5 in the depicted numerical example.
4. Mixed markets

Equation (8) gives the quality output in a market with both profit and non-profit companies and Figure 3, panel a to c, gives the picture of a mixed market with parameter values as before, a total of number of 50 companies in the market, and the quality weight of non-profit companies $\sigma$ changed to 0.998. Read along the horizontal axis from left to right, the figure shows what happens if, in a market with a total of 50 companies, one, two, three, etc. are turned into non-profit companies. Panel a pictures the total market quality output (on the left scale). With only one non-profit company in the market, output is below the efficient level of 100 and the price per quality unit (right scale) is above the production price of 3000. This is partly corrected as another non-profit company enters the market to substitute a profit company. In fact, in the example 15 or more non-profit companies reverse the picture and give too high a quality output and too low a price.

*Figure 3: Quality, price and profit in a mixed market with 50 companies*

*Panel 3.a*
Panel 3.b

Company profit with 50 companies

Number of non-profit companies

- profit comp.  - non-profit comp.

Panel 3.c

Quality output with 50 companies

Number of non-profit companies

- profit comp.  - non-profit comp.
Panel b of figure 3 reveals individual company profit. Profit companies always have non-negative profit that falls with the first non-profit companies entering the market, but subsequently rises and are the highest if a single profit company act alone in competition with forty nine non-profit companies. It is interesting that the first non-profit companies who “enters” the market to substitute a profit company gets a kind of first mover advantage vis-à-vis the profit companies and has higher profit. Knowing this, one may wonder why not profit companies are eager to change behaviour and act like non-profit companies. But profit companies do not necessarily want to change status to non-profit companies because this excludes the possibility to retrieve profit for private use. Moreover, if too many companies do this (in the example more than 14) they will run a negative profit and it would be profitable for them to change behaviour back to profit maximisation, see panel b. An important conclusion from panel b is that with an efficient number of non-profit companies in the market they will not be squeezed out by competition from profit companies. All companies will have zero profit and so are unable to retrieve any kind of economic profit.

A market with both non-profit and profit companies competing on equal terms is what Kemeny (1995 p. 57) terms a unitary part-profit rental market. However, Kemeny seems to be of the opinion that non-profit companies are able to survive in competition with profit companies only when they have reduced their outstanding debt and so are able to accept a low rent on their capital. The present analyses does not confirm this but shows that non-profit companies may even earn higher profits than profit companies\textsuperscript{12}.

\textsuperscript{12} The market descriptions also demonstrated that Kemeny’s so-called cost renting can be achieved both in pure profit, mixed and pure non-profit markets.
It is assumed that non-profit companies maximise a combined target of quality and profit. Hence it is no surprise that non-profit companies become market leaders in quality. With only two homogenous groups of companies, all non-profit companies will supply high quality apartments. Panel c of figure 3 depicts this and shows that profit companies will only supply standard apartments in equilibrium.

Formally, it is possible to calculate the exact number of non-profit companies needed in the mixed market to obtain efficient equilibrium. Set (8) equal to (9) to get the efficient number of non-profit companies

\[
(n - p\)^* = \frac{1 - \sigma}{\sigma} (a - \beta).
\]  

(11)

The efficient number of non-profit companies is decreasing in \(\sigma\). Hence, if non-profit companies feel much attached to the production of high quality, fewer are needed in the market to correct for lack of competition between profit companies. On the other hand, if non-profit companies have managers who stress the importance of a positive profit, more non-profit companies are needed to correct the market. In fact, it can easily be so that the correction will be insufficient no matter how many non-profit companies operate in the market. This happens if \((n - p)^* > n\), which, using (11), leads to the inequality

\[
\sigma < \frac{a - \beta}{n + a - \beta}.
\]  

(12)

\[13\] Equation (10) is just a special case of (11).
Of course, the more non-profit companies act like profit companies, the less they can change the market equilibrium compared to the pure profit company market. Although the numerical example may be far away from the real world, the very high value of $\sigma$ needed to reach the market correction\textsuperscript{14} may indicate that only minor deviations by non-profit companies from strong attachment to quality imply that they will lose their role as market correctors. If this is the case, the best common sense rule public authorities can enforce on non-profit companies seems to be straight quality maximisation, and combine this with a moderate infusion of non-profit companies in the market. But it is also obvious that too many such companies may lead to welfare reducing overproduction of quality. The inclination to collude or merge among companies is also present in the mixed market, as both profit and the combined target per company will increase with fewer companies in the market.

Figure 3 does not show the equilibrium market shares of the two types of companies in terms of square meters. The model assumes that the quality units produced by profit and non-profit companies are spread evenly over square meters owned by the two types of companies respectively. Moreover, panel c showed that only non-profit companies will supply high quality apartments; but the number of square meters needed to cover the supplied quality units depends on the distribution of quality demand among consumers, and will typically not result in square meters of even quality among consumers. Figure 4 depicts an ordinary demand schedule for quality with a curve added below showing the distribution of demand for square meters. The figure implicitly assumes that all apartments are equal in size. Hence, the curve relating quality to apartments has the most quality demanding apartments (consumers) placed close to the crossing point of the axes at 0, and consecutive less quality demanding apartments listed below. The apartment nearest to 0 will be the

\textsuperscript{14} With the chosen numerical values the right side of (12) is 0.993.
most luxury, whereas lower ones are less luxury, then of standard and finally of low quality. With the equilibrium price $P$, the demanded and produced quality units are $q$ in the figure and a number $f$ of apartments consume this quality supplied by non-profit companies, whereas the residual $F-f$ apartments have standard level supplied by profit companies. No empirical estimation of the distribution of quality on apartments is known to the author, but estimations of income distributions are well known. OECD (2005) reports Gini coefficients for income inequality between 22 and 48 for its member states. For the numerical equilibrium case shown in figure 3 this corresponds to a share of apartments for non-profit companies between 12 and 21 per cent.

*Figure 4: Demand for and distribution of quality*

One important conclusion so far is that non-profit companies may have a welfare increasing effect when they operate on markets in competition with profit companies. However, the efficient market
equilibrium can also be achieved in pure profit markets. A used mean to raise quality in pure profit markets is to subsidise quality production. If a subsidy $s$ is given per quality unit, the profit from quality production becomes

$$\pi_i = sq_i + (Pq_i - \beta_i) = Pq_i - (\beta - s)q_i.$$  \hspace{1cm} (13)

Equation (13) is similar to equation (2); the only difference being that $(\beta - s)$ substitutes $\beta$. Changing (8) to the pure profit case with $(\beta - s)$ inserted and using equation (9) gives the efficient subsidy

$$s = \frac{a - \beta}{n}.$$  \hspace{1cm} (14)

The efficient subsidy naturally falls with an increasing number of companies in the market. The subsidy can be “politically balanced” by a lump sum tax on companies, especially when company profit is high. Also, if quality is considered to be inefficiently low in a mixed market, a way to raise it is to give a quality subsidy; this follows from equation (8) with $(\beta - s)$ inserted.

5. Conclusion

In a closed rental housing market with a fixed number of square meters, housing supply can only be changed by variation in the quality of housing square meters. Assuming Cournot-Nash equilibrium as the outcome in this market, “a drop” of non-profit companies in the market will change the equilibrium and an efficient, perfect competitive equilibrium can be obtained. This happens because non-profit companies are assumed to give quality output a more direct effect on their target. Hence, non-profit companies have a potential important role in such markets. Moreover, non-profit
companies are perfectly viable and may get a first mover’s advantage with high profit vis-à-vis profit companies. Like profit companies, non-profit companies have to be controlled by a competition authority that aims to reach the efficient market equilibrium. Not only external market behaviour, but also the inclination by non-profit companies to seek profit should be observed.

Appendix

Instead of the combined target proposed in equation (4), non-profit companies may alternatively maximise revenue \( R_i \):

\[
R_i = Pq_i^h. \tag{15}
\]

Maximising this with respect to \( q_i^h \) leads to the following reaction function for non-profit companies:

\[
q_i^h = \frac{a - b(\sum_{i=1}^{p} q_i^k + \sum_{j=p+1}^{n} q_j^h)}{2b}. \tag{16}
\]

With the reaction function (3) for profit companies, output quantities in the Cournot-Nash equilibrium becomes

\[
q_i^k = \frac{a - (1 + n - p)\beta}{(1 + n)b}. \tag{17}
\]
and

\[ q_i^h = \frac{a + p\beta}{(1 + n)b}. \]  \hspace{1cm} (18)

Non-profit companies supply a positive amount of quality and more than profit companies. The total market supply of quality on the market \( Q \) will be

\[ Q = pq_i^h + (n - p)q_i^h \Rightarrow \]

\[ Q = \frac{na - p\beta}{(1 + n)b}. \]  \hspace{1cm} (19)

From this one can proceed like in the main text and with mainly equal implications.

References


