

# TAX POLICY AND MARKET STRUCTURE<sup>1</sup>

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**Abstract:** A structural model of entry and taxation is presented to explain the changes in market structure resulting from the 1869 stamped paper tax reform act that abolished taxation on paper used for advertising and publishing news in the Netherlands. Data on when and where the newspapers existed and were introduced together with demographic census data are used to test the model. We find that the production costs reducing tax cut lowered the average market size necessary for profitable first entry and changed the competitive conduct allowing competition to grow in locally concentrated markets with sufficient potential demand. The paper's results are valuable to any policy related discussion on the effects of taxation and entry limitation on market structures and the development of new industries such as wireless telecommunication and e-businesses.

**Keywords:** Natural experiment, entry, taxation, competition, profitability.

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*"Every morning, when you opened the morning newspaper, 'cut' was the most common noun, 'cut' was the most regular verb."* **"Cuts", Malcolm Bradbury, 1987**

## **1. Introduction**

Tax cuts change competition and the structure of markets. Production costs reducing shocks from tax changes affect entry conditions just like cost-reducing technological shocks<sup>i</sup>. New firms enter, commodity prices fall, more customers are served, while incumbent firms' profits increase. Usually we do not observe cost-reducing shocks directly, or at least not their exact timing. This is why quantifying the effects of taxation on the firms' profits and on the structure of the market in which the firms operate is non-existent in the structural-empirical literature on taxation and entry. This paper tries to fill this gap. We study how a production costs reducing tax cut in 1869 affected the competitive conduct and the market structure for daily newspapers in the Netherlands.

On July 1<sup>st</sup>, 1869, 21 years after the freedom of press was written into the New Constitution of the Kingdom of The Netherlands, a new constitutional law was implemented that repealed the "stamped paper tax" (see Appendix 1). The tax stamp on all paper used for news provision and advertisements was no longer allowed. This reduced variable production costs for newspapers by as much as 50 percent (Hemels (1969)). As a result of this in the period 1869 to 1871 the number of available newspapers increased from 41 to 62 countrywide. Entry occurred in two different ways: 7 appeared as monopolists in small and distant towns, while 14 entered in multiple firm markets in large cities. Many towns already served by one or at most two newspapers, however, did not face a change in their local newspaper market structure. The information on when and where the newspapers existed and entered combined with demographic census data from 1859 and 1869 are used to study the effects of tax reduction on the market structure for daily newspapers in the Netherlands.

We present a theoretical model of entry and taxation in concentrated markets and derive the price and entry effects of an exogenous shock in the variable costs. Existing theoretical models of entry and taxation either assume monopolistic competition (Seade (1980), Besley (1989)) or monopolists' provision of new goods (Romer (1994)). The model presented here combines that with free-entry competition models with zero-profits entry thresholds of equilibrium demand. Free-entry competition models were developed to study how entry in concentrated markets change profitability or competitive conduct (Bresnahan and Reiss (1990, 1991, 1994); Berry (1992)). The advantage of these models is that one does not need to observe the price-costs margins of incumbent and entering firms to quantify how shifts in market demand affect profitability, the market's structure and competitiveness.

In this paper the free-entry model is extended with a tax component to analyze how variable production costs reducing tax shocks can change competitiveness and profitability in locally concentrated markets. Monopoly and oligopoly entry thresholds are determined based on the average market size needed to support a given number of firms. The entry order of each firm, being derived from the moment of entry, will be used to distinguish different firms in the same location.

The theoretical model predicts that lower taxes reduce entry thresholds and equilibrium prices and increase aggregate demand and the number of firms. The econometric analysis shows that entry in small towns resulted from the fact that the tax reduction lowered the variable production costs and made it profitable to enter as a monopolist in smaller markets with less demand for newspapers. Most of the new local monopolies were created in small towns far away the province's largest city – usually its capital city – already served by at least one newspaper. It shows that local markets were not completely isolated, but spill-over effects from one town to another were limited by geographical distance. In the largest cities, that could accommodate a variety of newspapers, publishers profited most from the

change in competitive conduct induced by the tax cut. A town's relative wealth, measured as the rate of empty houses relative to occupied houses and by the number of people living in one house, did not play a role in the entering decision. Regardless of the market structure, however, all new dailies were put in places with the highest population growth rates over the last decade.

The paper is organized as follows. Section 2 discusses the historical background of the stamped paper tax and the arguments against it used at the time it was abolished. Summary information on the data used are given in section 3. Section 4 presents a structural model of free entry in concentrated markets with taxation. In section 5 the econometric results of a town-level analysis are discussed together with how changes in competitive conduct explained the way entry occurred. An analysis focussing on the determinant factors of entry choices at the individual newspaper level is also presented. Section 6 concludes.

## **2. The 1869 newspaper tax reform act<sup>ii</sup>**

The stamped paper duty remained from the "*timbre extraordinaire*" of the French Empire's tax laws installed in 1811 one year after the annexation of the Netherlands. To keep governmental control over the information flowing to the citizens tax stamped paper was the only format that was legally allowed for advertisements or announcements designed for publication in newspapers. After 1848, when freedom of speech, press and expression were written into the New Constitution of the Kingdom of The Netherlands, the stamped paper duty constituted the last remaining obstacle to be removed from the route to economic press freedom.

On April 17<sup>th</sup>, 1867 an influential group of Dutch intellectuals founded the "Anti-Stamp-Duty-Alliance". The arguments they put forward to persuade the government abolishing the newspaper tax law were:

- 1: fundamentally political: a free press is a *sine qua non* for a parliamentary-constitutionally ruled country. Repeal of the stamped paper duty creates opportunities for new newspapers to be set up and break down the existing monopolistic structure.
- 2: socio-economic: the imposition of large levy on newspapers' gross income is not only disadvantageous for the newspapers themselves; trade and industry suffer losses as well.
- 3: cultural: taxation on the spread of knowledge keeps news beyond the reach of many.

All prominent newspapers were also in favor of the abolition of the newspaper tax. Publishers regarded the repeal of the stamped paper duty as a means to improving the literacy of the Dutch citizens. It would widen the distribution of information they struggled for to provide. The stamped paper tax withheld newspaper publishers from using their capital in favor of the improvement and enforcement of their informational powers and contents. On November 10<sup>th</sup>, 1868, the *Nieuwe Rotterdamsche Courant*, a leading and widely read daily newspaper, wrote:

*“Is it not an anomaly that the State spends a fortune on education, while keeping people from decent and inexpensive daily readings through a stamp tax levied upon newspapers?”*

Incumbent newspapers actually welcomed more competition. The tax cut was expected to widen and liberalize the market for newspaper. Not only would it enhance competition, it would also increase the availability of information and increase incumbents' opportunities to grow and survive when profits and sales would rise as a result of the upward shock in the demand for newspapers in general. Income losses from lower prices due to increased competition were expected to be offset by the increased readership served by those best equipped to face it, *in casu* the existing newspapers.

The tax on paper for printing news was officially repealed on the 1<sup>st</sup> of July 1869 (see Appendix I). The tax cut caused a considerable decrease in variable production costs, led to increased competition and a fall in the real aggregate price level. In its early years the newspaper industry produced general information that often was only locally available. During the time of the paper tax, the period 1848 to 1869, confessional or politically oriented daily newspapers did not exist, most of the newly added titles in the period 1869-1871 are called the new general newspaper of town so-and-so. Only much later, in the late 1890s, segregation or compartmentalization of the newspaper market started to become important. Moreover, mentioned in The Alliance's second and third argument the provision of knowledge and useful new information occurred by means of daily newspapers, rather than by science books or academic journals. Those were only available via specialized libraries in University towns.

### **3. The data**

Table 1 compares demographic data obtained from the 1869 census with information on when and where newspapers existed and were introduced in the period 1869 to 1871. In 1869, before the shock, 42 daily newspapers were published in 31 towns. During the period 1869-1871 an amount of 21 additional newspapers were established, an expansion that has been the largest in the whole industry's life cycle by far<sup>iii</sup>. Two-third of the newcomers started at large places where other newspapers existed already: Amsterdam (+5), Arnhem (+2), Den Bosch (+1), Den Haag (+1), Groningen (+1), Maastricht (+1), and Rotterdam (+3). The average population of those cities yielded 85,100 citizens in 1869. One-third of the new entrants were brought to provincial towns where no local newspaper was yet available. The average population of these towns was 12,300 with a minimum of 5,400 citizens (Den Helder, Deventer, Enkhuizen, Harlingen, Roosendaal, Tilburg, and Winschoten). In 25 towns 28

newspapers were published at the time of the 1869 tax reform while no new ones were added. After the tax cut the average population per available newspaper dropped from 24,500 to 17,700 people. Den Bosch with 24,400 inhabitants was the smallest town that added a newspaper along existing ones.

**[INSERT TABLES 1 & 2 ABOUT HERE]**

The smallest town that added a newspaper after 1869 had a population of 5,400 people (Enkhuizen). We therefore define the choice set of towns that may have introduced a new journal after the tax cut as all the existing Dutch towns with at least 5,000 people in 1869<sup>iv</sup>. Table 2 presents 1869 demographic characteristics of all the 76 Dutch towns. Most of the information is obtained from the Netherlands Statistics 1869 census (CBS, 1999). It includes the town size (*PoP1000*), the percentage population growth between 1859 - the previous census - and 1869 (*PerGrPoP*); the number of people in a single household (*PopPerHs*); the town's surface area (*Area*); the number of people per squared kilometer surface area (*PoPArea*); and the ratio of unoccupied to occupied houses (*EFs*). Unfortunately, the census data do not include literacy data or wealth data. We consider the variables *PopPerHs* and *EFs* as proxies for a town's wealth, assuming that wealthier towns have fewer occupants per household and relatively fewer empty houses. In addition for each town we measured the geographical distance in kilometers to the largest city of the province it belonged to (*Dist*).

Table 2 shows that the average population of multiple newspaper towns was three times larger than that of single newspaper towns before the 1869 tax cut and five time larger thereafter. While the average size of single newspaper towns decreased, it went up for towns that accomodated more than one newspaper. Newspapers were added in towns with a larger than average population growth during the previous decade and with a lower population

density than existing newspaper towns. Of the two variables we have to proxy a town's relative wealth, *PopPerHs* and *EFs*, the first does not show much variation, while the second does. New single newspaper towns had lower average rates of unoccupied houses. They were also located at larger distances from the provinces' biggest cities.

**[INSERT TABLE 3 ABOUT HERE]**

Table 3 shows simple probabilities of newspaper entry in Dutch towns. A distinction is made between first entry into towns with no newspaper available before the 1869 tax cut and entry into an existing newspaper market. Population size contributes positively to entry in general. The town's rate of growth over the last decade is especially important for first entry. The probability of first entry is higher if a town is located farther away from the largest city of the province, but the reverse is true for entry into existing markets. Though higher in variation, the explanatory power of wealth variable *EFs* is not good at all. *PopPerHs* on the other hand does provide some explanatory power especially for entry in existing markets.

#### **4. A model of taxation and entry**

This section presents a theoretical model of entry and taxation. It is meant to analyze in theory how market structures can change when an industry is freed from taxation on the variable costs of production. We seek for answers to why the majority of new firms entered into existing markets in large cities and some as monopolists in small towns, while no entry occurred in the majority of towns already served by one or two newspapers.

**[INSERT FIGURE 2 ABOUT HERE]**

Our analysis concentrates on the impact of taxation on the market structure and on the local markets' competitive conduct. Competition can change through entry of new firms. Competitive conduct changes when, for a given number of firms, the profitability of each incumbent firm changes, for example, because of a downward shock in the costs of production. Figure 2 shows the effects of a tax reduction in variable profits on the equilibrium price for news and on the equilibrium quantity of available news. Two local market structures are being considered. One accommodates  $n_1$  firms, the other  $n_2 > n_1$  firms. In both markets, firms are facing a downward sloping demand curve, but as the size of the market increases market demand rotates outward (Bresnahan and Reiss, 1991). The equilibria in the two markets are  $\{A: [P^\tau(n_1) ; Q^\tau(n_1)]\}$  and  $\{B: [P^\tau(n_2) ; Q^\tau(n_2)]\}$ . A costs reducing tax cut shifts the equilibria to  $\{C: [P(n_1) ; Q(n_1)]\}$  for the market with  $n_1$  firms and to  $\{D: [P(n_2) ; Q(n_2)]\}$  for the market with  $n_2$  firms. We can now consider the impact of the tax cut for the smaller local market with  $n_1$  firms. It can be twofold. First, without entry, there is the pure elasticity effect. The market moves from A to C along the same demand curve  $D(n_1)$ . Second, the tax cut may have induced entry of  $n_2 - n_1$  firms. The equilibrium price level then falls with an additional  $P(n_2) - P(n_1)$  and the equilibrium output increases with an extra  $Q(n_2) - Q(n_1)$ . The change in competitive conduct from entry is a function of the price ratio  $P(n_2)/P(n_1)$ , assuming that the slope of the demand curves are unaffected by a change in the tax rate  $\tau$ . This is identical to  $P^\tau(n_2)/P^\tau(n_1)$  and is determined by the increase in the number of firms from  $n_1$  to  $n_2$  only. The larger  $n_1$ , the closer the price ratio is to one. Consequently, in existing markets without entry after a cost reducing tax shock, the effect on equilibrium prices is the same regardless the market structure. With entry, however, prices fall more substantially the more concentrated the market is prior to the shock.

The structural model of entry and taxation that we present in this paper starts with the entry of a monopolist newspaper into a town that did not have a newspapers before. This part

is related to Romer's (1994) new goods model. We investigate the effects of the downward shock in variable profit taxation on the equilibrium price level, the information provided in each town, and the change in the number of towns served by monopolist newspaper firms. Next, we define entry thresholds (cf. Bresnahan and Reiss (1991)) to analyze changes in competitive conduct in cities that added newspapers after the tax cut.

*Entry as a monopolist*

In line with the Alliance's arguments presented in section 2, we assume that the existence of a newspaper in a town signals the town's capability to produce a modern good. The production of it requires knowledge and skilled labor as inputs. Other towns that do not have newspapers can only produce a traditional good for which just manual labor is needed as an input. We assume that a country's total GDP consists of the production from M+N towns. In M towns traditional - e.g. agricultural - goods are produced. The other N towns produce modern - e.g. industrial - goods. In principle, each town can produce agricultural products. But as soon as sufficiently skilled labor is available the town changes from traditional to modern production.

Single newspaper firms are present in  $i=1, \dots, N_1$  towns. The presence of a newspaper in town  $i$  thus signals the production the modern good  $Y_{li}$ . The inputs for  $Y_{li}$  are knowledge  $X_i$  provided by the newspaper firm and skilled labor  $L_i$  which is proportional to the town's total population  $S_i$  and varies exogenously with demographic variables  $\mathbf{Z}_i$ .  $Y_{li}$  is produced by a constant returns to scale technology. The total production of good  $Y_l$  in towns with one newspaper firm yields

$$Y_l = \sum_{i=1}^{N_1} Y_{li} = \sum_{i=1}^{N_1} S_i (\mathbf{Z}_i)^{1-\alpha} X_i^\alpha \quad 0 < \alpha < 1, \quad (3.1)$$

The set up costs  $F_I(\mathbf{W}_i)$  for the monopolist to produce  $X_i$  newspapers in town  $i$  are fixed and depend on a vector of exogenous town-specific variables  $\mathbf{W}_i$ . The variable production costs for an additional unit of  $X_i$  yields  $(1+\tau)C_1(\mathbf{V}_i, \mathbf{W}_i)$ , where  $\mathbf{V}_i$  is a vector of demographic variables affecting the demand for  $X_i$ , and the tax rate  $\tau$ , levied upon variable production costs. The tax rate  $\tau$  is equal for all towns. Once the firm has entered town  $i$ , it sets  $X_i$  and a monopoly price  $p_i$  to maximize variable profits

$$\begin{aligned} \text{MAX}_{p, X} \quad & p_i(X_i)X_i - (1+\tau)C_1(\mathbf{V}_i, \mathbf{W}_i)X_i, \end{aligned} \quad (3.2)$$

where

$$p_i(X_i) = \alpha S_1(\mathbf{Z}_i)^{1-\alpha} X_i^{\alpha-1}, \quad (3.3)$$

The equilibrium price yields

$$p_i^*(\mathbf{V}_i, \mathbf{W}_i, \alpha, \tau) = \frac{1+\tau}{\alpha} C_1(\mathbf{V}_i, \mathbf{W}_i) \quad (3.4)$$

and the equilibrium provision of newspapers yields

$$X_i^*(\mathbf{V}_i, \mathbf{W}_i, \mathbf{Z}_i, \alpha, \tau) = \left[ \frac{1+\tau}{\alpha^2} C_1(\mathbf{V}_i, \mathbf{W}_i) \right]^{\frac{1}{\alpha-1}} S_1(\mathbf{Z}_i). \quad (3.5)$$

Note that the equilibrium provision of newspapers in each town is positively related to its population size. We can now derive the effect of taxation of variable production costs on the average price charged by monopolists, the provision of newspapers per town, and the number of towns served by one newspaper firm.

We find that the abolishment of the stamped paper tax leads to lower equilibrium prices for newspapers ( $\partial p_i^*/\partial \tau > 0$ ), while more of the same newspaper is provided ( $\partial X_i^*/\partial \tau > 0$ ). Total profits of town  $i$ 's monopolist newspaper firm equal

$$\Pi_{1i} = p_i^*(\mathbf{V}_i, \mathbf{W}_i, \mathbf{Z}_i, \alpha, \tau) - (1 + \tau)C_1(\mathbf{V}_i, \mathbf{W}_i)]X_i^*(\mathbf{V}_i, \mathbf{W}_i, \mathbf{Z}_i, \alpha, \tau) - F_1(\mathbf{W}_i), \text{ or}$$

$$\Pi_{1i} = (1 + \tau)\Psi_{1i}(\mathbf{V}_i, \mathbf{W}_i, \alpha, \tau)]S_1(\mathbf{Z}_i) - F_1(\mathbf{W}_i), \quad (3.6)$$

where  $\Psi_{1i}$  denotes the variable profits of town  $i$ 's monopolist. The expression of the breakeven point for a monopolist market structure in equation (3.6),  $\Pi_{1i}=0$ , shows that if variable profits  $\Psi_{1i}$  increase, *ceteris paribus*, the minimum population size needed for profitable entry gets smaller.

The country-wide equilibrium number of towns served by a monopolist newspaper can be derived from the country's per monopolist average production. This is equal to

$$X^*(\mathbf{Z}, \alpha, \tau) = \left[ \frac{1 + \tau}{\alpha^2} C_1 \right]^{\frac{1}{\alpha-1}} (S_1(\mathbf{Z}) / N_1) \quad (3.7)$$

where  $S_1(\mathbf{Z})$  is the total population of all single newspaper towns and  $C_1$  is the average variable costs for monopolists. The per firm's net of tax revenue equals  $((1 - \alpha)/\alpha)C_1X^*$ . The equilibrium number of monopolist towns is found from letting the average fixed costs  $F_1$  be equal to the net rent. This yields

$$N_1^* = (1 + \tau)^{\frac{1}{\alpha-1}} \alpha^{\frac{2}{\alpha-1}} C_1^{\frac{\alpha}{\alpha-1}} S_1(\mathbf{Z}) / F_1 \quad (3.8)$$

assuming  $N_1^*$  is an integer. The abolishment of the stamped paper tax causes more towns being served by one newspaper firm ( $\partial N_1^* / \partial \tau < 0$ ).

### *Entry into existing markets*

Figure 2 has illustrated that even though the change in equilibrium price level may be small in the case of an unchanged market structure the difference can be quite substantial when competition increases. It is important to note that the majority of new titles that appeared between 1869 and 1871 were called “general daily newspaper” or “new general daily newspaper” of town so and so. Entry is thus considered as additional competition in a market for a homogeneous good: newspapers.

In the previous section we have said that before the tax reform  $N_1$  towns had a single newspaper. This leaves  $N-N_1$  towns with two or more different newspapers. Town  $j$  accommodates  $n_j$  newspaper firms. The  $n_j$ -th firm earns the following profit

$$\Pi_{n_j} = (1 + \tau)\Psi_{n_j}(\mathbf{V}_{j_i}, \mathbf{W}_{j_i}, \alpha, \tau)S_n(\mathbf{Z}_{j_i})/n_{j_i} - F_n(\mathbf{W}_{j_i}) \quad (9)$$

We allow for the possibility that, given characteristics  $\mathbf{V}$  and  $\mathbf{W}$ , later entrants have lower variable profits and higher set-up costs,  $\Psi_n \geq \Psi_{n+l}$  and  $F_n \leq F_{n+l}$ . As showed in Figure 2, the effect of a reduction in taxes for the  $n_j$ -th newspaper’s profitability can be separated into a change of variable profits without a change in the number of newspapers, and a change in the competitive conduct due to entry. Just as in the case for monopolists, the break-even point for the  $n_j$ -th firm is  $\Pi_{n_j}=0$ . Other things equal, an increase in variable profits lowers the population size to accommodate  $n_j$  firms, since

$$S_n(\mathbf{Z}_j)/n_j = F_n(\mathbf{W}_{j_i})/[(1 + \tau)\Psi_n(\mathbf{V}_j, \mathbf{W}_{j_i}, \alpha, \tau)] \quad (10)$$

In the case of entry, however, and allowing for  $F_n$  and  $\Psi_n$  to vary with the market structure, the overall effect of a tax reduction is difficult to predict, because in general the set up costs

are unknown and individual prices are not observed. We need an empirical approach to actually estimate the change in profit margins for which we will follow the entry threshold methodology proposed by Bresnahan and Reiss (1991). An entry threshold is a scale free unit that contains information about the effect of entry on profit margins. We are interested in the changes in competitive conduct resulting from the tax reform. Changes in profit margins between markets with n+1 and n different newspaper firms can be expressed by the following ratio (omitting subscript j):

$$\frac{S_n / n}{S_{n+1} / n + 1} = \frac{s_n}{s_{n+1}} = \frac{F_n}{F_{n+1}} * \frac{\Psi_{n+1}}{\Psi_n} \quad (11)$$

The ratio of per firm entry thresholds for n+1 and n different newspapers is close to one when markets are perfectly competitive. In that case entry has no impact on variable profits. The larger this ratio deviates from one, however, the larger the difference in market power and hence in profit margins between the n-th and the n+1-th newspaper. In the next section we will investigate the impact of the 1869 tax reform act on the profit margins of firms in towns with one or with more than one newspaper.

## **5. An econometric analysis of taxation and entry thresholds**

The 1869 tax reform act can be regarded as a natural experiment to investigate the effects of changes in taxation on variable production costs and market structure. In this section we will estimate how the tax cut changed the competitive conduct in markets with one or more firms. The analysis provides us with better understanding of why 67% of all new firms entered in large cities already served by newspapers and the other 33% of firms entered as monopolists in small towns, while no entry occurred in a majority of towns already served by one or two newspapers. We will perform a market analysis of all (76) existing towns in the

Netherlands that had at least 5,000 inhabitants. In relation to the theoretical model the number of towns without any newspapers equaled  $M=45$ , the number of towns served by a single newspaper was  $N_1=24$ , and the number of multiple newspaper towns was  $N_2=7$ . These numbers changed to  $M=38$ ,  $N_1=28$ , and  $N_2=10$  in the two years following the 1869 tax cut.

### 5.1 Town analysis

We consider the following market structures. When no newspaper is available, profits for newspaper firms are below zero ( $\Pi_1 < 0$ ). If the town has one newspaper, we assume that  $\Pi_1 \geq 0$  and  $\Pi_2 < 0$ . For towns with more than one newspaper, we have  $\Pi_2 \geq 0$ . Lacking observations on profits, we write the total profits averaged over all towns with  $J$  firms net of taxes as follows

$$\Pi_J = \Psi_J(\mathbf{V}, \mathbf{W}, \alpha, \tau) S_J - \bar{N}_J F_J(\mathbf{W}) + \varepsilon_J \quad J = 0, 1, 2, \quad (4.1)$$

with  $\bar{N}_J$  being the average number of firms in category  $J$ , and assuming that all firms in one town face the same profit. This allows us to write down an ordered probability model of newspaper provision in Dutch towns. We have for towns without newspapers:

$$\Pr(\Pi_1 < 0) = \Pr(\Psi_1 S_1 - F_1 + \varepsilon_1 < \kappa_1) = 1 - \Phi(\Psi_1 S_1 - F_1);$$

for towns with one newspaper:

$$\Pr(\Pi_1 \geq 0 \wedge \Pi_2 < 0) = \Pr(\kappa_1 \leq \Psi_1 S_1 - F_1 + \varepsilon_1 < \kappa_2) = \Phi(\Psi_1 S_1 - F_1) - \Phi(\Psi_2 S_2 - \bar{N}_2 F_2);$$

and for towns with more than one newspaper:

$$\Pr(\Pi_2 \geq 0) = \Pr(\kappa_2 \leq \Psi_2 S_2 - \bar{N}_2 F_2 + \varepsilon_2) = \Phi(\Psi_2 S_2 - \bar{N}_2 F_2),$$

where  $\Phi(\cdot)$  is the cumulative normal distribution function. For each town with 1 firm,  $\Psi_1 S_1$  is estimated as the linear combination of total population in thousands of inhabitants (Pop1000), and the variable profits of a monopolist proxied by the distance between the largest city of the province and the incumbent's town in 100 kilometers (Dist<sub>1</sub>). The ratio of unoccupied by occupied houses (EFs<sub>1</sub>) is considered to capture, in part at least, possible wealth differences among towns. We assume that firms operating in wealthier towns have lower fixed set-up costs. For example, advertising costs to obtain a given market size are fixed but are related to the town's relative wealth. Entry into monopoly markets incurs a fall in variable profits, measured by the variable "Dist<sub>2</sub>", and an increase in fixed costs, measured by the variable "EFs<sub>2</sub>".

**[INSERT TABLE 4 ABOUT HERE]**

Table 4 presents the estimation results of the ordered entry probabilities. Despite the model's scarce parameterization it predicts the percentages of firms in each category well. Population and the distance from the biggest city in the province are accurate covariates to describe the differences between market structures. The estimated average  $\Pi$ 's and break-even profits  $\kappa_1$  and  $\kappa_2$  suggest a substantial increase of profitability in all sectors after the 1869 tax reform.

#### *Changes in competitive conduct*

Before the tax reform, many of the existing monopolist newspapers received subsidies, since they were the official – controlled – information platforms of the local governments. This situation made quite a few monopolist newspaper firms perform unprofitably.

**[INSERT FIGURE 3 ABOUT HERE]**

To investigate how the tax reform act changed the profitability of newspapers across towns, we will first look at the distribution of predicted profits before and after the tax reform. Figure 3A shows the distributions of per capita profit for each town, predicted from the ordered probit model in Table 4. Before the tax cut, the curve is flat around zero indicating that a reduction of the entry barriers would induce entry. After the tax cut, the curve is steep below the zero-profit line. This points at the fact that the tax reform act added newspaper firms in all the profitable places of the entire market.

Figure 3B shows the relationship between the predicted per capita profit and the town size. It illustrates that the largest per capita profits were obtained in the biggest cities, which is why entry occurred mostly there. After the tax change some small towns became very profitable as well, while the profitability of medium sized cities remained relatively diverse.

**[INSERT TABLE 5 ABOUT HERE]**

Next, we compute the change in competitive conduct between different market structures. Using the results of Table 4, we can compute the threshold population sizes for single and multiple firms markets as follows

$$\tilde{S}_1^\tau = \frac{\hat{\kappa}_1^\tau - \hat{\beta}_1^\tau \overline{Dist}_1^\tau - \hat{\gamma}_1^\tau \overline{EFS}_1^\tau}{\hat{\alpha}_{Pop}^\tau}$$

and

$$\tilde{S}_2^\tau = \frac{\hat{\kappa}_2^\tau - (\hat{\beta}_1^\tau \overline{Dist}_1^\tau + \hat{\beta}_2^\tau \overline{Dist}_2^\tau) - (\hat{\gamma}_1^\tau \overline{EFS}_1^\tau + \hat{\gamma}_2^\tau \overline{EFS}_2^\tau)}{\hat{\alpha}_{Pop}^\tau},$$

where the bars refer to the within group variable means. The per firm entry thresholds are than computed as  $\frac{\tilde{s}_2^\tau}{\tilde{s}_1^\tau} = \frac{\tilde{S}_2^\tau / \bar{N}_2^\tau}{\tilde{S}_1^\tau}$ , where  $\bar{N}_2^\tau$  is the average number of firms in multiple firms markets. Results are given in Table 5 and show a dramatic decrease in the average population size for all market structures as a result from the abolishment of the stamped paper tax. This explains the large increase of the overall number of available newspapers right after the establishment of he new tax law. The results also show an 37 percent increase - from 1.115 to 1.523 - in the profitability of multiple firms markets for each additional firm. This explains why so much entry occurred in large cities.

## 5.2 *Firm analysis*

We also perform a firm analysis. At the firm level, we control for unobserved idiosyncratic components of both the fixed and variable costs by transforming the year of entry, available for each newspaper in the sample, into the order of entry into the local market. Until here we have assumed that the residual errors in the profit equations (4.1) were different among local markets but equal among firms in the same market. This was helpful to analyze which towns were most likely to add newspapers after the variable production costs reducing 1869 tax reform act.

The fact that we know for each newspaper in the sample the exact year of entry allows us to control for unobserved idiosyncratic components at the firm level of both fixed and variable costs. For this purpose, we transform the year of entry into the order of entry into the firm's local market. This transformation is necessary, as all the newly added newspapers entered in the short time spell of 1869 to 1871. Rather than asking which towns are most likely to see entry of news providing firms, in this section we explore the demographic

differences between existing newspapers, and newspapers that entered as monopolists or as competitors in multiple firms markets.

**[INSERT TABLE 6 ABOUT HERE]**

The sample that we use in this part of the empirical analysis includes all the 62 daily newspapers that exist in 1872. We consider three – unordered - categories of newspaper firms. The control group is formed by the 42 incumbent newspapers before the 1869 tax reform. The other two categories are *(i)* the 14 newspapers that entered into existing markets in large cities; and *(ii)* the 7 newspapers that entered as monopolists in small towns.

Table 6 presents the descriptive statistics for the three categories. Important differences can be observed between the three types of newspapers. First, monopolist firms enter in small towns while oligopolists enter in large cities. Second, monopolist firms pop up in distant towns. Third, both types of entrants chose towns that had seen more than average population growth over the decade preceding the 1869 tax cut. Fourth, both types of entrants chose towns with lower percentage of unoccupied houses than existing newspapers. Fifth, oligopolist entrants settled in towns with a large number of people per household.

**[INSERT TABLE 7 ABOUT HERE]**

Table 7 presents the estimation results of an unordered multinomial logit model for the three types of newspaper firms. The incumbent firms form the control group of this analysis. The variables that were used to proxy possible wealth differences between towns, *EFs* and *PopPerHs*, drop out due to few identifying observations. The likelihood ratio tests point at a significant difference between the two type of entrants as well as from the incumbent

newspaper firms. For monopolist entrants the population growth during the last decade is found to be the most important variable contributing to this difference. For the oligopolist entrants the other three explanatory variables, the population size, its growth rate, and distance jointly constituted a significant difference with respect to the incumbent newspapers. Noteworthy is the fact that for the last category of new firms the location of the town was close to the province's largest city as possible.

## **6. Conclusions**

In this paper we investigated how tax changes that reduce variable costs of production can affect the market structure and the profitability of incumbents and entrants. We have used an historical experiment to quantify the effects of a tax cut and analyzed its significance. The experiment consisted of the implementation of a new tax law in 1869 in the Netherlands that abolished the taxation on printing paper for newspapers. Within two years after the reform the Dutch newspaper market experienced its largest expansion in its whole history until today. Two-third of all new entrants appeared in large cities that were already served by other newspapers prior to the tax reform. The remaining one third of new entrants started out as monopolists in small distant towns where no newspaper was available before.

Our results show that the tax reduction lowered the average population size needed for profitable entry. The profitability of newspapers operating in multiple newspaper towns increased with 37 percent. This outcome provides an explanation why so many new entrants chose an existing market to start up a new business. It is also consistent with the arguments found in the historical archives on the come-about of the 1869 tax reform act. An additional firm specific analysis shows that population growth during the last decade was the most important factor for monopolists in which town to enter. Oligopolist entrants were pulled by a

combination of population size, its growth rate, and a close distance to the province's largest city.

These results are not only of historical value. They hold true for a specific industry in a small country. But it is also the first experimental empirical analysis of a theoretical structural model of entry and taxation. Therefore, our results may have a more general meaning than only the Dutch newspaper market in 1869. The tax change can be regarded as an example of changing entry conditions that result from a cost reducing shocks. It has been very successful for the profitability, market growth, competition, and the development of a new industry. In this light the paper's results should be seen as a valuable addition to any policy related discussions on the effects of taxation on market structures and the development of new industries like, for example, wireless telecommunication and e-businesses.

TABLE 1: CHANGES IN MARKET STRUCTURES DUE TO THE 1869 NEWSPAPER TAX REFORM

	NUMBER OF NEWSPAPERS <u>BEFORE</u> & <u>AFTER</u> THE 1869 TAX REPEAL		POPULATION 1869 CENSUS' (x 1,000)
<i><u>I: TOWNS WHERE NEWSPAPERS WERE ADDED</u></i>			
Amsterdam	5	10	264.1
Rotterdam	1	4	117.1
Den Haag	1	2	91.3
Groningen	2	3	38.0
Arnhem	1	3	32.3
Maastricht	2	3	28.5
Den Bosch	<u>2</u>	<u>3</u>	<u>24.4</u>
TOTAL I	14	28	595.7
<i><u>II: TOWNS WHERE NEWSPAPERS FIRST APPEARED</u></i>			
Tilburg	0	1	21.4
Den Helder	0	1	18.5
Deventer	0	1	17.8
Harlingen	0	1	9.9
Roosendaal	0	1	7.6
Winschoten	0	1	5.5
Enkhuizen	<u>0</u>	<u>1</u>	<u>5.4</u>
TOTAL II	0	7	86.3
<i><u>III: TOWNS WHERE THE NUMBER OF NEWSPAPERS (&gt;0) DID NOT CHANGE</u></i>			
Utrecht	2	2	60.4
Leiden	2	2	39.3
Nijmegen	2	2	23.0
Haarlem	1	1	31.0
Leeuwarden	1	1	26.0
Dordrecht	1	1	24.8
Delft	1	1	22.0
Zwolle	1	1	20.6
Schiedam	1	1	19.3
Middelburg	1	1	16.6
Gouda	1	1	16.0
Breda	1	1	15.2
Kampen	1	1	14.7
Zutphen	1	1	14.6
Amersfoort	1	1	13.3
Alkmaar	1	1	11.4
Almelo	1	1	10.3
Vlissingen	1	1	9.6
Roermond	1	1	9.2
Tiel	1	1	8.1
Zierikzee	1	1	7.7
Assen	1	1	6.9
Enschede	1	1	5.1
Heerlen	1	1	5.0
Schagen	<u>1</u>	<u>1</u>	<u>2.5</u>
TOTAL III	28	28	432.7

\* Source: Statistics Netherlands.

TABLE 2: DEMOGRAPHICS OF DUTCH TOWNS WITH AND WITHOUT NEWSPAPERS

		TOWNS WITHOUT NEWSPAPERS (with 5,000 people or more)		SINGLE NEWSPAPER TOWNS		MULTIPLE NEWSPAPERS TOWNS	
		Pre-1869	Post-1869	Pre-1869	Post-1869	Pre-1869	Post-1869
N° of Towns		45	38	24	28	7	10
<u>Population variables<sup>1</sup>:</u>							
<i>Pop1000</i>	Town size in 1,000s of inhabitants	8.21 (3.41)	7.45 (1.57)	22.8 (26.5)	14.1 (7.06)	68.3 (87.2)	71.9 (74.3)
<i>PerGrPop</i>	Growth rate during last decade	8.02 (3.94)	7.32 (2.39)	7.37 (6.58)	7.60 (6.63)	7.37 (2.41)	9.84 (5.49)
<i>PopPerHs</i>	Number of people in a single household	5.50 (1.04)	5.52 (1.08)	5.83 (1.25)	5.55 (0.84)	7.75 (2.17)	7.65 (2.13)
<i>PopArea</i>	Number of people per km <sup>2</sup> surface area	6.20 (14.9)	4.05 (5.77)	23.8 (27.7)	19.7 (26.0)	74.2 (82.6)	66.7 (72.3)
<u>Other demographic variables<sup>1</sup>:</u>							
<i>Area</i>	Town's surface area in 1,000 km <sup>2</sup>	3.85 (2.44)	3.95 (2.39)	2.00 (1.84)	2.18 (2.05)	1.73 (1.35)	2.22 (1.95)
<i>Dist</i>	Distance to the province's largest town (in 100 km)	.357 (.222)	.327 (.206)	.247 (.206)	.332 (.240)	.080 (.144)	.082 (.137)
<i>EFs</i>	Ratio of unoccupied and occupied houses	6.33 (5.58)	6.84 (5.84)	10.4 (7.36)	8.78 (7.53)	9.11 (8.03)	9.28 (6.69)

<sup>1</sup> Standard deviations are given between brackets

TABLE 3: SIMPLE PROBABILITIES OF NEWSPAPER ENTRY IN DUTCH TOWNS

		OVERALL ENTRY	FIRST ENTRY	ENTRY INTO EXISTING MARKET
N° of towns (in choice set)		76	45	31
N° of towns with entry		14	7	7
<u>Population variables<sup>1</sup>:</u>				
<i>Pop1000</i>	Town size in 1,000s of inhabitants	.037** (.014)	.191** (.075)	.047** (.021)
<i>PerGrPop</i>	Growth rate during last decade	.109** (.041)	.145* (.070)	.083 (.052)
<i>PopPerHs</i>	Number of people in a single household	.270* (.117)	-.086 (.242)	.481** (.186)
<i>PopArea</i>	Number of people per km <sup>2</sup> surface area	.009* (.004)	.068 (.143)	.007 (.005)
<u>Other demographic variables<sup>1</sup>:</u>				
<i>Area</i>	Town's surface area in 1,000 km <sup>2</sup>	-.040 (.072)	.068 (.143)	-.061 (.093)
<i>Dist</i>	Distance to the province's largest newspaper town	-2.42 (.708)	2.07* (1.04)	-5.58* (2.43)
<i>EFs</i>	Ratio of unoccupied and occupied houses	-5.34 (3.31)	-9.73 (6.85)	-5.33 (4.32)

<sup>1</sup> Standard errors are given between brackets

\* p-value 0 [.01 ; .05]

\*\* p-value < .01

TABLE 4: ORDERED ENTRY PROBABILITIES BEFORE AND AFTER THE 1869 TAX REFORM

<u>Variables:</u>	Pre-1869 Tax Reform		Post-1869 Tax Reform	
	<u>Estimates</u>	<u>S.e.</u>	<u>Estimates</u>	<u>S.e.</u>
<i>PoP1000</i>	.020 <sup>*</sup>	.009	.229	.059
<i>Dist1</i>	.085	1.18	1.79	1.21
<i>Dist2</i>	-11.3 <sup>**</sup>	2.53	-11.7	3.35
<i>EFh1</i>	-6.86 <sup>*</sup>	2.86	-6.11	3.64
<i>EFh2</i>	8.73 <sup>*</sup>	3.93	6.88	4.72
<u>Cut points:</u>				
$\hat{K}_1$	-1.06	.519	1.28	.784
$\hat{K}_2$	1.07	.547	6.08	1.63
<u>Predicted profits:</u>				
	<u>Mean</u>	<u>St.dev.</u>	<u>Mean</u>	<u>St.dev.</u>
$\hat{\Pi}_0$ (No news)	-3.74	2.51	-1.50	2.09
$\hat{\Pi}_1$ (Single firm news)	-.232	.763	3.28	1.58
$\hat{\Pi}_2$ (Multiple firm news)	1.26	2.14	16.1	17.1
<u>Model specification tests:</u>				
	<u>True</u>	<u>Predicted</u>	<u>True</u>	<u>Predicted</u>
%N <sub>0</sub> (No news)	59.2	59.8	50.0	49.9
%N <sub>1</sub> (Single firm news)	31.6	30.6	36.8	36.5
%N <sub>2</sub> (Multiple firms news)	9.2	9.6	13.2	13.6
Number of observations	76	76	76	76
	<u><math>\chi^2(5)</math></u>	<u>p-value</u>	<u><math>\chi^2(5)</math></u>	<u>p-value</u>
LR-test	69.7	.000	111.2	.000
	<u>Value</u>		<u>Value</u>	
Pseudo-R <sup>2</sup>	.513		.746	

<sup>1</sup> Standard errors are given between brackets

<sup>\*</sup> p-value 0 [.01 ; .05]

<sup>\*\*</sup> p-value < .01

TABLE 5: CHANGES IN COMPETITIVE CONDUCT DUE TO THE 1869 TAX REFORM ACT

	$\tilde{S}_1$	$\tilde{S}_2$	$\bar{N}_2$	$\tilde{S}_2 / \bar{N}_2$	$\tilde{s}_2 / \tilde{s}_1$
Before 1869 Tax Reform	34,319*	93,013	2.43	38,277	1.115
After 1869 Tax Reform	5,350	27,698	3,40	8,146	1.523

\* Since  $\hat{\kappa}_1 < 0$ , we used  $\hat{\kappa}_1 = 0$ .

TABLE 6 : DESCRIPTIVE STATISTICS FOR THREE TYPES OF NEWSPAPERS

		EXISTING NEWSPAPERS		FIRST ENTRY		ENTRY INTO EXISTING MARKET	
N° of Firms		41		7		14	
<u>Firm specific variables<sup>1</sup>:</u>							
		<u>Mean</u>	<u>St.Dev.</u>	<u>Mean</u>	<u>St.Dev.</u>	<u>Mean</u>	<u>St.Dev.</u>
<i>YrEntry</i>	Year of entry	1820	49.7	1870	.488	1870	.534
<i>OrderE</i>	Order of entry	1.36	.859	1	0	4.64	2.79
<u>Market specific variables<sup>1</sup>:</u>							
<i>PoP1000</i>	Town size in 1,000s of inhabitants	56.0	81.5	12.4	6.79	137.1	103.8
<i>PerGrPop</i>	Growth rate during last decade	7.46	5.17	11.8	7.67	10.7	5.62
<i>PopPerHs</i>	Number of people in a single household	6.86	2.11	5.38	.788	8.99	2.34
<i>Dist</i>	Distance to province largest town with news	17.2	19.8	51.7	25.3	1.86	6.95
<i>EFs</i>	Ratio of unoccupied and occupied houses	.093	.076	.036	.028	.057	.047

TABLE 7: THE DEMOGRAPHIC EFFECTS OF ENTRY CHOICES

MULTINOMIAL LOGISTIC ANALYSIS (CONTROL GROUP: INCUMBENT NEWSPAPER FIRMS)

<u>Variables:</u>	MONOPOLIST ENTRANT		OLIGOPOLIST ENTRANT	
	<u>Estimate</u>	<u>s.e.</u>	<u>Estimate</u>	<u>s.e.</u>
<i>Constant</i>	-3.80	2.39	-2.09**	.946
<i>Pop1000</i>	-.122	.111	.005	.003
<i>PerPopGr</i>	.256**	.117	.111	.069
<i>Distance</i>	.050	.033	-.075'	.044

' p-value 0 [.05 ; .10]

\*\* p-value < .05

Model specification test:

N <sup>o</sup> of Firms	62
Log Likelihood	-34.04
Pseudo R <sup>2</sup>	.358

LR Test of zero parameters:

Monopolist Entrants	[ $\chi^2$ (3) ]	7.05	[p-value = .070]
Oligopolist Entrants	[ $\chi^2$ (3) ]	8.73	[p-value = .033]
Both Entry Types	[ $\chi^2$ (6) ]	15.9	[p-value = .014]

LR Test of equal parameters:

Both Entry Types	[ $\chi^2$ (3) ]	8.72	[p-value = .034]
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# STAATSBLAD

VAN HET

## KONINGRIJK DER NEDERLANDEN.

(N<sup>o</sup>. 60.) **W E T** van den 9den April 1869, houdende  
afschaffing van het zegelregt op de gedrukte stukken  
en op de advertentien in de nieuwspapieren.

WIJ WILLEM III, BIJ DE GRATIE GODS, KONING DER NEDER-  
LANDEN, PRINS VAN ORANJE-NASSAU, GROOT-HERTOG VAN  
LUXEMBURG, ENZ., ENZ., ENZ.

Allen, die deze zullen zien of hooren lezen, salut! doen te weten:

Alzoo Wij in overweging hebben genomen, dat het noodzakelijk  
is het zegelregt op de gedrukte stukken en op de advertentien in  
de nieuwspapieren af te schaffen;

Zoo is het, dat Wij, den Raad van State gehoord en met  
gemeen overleg der Staten-Generaal, hebben goedgevonden en  
verstaan, gelijk Wij goedvinden en verstaan bij deze:

### Artikel 1.

Het zegelregt op de gedrukte stukken en op de advertentien in  
de nieuwspapieren wordt met den laatsten dag der maand Junij  
van het jaar 1869 afgeschaft.

### Artikel 2.

Art. 19 der wet van 3 October 1843 (*Staatsblad* n<sup>o</sup>. 47) blijft  
van kracht ten aanzien van de zegelregten op advertentien, ge-  
plaatst in bladen, welke vóór den 1sten Julij 1869 zijn gedrukt  
en uitgegeven.

Lasten en bevelen, dat deze in het *Staatsblad* zal worden ge-  
plaatst, en dat alle Ministeriële Departementen, Autoriteiten,  
Collegien en Ambtenaren, wien zulks aangaat, aan de naauw-  
keurige uitvoering de hand zullen houden.

Gegeven te 's Gravenhago, den 9den April 1869.

W I L L E M.

*De Minister van Financien,*

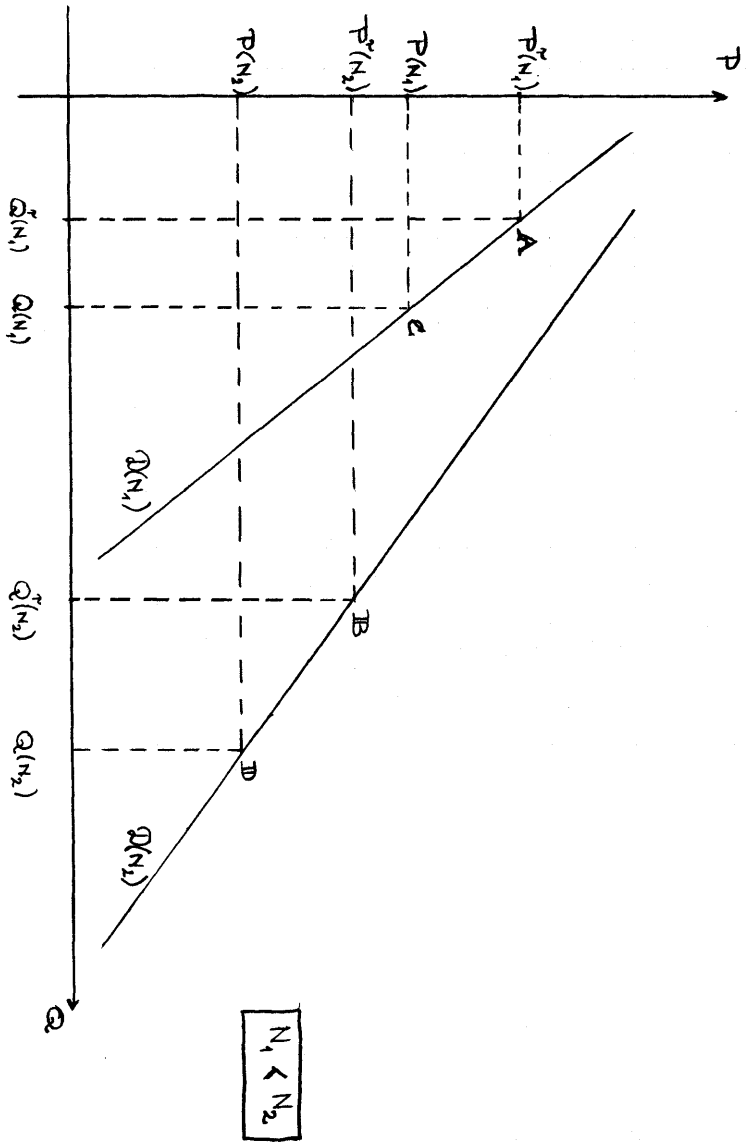
VAN BOSSE.

Uitgegeven den tienden April 1869.

*De Minister van Justitie,*

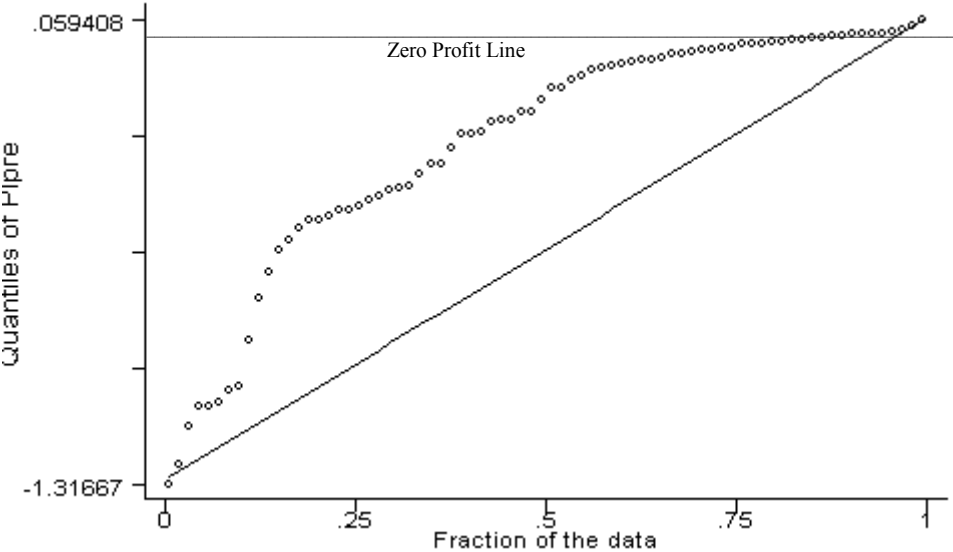
VAN LILAAR.

FIGURE 2: THE ENTRY EFFECT OF TAX CHANGES ON PRICES AND QUANTITIES

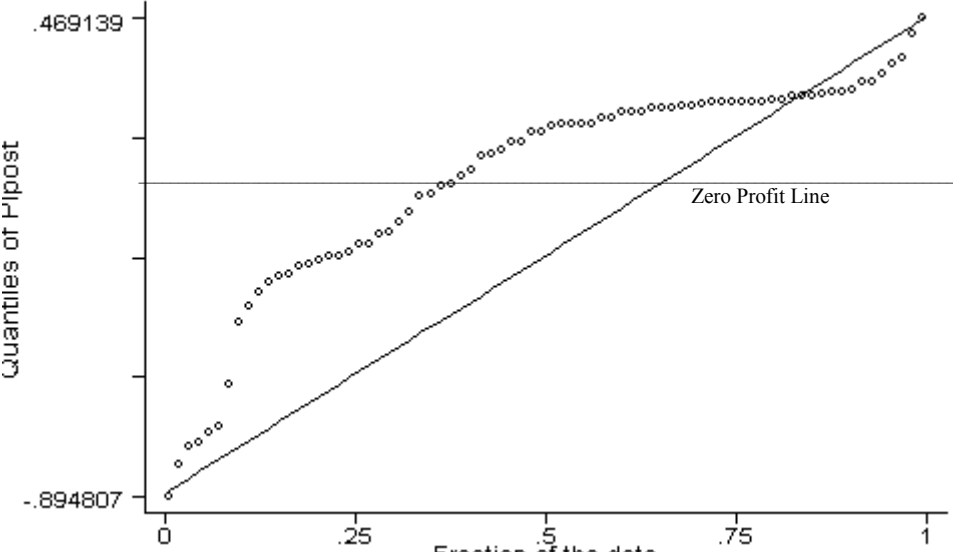


**FIGURE 3A: THE DISTRIBUTION OF ESTIMATED PROFITS**

**Pre-1869 stamped Paper Tax Reform**

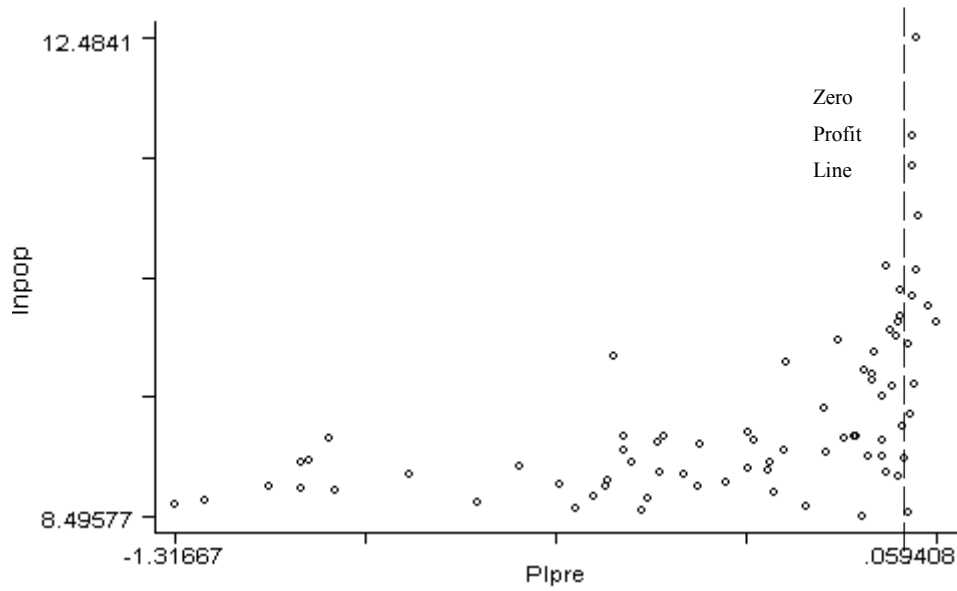


**Post-1869 stamped Paper Tax Reform**

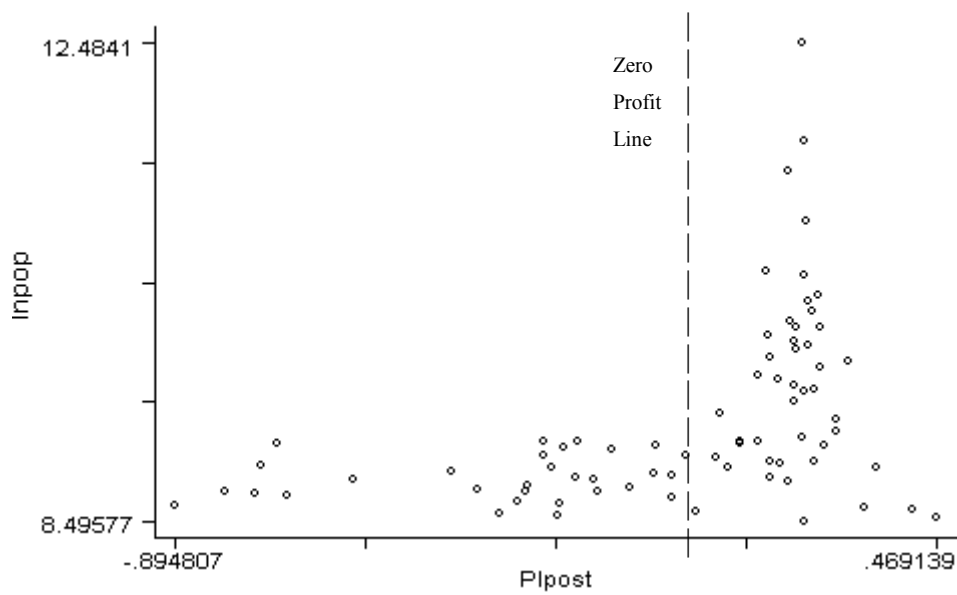


**FIGURE 3B: THE ESTIMATED PER CAPITA PROFIT BY TOWN SIZE**

**Pre-1869 stamped Paper Tax Reform**



**Post-1869 stamped Paper Tax Reform**



## ENDNOTES

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<sup>i</sup> See Jovanovic and MacDonald (1994).

<sup>ii</sup> The historical information on the “stamped paper tax” is based on Joan Hemels (1969).

<sup>iii</sup> See Kranenburg, Palm and Pfann (1998).

<sup>iv</sup> Schagen was smaller than that. Its newspaper was introduced in 1850 shortly after the establishment of the New Constitution. In the analysis of towns that were most likely to add a newspaper after 1869, we disregard all existing towns with less than 5,000 inhabitants in 1869. The reason behind this choice is the fact that it leaves out a large number of small towns where nothing happened as a result of the 1869 tax cut (dropping many uninformative zeros from the probability analysis). The definition of the choice set has one minor drawback that Schagen is thus excluded from the analysis.