Competitive effects of cross-ownership in the Norwegian publishing industry

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Preface

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A special thank you to my roommates and close friends these past five years for making my time in Bergen so enjoyable. I would also like to thank my Anurathan and my other fellow students for an enjoyable student life.

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Abstract

The aim of this paper is to contribute to the growing literature on competitive effects of overlapping ownership. Overlapping ownership means that competing firms have ownership in each other, this is known as cross-ownership, or are partially owned by a common investor or set of investors, known as common ownership. In this thesis, I focus on the former in the Norwegian publishing industry. The publishing industry is fairly concentrated, with four big firms generating more than 80 percent of the total revenues. Some of these firms have had varying degrees of partial ownership in smaller rival firms throughout the period. The industry is also characterized by a fixed price system, and a large extent of vertical integration.

The analysis is based on a time series consisting of annual data over a 13-year period. I explore the price effects of changes in cross-ownership. According to the Norwegian Law of Competition, partial acquisitions which harm competition are prohibited. However, I do not find evidence that increases in cross-ownership has led to higher prices in the industry. Based on this analysis, increases in cross-ownership has not had anticompetitive effects in the publishing market. I do however believe that further analyses should be done, and I show how I would recommend conducting them in a panel data example.

Key words: Competition; Overlapping ownership; Cross-ownership; Publishing industry

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1 Introduction

Traditional oligopoly models assume that each firm in a market is owned by a separate agent, and that each agent attempts to maximize its own firm's profits. All the firms in a market are in direct competition. If the firms are in Cournot competition (compete by setting quantity), then the prices will exceed the marginal cost by the HHI divided by the market elasticity. The HHI is a measure of market concentration, defined by each firm's market share squared, where lower numbers imply healthier competition. In reality however, ownership is often spread between separate shareholders. Sometimes, firms might have ownership in competitors, or shareholders in the firm, might also own shares in their rivals. This is known as overlapping ownership. Recent years have seen a rapid increase in overlapping ownership. The implications of this on competition are heavily debated, and there are a lot of discussions as to whether antitrust authorities should intervene in markets with overlapping ownership. The intuitive reasoning behind the skepticism is understandable, as overlapping ownership leads to firms taking rivals' profits into account in their decision-making process, leading to less aggressive competition, which results in higher prices and a lower output.

Overlapping ownership is an umbrella term for cross-ownership and common ownership, which are similar but different ownership structures. Cross ownership is when a firm obtains a minority post in a competitor. Common ownership on the other hand, is when a group of investors (often institutional) have shares in competing firms. In the case of common ownership, each investor's share will be smaller than that of the firm in the case of cross ownership. Common ownership is rational according to portfolio theory, which predicts that more diverse portfolios reduce risk. The focus of this paper however, will be cross-ownership. Bresnahan and Salop (1986) showed in a theoretical model how cross-ownership might result in anticompetitive outcomes. They developed a measure of overlapping ownership, the MHHI-delta, which can be utilized to assess the effects it has on competition. Salop and O'Brien (2000) extended the MHHI-delta measure to apply to multiple joint ventures, and showed that the price increasing effect might also apply in a Bertrand setting. Recent empirical studies on overlapping ownership have mainly utilized the framework laid by Salop and O'Brien when estimating the effects of overlapping ownership.

Theory predicts that the more overlapping ownership there is in a market, the more the outcome moves towards the monopoly outcome. Several empirical papers have found price increasing, and output reducing effects of increases in overlapping ownership. Especially cross-ownership is considered to have potential anticompetitive effects since an alignment of interests arises

between competitors as a result of the linking of profits. Due to this, the Norwegian Law of Competition specifically states that the acquisition of partial ownership is prohibited if it hinders effective competition.

An industry in Norway with recent changes in cross-ownership is the publishing industry. Especially two of the biggest publishers, Gyldendal and Aschehoug, have partial ownership in rivals. The cross-ownership in the industry is however, mainly these two firms having partial ownership in smaller firms. In this paper I study the price effects of cross-ownership in the Norwegian publishing market. I also regress to see if the overall market turnover is impacted. Theory predicts that in concentrated markets, competition will be harmed by increases in cross-ownership. The Norwegian publishing market is fairly concentrated, and there is cross-ownership, which makes it interesting an interesting case to study. The Norwegian publishing market is also dominated by Norwegian firms, the competition is therefore between domestic firms. The market is quite unique with its fixed price system, which ensures that all books will be sold at a fixed price until April 30. the year after release. The publishers set the price at which the book is sold at the bookstore. The fixed price is meant to prevent price competition on the best-selling books, the revenues from this is then meant to finance smaller literature (Konkurransetilsynet, 2018). Since the publishers decide the price the first year after release, the bookstores are safe from price competition in that period. As prices are fixed for about a year, it seems reasonable to assume that the outcome is higher prices, at least until the fixed price period expires.

The publishing industry is rather unique compared to other sectors in the Norwegian economy in other ways as well. There is a lot of vertical integration, as the big publishers own many of the distributors, book clubs, and bookstores. As a result, the publishers have a lot of power. The industry is also rather concentrated, and some of the biggest firms have partial ownership in smaller rivals. Lastly, there is the fixed price system, which is meant to encourage diverse literature. All of these factors impact the price. In addition to this, the Norwegian Law of Competition § 16 a clearly states that the acquisition of partial ownership is prohibited if it hinders effective competition. When evaluating if competition is hindered, they try to determine how the partial acquisition will change the current state of competition in the form of non-coordinated and coordinated effects. Coordinated effects are often in the form of tacit collusion, and whether or not the partial acquisition will help the firms in the market find an agreed price level, but it can also be a silent agreement to not approach each other's customers. Non-

coordinated effects are all other competition harming effects, for instance, if the equilibrium price level rises or if entry barriers arise following the acquisition.

I seek to discover whether or not this is the case in the Norwegian publishing industry, and if the Competition Authorities should intervene. Specifically, I seek to discover if the increase in cross-ownership has increased book prices in Norway. To this end, I regress the inflation adjusted price on the MHHI-delta. Positive coefficients, which are statistically significant at a 1%-level, at the very least, would imply that antitrust authorities should investigate. However, evaluations regarding the consumer surplus effects must still be made. Whether or not a price increase is economically significant can be evaluated by looking at the industry profit margins. If the profit margin is positive, and a partial acquisition is expected to increase price levels, competition authorities might prevent it, unless other factors, like spillover effects, leading to enhanced productivity compensates. Unfortunately, I do not have the profit margins of the publishers, and in this thesis, I solely focus on the price effects of cross-ownership.

I find that when regressing the price on cross-ownership, we get positive coefficients however, most of the coefficients of cross-ownership are not statistically significant, and none of my findings are statistically significant at a 1%-level. In other words, I find no evidence that implies a need for the Competition Authorities to intervene. Nor do I find evidence that the market concentration has led to price increases. As there are markets that are more concentrated, and with more cross-ownership, I would expect the price effects to be smaller than those found in other empirical works. In addition, due to time limitations, the dataset is not as complete as it could be, and as a result, the statistical significance of the results is not very high. As there are quite few observations, one should also be aware of the potential for spurious correlations, as common trends might be picked up as causal in my analysis. I do however address this by including a time trend variable. I also address potential model misspecifications, and conduct alternative analyses. While I do not find is cause for intervening, I do believe that more research on cross-ownership in the publishing sector should be done.

This paper proceeds as follows. Section 2 discusses theory on overlapping ownership, and related literature. Section 3 describes the data used, and shows my hypothesis. Section 4 shows my empirical analyses, and discusses the results and their validity, while Section 5 discusses the legal framework for intervening in markets with cross-ownership, and concludes.

2 Theory

2.1 Literature review

In this paper I seek to analyze the price effects of the cross-ownership in the publishing industry in Norway. As far as I am aware this has not been done yet. Though similar studies have been conducted in other countries and industries. This paper aims to contribute to the debate regarding the effects of cross ownership and also the debate in Norway regarding the oligopoly in the publishing industry. An advantage of doing such an analysis in the Norwegian market is the accessible and reliable data.

Overlapping ownership

Throughout the years there has been a lot of debate and theoretical papers discussing the effects of overlapping ownership. Hart (1979) noted that shareholders may not always agree on a firm's objective or how to achieve the goal due to imperfect information, which often leads to losses in consumer surplus. Differences in shareholder preferences thus has a fairly long history of research. Furthermore, there is a large extent of papers arguing that investors with diversified portfolios will aim to maximize their joint portfolio profits rather than the individual firm profits, or increase each individual firm profits, by lowering direct competition pressure between overlappingly owned firms. Should this hold, then overlapping ownership could have a negative societal impact as product markets might not be perfectly competitive.

Reynolds and Snapp (1986) use oligopoly theory with the addition of allowing for cross-ownership in the model. They assume Cournot competition rather than Bertrand competition. They find that in markets where entry is difficult, partial ownership in competing firms could result in less output and higher prices. In other words, the more cross ownership there is between competitors, the more the outcome will converge towards the monopoly outcome. They argue that this happens because the fortunes of the two companies will be linked, and thus a positive correlation arises between their profits. However, this is not a result of collusion, it is rather that the linking of profits gives the firms an incentive to compete less aggressively in order to achieve a joint profit maximization. Thus, as cross-ownership arises, the joint firms are less incentivized to compete aggressively since their own profits will increase if the partially owned firm increases its profits. In that way it resembles a merger outcome. They show that if one or more of the Cournot competitors increase their level of ownership in rival firms, the equilibrium output will decline. Azar (2012) and Banal-Estanol et al. (2020) find similar outcomes. While Bresnahan (1986) use a modified Herfindahl-Hirschman Index (MHHI) to evaluate the effects.

The MHHI has since been widely used in studies of overlapping ownership and the effects that arise from it.

Hansen (1996) points out, the shareholders want a policy of internalization between firm externalities. In other words, the firms will pursue portfolio maximization, and thus behave differently from firms that pursue value maximization. Hansen then proceeds to use a simple oligopolistic model of competing firms to illustrate his point. In the model he assumes non-consuming shareholders.

Gilo et al. (2006) show that cross ownership can have a negative effect on competition in a theoretical model. They assume Bertrand competition unlike most of the other studies.

Azar (2012) studies the effects of common ownership in an oligopoly setting, including one where he looks at the implicit collusion effects arising from common ownership. He states that in the extreme case, where all shareholders are completely diversified, the firms act as if they are owned by a single monopolist. The more diversified the shareholders of the competing firms are, the closer we get to this result. He assumes that a firms' objective is decided by majority voting, and that one share equates to one vote. He also showed the rapid increase in common ownership in the United States between 2000 and 2010.

Historically, most of the empirical literature has not considered the effects of overlapping ownership when analyzing markets. In recent years however, this issue has gained momentum. Azar et al. (2018) are among the people in the forefront of this issue, and they found that common ownership has had an effect of increased ticket prices in the airline market. Azar et al. (2018) goes on to point out that with common ownership, the owners do not necessarily need to explicitly communicate their incentives in order for the anticompetitive effects to arise. The owners can just avoid incentivizing tough competition between the portfolio firms. This is due to the "quiet life effect" as documented by Bertrand & Mullainathan (2003), who found that unless closely monitored, managers will not always pursue goals in the shareholders' interest. Though the quiet life effect might impact firm decisions, it seems more likely that the effects found by Anton et al. (2020) below have an effect. Azar et al. (2018) focused on the airline industry, and considered each route a separate market. He related common ownership concentration to prices within the same firm, period and industry. He found that when including common ownership in the calculation of market concentration, the market was far more concentrated than what the US horizontal merger guidelines considers likely to enhance market power.

Lopes and Vives (2019) on the other hand, claim that overlapping ownership can increase consumer welfare, but only if the spillover effects are large enough to counter potential anticompetitive effects. While they claim it is possible, they do concede that it is mainly relevant in highly innovative sectors.

Similar to Azar, Torshizi & Clapp (2019) empirically examines the price effects of common ownership. They look at the seed sector, and find similar results.

Anton et al. (2020) study how common ownership affects the managerial incentives and how hard they compete with rival firms. They find that in the case of common ownership the shareholders will want to make the managers contract less performance sensitive, and thus reduce the firms' incentive to compete aggressively, which in turn increases the shareholders' profits. They show that firms with common ownership are far less likely to have performance sensitive contracts.

Backus et al. (2020) however point out some measurement problems in previous empirical evaluations, and thus questions regarding the validity of the papers arise. They point to the fact that the data used often does not correspond to the level at which decisions are made. Furthermore, the data does not distinguish short positions from long ones. They also state that the influence of investors on firm decisions is not necessarily endogenously given simply by their share in the company, so if an investor owns 10% of a company, he does not necessarily have 10% control of the company. They have also done research on common ownership between 1980 and 2017 in the US (Backus, Conlon, & Sinkinson, 2019), and while they find an increase in common ownership in the period, they do not conclude that it has brought anticompetitive effects, they did not find substantial evidence of the increase in common ownership having led to higher prices or a lower output. In January 2021 they released a paper in common ownership in the cereal industry, where they find support for the more classic theory of own-profit maximization (Backus, Conlon, & Sinkinson, 2021).

One of the biggest believers in antitrust regulations towards overlapping ownership is Einer Elhauge. In his paper (2020), he discusses the critiques of Azar's (2018) and other similar papers, and argues that, while many of their concerns regarding the results are valid, if one were to correct for these changes, the anticompetitive effects would be larger than those shown. He also claims that even in the absence of collusion, or any sort of communication between owners, the anticompetitive effects arise due to owner interest alignment. An argument used against the results which show a price increase due to overlapping ownership, is that the market shares are

captured in both the HHI and the MHHI. Elhauge however, claims that, while the endogeneity issues are valid, the outcome if one addresses this concern will be even more anticompetitive. Others have pointed out that overlapping ownership is only a problem in concentrated markets. To this, Elhauge points out that the same can be said regarding mergers, and there are antitrust regulations to prevent mergers which reduce competition.

Book Industry

In recent years there has also been a lot of discussion regarding the publishing companies in Norway, and whether the Competition Authorities should intervene in this oligopolistic market. This segment in dominated by Cappelen Damm, Gyldendal, Vigmostad & Bjørke, and Aschehoug. The four of them had, according to Bransjestatistikk (2019), more than 80 % of the net turnover of book sales in 2019. While the four biggest firms in 2007 had just short of 64 % of the net turnover in 2007. Showing an increasing trend.

Oslo Economics (2011) also show that there is a lot of vertical integration in the industry. The big publishing companies own most of the big bookstores. Tanum, Ark Bokhandel and Norli are all owned by these big publishers. They find potential gains from the vertical integration, however, they are more concerned with the horizontal cooperation, as this is more likely to cause anticompetitive effects. Vertical integration can increase productivity and reduce costs, while horizontal integration is less likely to show similar effects.

Menon Economics (Grimsby, 2019) look into the increased market concentration in Norway and the market concentration when taking overlapping ownership into account. They show a steady increase in the market concentration in the publishing sector, especially when accounting for cross-ownership.

2.2 Theory of overlapping ownership

There is a lot of theory on overlapping ownership. Some predict that it will have anticompetitive effects, while others argue that spillover effects might negate this, and that it may actually be beneficial from a societal perspective. While most of the theory seems to assume Cournot competition, some use a Bertrand model.

In a two-firm Cournot model, with market values v_1 and v_2, as in Hansen (1996). They produce x_1 and x_2, and their value depends on the competitors' actions. We have:

1) $V_1 = v_1(x_1 , x_2)$
2) $V_2 = v_2\ x_1 , x_2)$

Classic oligopoly theory predicts that both firms will attempt to maximize their own profits by taking their rivals actions into account. However, Hansen (1996) asks what would happen if both firms are owned by a single owner (which would represent a merger outcome) and what would happen if several owners own an equal share in both companies. He compares the classic outcome with the two others. An important assumption here is that the firms act according to their owners' interests, this eliminates any agency problems. Assuming no transaction costs, the Coase theorem states that the three outcomes will all lead to joint value maximization:

3) $\frac{\partial v_1(x_1,x_2)}{\partial x_1} + \frac{\partial v_2(x_1,x_2)}{\partial x_1} = 0$
4) $\frac{\partial v_1(x_1,x_2)}{\partial x_2} + \frac{\partial v_2(x_1,x_2)}{\partial x_2} = 0$

With transaction costs however, the ownership structures affect the decision making. With a single owner, we have the same as above. Separate owners will maximize their own profits, and unless cooperation can be maintained, this will not be the joint maximization outcome, but rather the previously mentioned classic outcome.

In the case of diversified shareholders, the shareholders might opt for the joint value maximization, but in this case, they will not care how the value is distributed between the firms, given equal ownership in each firm. The shareholder will just want to maximize v_1+v_2. As the real world often has transaction costs (also counting incentive to maintain cooperation) the Coasian joint maximization solution is not a very likely outcome unless the owners are perfectly diversified, and their interests are aligned. In other words, if the owners of the firms are perfectly diversified, the case of the diversified shareholders will be equal to that of a single common owner. The assumption is thus, the more diversified between competitors the owners are, the closer we get to the merger outcome, which in this example is the monopoly outcome.

The impact of your decisions on the competitions profits is an externality. If your firm decides to produce less, then their competitors' profits might go up as a result of increased demand for

their product. With perfectly diversified portfolios, the shareholders aim to internalize these externalities in order to maximize their portfolio value.

2.2.1 Common ownership

One can look at the decision making from a game theory perspective, and observe how the ownership structures affect the equilibrium price and quantity. We assume that the two firms produce homogenous goods and have common owners, i = 1,….,M (Torshizi & Clapp, 2019). The common owners own β percent shares of firm 2 and α percent shares of firm 1. If the ownership creates any amount of control over the firm, it must incorporate their interests in their decisions. In the case of common owners, their interests would include the competitions' profits. If we assume that there is a linear one-to-one relationship between ownership shares and control, as Salop and O'Brien (2000) showed, then the profit maximization problem for the firms becomes:

5) $\pi^1 = \pi_1^1 + \beta\pi_2^2$ and $\pi^2 = \pi_2^2 + \alpha\pi_1^1$

Where π^1 and π^2 are the what firms need to maximize and π_1^1 and π_2^2 are each firms' individual profits, which are given by:

6) $\pi_1^1 = P(X) \times X_1 - mcX_1 - FC_1$ and $\pi_2^2 = P(X) \times X_2 - mcX_2 - FC_2$

In this equation $P(X) = a - bX$ shows the inverse demand for the total produced quantity, $X = X_1 + X_2$. mc represents the marginal cost, assumed to be equal for the firms, and FC is the fixed cost of firm 1 and 2 (Torshizi & Clapp, 2019). Profit maximization in the Cournot duopoly yields:

7) $\frac{\partial\pi^1}{\partial X_1} = \alpha - 2bX_1 - bX_2 - \beta bX_2 - m = 0$, $\frac{\partial\pi^2}{\partial X_2} = \alpha - bX_1 - 2bX_2 - \alpha bX_2 - m = 0$

Solving for X_1 and X_2 gives the best response functions for each firm:

8) $X_1 = \frac{\alpha - m - (1+\beta)bX_2}{2b}$ and $X_2 = \frac{\alpha - m - (1+\alpha)bX_1}{2b}$

Solving the two equations in 8) gives the equilibrium prices and quantities:

9) $X_1 = \frac{a-m}{2b} \times \frac{1-\frac{(1+\beta)}{2}}{1-\frac{(1+\beta)(1+\alpha)}{4}}$, $X_2 = \frac{a-m}{2b} \times \frac{1-\frac{(1+\alpha)}{2}}{1-\frac{(1+\beta)(1+\alpha)}{4}}$

10) $P = \alpha - \frac{(a-m)}{2} \times (\frac{8-2[(1+\alpha)+(1+\beta)]}{4-(1+\alpha)(1+\beta)})$

In classic oligopoly theory it is assumed that there is no common ownership, meaning α=β=0. Which implies equilibrium quantities $X_1 = X_2 = \frac{a-m}{3b}$ and $P = \frac{\alpha+2m}{3}$.

However, in the case of common ownership with equal shares, we have $\alpha = \beta > 0$ which gives $\frac{\partial P}{\partial \alpha} = \frac{2(\alpha-m)}{(3+\alpha)^2} > 0$ and $\alpha - m > 0$. We see that an increase in common ownership leads to higher prices as a result of an alignment of the firms' interests.

2.2.2 Cross-ownership

An example of work on cross-ownership is done by Gilo et al. (2006) who uses a repeated Bertrand model. The theory in this section shows that when a firm holds shares, even if they are non-controlling, in an industry rival, their incentives to sustain tacit collusion might increase. This results in higher equilibrium prices and a lower quantity.

The model assumes n homogenous firms, with equal marginal costs. With collusion firms can charge the monopoly price, and receive the monopoly profit divided by the number of firms. This collusive outcome is reasonable, and can be sustained if the discount factor is high enough:

11) $\delta \geq \delta^* = 1 - \frac{1}{n}$

Gilo et al. (2006) studies how cross-ownership affects the critical discount factor, and show that cross-ownership can increase the incentives for tacit collusion. Tacit collusion itself is not illegal, but mergers which can increase the likelihood of it, can be stopped. Similar rules should perhaps be applied to increases in cross-ownership.

Reynolds and Snapp (1986) however, show that even without collusion, cross-ownership can induce higher prices and lower quantities. They use a Cournot model where none of the firms are aware of the interdependent consequences of their actions. They assume that the conditions for a stable Cournot equilibrium holds. In the model they separate firms and plants. The firms are the profit-maximizing decisionmakers, while they own/control plants. Furthermore, each firm receives profits from ownership interests in jointly owned plants they have no controller rights in. The plants produce the product and sells it at market price, and the profits are shared among the owners. If a plant is co-owned by two or more firms, then one firm decides its output, while the profits are disbursed among each owners' share of the plant.

The model assumes *n* firms, where firm *i* controls the output, q, of plant *i*. The product and the marginal costs are assumed to be equal for all plants. There are also entry barriers. The profits, π, of firm *i* are:

$$12)\ \pi_i = \left(1 - \sum_k^{k \neq i} v_{ki}\right)(p - mc)q_i + \sum_k^{k \neq i} v_{ik}(p - mc)q_k$$

(Reynolds & Snapp, 1986)

Where p is the market price, mc is the marginal cost, q_i is the output controlled by firm i while q_k is the output controlled by firm k. Finally, v_{ki} is firm k's ownership interest in firm i or in jointly owned plants controlled by firm i, and vice versa with v_{ik}.

They go on to show that if a firm decides to increase its ownership in a competitor, the market output will decrease. The model assumes a cross-ownership structure, v and $\tilde{v}$ where $v>\tilde{v}$ if $v_{ik}>\tilde{v}_{ik}$ for at least one *i* and *k* and $v=\tilde{v}$ if not. The output under structure v will therefore be lower than under $\tilde{v}$.

If $\tilde{v}$ represents all the ownership interests that links the firms, and $\tilde{q}$ is the quantity produced in the Cournot equilibrium decision of the firms. The quantity of firm i will then be:

$$13)\ \frac{\partial \pi_i}{\partial q_i} = \left(1 - \tilde{V}_k\right)\left(p - mc + \frac{\partial p}{\partial q_i}\tilde{q}\right) + V_i \frac{\partial p}{\partial q_i}\tilde{q}_k = 0, \text{ here:}$$

$$V_i = \sum_k^{k \neq i} v_{ik} \quad \text{and}$$
$$V_k = \sum_k^{k \neq i} v_{ki}$$

This gives the equilibrium quantity for firm i:

$$14)\ \tilde{q}_i = \frac{mc - p}{\partial p / \partial q_i} - \frac{\tilde{V}_i q_k}{1 - \tilde{V}_k}$$

The first part of equation 14) shows the demand and the cost factors of production. It is in this part of the equation, in a standard oligopoly model the firm must decide its optimal price in a trade-off between a loss of customers, and increased revenue from each of the remaining customers. The second part of the equation shows the effects the ownership interests.

These ownership interests can, as we see in 14), affect the output of firm i. To see the ownership effects, one can differentiate 14) with respect to v_{ik}, this shows the equilibrium effects of firm i increasing its ownership in other firms. In addition, differentiating with respect to $\tilde{v}_{ki}$ shows how firm i's output changes as a result of competitors increasing their ownership in firm i. First, we differentiate 14) with respect to v_{ik}:

15) $\frac{\partial q_i}{\partial v_{ik}} = -\frac{q_k}{1-V_k}$

Due to $\tilde{V}_k$ being less than one, if $\tilde{v}$ is a positive number, the term is negative. In other words, if firm i increases its ownership in a competitor, its own optimal output will decrease given the rivals output. In 16) I show what happens when other firms increase their ownership in firm i:

16) $\frac{\partial q_i}{\partial v_{ki}} = -\frac{\tilde{V}_i q_i}{(1-\tilde{V}_k)^2}$

Given that only positive numbers are allowed, this term is negative, which implies that firm i will desire a lower output if rivals increase their ownership in them.

We see that if firm i increases its ownership in a rival, or a rival increases its ownership in firm i, the output of firm i will be reduced in both instances. Similarly, we could have shown that the price would increase. Therefore, if cross-ownership moves from $\tilde{v}$ to v the output decreases. The firms that are unaffected by the ownership changes however, would increase their own production, but not by enough to counter the reduced output by the affected firms. This shows that ownership change the firm's best reaction. The firms want a lower output if firms they have an ownership stake in reduce their output. The independent firms will have the same best response function as previously. Depending on each firm's cost and demand, and if they are not similar, the output changes may vary, but the reduction in aggregate output remains. The bigger the market shares of the of the cross-owned firms, the bigger the output reductions will be. These results do however depend on entry barriers in the market.

Equation 14) is useful as it shows how a small ownership change can affect output. If we assume five equal firms, all unlinked, and that one firm then decides to buy a 10 percent share in a rival, the output will decrease by 0,2 percent. However, if all five own 10 percent in each other, the aggregate output would be 10% less than in the case of no cross-ownership. This shows that the more cross-ownership there is, the closer we get to the monopoly outcome. In the extreme example, when $v = \frac{1}{n}$ with n homogenous firms, all linked, we get the monopoly outcome.

When examining the effects of cross-ownership, it is not enough to analyze a firm's direct ownership in a competitor. One must also account for the indirect ownership. For instance, if firm i owns 50% of firm j, and firm j owns 50% of firm k, then firm i will indirectly own 25% of firm k, and obtain 25% of their profits. This means that regardless of firm i's control over j (and k), these firms will be incentivized to increase firm i's profits.

Anton et al (2020) considers common ownership, rather than cross-ownership. Their theory predicts that in the case of common ownership, managerial contracts will be designed to prevent aggressive competition between the shareholders' portfolio firms. They show that the managerial contracts are less performance sensitive when there is common ownership. In other words, the managers are less incentivized to outperform competitors. The outcome of this is less output and higher prices. This might also be the case under cross-ownership, as the acquiring firm will have board seats in the acquired firm when becoming a partial owner. As I will show later, this reduces the incentives for aggressive competition in itself, but it may be that managerial contracts are also made to prevent aggressive competition. This paper does not look at managerial contract changes following cross-ownership changes, but the reader should be aware of the potential for this to happen.

2.2.3 Salop and O'Brien

Salop and O'Brien (2000) also do a similar analysis where they separate two properties of partial control. They show that even when assuming that there is no tacit collusion, and the firms are competitors, cross-ownership will affect the market outcomes. If one firm has shares in another, they argue that it is important to distinguish financial interests and control rights. The financial interests here means that the acquiring firm has rights to a share of the acquired firms' profits. The control rights are the acquiring firm's ability to influence or even control the decisions of the acquired firm. Some shares might not give control or voting rights, but still entitles one to parts of the profits. They (Salop and O'Brien 2000) argue that the financial interests affect the interests of the acquiring firm, while the control rights affect the interests of the acquired firm. Simply put, a firm with partial ownership, but no control rights, in a competitor will have less incentive to compete aggressively as an increase in their rival's profit will increase their own due to their ownership. In this situation the acquired firm's incentive to compete aggressively might remain unchanged. If we assume control rights however, then they might compete less aggressively too.

In a situation where most of the shares are non-voting shares, a minority shareholder might hold the control rights. Should the controlling minority shareholder be a competing firm he might for instance increase the firm's prices, which diverts customers to his own firm.

To show this, imagine a standard oligopoly, with no cross-ownership oligopoly where firm i has a price of $100 and 16 customers, their cost is assumed to be $80 and they sell all the units

they produce (Salop and O'Brien, 2000). Their current profits would then be $320. If firm i were to consider raising its price by $10, and this would result in a loss of eight customers, the profits would be reduced by $160 from the customers moving to competitors. However, they would also gain $10 from each of the eight remaining customers resulting in $80 gain from the remaining customers resulting in a net profit of -$80. This price increase would therefore not be worth it.

Now let's consider the case with cross-ownership. If we assume that firm i has a 25% ownership in firm j, and the eight diverted customers from the previous example decide to move to firm j. Firm i still get a reduced net profit of $80, however, firm j gains eight customers, and thus their profits are increased. If we assume that firm j has a cost of $50, and still has a price of $100, then their profits would increase by $400. Since firm i has 25% financial interest in firm j they would be entitled to $100 of the profits, thus providing firm i with an overall net gain of $20 from the price increase.

A price increase of 10% is however, a fairly large increase, and works in this example due to the assumed cost asymmetries. If we assume homogenous firms, where both have costs of $80 per unit, the price increase would be smaller, but the effect remains. Suppose firm i increases its price by 2,5%. They now charge $102,5 for the product, and this results in two customers diverting to firm j. Firm i loses $20 on each diverting customer, resulting in a loss of $40. Meanwhile, they gain an increased $2,5 on each of the fourteen remaining customers, which sums to $35. Without cross-ownership this would result in a net loss of $5 from the price increase. If both of the diverted customers move to firm j (like they would in a duopoly), they earn a margin of $40 from the two customers. With firm i owning 25% of firm j, they would be entitled to $10 of the increase in firm j's profit. This results in firm i having a net gain of $5 from a price increase of 2,5% in the situation with cross-ownership, whereas they would have a net loss of $5 (and consequently not increase their price) if there were no cross-ownership. Salop and O'Brien (2000) use similar examples to show that partial cross-ownership gives the acquiring firm an incentive to increase their price, thereby damaging competition and reducing consumer surplus. When competition authorities evaluate whether a merger should be approved or not, they often look at the diversion rates and margins to see how many customers are recaptured from customers moving from one of the merged firms to the other and the increases in their margins if one increases its price. The above example shows that a similar analysis might be beneficial in cases of cross-ownership.

We have now shown that cross-ownership can harm consumer surplus if the ownership only implies financial interest, but no control rights. The outcome of this is shown in 9) and 10), where we, as mentioned, assume that there is a linear one-to-one relationship between ownership and control.

Another instance of cross-ownership often seen is that of horizontally joint ventures. That is, firm i, j, and k are all competitors, but firm k is owned by firm i and firm j. This structure is, according to Salop and O'Brien (2000) more complicated to analyze due to multiple owners with partial ownership interests and there is a larger set of governance structures. If, for instance, firm i has control rights in firm k, but firm j has more financial interest we get far less competition pressure than would be the case if firm i also had financial interests (see Salop and O'Brien, 2000). This is because firm i can raise firm k's price a lot without losing a lot of profit, due to low financial interest, and they might gain half, or perhaps even more, of the diverted customers from firm k. The final outcome in this situation will depend on the diversion rates, the margins, the financial interests, and the control rights of firms i and k. In the Norwegian publishing industry, this is what we see. The big companies do not have ownership in each other (a few do in fact have shares in Gyldendal, but as they have less than 0,5% we exclude that from this analysis), but we see a fair share of horizontally joint ventures.

2.2.4 HHI and MHHI

The previous section helps explain the intuitive reasoning for concerns regarding cross-ownership by using simple assumptions about the market. However, in the real market, things are usually a lot more complex. A tool commonly utilized to help analyze the effects of overlapping ownership, both theoretically, and empirically, is the modified Herfindahl-Hirschman Index, commonly known as MHHI. It is a modified version of the HHI which is a measure of market concentration commonly used when evaluating whether mergers should be approved.

In Europe, a market is considered unconcentrated if the HHI is below 0.1, and any merger will generally be accepted. Furthermore, intervening in a merger, or a buyout is unlikely if the HHI is between 0.1 and 0.2 after the merger, and the change in HHI is less than 0.025. Similarly, if the HHI is more than 0.2 after the merger, competition authorities are unlikely to intervene if the change in HHI is below 0.015. A market with HHI above 0.2 is considered highly

concentrated, while markets with an HHI between 0.1 and 0.2 is moderately concentrated (Nærings- og Fiskeridepartementet, 2012).

The MHHI is a measure of the market concentration if one accounts for overlapping ownership. It was first developed by Bresnahan & Salop (1986) and then extended by Salop & O'Brien (2000). The difference between the MHHI, and the HHI, is known as the MHHI-delta, and it is the one commonly used in empirical analyses. While the one developed by Bresnahan & Salop accounts for cross-ownership, it only assumes one firm has partial interest in one competitor. The developed version of the MHHI allows for multiple firms (or investors) having ownership interests in multiple competitors. The MHHI is formulated as:

$$17)\ MHHI = \sum_j \sum_k s_j s_k \frac{\sum_i \gamma_{ij}\beta_{ik}}{\sum_i \gamma_{ij}\beta_{ij}}$$

An attractive feature of the MHHI is that it can be decomposed into two parts, consisting of the standard HHI and the MHHI-delta, which is the change in MHHI, that is, the change in ownership structures:

$$18)\ \sum_j \sum_k s_j s_k \frac{\sum_i \gamma_{ij}\beta_{ik}}{\sum_i \gamma_{ij}\beta_{ij}} = \sum s_j^2 + \sum_j \sum_{k \neq j} s_j s_k \frac{\sum_i \gamma_{ij}\beta_{ik}}{\sum_i \gamma_{ij}\beta_{ij}}$$

The left-hand side of 18) is the MHHI, as shown in 17). The first part of the right-hand side is the HHI while the second part is the MHHI-delta. In these equations, β_{ij} is the fraction of firm j owned by owner i (could be firm or investor and this represents the financial interest), while γ_{ij} represents i's control rights over firm j. Firm j's market share is s_j.

In other words, the MHHI-delta is a measure of the amount of overlapping ownership in a market. This is what we use when attempting to analyze the price effects of cross-ownership. I run regressions in an attempt to discover whether increases in cross-ownership is associated with price increases.

The MHHI-delta expression is a general one, which captures different governance structures, from silent financial interests to complete control. Salop & O'Brien (2000) also show the formula for each of the different governance structures, shown in table 1, are the ones I focus on in this paper.

Table 1:

MHHI-Deltas:

	GENERAL FORMULA
SILENT FINANCIAL INTEREST:	$\Delta = \beta S_i S_j$
PROPORTIONAL CONTROL	$\Delta = (\beta + \frac{\beta}{((1-\beta)^2 + \beta^2)}) S_i S_j$

In table 1, β represents the ownership, in percentage of shares owned, while S is the market share of the acquiring firm i, and the acquired firm j. Silent financial interest represents a case of no control rights but the acquiring firm still has a right to β of the profits, and when this is the case, the acquiring firm's incentives change, but not the acquired firm. The proportional control scenario is when the managers of the acquiring firm take their shareholders' interests in other firms into account. The weight put on each shareholders' interest is directly linked with the shareholders' proportion to their financial interests in the acquired firm. There is a linear one-to-one relationship between ownership and control. In other words, if Firm i owns a 20 percent stake in Firm j, then Firm j will make pricing and output decisions as if they had a 20 percent stake in Firm i (Salop & O'Brien, p. 583). This scenario is relevant when there are competitors with financial interests in the same companies. Table 1 shows the formulas I have used to derive the MHHI-delta values in my analyses. The proportional control formula will always yield higher MHHI-delta values than the silent financial interest assumption, and one would therefore expect the price effects to be greater as well, as the theory predicts that greater values of MHHI-delta will lead to higher prices.

The empirical question I aim to answer in this paper is whether cross-ownership, measured by the MHHI-delta affects the price of books after controlling for the HHI and other determinants. If the delta does not show any effect in my analysis, then the empirical tests will support the null hypothesis.

H0: Cross-ownership, measured by MHHI-delta does not affect the prices

Should however the delta be shown to have an impact, then the test will support the alternative hypothesis.

H1: Cross-ownership, measured by MHHI-delta has a positive effect on the price level.

I check using both the proportional control assumption, and the silent financial interest assumption. If H1 holds, then the proportional control assumption will show the greatest effect, as higher an increase in the MHHI-delta is expected to yield higher prices.

3 Data

The data used in the analysis is from 2007-2019 with annual observations. I use time series with price, MHHI-delta, HHI, average income, population unemployment rates, and streaming application revenue data throughout the period. I have used the shareholder register from 2007 to 2019 in order to find the cross-ownership for each year in the time frame. This shows the ownership share of the firms in competitors during each year in the period. In addition to this I have used the yearly published industry statistics, "Bransjestatistikk" from "Forleggerforeningen" in order to find each firm's net-turnover in each year. The four biggest publishers as of 2019 are; Gyldendal, Cappelen Damm, Aschehoug and Vigmostad & Bjørke. All the mentioned firms have had some ownership changes in the time frame. Vigmostad & Bjørke and Cappelen Damm by mergers/acquisitions, while Gyldendal and Aschehoug have had cross-ownership changes. I have also used the industry statistics to determine the market shares. My market is therefore defined as the members of Forleggerforeningen. The reader should keep in mind that this does not cover the entire publishing market, and my data and results are therefore somewhat limited in this regard. According to Oslo Economics (2011) members of Forleggerforeningen covered 70,7 percent of the overall book sales in 2010. Furthermore, one of the bigger companies in the industry, Vigmostad & Bjørke, was not a part of Forleggerforeningen from 2017. My data on them from 2017 to 2019 is therefore an estimate, based on articles stating their change in turnover from the previous year (BOK365, 2018) (Bergens Tidende, 2019) (E24, 2020). In this time-period, I have added their estimated net-turnover to the overall number stated by Forleggerforeningen between 2017-2019 and then calculated each firm's market share from this. My price data is also from the industry statistics, and it is a measure of the average book price in a given year.

Another thing the reader should keep in mind, is that firms with a net-turnover below 10 million NOK in a year is not reported in the statistic, hence smaller firms are not included in the analysis. Therefore, if a firm owned by one of the panel firms has a net turnover below 10 million NOK a year, its net turnover, and therefore its impact, is assumed to be 0 in the analysis.

Any ownership above 90% is assumed to be a complete acquisition, and all the acquired firm's profits is included in the panel firm's profits and market share. For instance, since Aschehoug own 100% of Universitetsforlaget, all of Universitetsforlaget's profits are included in Aschehoug's.

Ownership between 1-90% is assumed to be cross-ownership. This is not included in the firms' profit, or the market share, but rather in the MHHI-delta variable. I disregard ownership below 1% and assume that it does not affect incentives or market outcomes. Tables 2 and 3 show Gyldendal's and Aschehoug's partial ownership interests throughout the period, these two firms have far more cross-ownership than the others in the market, as their rivals have tended to opt for complete buy-outs or mergers.

Table 2:

Year	Bestselgerforlaget	Lydbokforlaget	Kunnskapsforlaget
2007	0	0.25	0.5
2008	0	0.33	0.5
2009	0	0.33	0.5
2010	0.5	0.33	0.5
2011	0.5	0.33	0.5
2012	0.5	0.33	0.5
2013	0.5	0.33	0.5
2014	0.5	0.5	0.5
2015	0.5	0.5	0.5
2016	0.5	0.5	0.5
2017	0.5	0.5	0.5
2018	0	0.5	1
2019	0	0.5	1

Table 2 shows Gyldendal's partial ownership in competing firms throughout the period.

Table 3:

Year	Bestselgerforlaget	Lydbokforlaget	Kunnskapsforlaget	Spektrum
2007	0	0.25	0.5	0
2008	0	0.33	0.5	0.6
2009	0	0.33	0.5	0.6
2010	0.5	0.33	0.5	0.6
2011	0.5	0.33	0.5	0.6
2012	0.5	0.33	0.5	0.6
2013	0.5	0.33	0.5	0.6
2014	0.5	0.5	0.5	0.6
2015	0.5	0.5	0.5	0.6
2016	0.5	0.5	0.5	1
2017	0.5	0.5	0.5	1
2018	1	0.5	0	1
2019	1	0.5	0	0

Table 3 shows Aschehougs ownership interests in rivals throughout the period.

In the analysis, I use the market shares in order to find the HHI, and then calculate the MHHI-delta values assuming silent financial interests (no control rights), and proportional control (linear one-to-one relationship between ownership and control) using the formulas in table 1. As the market shares enter in both the HHI and the MHHI-delta, one should be aware of potential endogeneity issues which could bias the coefficient. If for instance, two firms own 50% in a competitor, and one of them correctly predicts an increase in firm profitability, and that firm proceeds to buy out the other firm, this will reduce the MHHI-delta, but increase the regular HHI, we see this during the last few years of my dataset. This might lead to a negative relationship between the MHHI-delta and the profit margins. Figure 1 shows the HHI and the MHHI values throughout the period. There are two MHHI lines, the green assumes silent financial interests, and the red assumes proportional control. The difference between the blue line, and the other lines is the MHHI-delta value.

Figure 1:

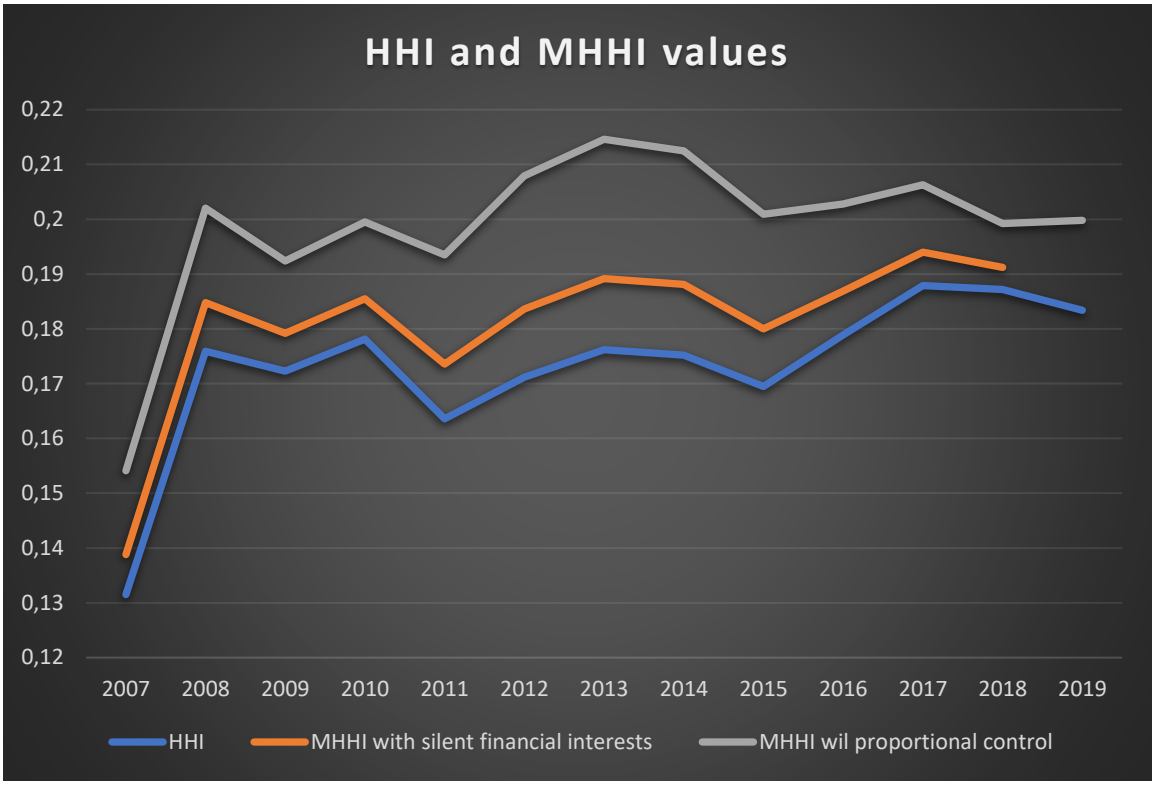
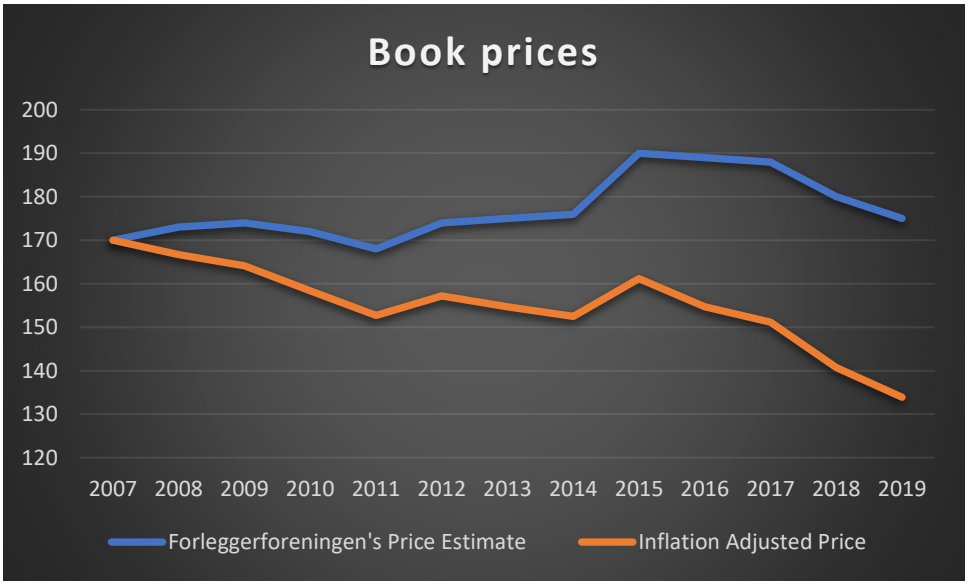


Figure 1 shows the market concentration values on the y-axis, and the year on the x-axis. The HHI increased a lot in 2008 following the merger of Cappelen and Damm. After that it remained somewhat steady for a while. It then increased further after Vigmostad & Bjørke bought Schibsted in 2015. It has remained above 0.18 since 2017, showing an increase of more than 500 since the beginning of the period. The MHHI with silent financial interests shows a very similar patterns, but with somewhat larger values. The two have a 92,8% correlation. The MHHI with proportional control rights also shows a similar pattern, but peaks in 2013, rather than 2017, and it has a correlation of 0.833 with the HHI. This is likely due to Lydbokforlaget, Spektrum, and Kunnskapsforlaget, all going from being cross-owned to being fully acquired after 2016. The MHHI-delta with the proportional control assumption, and the HHI have a correlation of -0.216, while the MHHI-delta with the silent financial interest assumption and the HHI have a correlation of -0.185.

The industry statistic also shows an estimate of the average price for a book in each genre, each year. Forleggerforeningen do however admit that these are mere estimates, and that one should not take these numbers for granted. Another problem of the price estimates is that they are an average across the whole industry. They do not separate between the firms. Using the consumer

price index, I have found the inflation adjusted price each year in 2007 NOK (SSB, 2021c). This is shown in figure 2.

Figure 2:

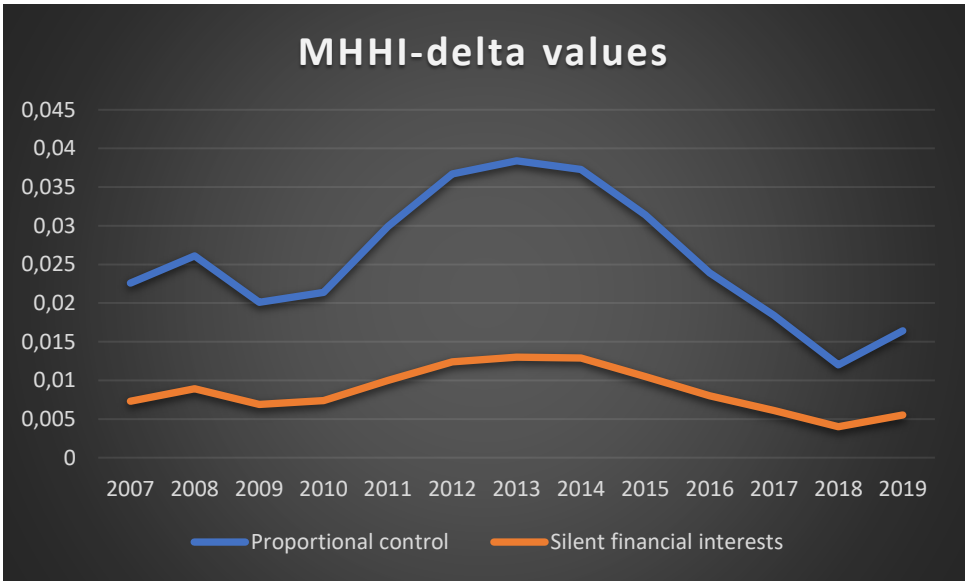


From figure 2 it is clear that when adjusting for inflation, the average price for a book in Norway has declined a significant amount. From 170kr in 2007 to 134kr in 2019, which is more than a 20% price reduction. This reduction is likely a result of market changes. According to Bransjestatistikk (2019) the demand for books in paper format has remained around the same, or declined slightly in the past few years, while the demand for book streaming has increased massively. This is cheaper to produce, and followingly the price falls. In order to control for this, I have included the revenues of the two biggest book streaming firms in Norway, Fabel and Storytel. I control for their combined profits.

We now look at the price and MHHI-delta correlations. The price and the MHHI-delta when assuming proportional control rights have a 35% correlation, which does not necessarily indicate a causal relationship between the two as large correlations do not always mean causal relationships. Meanwhile, the lagged MHHI-delta has a 50% correlation with the book prices. As this is higher, it could be interpreted as an indication of prices following cross-ownership increases about a year later. Though again, the relationship cannot be interpreted as causal, and additional analyses are needed. The MHHI-delta when assuming silent financial interests shows very similar correlations, which makes sense as the β (ownership) and market shares are the same under the two assumptions. As a result, the MHHI-delta under the two assumptions show a 99.9% correlation. They will naturally change similarly as the market shares and ownership

changes. As we regress the price on the MHHI-delta, which is the difference between the MHHI and the HHI, figure 3 shows how the MHHI-delta changes throughout the period.

Figure 3:



As control variables I have included the average income (Pedersen, 2021), population (SSB, 2021a), unemployment rate (FN, 2021). Finally, I have included a "streaming" variable which shows the revenues of Storytel and Fabel to control for the increase in audio book demand (Proff.no).

In the dataset, the turnover is given in 1000 NOK, ownership in rivals and market share between is 0 and 1, prices are in 2007 NOK, streaming app revenues are in 10 Million NOK, unemployment rate is given in percentage, while population is rounded to the nearest thousand, and average income to the nearest 100. The reader should keep this in mind when interpreting the coefficients in the below regressions.

4 Empirical methodology and results

The aim of this section is to estimate the price effects of changes in cross-ownership, and show how I would recommend someone analyzing cross-ownership in the future to proceed. I also check to see if I find effects on the total market turnover resulting from cross-ownership changes. I first use a time-series with the proportional control assumption when estimating the MHHI-delta for the industry statistic as a whole, and control for the market concentration, the average income, population, unemployment rate, and the streaming app revenues. I then

proceed to do the same analysis, but this time I use a one-year lagged MHHI-delta and HHI, as the price effects might not follow cross-ownership changes instantly. As spurious correlations might occur, I repeat the analysis, but I also include a time trend variable. I then follow up with a similar regression, but using the silent financial interest assumption, as theory predicts that this effect will be smaller, but yet increase the price slightly. In both analyses I find that the MHHI-delta has a coefficient, but no statistical significance is found.

I then regress the MHHI-delta on the overall market turnover to see if it is affected by cross-ownership changes. Nor here do we find any effects resulting from cross-ownership changes.

I proceed to discuss the limitations of my analysis, and attempt alternative regressions which might help control for these issues. I also regress the price on the MHHI-delta with one lead, to make sure that increases in prices follows increases in cross-ownership, and not the other way round.

As cross-ownership is expected to mainly cause anticompetitive effects in concentrated markets, I also do the analysis in a highly concentrated submarket, to see if the effects are stronger. Lastly, I do a panel data analysis where I include five different submarkets. As this does not cover all book genres, this analysis is limited, but it illustrates how future analyses should be done in order to acquire more reliable results.

In the first specifications, I use time-series to regress the natural logarithm of the estimated average price in 2007 NOK at time t on MHHI-delta, HHI and additional controls:

$$19)\ \ln(p_t) = \beta_1 MHHI\ \Delta_t + \beta_2 HHI_t + \beta_3 X_t + \varepsilon_t$$

Where p_t is the average book price at time t, $MHHI\Delta_t$ is the MHHI-delta at time t, and X_t are control variables at time t.

I show the results with the proportional control assumption in table 4, and with the assumption of silent financial interests in table 5. I also run the analysis with a one-year lag on the MHHI-delta and the HHI. A limitation with the analysis is that I only have 13 observations. The results can therefore not be taken for granted as representational of the real situation, but rather used as an indication. In the analysis, I disregard the statistical significance if $p<0.05$.

Table 4:

	(1) Log price	(2) Log price	(3) Log price	(4) Log price	(5) Log price
MHHIΔ	1.742	3.073**	3.228		
	(1.573)	(0.671)	(2.136)		
MHHIΔ, one year lag				5.024*	4.141*
				(1.786)	(1.304)
HHI	-2.602**	0.863	0.885	-1.321	
	(0.535)	(0.769)	(0.926)	(1.283)	
HHI, one year lag					-0.530
					(0.354)
Log income		-2.558*	-2.586	-2.710*	-1.573
		(0.858)	(1.135)	(0.712)	(0.832)
Log population		5.732	5.759	5.794*	2.683
		(2.678)	(3.074)	(2.191)	(2.647)
Unemployment rate		0.0485	0.0504	0.0322	0.0404
		(0.0249)	(0.0319)	(0.0237)	(0.0266)
Streaming app revenues			0.000194	0.00309	0.00172
			(0.00205)	(0.00251)	(0.00146)
N	13	13	13	12	12
r2	0.430	0.935	0.935	0.963	0.964
r2_a	0.316	0.888	0.870	0.918	0.920

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$
Table 4 estimates the price effects of cross-ownership when the MHHI-delta is derived by using the proportional control formula shown in table 1. The regression is a time series in the period 2007-2019.

Table 4 shows how the book price is affected by changes in cross-ownership, market concentration, average income, population changes, unemployment rate, and the revenues of the audio book apps, Storytel and Fabel. One thing to keep in mind when analyzing these results is that we have defined the HHI to range between 0 and 1. Therefore, in regression (1) in table 4 the MHHI-delta cannot increase by one, and therefore the price will not increase by more than 100%. Rather, if we look at the lowest to the largest delta-values, the difference is 0.0264. This change would implicate a price increase of 4,6% according to column 1. That said, regression (1) is not statistically significant, and it clearly suffers from omitted variable bias. Column 2 likely performs better in this regard, as we have introduced control variables that might also

have an impact on the price. The price effect of cross-ownership is statistically significant at a 1%-level. This time, moving from the lowest delta-value to the highest is assumed to increase the prices by 9,7%. In recent years however streaming apps like Fabel (created in 2017) and Storytel (created in 2015) have entered the market. Subscribers can listen to as many of the available book as they want for a monthly fee. This is generally cheaper than buying books, and I expect this to be one of the main drivers behind the big price decrease shown in figure 2. In columns 3-5, their yearly revenues are controlled for. In column 3 the price effect of cross-ownership is no longer statistically significant. As the potential gains from acquiring ownership in a competitor might not be instant, I have also included a one-year lag for the MHHI-delta and the HHI to see if this better explains the price changes. The fourth column includes the MHHI-delta lag. The price-effect of cross-ownership is now assumed to be far stronger, and moving from the lowest delta-value to the highest is now expected to increase the price of a book by 13,3%. When also including the lagged HHI we see a similar, but somewhat smaller effect, and the delta is statistically significant at a 5%-level in both instances., which indicates a price-effect of cross-ownership changes, but is not conclusive. The statistical significance with few observations, might also be an indication of the analysis picking up spurious correlations.

The perhaps most surprising result in table 4 is that the HHI does not appear to have an effect on the price. Furthermore, increased average income is associated with cheaper books when prices are adjusted for inflation, which could mean that the average income has increased more than the inflation during the period, the income has at least increased more than book prices. Population growth results in higher prices, potentially due to increased demand, and the unemployment rate does not appear to have an effect. However, as there is a very limited number of observations, n=13, the results are more of an indication of what influences the book price, rather than a conclusive answer, and the reader should keep this in mind. With few observations and control variables, the regression could be picking up common trends rather than causal relationships. In column 1 for instance, the HHI is likely negative since the inflation adjusted price drops, while the market concentration increases throughout the time period. In addition to this, as Elhauge (2020) points out, overlapping ownership is, just as mergers, mainly anticompetitive if the market is highly concentrated, that is, if the HHI is more than 2000. This is not the case in any of the years in my analysis. Lastly, a potential issue is the market definition. I have defined the market as the firms in Forleggerforeningen, but this may be too broad, as many of the firms sell books in different genres. For instance, assuming that

elementary school books and novels are part of the same market might be farfetched. Later I attempt to correct the two latter issues, by regressing only in a submarket, cheap books, which is a submarket where the HHI ranges between 1900 and 2700 during the period.

We now attempt the same regression, however, we include a time trend independent variable, to attempt to control for common changes through time across the variables. This is shown in table 4.1.

Table 4.1

	(1) Log price	(2) Log price	(3) Log price	(4) Log price	(5) Log price
MHHIΔ	1.012	2.658	2.974		
	(0.967)	(2.304)	(2.278)		
MHHIΔ, one year lag				5.044	3.717
				(2.118)	(1.368)
HHI	-0.320	0.794	0.801	-1.721	
	(0.601)	(1.031)	(1.032)	(1.527)	
HHI, one year lag					-0.854
					(0.363)
Time trend	-0.0129**	-0.00953	0.0674	-0.115	-0.154
	(0.00364)	(0.0417)	(0.0483)	(0.0886)	(0.112)
Log income		-2.465	-2.4101	-2.703*	-1.011
		(1.266)	(1.3803)	(0.830)	(0.984)
Log population		6.346*		14.75	13.16
		(2.137)		(6.574)	(6.632)
Unemployment rate		0.0447	0.0439	0.0447	0.0614
		(0.0286)	(0.0354)	(0.0281)	(0.0269)
Streaming app revenues			0.00356	0.00946	0.00961
			(0.00205)	(0.00621)	(0.00614)
N	13	13	13	12	12
r2	0.747	0.935	0.939	0.970	0.974
r2_a	0.663	0.870	0.852	0.917	0.930

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$

Table 4.1 shows that when including a time trend, neither the MHHI-delta or the HHI are statistically significant in any of the regressions. It is likely that table 4 picked up common trends across time. Hence, table 4.1 likely outperforms table 4, as I believe we have now controlled for spurious correlations. Due to the limited number of observations, it also seems reasonable to not find a statistically significant effect. An issue with adding an additional control variable with few observations is that the degrees of freedom will be reduced even more. Removing some of the other control variables might be beneficial in this regard. In column 3, I removed the population variable to adjust for this. Again, none of the effects were statistically significant. As I believe table 4.1 outperforms table 4, I proceed by including the time trend variable in the next specifications.

In table 5, I do the same analysis, but we now assume silent financial interests, so the partial owners have no control rights. By relaxing the control assumption, we can ensure robustness. The variation of the share to control ratio yields an important placebo test. Theory predicts that when assuming no control rights, the anticompetitive effects should be smaller, but still apply, as shown in section 2.2.3 This is meant as a validity check, as I would expect smaller coefficients due to the partial owners not having any control rights.

Table 5:

	(1) Log price	(2) Log price	(3) Log price	(4) Log price	(5) Log price
MHHIΔ	2.809	7.423	9.320		
	(2.782)	(6.841)	(7.170)		
MHHIΔ, one year lag				14.51	11.39
				(6.606)	(4.140)
HHI	-0.352	0.701	0.677	-1.450	
	(0.614)	(1.030)	(1.151)	(1.529)	
HHI, one year lag					-0.928
					(0.358)
Time trend	-0.0129**	-0.0116	-0.0978	-0.0942	-0.148
	(0.00366)	(0.0430)	(0.121)	(0.0929)	(0.108)
Log income		-2.457	-2.418	-2.857*	-1.155
		(1.312)	(1.417)	(0.858)	(0.907)
Log population		6.528*	12.90	13.63	13.07
		(2.118)	(7.588)	(6.997)	(6.453)
Unemployment rate		0.0440	0.0625	0.0377	0.0584
		(0.0286)	(0.0376)	(0.0282)	(0.0244)
Streaming app revenues			0.00547	0.00810	0.00947
			(0.00621)	(0.00614)	(0.00581)
N	13	13	13	12	12
r2	0.746	0.934	0.938	0.967	0.977
r2_a	0.661	0.868	0.851	0.908	0.937

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$
Table 5 estimates the price effects of cross-ownership when the MHHI-delta is derived by using the silent financial interests formula shown in table 1. The regression is a time series in the period 2007-2019.

It appears from the coefficients in tables 4 & 5 that cross-ownership has a positive effect on book prices, however as none of the MHHI-delta coefficients are statistically significant, we disregard this, and assume no effect. A somewhat surprising effect, which also indicates that the results are not robust, is that the MHHI-delta has a higher coefficient when assuming that the ownership comes with silent financial interests rather than with proportional control rights. This might be an indication of the previously mentioned spurious correlations being assumed to be causal in the analysis, however, after the inclusion of the time trend, the results are not

statistically significant. I question whether the one-year lag performs better than the MHHI-delta without a lag. One year is quite a long time, and ideally, I would have monthly or quarterly data, and perform a Dickey-Fuller generalized least squares (DF-GLS) test, in an attempt to find the optimal number of lags. Even though quarterly data would be preferable, I do run a DF-GLS test, to find the optimal number of lags for the MHHI-delta, and find that under the NG-perron criterion, the optimal number of lags is 0 under the proportional control assumption, and 1 lag is optimal when assuming silent financial interests. Under the MAIC criterion, one lag is optimal under both MHHI-delta assumptions. I therefore stick to running the analyses with zero and one lag from this point. The inclusion of more lags will also reduce the number of observations even further.

In most industries having a one-year lag on the price might be too much, and while this may still be the case in the book market, the fixed price system might make the one-year lag optimal as the initial price cannot be altered until May 1. the following year. How the fixed price and cross-ownership jointly impact the price decisions of publishers is interesting, but hard to measure. However, the lagged MHHI-delta might measure how cross-ownership impacts the price after the fixed price period is over, while the MHHI-delta with no lags indicates how the fixed price is impacted by cross-ownership, this might be especially relevant as most of the larger bookstores are owned, at least partially, by the big publishers, and they can keep making price decisions after the fixed price period is finished. If this is the case, then the above tables indicate that the pricing decisions are more impacted by cross-ownership after the fixed price period is over, as shown by the larger coefficients on the lagged MHHI-delta. However, as there be other reasons why the price effects are lagged, we cannot assume this to be the case, and the reader should be careful in this interpretation.

I now check to see if the total market turnover is impacted by increases in cross-ownership. This is shown in table 6.

Table 6:

	(1) Log market turnover	(2) Log market turnover	(3) Log market turnover	(4) Log market turnover
Silent financial interests	10.60			
	(8.895)			
		3.971		
Proportional control rights				
		(3.173)		
Silent with one lag			16.99	
			(7.821)	
Proportional with one lag				5.938
				(2.580)
HHI	1.250	1.420	-3.877*	-4.201*
	(1.716)	(1.700)	(1.345)	(1.373)
Log income	-4.670	-4.735	-7.191**	-7.014**
	(1.938)	(1.917)	(1.454)	(1.292)
Log population	1.554	0.955	12.23	13.55
	(11.10)	(11.06)	(9.896)	(9.449)
Unemployment rate	0.0433	0.0452	0.00270	0.0110
	(0.0574)	(0.0548)	(0.0388)	(0.0379)
Streaming app revenues	-0.00436	-0.00449	0.00253	0.00417
	(0.00937)	(0.00912)	(0.00938)	(0.00935)
Time trend	0.154	0.163	0.109	0.0848
	(0.196)	(0.195)	(0.143)	(0.136)
N	13	13	12	12
r2	0.888	0.891	0.964	0.968
r2_a	0.730	0.739	0.901	0.912

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$

Table 6 estimates the market turnover effects of cross-ownership in the book market. The analysis uses time series in the period 2007-2019, and the MHHI-delta is derived using the proportional control, and the silent financial interests assumptions in table 1.

Table 6 shows the overall net turnover effect of cross-ownership. Again, the lag in MHHI-delta shows a stronger effect, but it is not statistically significant. This indicates that the market turnover is not affected by cross-ownership changes. The counterintuitive result is again that the silent financial interest assumption has the highest effect on net-turnover, though as neither MHHI-delta coefficient is statistically significant, we disregard this. This time, it also appears

that an increase in the market concentration, shown by HHI, results in a lower market turnover. As an increase in HHI indicates fewer firms that can gain profits, this is not unbelievable.

4.1 Results, robustness and discussion

One cannot assert that the results are representational to the market as a whole due to the limited number of observations. Monthly or quarterly data would help greatly in this regard. Furthermore, the dataset is limited as I cannot control for market fixed effects, and my main specification is a time series rather than panel data. I only have a market average price, and not firm specific prices, as a result, I am unable to truly see how a firm's partial ownership acquisition influences its price decisions. Thus far I have an estimate of how changes in the aggregate level of cross-ownership in the market influences the average price of a book, or the market turnover as a whole. Ideally, I would have panel data, which would allow controlling for market fixed effects. This would difference out potential omitted variable bias. The wide market definition is also a potential issue, as different book genres may not be considered to all be one market. Furthermore, the above analyses do not include HHI values above 2000, and while this may indicate that cross-ownership at the current point in time is not an issue in the publishing industry, the analysis does not help conclude whether or not cross-ownership results in anticompetitive outcomes in highly concentrated markets. Lastly, the perhaps most important thing to keep in mind when interpreting the results is that we might be picking up common trends. That is, if any of the control variables show a similar trend throughout the period to the price (decreasing), then this is picked up as a causal relationship, we need to be careful of such spurious correlations. Variables that increase throughout the period will have negative coefficients as their increase is assumed to cause the dependent variable to decrease. The time trend variable should help control for this. A panel regression on all different submarkets would however be beneficial, as the fixed effects would difference out the common trends.

As previously mentioned, there are also potential endogeneity of market shares and ownership, as the market shares are picked up in both the MHHI-delta and in the regular HHI. Another thing is the potential for reverse causality as price changes might induce ownership changes, rather than the other way around. We start by discussing this issue.

4.1.1 Reverse causality issues

If prices cause increased cross-ownership, then the price increase should precede increases in cross-ownership. In table 4, I assumed that the prices followed cross-ownership, and the lag of MHHI-delta was positive and statistically significant at a 5%-level. I repeat the analysis in table 7, but this time with the lead of MHHI-delta, under the proportional control assumption.

Table 7:

	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price
MHHIΔ with one lead	-0.669	-1.853	-3.397	-2.149
	(1.213)	(2.245)	(1.737)	(1.005)
HHI	-2.398**	-1.702	-0.592	
	(0.599)	(1.754)	(1.446)	
HHI with one lead				1.247
				(1.079)
Log income		1.409	-0.484	-0.889
		(2.234)	(1.989)	(0.425)
Log population		-5.466	1.245	2.079
		(6.353)	(6.010)	(1.470)
Unemployment rate		0.0440	-0.00925	
		(0.0282)	(0.0316)	
Audio book revenues			-0.00616	-0.00578*
			(0.00268)	(0.00172)
N	12	12	12	12
r2	0.438	0.808	0.920	0.924
r2_a	0.313	0.648	0.824	0.861

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$

Table 7 tests if changes in the price level might induce cross-ownership changes, rather than vice versa. The analysis uses time series in the period 2007-2019, and the MHHI-delta is derived using the proportional control assumption in table 1.

The coefficient on one lead of MHHI-delta is not statistically significant, furthermore it is now negative. The implication is that if anything, higher prices may actually reduce firms' willingness to acquire partial ownership in rivals. However, as the results are not statistically significant, the assumption is that they are not correlated. This reduces the likelihood of reverse causality.

4.1.2 Data limitations

As I have had to gather all the data on my own from public sources, the analysis is limited to 13 observations, more observations will usually yield more reliable estimates. In addition, Forleggerforeningen does not include the whole publishing market. Should someone at a later point wish to examine the impacts of cross-ownership on competition in the publishing industry, these would however be one of the easier issues to rectify. I was unable to gain access monthly or quarterly data, so my control variables are limited to annual observations which prevents me from controlling for seasonal changes. Furthermore, the only variables I have that vary between firms, are their net turnover (and consequentially their market shares), and their partial ownership in competitors. Someone doing the analysis in the future should find a price estimate for each book genre. That way, one can do a panel analysis with fixed market effects.

4.1.3 Endogeneity issues

The MHHI-delta itself possesses a potential issue, since it is a function of both cross-ownership, and market shares. Therefore, when the coefficient is statistically significant, we cannot conclude that there is a causal relationship between increased cross-ownership and a price increase. The shifts in figure 1 shows definite changes in the market shares of at least some of the firms. The negative correlation between the MHHI-delta and HHI is however a good indication that this is not a huge issue. Nevertheless, the reader should be aware of this when interpreting the results, though, according to Elhauge (2020), this only lowers the coefficient relative to its actual value, and rectifying this will lead to cross-ownership showing a bigger effect on the price. To try to counter this, I follow Torshizi & Clapp (2019) and apply each firm's average market share throughout the period when calculating the MHHI-delta. This way, changes in market shares are not captured by both the HHI and the MHHI-delta. If the MHHI-delta is statistically significant, one can now be more certain that it is due to changes in cross-ownership and not variations in market shares. There will be limitations due to the limited number of observations, potential omitted variables and the not controlling for fixed market effects. In table 8, I repeat the analysis done in table 4, however, this time I have used each firm's (acquirer and acquired) average market share throughout the period when computing the

MHHI-delta. The delta values therefore vary a lot less than previously as changes in market shares are not accounted for.

Table 8:

	(1) Log price	(2) Log price	(3) Log price	(4) Log price	(5) Log price
MHHIΔ	2.034	-0.986	-1.141		
	(1.104)	(1.838)	(1.999)		
MHHIΔ, one year lag				-5.627	-0.778
				(3.191)	(2.121)
HHI	-0.627	0.264	0.192	-3.883	
	(0.751)	(0.991)	(1.227)	(2.707)	
HHI, one year lag					-1.122
					(0.937)
Time Trend	-0.0129**	-0.0796	-0.135	-0.252	-0.201
	(0.00320)	(0.0382)	(0.162)	(0.157)	(0.117)
Log income		-1.578	-1.435	-5.801	-1.086
		(0.880)	(1.143)	(2.101)	(1.976)
Log population		10.12	14.01	37.76	18.34
		(4.683)	(11.23)	(17.42)	(8.859)
Unemployment rate		0.0311	0.0393	0.00153	0.0503
		(0.0274)	(0.0436)	(0.0315)	(0.0424)
Streaming app revenues			0.00290	0.00652	0.00724
			(0.00795)	(0.00825)	(0.00619)
N	13	13	13	12	12
r2	0.805	0.927	0.929	0.952	0.945
r2_a	0.740	0.855	0.829	0.869	0.849

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$
Table 8 estimates the price effects of cross-ownership in the book market. The analysis uses time series in the period 2007-2019, and the MHHI-delta is derived using the proportional control assumption in table 1, with an average market share throughout the period

In table 8, neither the HHI or the MHHI-delta coefficients are statistically significant. In other words, table 8 indicates that the results from tables 4 & 5 were suffering from endogeneity as

the MHHI-delta has negative coefficients. This result stands in contrast to Elhauge's (2020) prediction that the coefficient would be higher when eliminating the market share variation. If the error term is correlated with market shares, we have limited this variation to the HHI. An issue however is that the MHHI-delta varies a lot less, resulting in even more limited number of observations, as we now only have six different values for the MHHI-delta. In many of the analyses done so far, the effects of cross-ownership seem to have a positive effect on the price level, until controlling for the streaming application revenues. Considering that n=13 at most, it seems somewhat unlikely that we can find effects statistically significant at a 5%-level. Controlling for the streaming application revenues changes the coefficients. This might be due to the streaming revenues being a main driver behind the price fall (Forleggerforeningen, 2019), and the inclusion of it might remove a lot of omitted variable bias, and also helps correcting for common trends being assumed to be causal relationships. As figure 2 shows, the price drop was especially strong from 2015, the year Storytel was introduced. However, the coefficient is not statistically significant, and based on this analysis, we cannot determine that the introduction of streaming apps has affected the price. The inclusion of several control variables with few observations does however reduce the degrees of freedom, which might be an issue here as well.

Another issue with table 8 is that anticompetitive effects might depend on the interaction between current market shares and the cross-ownership. Should that be the case, then the results might underestimate the price effect. However, that might also be beneficial as it might shed light on the minimum effect of cross-ownership. Though in table 8, that minimum effect is shown to be no effect. Still, it is important to note that in the publishing market, cross-ownership might not have anticompetitive effects, perhaps because the market is not highly concentrated (HHI<2000). Though again, this might be due to the market definition being too wide, or the limited number of observations not yielding market representative results. Regardless, based on this analysis, there is no reason for competition authorities to intervene in the publishing industry due to anticompetitive effects arising from cross-ownership.

4.1.4 Market definition and concentration concerns

We now address the issues regarding cross-ownership primarily being anticompetitive in highly concentrated markets. As mergers are often not considered anticompetitive if the market is unconcentrated, the same has to be true for cross-ownership, as the anticompetitive effects of the acquisition of partial ownership in one competitor, can never be larger than those of mergers. We also address the issue with the market definition used in the previous analyses being too

wide as a price increase in educational books is unlikely to increase demand for fiction, in other words, it is unlikely that all books can be considered close substitutes to each other. In this section, I narrow the market definition, and look at one submarket in Forleggerforeningen, cheap books (pocket books etc.). The advantage of this is that we now have a more precise market definition, and one where the HHI is above 2000 throughout most of the period. The HHI in this submarket only drops below 2000 in three of the years in the period, in which the HHI is between 1500 and 2000. This better indicates the effects of cross-ownership increases in a highly concentrated market. I was not able to acquire the data from 2007 in this submarket, so this analysis is a time-series from 2008 to 2019.

Table 9:

	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price	(5) Log Price
MHHIΔ	2.833*	3.004	2.450		
	(1.067)	(1.407)	(1.634)		
MHHIΔ, one year lag				0.665	-1.832
				(2.943)	(1.599)
HHI	1.288	1.591	-0.271	-4.075	
	(1.113)	(1.182)	(2.098)	(6.043)	
HHI, one year lag					-0.408
					(1.604)
Time trend	-0.00193	-0.00118	-0.746	-1.494	-0.160
	(0.0129)	(0.0564)	(0.737)	(1.758)	(0.614)
Log population		-18.95	33.22	95.15	24.46
		(14.25)	(54.28)	(101.8)	(39.07)
Log income		6.239	7.747	5.383	-4.465
		(4.093)	(4.697)	(11.40)	(6.891)
Unemployment rate		0.101	0.176	0.202	0.00537
		(0.0961)	(0.110)	(0.184)	(0.165)
Streaming app revenues			0.0404	0.0815	0.00743
			(0.0381)	(0.0969)	(0.0321)
N	12	12	12	11	11
r2	0.481	0.685	0.716	0.710	0.641
r2_a	0.286	0.306	0.220	0.0321	-0.195

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$

Table 9 estimates the price effects of cross-ownership in a highly concentrated submarket, cheap books. The analysis uses time series in the period 2007-2019, and the MHHI-delta is derived using the proportional control assumption in table 1.

Table 9 shows similar results as the previous analyses. Except for column 1, none of the coefficients are statistically significant, and we cannot dismiss H0, that cross-ownership impacts the price, even in a concentrated market. This indicates that increases in cross-ownership, in highly concentrated markets, has no significant effects on the price level. If the MHHI-delta were to increase by 0.0557 (which is the difference between the highest and the lowest MHHI-delta values in this market), the price would be expected to increase by about 14% according the column 3 in table 9. This is a huge price effect, and one that would harm consumer welfare. However, as the results are not statistically significant, we disregard this, and based on this analysis, do not assume that cross-ownership changes will impact price decisions. The reader should however, still keep in mind that many of the previous limitations remain. Particularly perhaps the observation limitations, and the fact that we have time-series rather than panel data which would help with omitted variable bias.

The MHHI-delta effect on prices in tables 4-9 might also have a common flaw, which results in the coefficient being too low. A common feature of the MHHI-delta in all the analyses done so far is that they assume that each firm acts independently. If several of the panel firms have their interests aligned, then the true cross-ownership concentration would be higher than the MHHI-delta value measures (Torshizi & Clapp, 2019). In the publishing industry, it does not seem unlikely that Aschehoug and Gyldendal have common interests as they have a lot of joined ventures. A strategy that yields higher returns for one of the firms, will yield higher returns for the other. In addition to this, their combined market share is above 40% in some years, meaning a price increase from the two would be very significant, and would likely incentivize other firms to also charge a higher price, as their demand would increase following their rivals' price increase.

The above regressions have all assumed that the amount of control is proportional to the ownership, or non-existent. However, the amount of control a firm can exercise over a partially owned firm, is not something that the percentage of shares necessarily implies. An exact measure of this cannot be computed, and it will naturally have consequences on the MHHI-delta values. Depending on the governance structure of the acquired firm, the amount of control held by one of the panel firms might be higher or lower than the proportional control assumption.

Some of the regressions done so far do, to a limited extent, support the theoretical literature. Specifically, the regression done with a lag on MHHI-delta in table 4 shows anticompetitive effects of increases in cross-ownership. The validity of these results is however questioned by the fact that the MHHI-delta coefficient when assuming silent financial interests is higher than when assuming proportional control rights. This defies theory, intuition, and previous results. In addition to this, the inclusion of the time trend variable eliminates this statistical significance.

4.2 Preferred specification

The limitations are, as previously mentioned, in part due to most of my data being from Forleggerforeningen's Bransjestatistikk (2007-2019), and it does not contain all the information necessary to do a panel regression, particularly the information regarding each separate book genre is limited as they only include a few of the biggest publishers in each category. As the cross-ownership is mainly big publishers having partial ownership in smaller ones, I have missing data. I believe the ideal way to do the analysis would be to use the time period I have used as the time variable, however, the panel variable should have been book genres, to differentiate between separate markets. This way I could have done the analysis with a price estimate for each book genre. I would also have the aggregate MHHI-delta, and the HHI in each submarket throughout the period. As a control variable, the aggregate turnover in each market segment could also have been included. Equation 20) shows how I would have preferred to regress, and how I would recommend someone analyzing in the future to do it.

$$20)\ \ln(p_{it}) = \beta_1 MHHI\Delta_{it} + \beta_2 HHI_{it} + \beta_3 X_{it} + \alpha_t + g_i + \varepsilon_{it}$$

Equation 20) is similar to 18), but it now includes the market fixed effects, where p_{it} is the price of book genre i at time t, and so forth. The equation now also contains g_i which represents the market fixed effects (book genres).

Potentially one could control for both the market and the publisher, shown by equation 21)

$$21)\ \ln(p_{ift}) = \beta_1 MHHI\Delta_{it} + \beta_2 HHI_{it} + \beta_3 X_{ift} + \alpha_t + g_{if} + \varepsilon_{ift}$$

where p_{ift} is the average price of publisher f in book genre i at time t. Equation 20) is an aggregated version of equation 21), and g_{if} are $market\ x\ publisher$ fixed effects.

The industry statistics do not include the firm specific prices, so equation 21) was not an analysis I could do. I do however attempt to run the regression from 20), but again, the reader

should keep in mind that the information regarding each genre is limited compared to the overall statistics. Another thing is that I was unable to obtain the genre specific information from 2007, so the below analysis is between 2008-2019. Therefore, the big jump in market concentration due to the merger of Cappelen and Damm, is not accounted for. In the analysis I have included ownership between 1% and 95% as partial cross-ownership.

The data for each of the individual market segments does not include publishers with a turnover of less than 5 MNOK in a particular year. In some submarkets, this accounts for more than 20% of the total turnover. This throws off the HHI and the MHHI-delta values, as the estimates will be too low.

Another thing to keep in mind, is that Vigmostad & Bjørke left Forleggerforeningen in 2017, and I was not able to find their turnover in each of the different market segments after this period. Therefore, the HHI values from 2017 to 2019 will also be somewhat inaccurate.

The panel data uses five submarkets, from 2008 to 2019. The five book genres used as the submarkets are, non-fiction, translated non-fiction, fiction, books for higher education, and cheap books (books in pocket format). I have used the industry statistics estimated price for each of these book types throughout the period, and deflated the price to 2007 NOK. Furthermore, I have calculated the HHI and the MHHI-delta for the genres in each year during the period. The MHHI-delta values are constructed using the proportional control assumption. Both of these numbers vary vastly between submarkets.

When doing a panel data analysis, each of the included submarkets need to have some common correlations, to be considered a market, and for the analysis to be fruitful. For instance, demand fluctuations might be correlated with the average income across all markets. Cheap books might have increased demand as a result of reduced income, and it is possible that this is negatively correlated with income, however, if the fluctuations change approximately at the same time, following the income changes, the correlations are stable. Another possible correlation which might impact prices similarly across submarkets might be taxation. Nationwide income taxation policies might impact the publishers pricing decisions, and the effect of this is likely similar across all submarkets.

The lowest HHI value is 0.0694, which indicates a very unconcentrated market, and healthy competition. This is in the non-fiction category. The highest HHI value found is the educational books for higher education category, and is 0.3551, indicating a highly concentrated market.

The MHHI-delta also varies a lot. In the books for higher education there is no cross-ownership throughout the period. Meanwhile, in the fiction category, it goes as high as 0.1555.

Table 10:

	(1) Log Price	(2) Log Price	(3) Log Price	(4) Log Price
MHHIΔ	0.756		0.685	
	(0.406)		(0.488)	
HHI	0.284	0.316		
	(0.367)	(0.308)		
MHHIΔ with one lag		-1.142**		-1.173**
		(0.231)		(0.229)
HHI with one lag			0.361	0.0858
			(0.686)	(0.415)
N	60	55	55	55
r2	0.0613	0.142	0.0527	0.126
r2_a	0.0283	0.109	0.0162	0.0925

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$
Table 10 estimates the price effects of cross-ownership in a panel data regression, using five submarkets in the time period 2008-2019. The MHHI-delta is derived by using the proportional control assumption given in table 1.

When regressing the price on the MHHI-delta, and the HHI, the results are not statistically significantly different from zero. In other words, cross-ownership does not appear to have an effect on prices. The only statistically significant coefficients in table 10, are the lagged delta values, which are in fact negative. Implying that an increase in cross-ownership is associated with lower prices. This seems unlikely, and is likely proof of the model not being accurate. However, Lopes and Vives (2019) show that increases in overlapping ownership might lead to spillover effects which in fact increase consumer surplus, if certain criteria are met. They point to R&D investments reducing firms' costs, and if one such firm has ownership in a rival this might spillover to that rival. As a result, both firms have lowers costs, and can increase output or reduce the price. They point out that this is especially prevalent in highly innovative sectors. However, the book market is unlikely to be considered highly innovative. With the exception of audio books, the market has remained the same throughout the period. Unfortunately, the audio book submarket was one of many that were not included in this analysis, showing that

table 10 suffers from data limitations. The analysis is however, a nice example of how future analyses should be done when studying cross-ownership in the publishing sector, with complete data.

The fixed effects regression itself should difference out the omitted variables that are specific to each submarket. However, the data only includes five submarkets. The industry statistics show the average price, and market shares in 25 different submarkets. Unfortunately, including all these would be too time consuming, but if the competition authorities were to do this analysis in the future, the inclusion of all 25 submarkets, and their HHI and MHHI-delta values would be beneficial. In addition, a future analysis should not be limited to members of Forleggerforeningen, since this does not cover the entire market. Ideally, they would follow specification 21). As a control variable, one should add demand for streaming applications, since, according to Forleggerforeningen (Bransjestatistikk 2019, 2020), the demand for streaming has increased rapidly in the past few years, while the demand for regular books, has remained steady, or perhaps declined slightly. They point out that this has been a driver for reduced average prices. Controlling for this would likely yield more accurate results, as this is currently picked up in the error term, leading to estimation bias. I used the proportional control assumption from table 1 when estimating the MHHI-delta values, but as this demands the market share of both the acquiring and the acquired firm, I was unable to include book streaming in my panel regression. The only two publishers in the audio book submarket are Lydbokforlaget, and Cappelen Damm. Lydbokforlaget is owned by Gyldendal and Aschehoug, who own 50% each in the latter years of the period, but since they are not themselves listed in the industry statistics, I was unable to apply the formula from table 1 to find the MHHI-delta of this. Preferably, I would also have a demand variable to control for, as seeing the effects of demand on price would likely help with omitted variable bias. Instead, I have used the population, but this is not reliable replacement. By including a demand variable, I could find the price and quantity coefficients of demand. Dividing the demand's output coefficient by the price coefficient would then give an estimate of the elasticity of demand. We would then see if demand fluctuations are driving price changes. The main problems however, is likely that the analysis only includes five of the 25 market segments, and that there might be omitted variables that apply to all the markets. This analysis and discussion, is meant as an example of how the analysis should be done when including sufficient data.

5 Concluding remarks

5.1 Legal grounds for intervention

The Norwegian Competition Authorities accused the four biggest publishers in Norway of violating the Competition Law, a case which ended last year, following appeals. This case however, was not cross-ownership related. The publishers were accused of illegal exchange of information, and violating § 10 in the Norwegian Competition Law (krrl, § 10). In this section I discuss whether the publishing industry should be looked at again, in regards to cross-ownership. An interesting feature of the Norwegian publishing industry is however related to exactly this. The publishers can set a fixed price which lasts until April 30. the following year. This means that they are excepted from § 10, as the publishers and the bookstores agree on a fixed price until the fixed price period ends. The Norwegian Competition Authorities have however, expressed a desire for this law to be revised, as they feel it leads to higher prices (Konkurransetilsynet, 2020). This exemption does not hold regarding horizontal communication, and it is for this they have been fined.

I focus on European competition law, mainly Norwegian, which is made to hold the same rules. I discuss whether current EU competition laws provide grounds for authorities to intervene in markets with cross-ownership, and if so, under which terms. The Norwegian Competition Law is based on the EU law. I then discuss whether there is legal justification for the Norwegian Competition Authorities to intervene in the publishing sector.

As previously mentioned, mergers and acquisitions (M & A's) are always evaluated by the competition authorities. If they are considered to reduce the competitive pressure in the market, they will not be allowed. At the basis of the evaluation is whether or not the consumer welfare will be harmed, this is in accordance to the European Merger Regulation (EUMR). In addition to this, M & A's can be stopped if the chances of tacit collusion are considered to increase following the M & A's, even though tacit collusion itself is not illegal. EEA law is also strict in regards to collective dominance and excessive pricing when evaluating mergers. Collective dominance means that two or more firms in a market hold a dominant position. It makes it hard for rivals to compete, and if not regulated, the dominant firms can, for instance, easily drive them out with aggressive pricing (excessive pricing). Abusing a collective dominant position is prohibited by Article 102 of the Treaty on the Functioning of the European Union (TFEU). These rules also apply to members of the EEA, and in Norway it falls under the Competition Law, Article 11. These articles are specific to abuse of dominance. When in a dominant

position, excessive pricing is also prohibited by TFEU, Article 102. When showing that M & A's will have anticompetitive effects, as described in Article 102 of TFEU, the merger will not be allowed, due to EUMR, which in the Norwegian law of competition is stated in § 16 (krrl, 2004, § 16).

With the recent rise in discussions regarding the effects of overlapping ownership, the main topic is if such regulations should be implemented by antitrust authorities in regards to overlapping ownership, as they are for M & A's. In the Norwegian competition law, § 16, it is stated that M & A's that hinders effective competition are prohibited, especially if it creates, or enhances a dominant position. Furthermore, § 16 a clearly states that the acquisition of partial ownership will be blocked if it hinders effective competition, especially if it creates or enhances a dominant position, the same goes for increases in already existing partial ownership. The partial ownership is feared to reduce the incentives of the acquired firm and the partial owner to compete aggressively. It might also make it easier for the firms to exchange information, which is prohibited by § 10. Cross-ownership regulation is in other words in place. Whether or not common ownership should fall under the same set of rules is heavily debated, but that is out of the scope of this paper.

In the Norwegian publishing industry cross-ownership is present. Table 2 and table 3 shows Gyldendal's and Aschehoug's partial ownership in rival publishers between 2007 and 2019. Of the big four publishing firms, which might gain dominance, these are the two firms with cross-ownership. We see that the amount increased a lot until 2015. It then fell as they started to fully acquire the joint ventures. Bestselgerforlaget, Lydbokforlaget, and Kunnskapsforlaget were all owned by these two firms, and between 2014 and 2017 they had 50% each in all of them. This is still the case for Lydbokforlaget. As § 16 a in the Norwegian Law of Competition states that partial ownership is prohibited if it harms competition, it seems the Norwegian Competition Authorities have not considered cross-ownership changes in the Norwegian publishing industry to harm competition. Should it be found that the competition has been harmed, or will be in the future, they will intervene. Based on my analysis, there is no conclusive evidence of consumer welfare being harmed as a consequence of cross-ownership.

5.2 Summary of regression results

We have now looked at how cross-ownership influences the market, and we have performed robustness tests to check the validity of the results. We also illustrated how the analysis should be performed in the future, in the form of a panel regression.

Column 2 in table 4 estimates that prices will increase with cross-ownership, and this result is statistically significant at a 1%-level. When including the streaming app revenues however, this effect is no longer statistically significant, except when using the lagged MHHI-delta. It seems reasonable that the price increase might not be instant following a partial acquisition in a rival. One interpretation could also be that the lag indicates the price effects after the bookstores are free to set their own price, and the MHHI-delta without lags estimates the fixed price effect of cross-ownership changes. Nevertheless, most of the regressions in table 4 estimates that cross-ownership increases price levels, as theory predicts. As we have 13 observations, it is not surprising that none of the coefficients are statistically significant at a 0.1%-level. I then repeated the analysis, but this time I included a time trend variable, to control for potential spurious correlations. When including the time trend, none of the MHHI-delta variables were statistically significant. I also tested this in tables 5-9, and found similar outcomes, including a time trend removed the statistically significant results, as spurious correlations are better controlled for.

Table 5 performs as the first robustness test. We now assume silent financial interests rather than proportional control when calculating the MHHI-delta. Theory would predict a smaller effect here than in table 4, as the acquirer has no control rights in the acquired firm. As expected, table 5 estimates that increases in cross-ownership leads to higher prices. Despite this, the analysis fails the first robustness test, as the effects are estimated to be far larger when assuming no control rights. This might be an indication that the regression is picking up common trends as causal effects, and this tells us that we cannot assume that the results in table 4 are representative for the anticompetitive effects of cross-ownership in the publishing industry.

I then checked to see if cross-ownership impacts the overall market turnover. I checked under both control assumptions in table 1, and found no indication of any causal effects arising from cross-ownership. As cross-ownership might give some firms a more dominant position, this will come at the expense of competitors, so this seems plausible.

The next analysis, shown in table 7 is an additional robustness test. As column 2 in table 4 showed a positive price effect, we now check to see if the MHHI-delta with one lead is

statistically significant. If this were the case, then cross-ownership increases would be a result of price increases, rather than vice versa, as firms might see the price increase as an opportunity to acquire additional profits. If anything, table 7 indicates that a price increase leads to firms reducing their cross-ownership, however, none of the results are statistically significant. Therefore, it seems likely that cross-ownership changes precede price changes.

Table 8 addresses potential endogeneity concerns regarding market shares being picked up by the HHI and the MHHI-delta. I therefore repeat the analysis done in table 4, but this time I use the average market share of each firm throughout the period when calculating the MHHI-delta. These results are not statistically significant, indicating that table 4 suffered from endogeneity issues. However, due to the limited number of observations, using average market shares gives us half as many different MHHI-delta values throughout the period. This particular regression therefore suffers more than the others from limited observations. Still, we keep the results in mind when considering the validity of table 4.

An issue with most of the analyses is the wide market definition, as it is not necessarily plausible to consider all books to be part of the same market, as they appeal to various consumer groups. In addition to this, just as mergers are mainly problematic in concentrated markets, so is cross-ownership, as the effects of this will always be smaller than those of a full merger. Table 9 attempts to solve for both these issues. I narrow the market definition to only apply to cheap books, which is listed as its own submarket by Forleggerforeningen. I chose this particular submarket as it has a significant amount of cross-ownership, and it is highly concentrated. If cross-ownership has anticompetitive effects in the publishing industry, I would expect it to be shown in this market. The somewhat surprising result is that, while the coefficient in table 9, column 2 is similar to column 2 in table 4, it is not statistically significant. When including the lagged MHHI-delta and HHI, the coefficient is in fact negative, though not statistically significant. In other words, table 9 shows no evidence on cross-ownership impacting the market price, even though the market is highly concentrated. This regression also serves to dismiss the validity of the results in table 4, and it might be an indication that the previous market definition was too wide, which led to estimation bias.

Lastly, I did a panel data regression to illustrate how I would recommend the competition authorities to do the analysis, should they decide to investigate cross-ownership in the future. Though naturally, they would include monthly or quarterly data, several more submarkets and control variables, as explained above. The most surprising result in table 10 was that when regressing the price on the lagged MHHI-delta, we got a negative coefficient which was

statistically significant at a 1%-level. However, as previously discussed, the panel regression only includes five submarkets.

5.3 Conclusion

In this paper I examine whether cross-ownership has had anticompetitive effects in the publishing market. In order to do this, I regressed book consumer-prices on a measure of cross-ownership taken from recent IO-literature, MHHI-delta (Salop & O'Brien, 2000), and other control variables. Publishing was an interesting sector to investigate as it is fairly concentrated, especially some of the submarkets are highly concentrated, and there has been a varying degree of cross-ownership throughout the period.

I regressed the price on the MHHI-delta in various specifications. Most of the results showed a price increasing effect resulting from increases in cross-ownership, however, most of the results were not statistically significant. Which indicates that there may have been a price increase due to cross-ownership, but no conclusive evidence was found. Similar results throughout various specifications indicate some level of robustness. The most surprising result was that the silent financial interests assumption showed a larger effect on the price than the proportional control assumption which defies theory, as more control rights should mean stronger anticompetitive effects. The panel regression was an illustration of how I would recommend future analyses to be done, as panel data is likely necessary to find better estimates. The surprising result here was that when utilizing the lagged MHHI-delta, the price effect was negative. The fixed price system also impacts the price. Though better controlling for this would be beneficial, the lagged MHHI-delta might indicate how the price is affected by cross-ownership after the fixed price period. If so, it seems that it has a stronger effect then, than during the fixed price period. However, as the price increase of cross-ownership might be delayed due to other reasons, we should be careful in this interpretation. After checking several different specifications, I did not find evidence that H0 can be dismissed. As the Competition Authorities have not intervened, I expect they have reached a similar conclusion, as they need to show that the acquisition will result in anticompetitive effects. This shows that proving that price changes emerge as a result of changes in cross-ownership is complicated as there are many factors that simultaneously impact the price.

While this paper does not show anticompetitive effects of cross-ownership in the publishing sector, I believe further analyses should be done. In the future, I would recommend repeating the panel regression methodology. However, more submarkets should be included, as well as firm specific effects. Monthly or quarterly data should also be employed. Controlling for demand shifts from traditional books to audio books would also likely be beneficial. The inclusion of a demand variable would also help show whether price changes are due to changes in demand or other factors.

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