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The case of the UK Quality Newspapers

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Price Wars in Two-Sided Markets: The case of the UK Quality Newspapers

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Abstract

This paper investigates the price war in the UK quality newspaper industry in the 1990s. We build a model of the newspaper market which encompasses demand for differentiated products on both, the readers and advertisers side of the market, and profit maximization by four competing oligopolistic editors who recognize the existence of an indirect network effect of circulation on advertising demand. Editors choose first the political position, then simultaneously cover prices and advertising tariffs. We contribute to the literature on two-sided markets by endogenizing the political differentiation of newspapers in a model with more than two firms. We simulate changes to market structure in order to explore which of the candidate explanations is most likely to lie behind the observed price war.

1 Introduction

In this paper we investigate the 'price war' in the UK weekly *quality broadsheet newspaper industry* in the 1990s. The public discussion of this period has portrayed it as being a case of presumed *predatory pricing*. While present lack of data does not yet allow us to fully investigate this claim, we focus our argument on that fact that the newspaper industry is a prima facie case for an analysis of a two-sided market that should be conducted in terms of the *Hotelling (1929) model* of horizontal product differentiation.

A two-sided market (see Parker & Van Alstyne (2005), Armstrong (2006), Rochet and Tirole (2006)) involves two groups of agents who interact via "platforms", where one group's benefit from joining a platform depends on the size

of the other group that joins the platform. In two-sided markets there are therefore critical network effects due to externalities not only from the group on the same side but also from that on the other side.

The media market is a typical two-sided market (see Anderson and Gabszewicz (2008)), as a media firm typically sells content to consumers readers/viewers/listeners and advertising space to advertisers. The firm knows that the number (and characteristics) of consumers influence the demand for advertising space while, vice versa, depending on the media product, the number (or concentration) of advertising spaces may influence the demand from consumers.

In the case of newspapers, clearly the advertisers are concerned with the reach of a newspaper and hence a newspaper with a higher market share will face a higher demand for its advertising slots for any given advertising tariff. Whether instead readers like or dislike advertising is a debated issue.

Previous theoretical work has modelled newspaper competition as taking place on the political line. Among them Gabszewicz, Laussel and Sonnac (2001, 2002), who, as we do, endogenise the location choice in a first stage, while in most models location is only exogenous. Our model features four oligopolistic competitors rather than two that have been investigated frequently.

The employment of the Hotelling model implies that there is an important non-price dimension which a firm may use as an instrument to adversely affect a competitor. This mechanism is important to this industry independently of whether the pricing strategy should be termed predatory or not.

Arguing in favour of a more economics and 'effects-based' rather than 'form-based' approach to EU Competition Law, Gual, et. al. (2005) argue that predation might in fact employ a wide set of strategic instruments and in particular may take place also through product differentiation. The issue of being able to harm a competitor in the newspaper industry by the *political location* of the newspaper was first suggested in Behringer (2007). His analysis uses industry data on newspaper circulation and prices and, by using the Hotelling model, is able to depict the implied changes on the political line. However his analysis is limited to the readers market and the model is therefore single-sided. The current paper extends it to the advertising market and therefore proposes a two-sided model.

Due to the complexity of the theoretical modelling and the substantial data requirements, structural econometric work on the media as two-sided markets is still quite scarce. Rysman (2004) analyses the market for yellow pages in the U.S. and shows that network effects between advertisers and readers are indeed present. He also considers whether the market benefits from monopoly (which takes advantage of network effects) or oligopoly (which reduces market power) and finds that a more competitive market is preferable. While the markets

analysed are different, we (and Chandra (2008)) use the specification for the advertising demand he proposed.

Kaiser and Wright (2006) estimate an adapted version of Armstrong's (2006) model of competition in a two-sided market where magazines compete in Hotelling duopolies and find that, due to the presence of indirect network effects, in Germany the readers' side of the market is subsidized by the advertisers. While they allow for an effect of advertising on circulation, location is exogenous and there are only two competing firms.

Argentesi & Filistrucchi (2007) test for market power in the national daily newspaper market in Italy, concluding that the four main national daily newspapers have colluding on the cover price but not on the advertising one. We extend their framework by endogenising the choice of political position while also substituting nested logit demand with Hotelling demand.

Fan (2008) analyses the market for daily newspapers in the U.S. and simulates some proposed mergers among them. Her model is the only one which allows for endogenous product characteristics. Again, while she uses a mixed logit specification for the readers' side of the market, we use a Hotelling one. Furthermore, due to the direct effect of location changes on neighbours market shares and profits only, the role of the political position as a characteristic is more complex than those of the characteristics modelled in her paper.

Instead of estimating the parameters of the theoretical model some papers test the validity of conclusions obtained in a theoretical model econometrically. Among these are Chandra (2009) and Collard-Wexler (2009) who analyse the merger wave among Canadian newspaper using a Hotelling framework for both sides of the market. Location choices are however exogenous and their analysis is restricted to duopoly.

Our model therefore encompasses demand for differentiated products on both sides of the market and profit maximization by four competing oligopolistic newspapers who recognize the existence of indirect network effects between the two sides of the market. They first choose the political position and then cover prices and advertising tariffs simultaneously. The importance of changes in the political line during the 90s for daily newspapers in the UK has been emphasized by political scholars, e.g. Curtice (1997). We show that, under certain assumptions on the advertising demand, this two-sided market setup can be reduced to a setting that can be investigated using an extended Hotelling setup as in Götz (2005).[1]

[1] We are very gratefuly to Georg Götz for making his Mathematica code available to us.

2 The UK newspaper industry in the 1990s

The labour force of the UK newspaper industry when still located at Fleet Street in London was heavily unionized when in February 1981 News International Newspaper Ltd. (NIN) owned by Rupert Murdoch purchased The Times newspaper. During the 1980s, NIN therefore clandestinely equipped a new printing facility for its UK newspapers in the London district of Wapping where newspapers could be composed electronically rather than using the hot-metal and labour-intensive linotype method.

At the time NIN owned The Times, the Sunday Times, the Sun and the News of the World. When the print unions announced a strike, NIN activated this new plant with the assistance of the Electrical, Electronic, Telecommunications, and Plumbing Union (EETPU). This led to the "Wapping dispute" from January 1986 to February 1987 which changed the history of UK industrial relations and of the newspaper industry in the UK. By 1988 nearly all the national newspapers had abandoned Fleet Street for the Docklands and started to change their printing practices to those employed by NIN.

Despite these events during the early 1990s the UK quality broadsheet newspaper industry composed of the The Times, The Independent, The Guardian, and the Daily Telegraph, had seen a relatively homogenous and stable pricing pattern for weekly editions. Then, on the 6. September 1993 NIN decided to cut the price for The Times from 45p to 30p, thereby undercutting the Guardian at 45p, The Independent at 45p and The Daily Telegraph at 48p. Public perception had it that a "price war" in the quality newspaper industry had begun.

The Independent, quoting a media analyst conjectured that the price cut was directed against its market share. "When the Independent was launched in 1986, it took more readers from The Times than the Guardian or the Telegraph' (...) It has been the Independent holding back The Times ever since".[2] Immediately after the announcement, Robin Cook, then the Labour party's trade and industry spokesman wrote to the Office of Fair Trading demanding an inquiry into possible unfair competition. The Independent estimated that at the current level of circulation of around 350,000 (August 1993) this price cut came at a cost to The Times of about £ 50,000 per day.

[2] Independent, 3. September, 1993, "Media analysts say 'Times' cut is commercial madness".

Bryan Carsberg, director general of the Office of Fair Trading (OFT) observed "with interest" the alleged newspaper "price war" that Rupert Murdoch ignited. His office's definition of predatory pricing - the deliberate acceptance of losses in the short term with the intention of eliminating competition so that enhanced profits may be achieved in the long term - looks prima facie as if it may indeed apply to the battle between the loss-making Times and the struggling Independent.

Because of its substantial financial difficulties, the Independent decided to raise its price from 45p to 50p on the 12. October 1993 but then came under even more pressure as the Telegraph under Conrad Black also decided to drop its price from 48p to 30p on 1. August 1994.

On 24. June 1994 The Times decreased is price again from 30p to 20p. By this time the issue has received strong political attention. Tam Dalyell, Labour MP said it was an issue of "the quality of democracy", and Tony Wright, Labour MP said that the use of monopoly power to drive out competitors was "offensive" to the public interest. A plurality of opinion was vital. Robin Cook demanded that the OFT should come up with a decision in favour of predatory behaviour since Bryan Carsberg had been talking about a thin dividing line between normal and aggressive competition and with the new price cut this line now surely had been crossed.

The Independent quotes Dalyell's estimates that of the 20p The Times received for each copy, 17.5p went to wholesalers and retailers and the cost of printing a copy was 15p. "This is a £ 30m a year subsidy". The Independent reacted on the 1. August 1994 and reduced its price from 50p to 30p permanently in order to stop the decline of its circulation that decreased by 20% since The Times had first reduced its price. Its financial situation was known to be severe. In the beginning of 1994 a substantial refinancing had to take place which prevented the paper from being taken over from Carlo de Benedetti, another newspaper tycoon.

On 21. October 1994, the OFT issued a decision in the case. Bryan Carsberg said that his inquiry into the price cuts had not established a case for formal action under the competition legislation. Subsequently there was a period of increase in cover prices as the costs of news printing were rising for all firms. The Times decided to increase its prices from 20p to 25p on the 3. July 1995 and at the same date The Telegraph also increased from 30p to 35p. The Independent followed on the 17. July and increased its price to 35p. Another wave of price increases was initiated by The Times and The Telegraph on the 20.November 1995 who raised their prices to 30p and 40p respectively. The Independent leapfrogged on the 22. January 1996 ending a period of rapid price fluctuations that lasted for 29 months.

The exact consequences of the alleged price war period are a matter of vigorous public disagreement. In fact no consensus emerged even as to who the alleged predator The Times was preying against. The data shows the following picture between August 1993 and January 1996: The Times has increased circulation market share from about 17% to 28%. The Independent has moved from 16% to 12% and the Daily Telegraph has moved from 49% to 43%. The market share of the Guardian has decreased a little. Looking at these figures one has to keep in mind that the prices of The Times are still 15p, that of the Independent and the Telegraph 5p lower than in 1993.

3 The Model

We set out to shed some light on issues of this price war using the Hotelling model. The model is conceptually very simple but fits the localized competition of the newspaper market well. The product differentiation is assumed to be one dimensional and firms can charge different prices influencing the position of marginal consumers drawn from some distribution function over the characteristic space which we simplify to be the real line. The standard 'transport cost' parameterized by t is thus a shared disutility that occurs if a reader does not consume the newspaper that exactly corresponds to her most preferred variety.

Mathematically the model can become very complex once locations of the firms on the characteristic space are no longer fixed (e.g. see Anderson, (1992), p.284). Also almost all theoretical models using assume that there are only *two firms* and if the n-firm case is analyzed symmetry assumptions about substitution patterns (e.g. logit model) or the use of a circular characteristic space (e.g. Salop model) erase many of the realistic properties of the simple model for the newspaper industry. Following the possible non-existence of Nash price equilibria for given and close locations noted by d'Aspremont, Gabszewicz, & Thisse (1979) we assume that 'transport costs' are quadratic.

A full characterization of the theoretical setup with more than two firms, variable location, variable price, and endpoints in a two-sided market implies a non-trivial analytical challenge. In order to meet this challenge we have to put some structure on the order of the player's moves and on the shape of the demand function on the demand for advertising.

We assume that firms play a non-cooperative *two-stage game* in which in the first stage they simultaneously chose their optimal locations on the political line and in the second stage they simultaneously chose both prices and advertising rates. The solution concept is subgame-perfect Nash Equilibrium (SPNE).

We assume four firms (newspapers), the Guardian (G), the Independent (I), The Times (T), and the Daily Telegraph (DT) that are differentiated on the political unit-line from left to right according to common consensus. Demand is fully inelastic and consumers have utility $u_{\cdot} - \alpha_{\cdot} p_{\cdot}$ from consuming the good and a quadratic cost proportional to the distance between their (political) location and that of the firm $l_{\cdot}$. The position of a marginal consumer ($x_{\cdot\cdot}$) between two firms i and $i+1$ can be determined by the indifference condition

$$u_i - \alpha_i p_i - t(x_{i,i+1} - l_i)^2 = u_{i+1} - \alpha_{i+1} p_{i+1} - t(x_{i,i+1} - l_{i+1})^2 \qquad (1)$$

of the consumer located at $x_{i,i+1}$. Hence this marginal consumer, who is indifferent of buying good i and $i+1$ is located at

$$x_{i,i+1} = x_{i,i+1} = \frac{1}{2} \frac{\alpha_{i+1} p_{i+1} + t l_{i+1}^2 - \alpha_i p_i - t l_i^2}{t\,(l_{i+1} - l_i)} \qquad (2)$$

and symmetrically the marginal consumer on his left is at

$$x_{i-1,i} = \frac{1}{2}\frac{\alpha_i p_i + t l_i^2 - p_{i-1}\alpha_{i-1} - t l_{i-1}^2}{t\left(l_i - l_{i-1}\right)} \tag{3}$$

Thus the market share of some interior newspaper $i = I, T$ given that consumers are distributed *uniformly* is

$$\begin{aligned} ms_i &= x_{i,i+1} - x_{i-1,i} = \\ &\frac{1}{2t}(\alpha_{i+1}\frac{p_{i+1}}{l_{i+1} - l_i} - \alpha_i p_i \frac{l_{i+1} - l_{i-1}}{\left(l_{i+1} - l_i\right)\left(l_i - l_{i-1}\right)} + \alpha_{i-1}\frac{p_{i-1}}{l_i - l_{i-1}} + t\left(l_{i+1} - l_{i-1}\right)) \end{aligned} \tag{4}$$

If we look at *non-interior firms,* for the LHS firm G setting $x_{i-1,i} = 0$ we have

$$\begin{aligned} & & ms_{G=i} = x_{i,i+1} - x_{i-1,i} = x_{i,i+1} = \\ \frac{1}{2}\frac{\alpha_{i+1}p_{i+1} + t l_{i+1}^2 - \alpha_i p_i - t l_i^2}{t\left(l_{i+1} - l_i\right)} &= \frac{l_G + l_I}{2} + \frac{\alpha_I p_I - \alpha_G p_G}{2t\left(l_I - l_G\right)} \end{aligned} \tag{5}$$

For the RHS firm DT we have $x_{i,i+1} = 1$ and

$$\begin{aligned} & ms_{DT=i} = x_{i,i+1} - x_{i-1,i} = 1 - x_{i-1,i} = \\ 1 - \frac{1}{2}\frac{\alpha_i p_i + t l_i^2 - p_{i-1}\alpha_{i-1} - t l_{i-1}^2}{t\left(l_i - l_{i-1}\right)} &= 1 - \left(\frac{l_T + l_{DT}}{2} + \frac{\alpha_{DT}p_{DT} - \alpha_T p_T}{2t\left(l_{DT} - l_T\right)}\right) \end{aligned} \tag{6}$$

If we further assume $\alpha_i = \alpha \ \forall i$ the system reduces to a demand for an interior firm $i = I, T$ of

$$ms_i = \frac{l_{i+1} - l_{i-1}}{2} + \frac{\alpha}{t}\frac{p_{i+1} - p_i}{2\left(l_{i+1} - l_i\right)} - \frac{\alpha}{t}\frac{p_i - p_{i-1}}{2\left(l_i - l_{i-1}\right)} \tag{7}$$

and that of the firm G on the LHS as

$$ms_G = \frac{l_G + l_I}{2} + \frac{\alpha}{t}\frac{p_I - p_G}{2\left(l_T - l_G\right)} \tag{8}$$

and that for DT on the RHS as

$$ms_{DT} = 1 - \left(\frac{l_T + l_{DT}}{2} + \frac{\alpha}{t}\frac{p_{DT} - p_T}{2\left(l_{DT} - l_T\right)}\right) \tag{9}$$

The resulting elasticity matrix given the 4 newspapers is

$$\begin{vmatrix} \varepsilon_{G,G} & \varepsilon_{G,I} & \varepsilon_{G,T} & \varepsilon_{G,DT} \\ \varepsilon_{I,G} & \varepsilon_{I,I} & \varepsilon_{I,T} & \varepsilon_{I,DT} \\ \varepsilon_{T,G} & \varepsilon_{T,I} & \varepsilon_{T,T} & \varepsilon_{T,DT} \\ \varepsilon_{DT,G} & \varepsilon_{DT,I} & \varepsilon_{DT,T} & \varepsilon_{DT,DT} \end{vmatrix} =$$

$$\frac{\alpha}{2t} \begin{vmatrix} -\frac{1}{(l_I - l_G)} \frac{p_G}{ms_G} & \frac{1}{(l_I - l_G)} \frac{p_I}{ms_G} & 0 & 0 \\ \frac{1}{(l_I - l_G)} \frac{p_G}{ms_I} & -\frac{l_T - l_G}{(l_T - l_I)(l_I - l_G)} \frac{p_I}{ms_I} & \frac{1}{(l_T - l_I)} \frac{p_T}{ms_I} & 0 \\ 0 & \frac{1}{(l_T - l_I)} \frac{p_I}{ms_T} & -\frac{l_{DT} - l_I}{(l_{DT} - l_T)(l_T - l_I)} \frac{p_T}{ms_T} & \frac{1}{(l_{DT} - l_T)} \frac{p_{DT}}{ms_T} \\ 0 & 0 & \frac{1}{(l_{DT} - l_T)} \frac{p_T}{ms_{DT}} & -\frac{1}{(l_{DT} - l_T)} \frac{p_{DT}}{ms_{DT}} \end{vmatrix}$$

Note that these elasticities depend on locations, i.e. the newspaper's optimal choices in the first stage of the game.

Locations l, newspaper prices p^N, and advertising rates p^A are determined in a non-cooperative supply side game. Thus we determine equilibrium prices $p^*(\mathbf{l})$ and r^* given the location vector in stage II and then the SPNE location vector $\mathbf{l}^* = (l_G^*, l_I^*, l_T^*, l_{DT}^*)'$ in stage I.

Profits with differentiated products in *stage II* are

$$\pi_x^{II}(p_x^A, p_x^N) = (p_x^N(\mathbf{l}) - c_x^N) ms_x^N(\mathbf{p}^N(\mathbf{l})) + (p_x^A - c_x^A) ms_x^A(\mathbf{p}^A, \mathbf{ms}^N(\mathbf{p}^N(\mathbf{l}))) \quad (10)$$

As the newspaper industry is a prima facie case of a two-sided market there is a second side to the firm's overall profit that results from sales of advertising slots to advertisers. Advertising demand for a particular newspaper will increase in the newspaper's reach and hence its reader market share.

Lemma 1 *The Nash equilibrium in prices necessarily satisfies*

$$\frac{p_x^N(\mathbf{l}) - c_x^N}{p_x^N(\mathbf{l})} = -\frac{1}{\varepsilon_{xx}} \left(1 + \frac{p_x^A - c_x^A}{p_x^N(\mathbf{l})} \left(\frac{\partial ms_x^A}{\partial ms_x^N} \varepsilon_{xx} + \frac{1}{ms_x^N} \sum_{j \neq x} \frac{\partial ms_x^A}{\partial ms_j^N} \varepsilon_{jx} ms_j^N \right) \right) \quad (11)$$

where $\varepsilon_{xx} = \frac{\partial ms_x^N}{\partial p_x^N(\mathbf{l})} \frac{p_x^N(\mathbf{l})}{ms_x^N(\mathbf{p}^N(\mathbf{l}))}$ *and* $\varepsilon_{jx} = \frac{\partial ms_j^N}{\partial p_x^N(\mathbf{l})} \frac{p_x^N(\mathbf{l})}{ms_j^N(\mathbf{p}^N(\mathbf{l}))}$ *are respectively own- and cross-price elasticities.*

Proof: Take derivative.■

Given the Hotelling demand and elasticity structure the markup

$$\frac{p_x^N(\mathbf{l}) - c_x^N}{p_x^N(\mathbf{l})} = -\frac{1}{\varepsilon_{xx}}\left(1 + \frac{p_x^A - c_x^A}{p_x^N(\mathbf{l})}\left(\frac{\partial ms_x^A}{\partial ms_x^N}\varepsilon_{xx} + \frac{1}{ms_x^N}\sum_{j\neq x}\frac{\partial ms_x^A}{\partial ms_j^N}\varepsilon_{jx}ms_j^N\right)\right) \tag{12}$$

for example for the Independent, using ε_{II}; ε_{GI}, and ε_{TI} as given above this simplifies to

$$\begin{aligned} p_I^N(\mathbf{l}) - c_I^N = {} & \frac{2ms_I^N\,(l_T - l_I)\,(l_I - l_G)\,t}{(l_T - l_G)\alpha} \times \\ & \left(1 + \frac{p_I^A - c_I^A}{ms_I}\left(\begin{array}{c} \frac{\partial ms_I^A}{\partial ms_I^N}\left(-\frac{\alpha(l_T - l_G)}{t(l_T - l_I)(l_I - l_G)}\right) + \\ \frac{\partial ms_I^A}{\partial ms_G^N}\left(\frac{\alpha}{2t(l_I - l_G)}\right) + \frac{\partial ms_I^A}{\partial ms_T^N}\left(\frac{\alpha}{2t(l_T - l_I)}\right) \end{array}\right)\right) \end{aligned} \tag{13}$$

3.1 Solving stage II : Newspaper prices

Solving for the equilibrium prices of the second stage analytically is possible.

Given the market shares from (4) and some simplifications we find that equilibrium prices for the Independent are

$$p_I^N(\mathbf{l}) = \frac{1}{2}c_I + \frac{(l_T - l_I)\,(l_I - l_G)\,t}{(l_T - l_G)\alpha}\left(\frac{l_T - l_G}{2} + \frac{\alpha p_T(\mathbf{l})}{2t\,(l_T - l_I)} + \frac{\alpha p_G(\mathbf{l})}{2t\,(l_I - l_G)}\right) - \frac{1}{2}A_I \tag{14}$$

where $A_I \equiv (p_I^A - c_I^A)\frac{\partial ms_I^A}{\partial ms_I^N}$. By symmetry for the Times we have

$$p_T^N(\mathbf{l}) = \frac{1}{2}c_T + \frac{(l_{DT} - l_T)\,(l_T - l_I)\,t}{(l_{DT} - l_I)\alpha}\left(\frac{l_{DT} - l_I}{2} + \frac{\alpha p_{DT}(\mathbf{l})}{2t\,(l_{DT} - l_T)} + \frac{\alpha p_I(\mathbf{l})}{2t\,(l_T - l_I)}\right) - \frac{1}{2}A_T \tag{15}$$

For the Guardian, using ε_{GG} (12) simplifies to

$$\begin{aligned} p_G^N(\mathbf{l}) - c_G^N &= 2\frac{t}{\alpha}\,(l_I - l_G)\,ms_G - A_x = \\ & \quad 2\frac{t}{\alpha}\,(l_I - l_G)\left(\frac{l_G + l_I}{2} + \frac{p_I(\mathbf{l}) - p_G(\mathbf{l})}{2t\,(l_I - l_G)}\right) - A_G \end{aligned} \tag{16}$$

which we can solve for prices as

$$p_G(\mathbf{l}) = \frac{1}{2}c_G + \frac{1}{2}\,(l_I - l_G)\,(l_G + l_I)\,\frac{t}{\alpha} + \frac{1}{2}p_I(\mathbf{l}) - \frac{1}{2}A_G \tag{17}$$

For the Daily Telegraph, using $\varepsilon_{DT,DT}$ we have

$$\begin{aligned} p^N_{DT}(\mathbf{l}) - c^N_{DT} &= 2\frac{t}{\alpha}\left(l_{DT} - l_T\right) ms_{DT} - A_{DT} = \\ & 2\frac{t}{\alpha}\left(l_{DT} - l_T\right)\left(1 - \left(\frac{l_T + l_{DT}}{2} + \frac{\alpha(p_{DT}(\mathbf{l}) - p_T(\mathbf{l}))}{2t\left(l_{DT} - l_T\right)}\right)\right) - A_{DT} \end{aligned} \tag{18}$$

which can be solved as

$$p_{DT}(\mathbf{l}) = \frac{1}{2}c_{DT} + l_{DT}(1 - \frac{1}{2}l_{DT})\frac{t}{\alpha} - l_T(1 - \frac{1}{2}l_T)\frac{t}{\alpha} + \frac{1}{2}p_T(\mathbf{l}) - \frac{1}{2}A_{DT} \tag{19}$$

We thus have as system of 4 equations in 4 unknowns as

$$p_G = \frac{1}{2}c_G + \frac{1}{2}\frac{t}{\alpha}\left(l_I - l_G\right)\left(l_G + l_I\right) + \frac{1}{2}p_I - \frac{1}{2}A_G \tag{20}$$

$$p_I = \frac{1}{2}c_I + \frac{\left(l_T - l_I\right)\left(l_I - l_G\right)t}{(l_T - l_G)\alpha}\left(\frac{l_T - l_G}{2} + \frac{\alpha p_T}{2t\left(l_T - l_I\right)} + \frac{\alpha p_G}{2t\left(l_I - l_G\right)}\right) - \frac{1}{2}A_I \tag{21}$$

$$p_T = \frac{1}{2}c_T + \frac{\left(l_{DT} - l_T\right)\left(l_T - l_I\right)t}{(l_{DT} - l_I)\alpha}\left(\frac{l_{DT} - l_I}{2} + \frac{\alpha p_{DT}}{2t\left(l_{DT} - l_T\right)} + \frac{\alpha p_I}{2t\left(l_T - l_I\right)}\right) - \frac{1}{2}A_T \tag{22a}$$

$$p_{DT} = \frac{1}{2}c_{DT} + l_{DT}(1 - \frac{1}{2}l_{DT})\frac{t}{\alpha} - l_T(1 - \frac{1}{2}l_T)\frac{t}{\alpha} + \frac{1}{2}p_T - \frac{1}{2}A_{DT} \tag{23}$$

In matrix form we can write this as:

$$\begin{vmatrix} -1 & \frac{1}{2} & 0 & 0 \\ \frac{l_T - l_I}{2(l_T - l_G)} & -1 & \frac{l_I - l_G}{2(l_T - l_G)} & 0 \\ 0 & \frac{l_{DT} - l_T}{2(l_{DT} - l_I)} & -1 & \frac{l_T - l_I}{2(l_{DT} - l_I)} \\ 0 & 0 & \frac{1}{2} & -1 \end{vmatrix} \times \begin{vmatrix} p_G \\ p_I \\ p_T \\ p_{DT} \end{vmatrix} = \frac{1}{2}\begin{vmatrix} -c_G - \frac{t}{\alpha}\left(l_I - l_G\right)\left(l_G + l_I\right) + A_G \\ -c_I - \frac{t}{\alpha}\left(l_T - l_I\right)\left(l_I - l_G\right) + A_I \\ -c_T - \frac{t}{\alpha}\left(l_{DT} - l_T\right)\left(l_T - l_I\right) + A_T \\ -c_{DT} - 2l_{DT}(1 - \frac{1}{2}l_{DT})\frac{t}{\alpha} + 2l_T(1 - \frac{1}{2}l_T)\frac{t}{\alpha} + A_{DT} \end{vmatrix}$$

which can be solved analytically for the equilibrium price vector $\mathbf{p}^{N*}(\mathbf{l})' = (p^*_G(\mathbf{l}), p^*_I(\mathbf{l}), p^*_T(\mathbf{l}), p^*_{DT}(\mathbf{l}))'$ by inverting the system.

3.2 Solving Stage II: Advertising rates

Profit as given in (10) is

$$\pi_x^{II}(p_x^A, p_x^N) = (p_x^N(\mathbf{l}) - c_x^N) ms_x^N(\mathbf{p}^N(\mathbf{l})) + (p_x^A - c_x^A) ms_x^A(\mathbf{p}^A, \mathbf{ms}^N(\mathbf{p}^N(\mathbf{l}))) \quad (24)$$

and also depends on the other side of the market, i.e. on advertising revenue. Hence firm' also simultaneously chose optimal advertising rates p_x^A.

As in the model of Rysman (2004), advertising utility will depend positively on the newspapers share of the readers market. Whence a representative advertiser with newspaper x is assumed to maximize

$$\max_{\{ms_x^A\}} (\eta (ms_x^N)^\gamma (ms_x^A)^\delta - p_x^A ms_x^A) \quad (25)$$

with elasticities $0 < \gamma, \delta < 1$ which leads to a demand for advertising as

$$ms_x^A = \left(\frac{1}{\delta\eta} \frac{p_x^A}{(ms_x^N)^\gamma} \right)^{\frac{1}{\delta - 1}} \quad (26)$$

or in logarithmic form as

$$\ln ms_x^A = \frac{1}{1-\delta} \left[\ln(\delta) + \ln(\eta) - \ln(p_x^A) + \gamma \ln ms_x^N \right] \quad (27)$$

If $\gamma = \lambda$ and $\delta = 1 - \lambda$ this leads to demand for advertising as

$$ms_x^A = \left((1-\lambda) \frac{\eta}{p_x^A} \right)^{\frac{1}{\lambda}} ms_x^N \quad (28)$$

or

$$\ln ms_x^A = \frac{1}{\lambda} \left[\ln(1-\lambda) + \ln(\eta) - \ln(p_x^A) \right] + \ln ms_x^N \quad (29)$$

for estimation purposes.

Consequently:

Lemma 2 *The Nash equilibrium in advertising rates necessarily satisfies*

$$p_x^{A*} = \frac{c_x^A}{1-\lambda} \quad (30)$$

Proof: Take derivative of the advertising profit function.■

3.3 Solving stage I

Given our results from stage II of the game we can first show the following:

Proposition 3 *Given the structure of the advertising side, the problem at the first stage can be transformed into a Hotelling problem with profits depending only on location as* $\pi'(p_x^{A*}, p_x^{N*}) = (p_x^*(\mathbf{l}) - c'_x) ms_x(\mathbf{p}^*(\mathbf{l}))$.

Proof:

Profits for newspaper x with a price vector that depends on locations of the papers $\mathbf{p}^N(\mathbf{l})$, and an advertising rate vector $\mathbf{p}^A$ are

$$\pi_x(p_x^A, p_x^N(\mathbf{l})) = (p_x^N(\mathbf{l}) - c_x^N) ms_x^N(\mathbf{p}^N(\mathbf{l})) + (p_x^A - c_x^A) ms_x^A(\mathbf{p}^A, \mathbf{ms}^N(\mathbf{p}^N(\mathbf{l}))) \tag{31}$$

With Nash in prices we find the foc w.r.t. $p_x^N(\mathbf{l})$ as

$$\begin{aligned} \frac{\partial \pi_x(p_x^A, \mathbf{p}_x^N(\mathbf{l}))}{\partial p_x^N(\mathbf{l})} = ms_x^N(\mathbf{p}^N(\mathbf{l})) + (p_x^N(\mathbf{l}) - c_x^N) \frac{\partial ms_x^N(\mathbf{p}^N(\mathbf{l}))}{\partial p_x^N(\mathbf{l})} + \\ (p_x^A - c_x^A)[\nabla ms_x^A(\mathbf{ms}^N)]' \nabla \mathbf{ms}^N(p_x^N(\mathbf{l})) = 0 \end{aligned} \tag{32}$$

Given the advertising demand structure, all market share gradient vectors are single valued. Thus the foc reduces to

$$ms_x^N(\mathbf{p}^N(\mathbf{l})) + (p_x^N(\mathbf{l}) - c_x^N) \frac{\partial ms_x^N(\mathbf{p}^N(\mathbf{l}))}{\partial p_x^N(\mathbf{l})} + (p_x^A - c_x^A) \frac{\partial ms_x^A}{\partial ms_x^N(\mathbf{p}^N(\mathbf{l}))} \frac{\partial ms_x^N(\mathbf{p}^N(\mathbf{l}))}{\partial p_x^N(\mathbf{l})} = 0 \tag{33}$$

or

$$ms_x^N(\mathbf{p}^N(\mathbf{l})) + \left(p_x^N(\mathbf{l}) - c_x^N + \underbrace{(p_x^A - c_x^A) \frac{\partial ms_x^A}{\partial ms_x^N(\mathbf{p}^N(\mathbf{l}))}}_{A_x} \right) \frac{\partial ms_x^N(\mathbf{p}^N(\mathbf{l}))}{\partial p_x^N(\mathbf{l})} = 0 \tag{34}$$

or

$$p_x^N(\mathbf{l}) - c_x^N = -\frac{1}{\varepsilon_{xx}} \mathbf{p}^N(\mathbf{l}) - A_x \tag{35}$$

where ε_{xx} is the own price elasticity.

Given the advertising structure we can then find an *alternative profit function* as

$$\pi'_x(p_x^A, p_x^N(\mathbf{l})) = p_x^N(\mathbf{l}) - c_x^N + \underbrace{(p_x^A - c_x^A) \frac{\partial ms_x^A}{\partial ms_x^N(\mathbf{p}^N(\mathbf{l}))}}_{A_x}) ms_x^N(\mathbf{p}^N(\mathbf{l})) \tag{36}$$

Given the equilibrium advertising demands (28) and rates (30) the alternative profit function reduces to

$$\pi'_x(p_x^{A*}, p_x^{N*}(\mathbf{l})) = p_x^{N*}(\mathbf{l}) - \underbrace{c_x^N + \underbrace{(\frac{\lambda}{1-\lambda}c_x^A)\left((1-\lambda)^2\frac{\eta}{c_x^A}\right)^{\frac{1}{\lambda}}}_{A_x}}_{c'_x} ms_x^N(\mathbf{p}^{N*}(\mathbf{l})) \tag{37}$$

i.e. a standard Hotelling profit of the form $\pi' = (p_x - c'_x)ms_x(\mathbf{p}(\mathbf{l}))$. As A_x and thus c'_x are exogenous, we have

$$\frac{\partial \pi'_x(p_x^{A*}, p_x^N(\mathbf{l}))}{\partial p_x^N(\mathbf{l})} = ms_x(\mathbf{p}(\mathbf{l})) + (p_x - c'_x)\frac{\partial ms_x(\mathbf{p}(\mathbf{l}))}{\partial p_x^N(\mathbf{l})} = \frac{\partial \pi_x(p_x^A, p_x^N(\mathbf{l}))}{\partial p_x^N(\mathbf{l})}$$

i.e. the alternative profit function leads to the same equilibrium prices as (34) and hence can be used to derive equilibrium locations in stage I.■

Total profits in stage I given the equilibrium price vector $\mathbf{p}^{N*}(\mathbf{l})'$ with generic element p_x^{N*} and p_x^{A*} from stage II can then be written as

$$\pi_x^I(p_x^{A*}, p_x^{N*}(\mathbf{l})) = \left((p_x^{N*}(\mathbf{l}) - \underbrace{c_x^N + \lambda(1-\lambda)^{\frac{2}{\lambda}-1}(\eta)^{\frac{1}{\lambda}}(c_x^A)^{1-\frac{1}{\lambda}}}_{c'_x}\right) ms_x^N(\mathbf{p}^{N*}(\mathbf{l})) \tag{38}$$

so that stage I equilibrium profits are *linear* in the market shares that are given by the Hotelling specification, i.e. for interior firms see (4).

Clearly this equilibrium firm profit is decreasing in costs c_x^N and c_x^A and increasing in η. The comparative statics of profit with regard λ is negative if $\eta >> c_x^A$. We refer to the term in brackets c'_x as "extended cost" in what follows.

4 Data

The dataset on the readers' side contains market level data on circulation, cover prices, and content characteristics of the four daily quality national newspapers in the UK (Guardian, The Times, Independent, and Daily Telegraph), with monthly observations from 1990 to 2000. Data on circulation come from the Audit Bureau of Circulation (ABC). Data on prices were collected from newspaper publishers themselves.

Data on the results of the political elections and on the political position of the newspapers were collected from the British Election Surveys (BES) of 1992 and 1997 and from the British Panel Election Survey (BPES) for the years 1992-1997 and 1997-2001. In particular, the relative political position of the newspaper was calculated as the percentage of readers of a given newspaper who a) voted for the conservative (or alternatively the labour) party b) felt closer to the conservative (or alternatively to the labour) party c) thought their newspaper favoured the conservative (or alternatively the labour) party.

On the advertising side of the market we acquired market level data on advertising quantity and revenues of the same newspapers with monthly observations from 1991 to 2000 from Nielsen Media Research UK. The latter directly collects data on quantities and applies list prices in order to calculate advertising revenues. In doing so, however, Nielsen also applies an estimate of the discounts with respect to the list prices. We recovered nominal advertising tariffs dividing revenues by quantity. Finally, we deflated cover prices and advertising tariffs by the Consumer Price Index.

The data is depicted in Figure 1 above (cover prices) and on the following Figure 2 (circulation), Figure 3 (advertising volume), Figure 4 (advertising tariffs), Figure 5 (circulation and advertising volume for the whole market) and Figure 6 (political position).

5 Empirical analysis

We proceed to analyse how the price war discussed above affected the two-sides of the newspaper market. The analysis at this stage is only descriptive. We plan to run a full econometric analysis soon, once we have identified and collected suitable instruments for cover prices on the readers' and both advertising tariffs and circulation on the advertisers' side of the market. Suitable instruments could include other exogenous or pre-determined characteristics of the newspapers on the readers' side (such as featured content sections) and on the advertisers' side (such as demographics of the readers) or measures of the marginal costs (identified as the cost of the paper, the ink, and the distribution).

For The Times Figure 2c reveals that, as The Times cut its price for the first time in September 1993, circulation of The Times immediately picked up. It increased even more as The Times cut its price again in June 1994. However it didn't drop when the price was raised again first in July 1995, then in November 1995 and finally in November 1999. Rather it first picked up again in 1997 and then stabilised at a much higher level than before the price war. Figure 3c shows that advertising quantity always increased, while Figure 4c shows that advertising tariffs first declined up to December 1994 and then increased. According to Figures 6i-ii The Times moved substantially to the political Left. In particular, Figure 6i depicts the change in the percentage of readers of The Times who voted conservative for both the 1992 and the 1997 elections: However, as the labour party won the elections in 1997, one would expect a fall in the percentage of readers voting Conservatives in all newspapers. To cotronl for that, Figure 6ii graphs the percentage increase in the percentage of readers of The Times who voted Conservative with respect to the percentage of readers in the market who voted Conservatives.

For the Independent Figure 2b shows that the initial decision of the Independent in October 1993 to react to The Times by raising its price lead to the loss of even more circulation. As circulation continued to drop it was forced to lower its price in August 1994. But circulation dropped further until January 1996. In the meantime the Independent raised its price again in July 1995. It then stabilised despite the price being first raised in January 1996 and again in October 1997 and cut again later on. Figure 3b shows that advertising quantity has increased from August 1994, while according to Figure 4b advertising tariffs dropped sharply during 1995 and started to increase again only in 1997. Figure 6 shows that the Independent moved a bit to the political Left.

For the Daily Telegraph Figure 2d shows that circulation dropped up to May 1994 then increased and dropped again as of October 1994 to February 1996 and peaked again in January 1997. According to Figure 3d advertising quantity increased from August 1994 while advertising tariffs always increased as shown in Figure 4d. According to Figure 6 the Daily Telegraph might have even moved to the political Right.

For the Guardian Figure 1a shows that it never changed its nominal price, i.e. it never took part in the cover price war. According to Figure 4a however, it did lower its nominal advertising price during the price war and then raised it substantially from November 1996 after the price war had ended. As shown in Figure 2b circulation of the Guardian initially dropped a little but then stabilised. According to Figure 3b advertising volumes always increased. Figure 6 shows that also the Guardian moved to the political Left.

For the total quality newspaper market Figures 5-i and 5-ii show that before the price war circulation was decreasing, it increased during the price war and

up to 1998, then dropped and stabilised in the last two years. Advertising volume instead always increased in the period under consideration.

Overall, comparing 1992-1993 (before the beginning of the price war) and 1996-1997 (after the end of the price war), we find that:

- Cover prices were much lower for The Times, slightly lower for the Independent and the Daily Telegraph, unchanged for the Guardian.
- Circulation of quality newspapers was in general much higher; in particular it was slightly lower for the Guardian, much lower for The Independent, much higher for The Times and higher, though later again lower, for the Daily Telegraph.
- Advertising volume on quality newspapers was much higher for each of the four newspapers.
- Advertising tariffs were unchanged for the Guardian (though later increasing), lower for the Independent (though later increasing but not back to the level before the price war), much higher for The Times (and increasing further afterwards); much higher (and always increasing) for the Daily Telegraph.

Finally, looking at the data on political position, we find that:
- All newspapers but possibly the Daily Telegraph moved to the political Left.
- The move to the political Left of The Times was substantial and started during the price war, well before the public endorsement of Tony Blair by Rupert Murdoch on the occasion of the UK general elections of 1997.
- The Daily Telegraph may even have moved slightly to the political Right.

6 Simulation

Given the model outlined above, we can simulate changes of the exogenous variables and analyse whether they might have been the ones giving rise to the observed changes between the period before and the one after the price war.

In particular proposition 3 implies that our two-sided market setup can be reduced to a Hotelling problem with four firms, simultaneous choices of location and prices and advertising rates. A similar problem has been analysed in a Götz, (2005) who extends work of Neven (1987) and Economides (1993) in a standard market. We are thus able to employ a modified Mathematica algorithm to solve for the equilibrium of the first stage locations explicitly.

The algorithm is based on a *Newton-Raphson approximation* of the equilibrium first stage location with starting values $\mathbf{l}'=(0,.3,.6,1)'$. The algorithm proceeds by evaluating the tangent on the original function at the starting value, finds its intercept with the abscissa which is then used to find the functional value and tangent again recursively until the point of tangency and the intercept with the abscissa coincide. The algorithm converges and sufficiency of the first order necessary conditions for optimality can be checked by looking at the profit function for local deviations.

Because of the economies of scale and scope which typically characterize the media market, a possible effect of Rupert Murdoch's acquisition of the Times could have been a cost advantage over the rivals. In particular this could have been due to the setting up of the new production plant in Wapping, To explore the effect of such a change in productive efficiency we therefore assume that starting from a symmetric situation the marginal cost of production of the newspaper Times c_x^N drops substantially (reducing the extended cost $c_x^{'}$) and we investigate the effect this change has on the equilibrium magnitudes of the model.

6.1 The symmetric situation

We assume that $t/\alpha = 10$ and that the extended cost is $c_x^{'} = .5$ for all firms. The NR-algorithm then yields equilibrium location on the political line in the first stage of the game as

$$\mathbf{l}^* = (l_G^*, l_I^*, l_T^*, l_{DT}^*)' = (.124, .396, .604, .876)' \tag{39}$$

Note that despite the symmetry of the situation there remains a difference between the interior and the non-interior newspapers. This implies that only the locations of interior newspapers I and T and those of the non-interior newspapers G and DT are mirror images, i.e. $l_G^* = 1 - l_{DT}^*$ and $l_I^* = 1 - l_T^*$. These equilibrium locations imply equilibrium prices in the second stage as

$$\mathbf{p}^{N*}(\mathbf{l}^*) = (p_G^*(\mathbf{l}^*), p_I^*(\mathbf{l}^*), p_T^*(\mathbf{l}^*), p_{DT}^*(\mathbf{l}^*))' = (1.566, 1.216, 1.216, 1.566)' \tag{40}$$

where again we observe the symmetry between interior and non-interior firms.

The equilibrium market share vector of the readers market is

$$\mathbf{ms}_x^N(\mathbf{p}^{N*}(\mathbf{l}^*)) = (.196, .304, .304, .196)' \tag{41}$$

which corresponds to the market share vector of the advertising market by (28). Equilibrium profits are

$$\boldsymbol{\pi}_x^I(p_x^{A*}, p_x^{N*}(\mathbf{l}^*)) = (.209, .218, .218, .209)' \tag{42}$$

6.2 An asymmetric cost situation

We now assume that the extended cost of The Times T drops to $c_x^{'} = .2$. This may be due to a substantial printing cost advantage resulting from substantially more efficient production methods at Wapping or due to some exogenous increase of the demand for advertising for T only (both are consistent with the Times joining a media conglomerate such as Rupert Murdoch's). Given this exogenous cost shock, the equilibrium magnitudes change to

$$\mathbf{l}^* = (l_G^*, l_I^*, l_T^*, l_{DT}^*)' = (.103, .353, .577, .887)' \tag{43}$$

Thus the equilibrium location on the political line of *all* newspapers *but* the DT shift to the Left. This finding is akin to the results in the non-strategic firm setting of Behringer (2007) based on market data only. The implied equilibrium prices in the second stage are

$$\mathbf{p}^{N*}(\mathbf{l}^*) = (p_G^*(\mathbf{l}^*), p_I^*(\mathbf{l}^*), p_T^*(\mathbf{l}^*), p_{DT}^*(\mathbf{l}^*))' = (1.4, 1.158, 1.128, 1.647)' \tag{44}$$

so that *all* equilibrium prices *but* that of the DT go down. The equilibrium market share vector of the readers market is now

$$\mathbf{ms}_x^N(\mathbf{p}^{N*}(\mathbf{l}^*)) = (.18, .279, .357, .185)' \tag{45}$$

so that market shares of *all* newspapers *but* that of the T go down.

Finally equilibrium profits are now

$$\boldsymbol{\pi}_x^I(p_x^{A*}, p_x^{N*}(\mathbf{l}^*)) = (.162, .183, .331, .212)' \tag{46}$$

so that equilibrium profits of the G and the I go down but that of the T and the DT go up. Thus by moving further to the political Right, the DT is able to reduce the competitive pressure (and even increase is profit despite its decreasing market share) that results from the T's unilaterally lower extended costs. The I on the other hand, being an interior firm does not have this option as a move to the political Left will automatically increase the competitive pressure from the G. Hence this move is punished with a substantially lower profit, but also the profit of the G suffers.

7 Conclusion

We proposed a theoretical model encompassing demand for differentiated products on both sides of the market and profit maximization by competing oligopolistic publishers who recognise the existence of indirect network effects between the two sides of the market as they choose first the political position, then simultaneously the cover prices and the advertising price

We then discussed the price war among UK quality newspapers in the '90s in light of the model above. The observed changes in market structure in the UK newspaper industry in the 90s are clearly remarkable. However there appear to be many candidate explanations for these changes,which are not even necessarily exclusive.

In particular in the above simulation we have shown that *asymmetric production costs* may explain much of the observed changes in prices, circulation and advertising volumes. In future work we should be able to replace the parametric assumptions of this simulation with econometric estimations. However even at this stage with exogenous parametric assumption the complexity of the changes in market structure given the realistic Hotelling differentiation with interior and non-interior firms on the political line becomes evident.

An alternative explanation of the observed market changes is the *breakdown of a collusive agreement* on cover prices which was upset when Rupert Murdoch took over the Times and changed old habits. In this context further econometric investigation along the lines of Argentesi & Filistrucchi (2007) allowing for a Hotelling demand structure would be indicated.

As emphasized in Behringer (2007) the possibility of *predatory behaviour* not (only) in prices but also by means of movements on the political line is also feasible. Hence there may be alternative reasons for such location changes as the ones shown above that are not captured in short run profit maximization motives and such changes may deserve the label predatory. However, given the lack of reliable cost data any final conclusion seems premature at this stage.

An eventual alternative and one that also takes seriously the role of product placement on the political line is that the observed changes in market structure result from a (expected) positive *shock on the demand side for advertising*. This shock would lead to an adjustment process that finally implies lower equilibrium prices on the reader's side as the new optimal mix of newspaper finance has more of its revenue resulting from advertisers than from readers. It is conceivable that Rupert Murdoch, being first to spot this change in the market structure was also first to react. Generically a new price equilibrium implies that also the optimal locations of the papers on the political line will now differ but changes are likely to be more symmetric. Further research will identify econometrically which of the explanations above is most consistent with the observed data.

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9 Appendix A - Figures

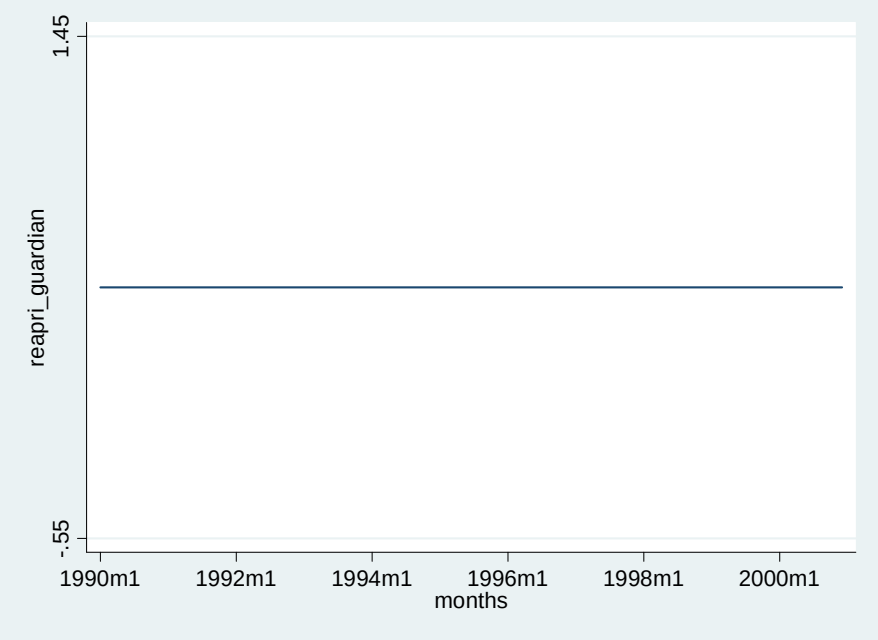

Figure 1a- Nominal Cover Prices of the Guardian

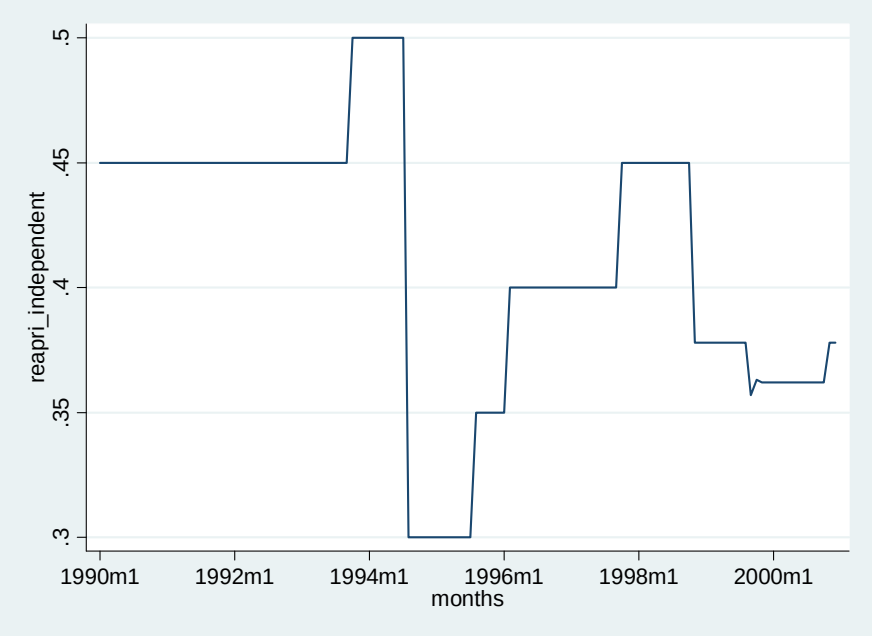

Figure 1b - Nominal Cover Prices of the Independent

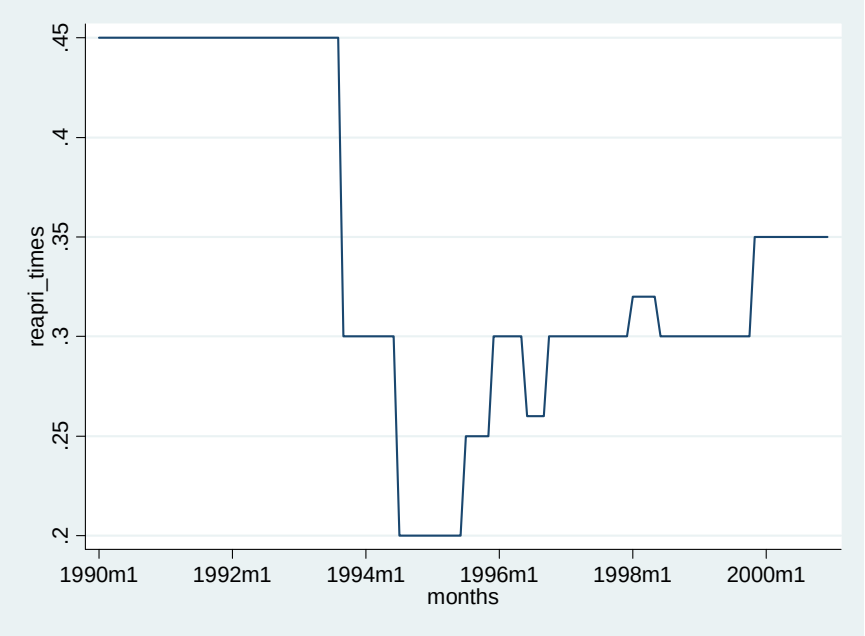

Figure1c- Nominal Cover Prices of the Times

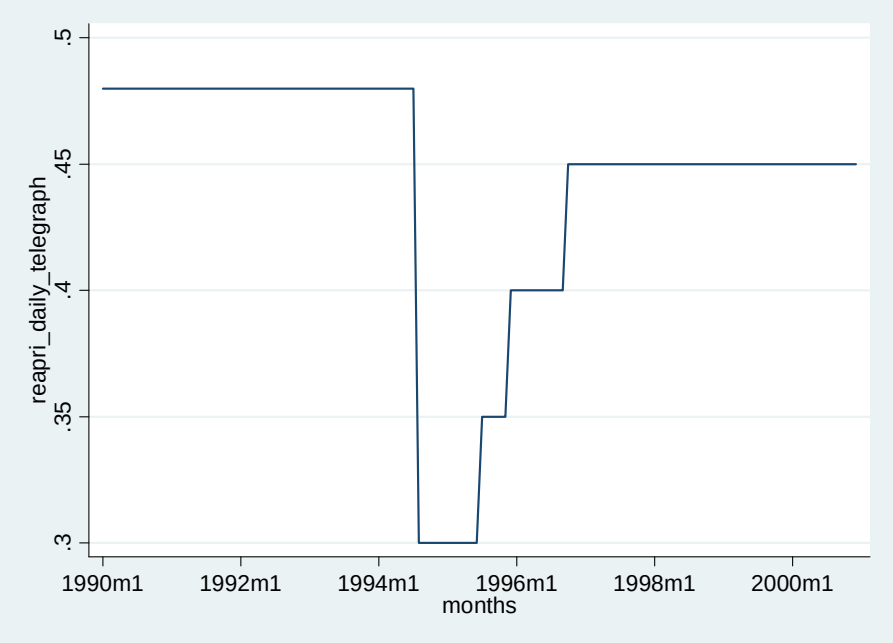

Figure 1d - Nominal Cover Prices of the Daily Telegraph

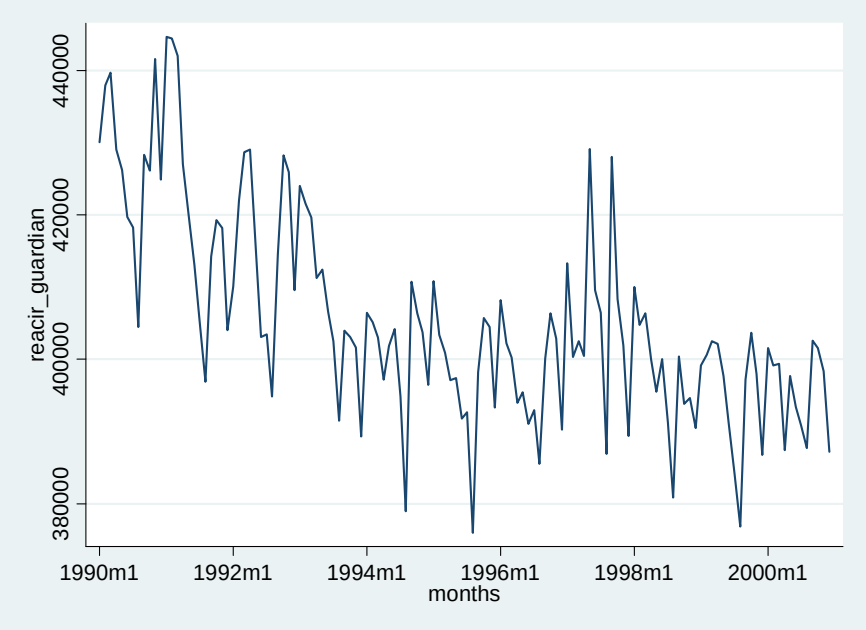

Figure 2a - Circulation of the Guardian

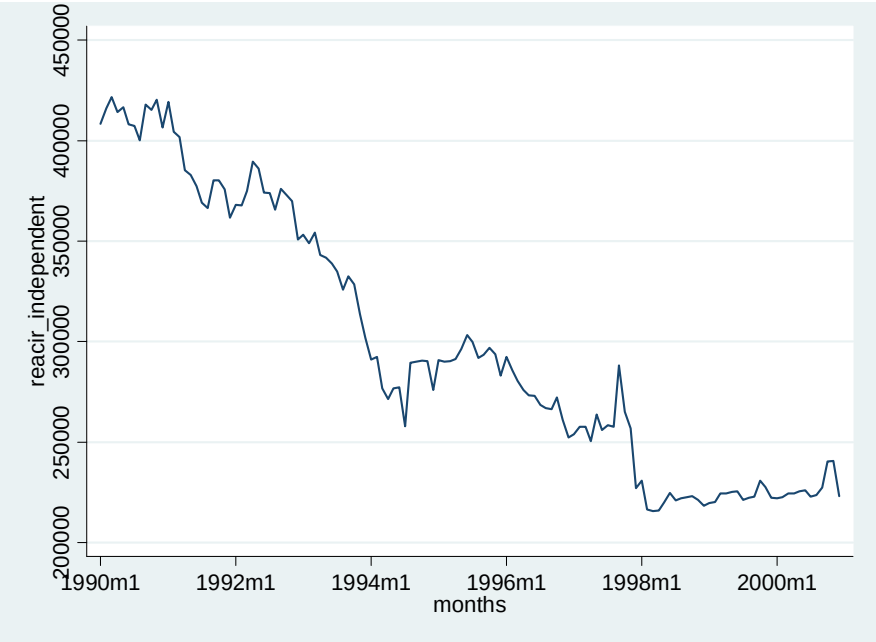

Figure 2b - Circulation of the Independent

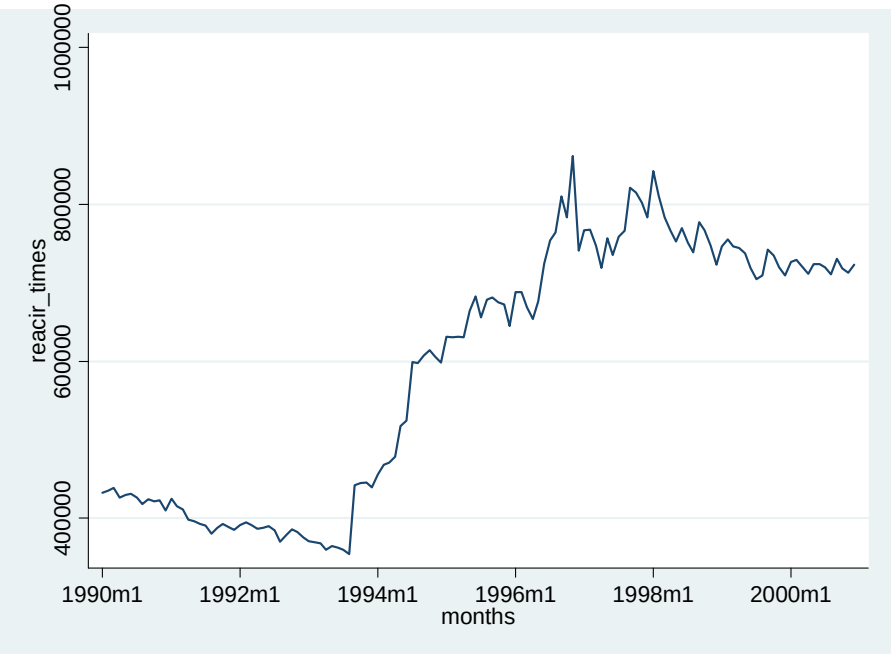

Figure 2c - Circulation of The Times

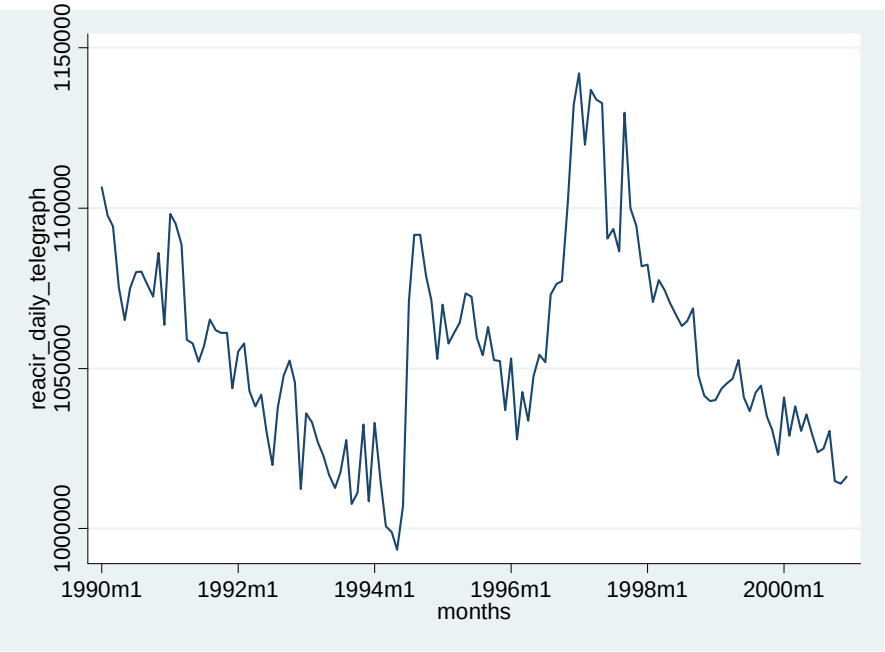

Figure 2d - Circulation of the Daily Telegraph

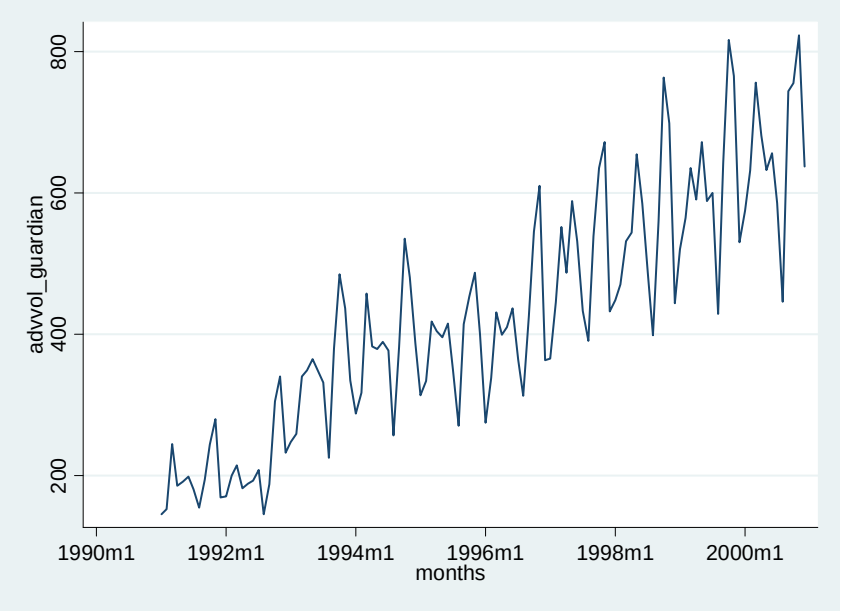

Figure 3a - Advertising Volume on the Guardian

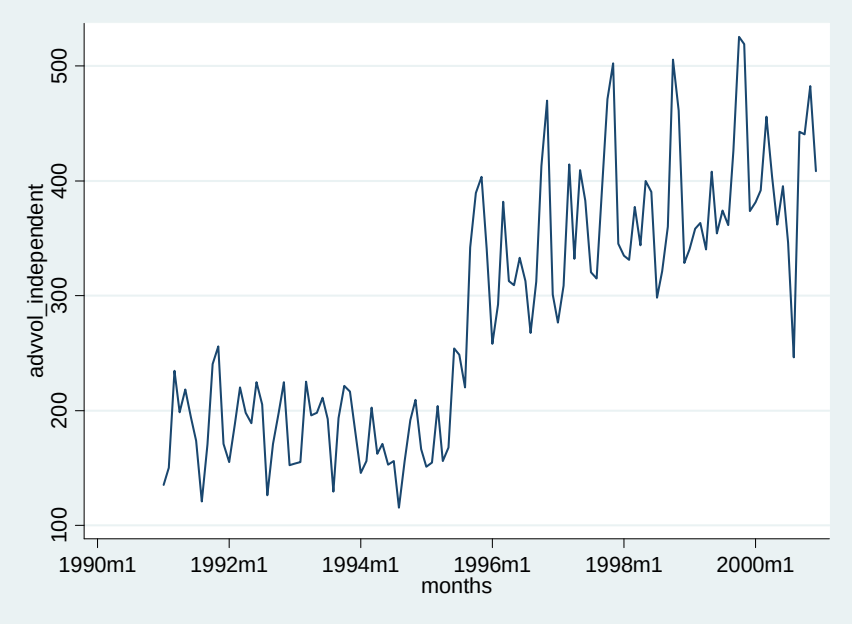

Figure 3b - Advertising Volume on The Independent

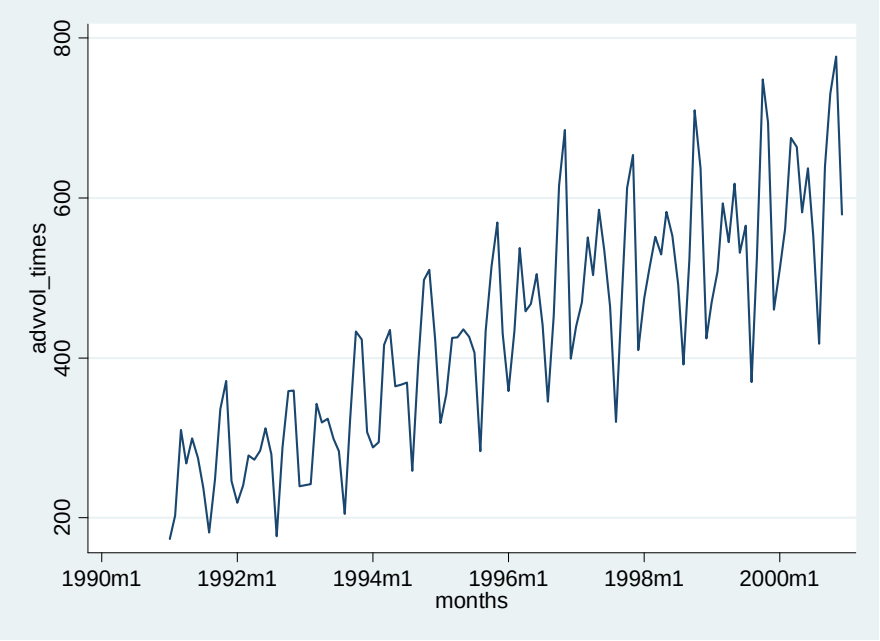

Figure 3c - Advertising Volume on The Times

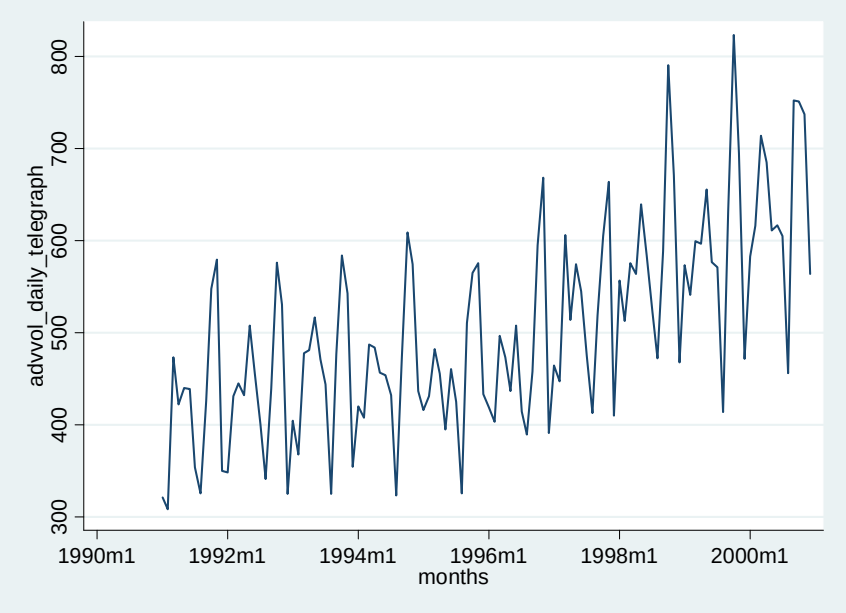

Figure 3d - Advertising Volume on the Daily Telegraph

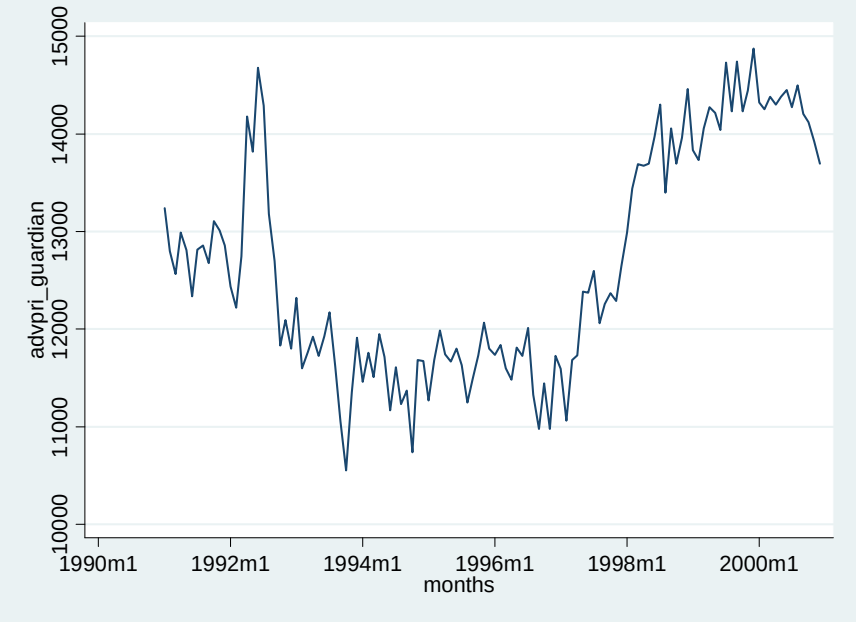

Figure 4a - Advertising Tariffs for the Guardian

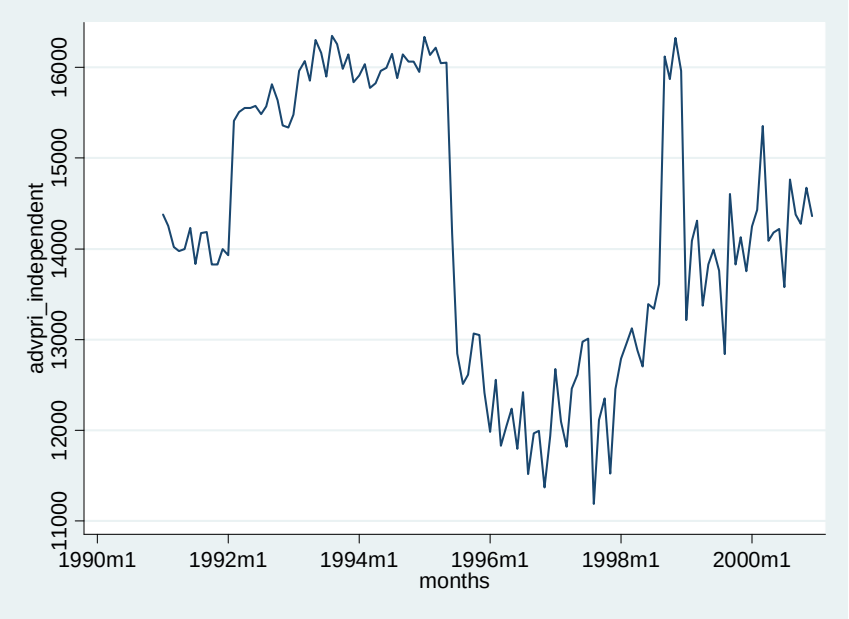

Figure 4b - Nominal Advertising Tariffs for the Independent

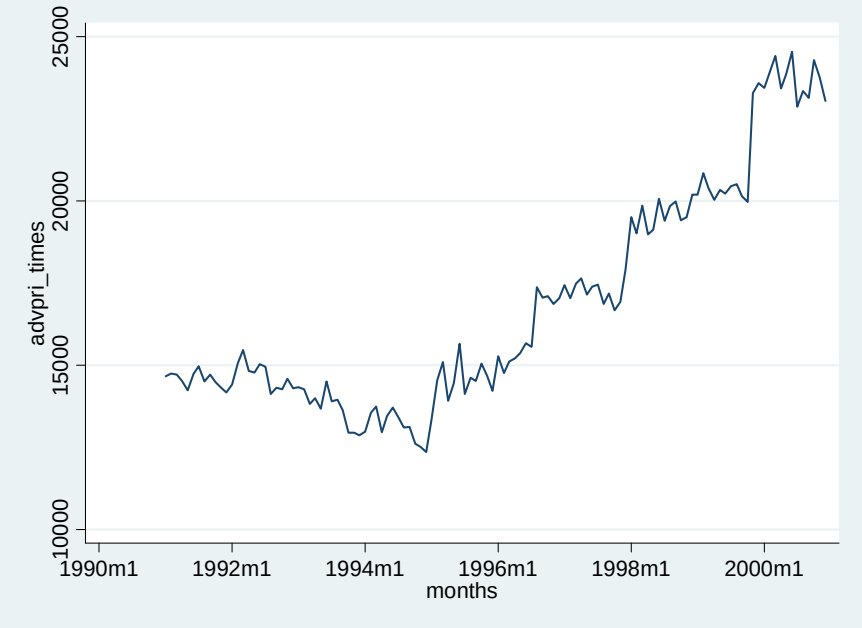

Figure 4c-Nominal Advertising Tariffs for the Times

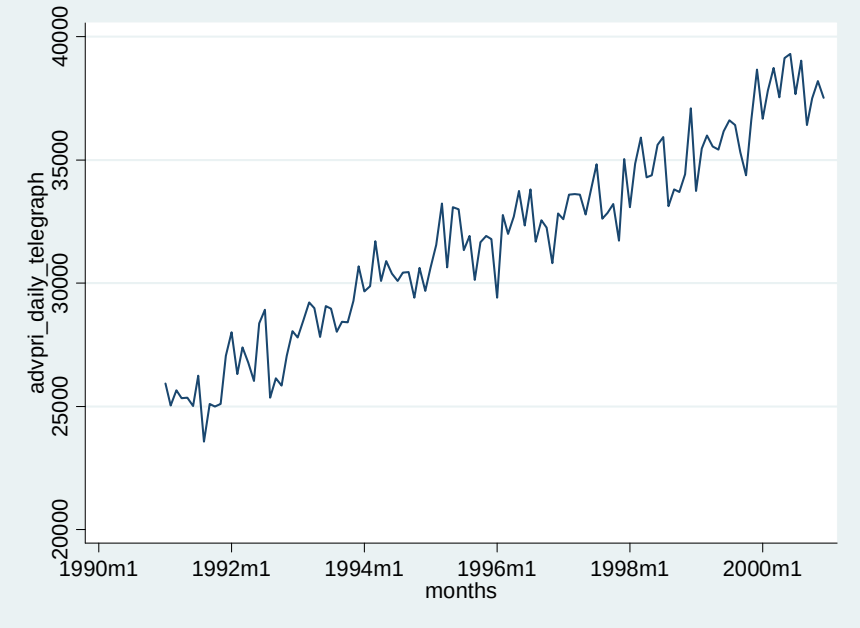

Figure 4d- Nominal Advertsing Tariffs for the Daily Telegraph

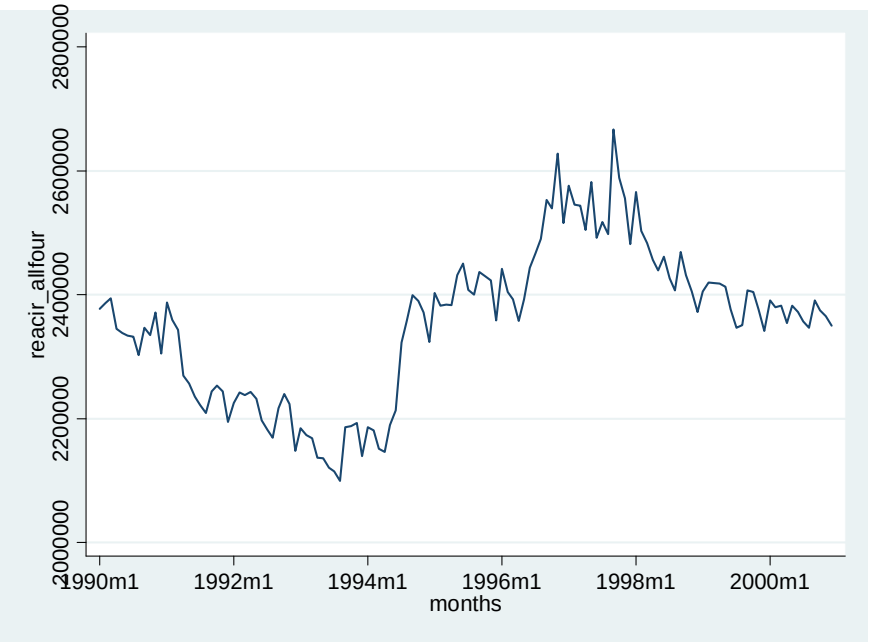

Figure 5 i- Circulation of all four quality newspapers

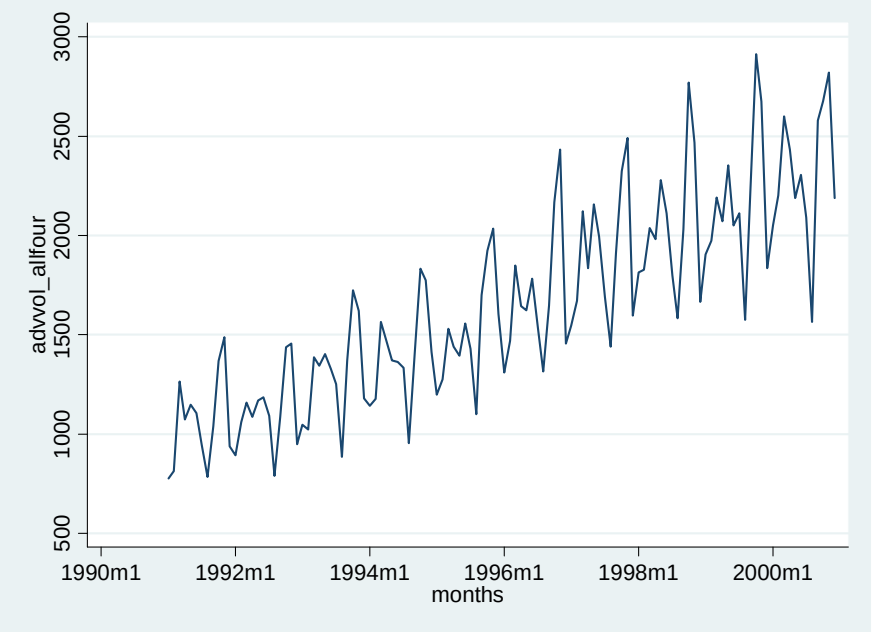

Figure 5ii - Advertising volume for all four quality newspapers

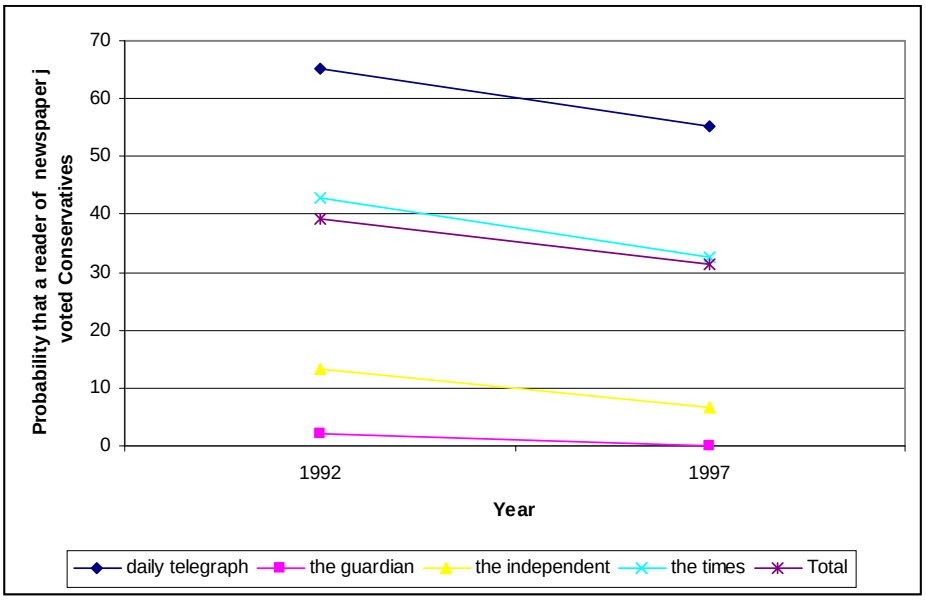

Figure 6i - Political position (percent readers voting Conservatives- absolute)

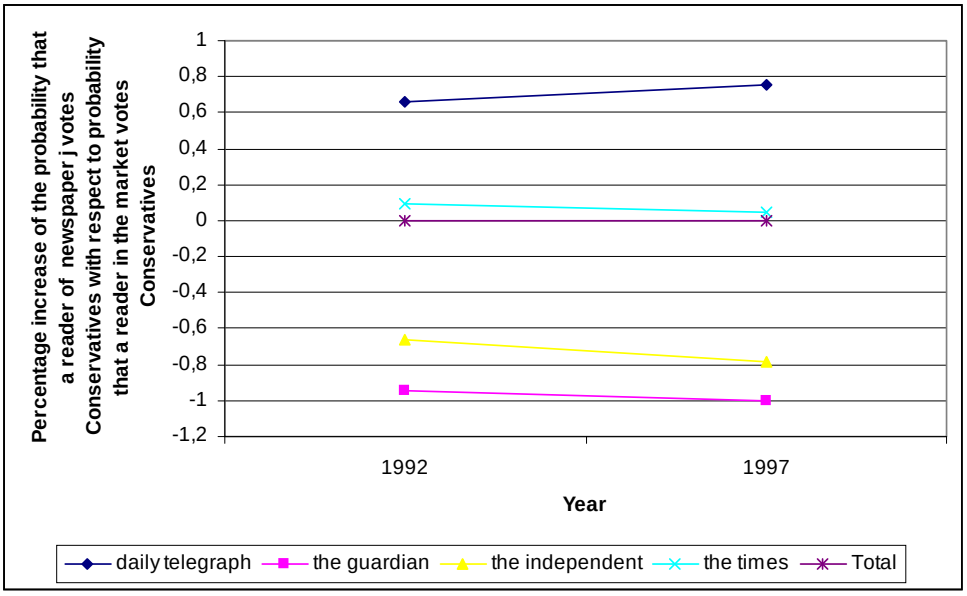

Figure 6ii - Political Position (percent readers voting Conservative - relative)