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ABSTRACT

Tax Policy, Location Choices, and Market Structure*

A structural model of entry and fiscal policy is presented. It shows that taxation of variable production costs can increase product prices, lower competition, and reduce the availability of new products in small markets. The model's test is based on a unique nationwide fiscal experiment. We study the effects of the 1869 stamped paper tax reform act on the market for daily newspapers in the Netherlands. The econometric analysis uses data on when and where the newspapers existed and were introduced together with demographic census data from 1859 and 1869. The results confirm the model's predictions and show how taxation affects strategic business location decisions.

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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

This paper shows that fiscal policy has a direct impact on business location decisions of firms, production, competition, and the structure of markets. Taxes levied upon the costs of production lower the profitability of firms, discourage markets to grow, dampen competition, and suppress the development of new industries. Usually we do not observe cost-reducing shocks, let alone their exact timing. This is why quantifying the effects of taxation on firms' profits and on the organization of markets is uncommon in the structural-empirical literature on public finance and industrial organization. As a result of this lack of information, it has long been thought that fiscal policy and governmental incentive programs did not have a large impact on location choices of firms (Carlton, 1983). Later results -- arguably blurred by severe identification problems -- gave at most a vague image of that relationship (see Wasylenko, 1991, for an overview).

Only quite recently a ground-breaking study comparing differences in economic activity along borders of states that vary in particular pro-business or anti-business legislations provided convincing evidence that governmental policy can indeed influence decisions on where firms are setting up their plants (Holmes, 1998). Holmes' theoretical model is static and the empirical study is a cross section analysis at one point in time. Our paper aims to extend the literature, adding a dynamic dimension to the business location model. We investigate entry decisions and realized location choices in condensed markets aroused by a pregnant change in corporate tax law.

Existing theoretical models of entry and taxation either assume imperfect competition (Seade (1980); Besley (1989)), or monopolists' provision of new goods (Romer (1994)). Free-entry models relating entry to zero-profits thresholds of equilibrium demand have been

developed to study how entry in concentrated markets changes the profitability of firms without the necessity to observe price-costs margins of incumbent and entering firms (Bresnahan and Reiss (1991); Berry (1992)). Free-entry models are helpful to quantify how cost-reducing shocks affect profitability as a result of the change in market structure. The model presented in this paper links imperfect competition models with free-entry models. We study how prices, profits, and entry into concentrated markets changed when a tax increasing variable costs of production was eliminated. The theoretical model predicts effects that are comparable to those predicted by theories of cost-reducing technological shocks: new firms enter, commodity prices fall, more customers are being served, and firms' profits increase (cf. Jovanovic and MacDonald, 1994). We find that the minimum efficient scale to warrant profitable entry for a monopolist is larger if the tax rate on variable costs of production increases. Given the size of the population, an increase in expected variable profits increases the probability to accommodate manifold firms in the concentrated market place.

The predictions generated by the theoretical model are tested using a uniquely identified nationwide fiscal experiment that drastically changed the market structure for daily newspapers in the Netherlands. On July 1st, 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 Picture I). Tax stamps on paper used for news provision were no longer legally allowed. Its elimination reduced the variable costs of producing newspapers by as much as 50 percent (Hemels, 1969, 1992). The expansion that followed immediately after the installation of the 1869 tax law was the largest the Dutch market for newspapers experienced during its growth until World War II.

In addition to the information on when and where daily newspapers existed and entered, geographical information and demographic census data from 1859 and 1869 are collected to investigate relevant differentiations among possible entry locations. The

econometric analysis shows that publishers in the largest cities, facing sufficient demand to accommodate multiple newspapers, profited most from the change in competitive conduct induced by the abolishment of the tax on paper used for printing news. Most of the newly chosen localities to start up a daily newspaper were towns characterized by a modest population, far away from the provinces' largest city – usually its capital city – already served by at least one newspaper, that had seen large population growth in the decade preceding the 1869 tax reform.

The paper is organized as follows. Section 2 presents the historical background of the stamped paper tax and the arguments used against it at the time it was abolished. In Section 3 the structural model is presented that describes how entry choices depend on fiscal policy and market structures. Section 4 summarizes the information available in the data and presents the results of the econometric analysis. This part of the paper focuses on how changes in profitability explained the way entry occurred and what have been the dominant factors determining the entry choices of single newspapers. Section 5 concludes.

2. The 1869 newspaper tax reform act¹

The stamped paper duty was left over from the “*timbre extraordinaire pour journaux, gazettes, feuilles périodiques ou papiers-nouvelles*” that was part of the French Empire’s tax laws which had been installed one year after the annexation of the Netherlands in 1810. To keep governmental control over the information flowing to citizens, stamped paper was the only legally allowed means for distributing news, advertisements, and other announcements in press among the general public (newspaper). Detailed information on the sums of money flowing into to the government’s treasury and the number of papers actually stamped is available for every Dutch province in the year 1826 and is listed in Table 1A. In that year the average revenue was 2 cents or 0,02 Dutch guilders (D*fl*) per stamped paper. The “right to stamp” was a taxation based on the size of the paper used for printing and publishing. For a

piece of paper of the size of two square *palms* (1 *palm*=10x10 centimeter) no stamp was required. For larger newspaper the tariffs as of April 1st, 1849 are presented in Table 1B. The figures on the 1868 financial balance sheet of the *Algemeen Handelsblad*, an influential daily newspaper, are illustrative of the fact that the stamp tax weighted heavily on the exploitation and must have stifled publishers' entrepreneurial initiatives: total expenses were 299,000 guilders, which included the listed amount paid that year to the tax authorities for stamped paper duties of 143,000 guilders, or 48 percent. These numbers show that the per unit paper tax was proportional to total variable costs, and that variables costs were linear in output.

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 represented one of the last remaining obstacles to be removed from the route to economic press freedom. On April 17th, 1867 an influential group of Dutch intellectuals founded the "Anti-Stamp-Duty-Alliance". The arguments put forward to persuade the government to abolish the newspaper tax law were based on three grounds:

- 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.

On November 10th, 1868, the *Nieuwe Rotterdamsche Courant*, another 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?”

In fact, all incumbent prominent newspapers were in favor of the abolition of the newspaper tax as well. Publishers regarded the repeal of the stamped paper duty as a means to improving the literacy of the Dutch citizens. Being responsible for approximately half of the production costs, its repeal would widen the distribution of information they struggled 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. Incumbent newspapers actually welcomed more competition. The tax cut was expected to widen and liberalize the market for newspapers. 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 1st of July 1869 (see Picture I). The tax cut not only considerably lowered variable production costs, but also induced an increase in the number of available newspapers and a fall in the real aggregate price level. Following the installation of the 1869 tax law the number of available newspapers increased from 41 to 62 nationwide within the period 1869 to 1871. It is relevant to note that most of the new papers had titles like “general daily newspaper” or “new general daily newspaper”.ⁱⁱ The market expansion went hand in hand with a 50 percent drop in the aggregate price for newspapers. Such a change in a comparatively short period of time was

the largest the market for newspapers has experienced in the entire life cycle of the industry (Figure 1). The reason of this significant price drop is twofold. First, the stamped paper tax was an *ad valorem* taxation, in the sense that the per unit tax was included in the price for newspapers. It could thus be regarded as a revenue taxation on newspaper providers. Moreover, the change in the market structure after the tax repeal -- the increase of competition in big cities and the access of monopolists in smaller towns -- also reduced the aggregate price level of newspapers. Thus entry occurred in two different ways: 7 newspapers appeared as monopolists in towns that did not have a newspaper before, while 14 entered into cities where other newspapers were already available. Interestingly, in many towns served by one or at most two newspapers the market structure did not alter. We seek answers to the question why entry occurred like this. The model presented in the next section provides a theoretical explanation.

3. A model of taxation and entry

The model describes the role of taxation and population on market structures and the profitability of firms. It starts with the analysis of monopolists' access to geographically isolated markets, and is then followed by entry into existing concentrated markets.

Entry as a monopolist

This part of the model builds on Romer's (1994) new goods model. We investigate the effects of levying taxes on the costs of producing information, on the equilibrium price for information, and on the amount of information provided in each market.

Suppose that a town can produce two types of goods: old goods or new goods. The production of new goods requires information and skilled labor as inputs. A country's GDP consists of the total production from $M+N$ towns. In M towns old goods are produced, while the other N towns produce new goods. Each town can manufacture old goods, but as soon as sufficient information is available the town changes from producing old goods to producing

new goods. The new good, Y , is produced using a constant returns to scale technology that varies exogenously with each town i 's demographics \mathbf{Z}_i . The necessary inputs to produce Y_i are information X_i and skilled labor L_i that is assumed to be proportional to the town's total population S_i . In N_1 towns the provision of information is in the hands of monopolists. The total production of new goods produced in towns with monopolistic information providers is Y_1 and yields

$$Y_1 = \sum_{i=1}^{N_1} Y_{1i} = \sum_{i=1}^{N_1} S_i (\mathbf{Z}_i)^{1-\alpha} X_i^\alpha, \quad 0 < \alpha < 1. \quad (1)$$

The set up costs $F_1(\mathbf{W}_i)$ for a monopolist to provide X_i in town i are fixed and depend on a vector of exogenous town-specific characteristics \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 τ is the rate of taxation levied upon the variable costs of production. The tax rate τ 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. The monopolist's decision problem is

$$\underset{p, X}{\text{MAX}} \quad p_i(X_i)X_i - (1 + \tau)C_1(\mathbf{V}_i, \mathbf{W}_i)X_i, \quad (2)$$

where

$$p_i(X_i) = \alpha S_i (\mathbf{Z}_i)^{1-\alpha} X_i^{\alpha-1}, \quad (3)$$

The equilibrium price is equal to

$$p_i^*(\mathbf{V}_i, \mathbf{W}_i, \alpha, \tau) = \frac{1+\tau}{\alpha} C_1(\mathbf{V}_i, \mathbf{W}_i), \quad (4)$$

so that a cost-reducing tax shock leads to a lower equilibrium price level, or $\partial p_i^*/\partial \tau > 0$.

The equilibrium provision of information is

$$X_i^*(\mathbf{V}_i, \mathbf{W}_i, \mathbf{Z}_i, \alpha, \tau) = \left[\frac{1+\tau}{\alpha^2} C_1(\mathbf{V}_i, \mathbf{W}_i) \right]^{-\frac{1}{\alpha-1}} S_1(\mathbf{Z}_i), \quad (5)$$

which shows that the equilibrium outcome of a cost-reducing tax shocks yields more production of information, or $\partial X_i^*/\partial \tau > 0$. Moreover, we find that in equilibrium X_i^* is positively correlated with the size of the population in town i , or $\partial X_i^*/\partial S_1(\mathbf{Z}_i) > 0$.

The explicit formulation of the equilibrium $(p_i^*; X_i^*)$ allows us to derive the effect of taxation on the minimum population size that warrants profitable entry as a monopolist. Total profits of town i 's monopolist equal

$$\Pi_{i1} = [p_i^*(\mathbf{V}_i, \mathbf{W}_i, \mathbf{Z}_i, \alpha, \tau) - (1+\tau)C_1(\mathbf{V}_i, \mathbf{W}_i)]X_i^*(\mathbf{V}_i, \mathbf{W}_i, \mathbf{Z}_i, \alpha, \tau) - F_1(\mathbf{W}_i), \quad (6)$$

or, omitting *addenda* for computational convenience, we find that

$$\Pi_{i1} = S_1(1+\tau)^{\left(\frac{\alpha}{\alpha-1}\right)} \Psi_1 - F_1, \quad (7)$$

where Ψ_1 does not depend on S_1 , nor on the tax rate τ . From equation (7) it is easy to show that profits are smaller when taxes are larger, or $\partial \Pi_{i1}/\partial \tau < 0$. A direct comparison of entry thresholds, $\Pi_{i1}=0$, under different tax regimes yields

$$\frac{S_1(\tau)}{S_1(0)} = (1 + \tau)^{\left(\frac{\alpha}{1-\alpha}\right)}, \quad (8)$$

assuming that the other variables do not change pre and post tax. This expression shows that $S_1(\tau) > S_1(0)$, so that the minimum efficient scale that warrants profitable entry for a monopolist increases with the tax rate τ on variable costs of production.

Entry into existing markets

In this part of the model we consider a second local market structure for the production of new goods. Suppose that one market accommodates $n_1=1$ firms, while another market has $n_2 > 1$ firms. The total number of markets in the economy with n_2 firms is equal to $N_2 \equiv N - N_1$. When firms are facing a downward sloping demand curve and the size of the market increases market demand rotates outward (cf. Bresnahan and Reiss, 1991).

Figure 2 illustrates that even though the change in equilibrium price level may be small when the market structure remains unchanged, the difference can be quite substantial when competition increases. 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 shock shifts these 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. Figure 2 also allows us to study 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 induce entry of $n_2 - n_1$ firms. The equilibrium price level then falls from $P(n_1)$ to $P(n_2)$, while the equilibrium output increases with an additional $Q(n_2) - Q(n_1)$. As a result, we find that entry induces prices to fall, and that fall is more substantial the more concentrated the market is prior to the shock.

In towns with an oligopoly market structure and with Cournot competition among n identical firms, the average profit for each firm yields

$$\Pi_n = (S_n / n)(1 + \tau)^{\left(\frac{\alpha}{\alpha-1}\right)} \Psi_n - F_n. \quad (9)$$

Also in concentrated markets we find that profits per firm are smaller when taxes are larger, or $\partial \Pi_n / \partial \tau < 0$. The break-even point for the n -th firm is $\Pi_n = 0$. Other things equal, an increase in variable profits lowers the minimum efficient scale to accommodate n firms, since $S_n(\tau) > S_n(0)$. When entry occurs, however, and allowing for F_n and Ψ_n to vary among towns, the overall effect of a tax reduction is difficult to predict. In general the set up costs are unknown and prices at the town-level are not observed. If we also allow for the possibility that, given characteristics V and W , later entrants have lower variable profits and higher set-up costs, so that $\Psi_n \geq \Psi_{n+1}$ and $F_n \leq F_{n+1}$, then the model becomes much more difficult to solve analytically.

We shall thus rely on an empirical approach to actually estimate the change in profit margins. To do this we 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. How the tax reform changes competition and market structure can be inferred from changes in profit margins between markets with $n+1$ and n firms expressed by the following ratio:

$$\frac{S_n / n}{S_{n+1} / n+1} = \frac{s_n}{s_{n+1}} = \frac{F_n}{F_{n+1}} * \frac{\Psi_{n+1}}{\Psi_n}. \quad (10)$$

The larger this ratio deviates from one, the larger the difference in market power and hence in profit margins between the n -th and the $n+1$ -th firm.

4. An econometric analysis of taxation, entry thresholds and location decisions

In the early years of newspaper publishing general information was often only locally available through the distribution of newspapers. As mentioned in the Alliance's second and third arguments the transfer of knowledge and of new information occurred by means of daily newspapers, rather than by science books or academic journals. Books were only available through specialized libraries in University towns. Journals as we know them today hardly existed. Table 2 compares demographic data obtained from the 1859 and 1869 censuses with information on when and where newspapers existed and were introduced in the period 1869 to 1871. The census data used in this study are obtained from Statistics Netherlands (CBS, 1999).

In 1869, before the shock, 42 daily newspapers were published in 31 towns. Two years after the tax repeal another 21 newspapers were added. Two-third of the newcomers entered into large cities where other newspapers already existed: Amsterdam (+5), Arnhem (+2), 's Hertogenbosch (+1), The Hague (+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 started a new business in provincial towns where no other newspapers were available at that time. The average population of these towns was 12,300 people. (Den Helder, Deventer, Enkhuizen, Harlingen, Roosendaal, Tilburg, and Winschoten). The smallest town that added a monopolist newspaper after 1869 was Enkhuizen with a population of 5,400 citizens. In 25 towns that jointly held 28 newspapers at the time of the 1869 tax reform no new journals were added right after the tax repeal. In 1871 the average population per available newspaper had fallen from 24,500 to 17,700 people. The city of 's-Hertogenbosch was with 24,400 inhabitants the smallest town that added a newspaper to existing ones.

For our empirical analysis we define the choice set of towns that could have introduced a new journal after the repeal of the stamped paper tax as all existing Dutch towns in 1869 with at least 5,000 citizens.ⁱⁱⁱ Picture II shows a map of entry locations and all major towns in the Netherlands. It separately identifies the towns where entry occurred. Different symbols for towns that saw first entry and towns already served by at least one newspaper before the installation of the 1869 tax law are noted in the map's legend. For each town in the data set the census data include the town size in thousands of people (*Pop1000*); the percentage of population growth between 1859 and 1869 (*PerGrPop*); the average number of people in a single household (*PopPerHs*); the town's surface area (*Area*); the number of people per square kilometer surface area (*PopArea*); and the ratio of unoccupied to occupied houses (*EFs*). Unfortunately, the census data does not include literacy data or wealth data. We think of the variables *PopPerHs* and *EFs* as proxies for a town's wealth, and assume that wealthier towns have fewer occupants per household and fewer empty houses. We also measured the geographical distance in kilometers to the largest city of the province a town belonged to (*Dist*).

Table 3 presents 1869 demographic characteristics of all 76 existing towns with a minimum population of 5,000 citizens. The average population of multiple newspaper towns before the 1869 tax cut is found to be three times as large as that of single newspaper towns, and five times as large afterwards. While on average the size of single newspaper towns decreased, for towns that accommodated more than one newspaper it actually went up. 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 that are available to us as proxies of a town's relative wealth, *PopPerHs* and *EFs*, the first does not show much variation, while the second one does. New single

newspapers towns had lower average rates of unoccupied houses. They were also located at a larger distance from the provinces' biggest cities.

We can also look at the demographic variation between existing newspapers, newspapers that entered as monopolists, and those entering as competitors in multiple firms markets. Table 4 presents the descriptive statistics for the three categories of newspapers. Important differences among them can immediately be observed. First, monopolist firms enter into small towns while oligopoly firms enter into large cities. Second, monopolist firms pop up in far away towns. Third, both types of entrants chose towns that had seen more than average population growth over the decade preceding the 1869 tax repeal. Fourth, both types of entrants chose towns with a lower percentage of unoccupied houses than existing newspapers. Fifth, entrants in concentrated multi-firm markets settled in towns with a large number of people per household.

The 1869 tax reform act can be regarded as a quasi-experiment producing information necessary to investigate the effects of changes in taxation on variable production costs and market structure. We will estimate how the tax cut changed the competition and profitability in markets with one or more newspaper firms. We are seeking answers as to why two-thirds of all new firms entered into large cities already served by newspapers, while only one-third entered as monopolists in small towns, and why no entry occurred in a majority of towns already served by one or two newspapers. A town-specific econometric analysis of the 76 Dutch towns that had 5,000 or more inhabitants in 1869 is presented next.

The econometric entry threshold model

Before 1869, the number of towns without any newspapers was $M_\tau=45$, the number of towns served by a single newspaper was $N_{1\tau}=24$, and the number of multiple newspaper towns was $N_{2\tau}=7$. In the two years after the 1869 tax repeal ($\tau = 0$), these numbers changed to $M_0=38$, $N_{10}=28$, and $N_{20}=10$.

We consider the following market structures. When no newspaper is available, profits for newspaper firms are below zero ($\Pi_{1\tau} < 0$). If the town has one newspaper, we assume that $\Pi_{1\tau} \geq 0$ and $\Pi_{2\tau} < 0$. For towns with more than one newspaper, we have $\Pi_{2\tau} \geq 0$. Lacking observations on profits, we assume that all firms in one town face the same profit, and write the total profits averaged over all towns with J firms net of taxes as follows

$$\Pi_{J\tau} = \alpha_\tau S_{J\tau} \Psi_{J\tau} - JF_{J\tau} + \varepsilon_{J\tau}, \quad J = 0, 1, 2, \quad (11)$$

where $\alpha_\tau \equiv (1 + \tau)^{\left(\frac{\alpha}{\alpha-1}\right)}$, F_J represents the set-up costs per firm for towns accommodating J firms, and ε_J is a normally distributed unobserved random error. Equation (11) allows us to write down an ordered probability model of newspaper provision in Dutch towns before ($\tau > 0$) and after ($\tau = 0$) the repeal of the stamped paper tax. For towns without newspapers we have:

$$\Pr(\Pi_{1\tau} < 0) = 1 - \Phi(\alpha_\tau \Psi_{1\tau} S_{1\tau} - F_{1\tau}), \quad (12a)$$

for towns with one newspaper:

$$\Pr(\Pi_{1\tau} \geq 0 \ \& \ \Pi_{2\tau} < 0) = \Phi(\alpha_\tau \Psi_{1\tau} S_{1\tau} - F_{1\tau}) - \Phi(\alpha_\tau \Psi_{2\tau} S_{2\tau} - 2F_{2\tau}) \quad (12b)$$

and for towns with two or more newspapers:

$$\Pr(\Pi_{2\tau} \geq 0) = \Phi(\alpha_\tau \Psi_{2\tau} S_{2\tau} - 2F_{2\tau}), \quad (12c)$$

where $\Phi(\cdot)$ is the cumulative standard normal distribution function; $\alpha_\tau \Psi_{1\tau} S_{1\tau} = F_{1\tau}$ is the break-even point for monopoly entry, and $\alpha_\tau \Psi_{2\tau} S_{2\tau} = 2F_{2\tau}$ is the break-even point for duopoly entry.

The econometric model is specified in the following way:

$$\alpha_\tau \Psi_{1\tau} S_{1\tau} = \alpha_\tau (Pop1000 + \delta_\tau PerGrPop) + \beta_{1\tau} Dist_1, \text{ and } F_{1\tau} = \psi_{1\tau} + \gamma_{1\tau} EFS_1 \quad (13a)$$

and

$$\alpha_\tau \Psi_{2\tau} S_{2\tau} = \alpha_\tau (Pop1000 + \delta_\tau PerGrPop) + \beta_{2\tau} Dist_2, \text{ and } 2F_{2\tau} = \psi_{2\tau} + \gamma_{2\tau} EFS_2. \quad (13b)$$

Each town's net present value of revenues is estimated as the linear combination of total population in thousands of inhabitants (*Pop1000*) and the growth of the population between 1859 and 1869 (*PerGrPop*). The variable profits of a monopolist are proxied by the covariate *Dist₁* measuring the distance (in 100 km) to the province's largest town for all cities that do not accommodate more than one newspaper; and the variable profits of a town accommodating more than one newspaper -- proxied by the covariate *Dist₂* measuring the distance (in 100 km) to the province's largest town for all cities not accommodating one newspaper. Theory predicts a positive effect of profits on the size of the population ($\alpha_\tau > 0$). Given fixed costs of entry are nonzero, we expect that larger growth rates of the population reduce the time firms spend waiting for entry (Dixit, 1989). The higher the growth rate of the population, the more likely it is that entry is observed in a concentrated market ($\delta_\tau < 0$). Entry into monopoly markets is predicted to generate a drop in variable profits, so that $\beta_{1\tau} > \beta_{2\tau}$.

Set-up costs for a monopolist are approximated by the covariate EFs_1 containing the ratio of unoccupied to occupied houses for all cities that do not accommodate more than one newspaper. EFs_1 is considered to capture, at least in part, possible wealth differences among towns. Wealthier towns have fewer unoccupied houses and thus a lower ratio EFs_1 . In wealthier towns the same set-up costs for first entrants form a lesser entry barrier when the expected revenues are higher. Advertising expenditures, for example, necessary to obtain a particular market size are sunk set-up costs. When the public purchasing power is higher and more people are able to buy the new good, advertising costs can be lower to achieve a given market size. Set up costs are thus inversely related to a town's wealth. If the unoccupied to occupied housing ratio is high in comparison to other towns, that town is supposed to be less wealthy. Its set-up costs are higher, and it takes longer to earn back sunk investments since profits are lower. The null hypothesis of this test would then be that the probability that profits would be positive is lower, or $\gamma_{1\tau} > 0$. Changes in set-up costs in markets with more than one newspaper are captured by the variable EFs_2 containing the ratio of unoccupied to occupied houses for all cities not accommodating one newspaper. If set-up costs are higher when markets are more concentrated markets, then $\gamma_{1\tau} > \gamma_{2\tau}$.

Table 5 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. In equation (1) we assumed a constant returns to scale technology of the production of new goods. The assumption itself is difficult to test, but if correct then we can identify the technology parameter α from the fact that

$$\hat{\alpha} = \frac{\Delta}{1 + \Delta} \quad , \text{ with } \Delta \equiv \log(\hat{\alpha}_0 / \hat{\alpha}_\tau) / \log(1 + \tau) .$$

The elimination of tax stamps on paper used for news provision reduced the variable costs of production by approximately 50 percent (Hemels; 1969, 1992). Before the tax cut we thus have $\tau = 1$, whereas after the tax change $\tau = 0$. Table 5 shows that $\hat{\alpha}_\tau = 0.024$ and $\hat{\alpha}_0 = 0.243$. We thus estimate $\hat{\alpha} = .771$ (s.e.= .258), given $\tau = 1$. This result suggests that the production technology of new goods used a capital-labor input ratio that is comparable to that of the twentieth century's industrialized economies.

The probability of having a profitable newspaper added in a city without a newspaper before 1869 increased from 8/45 to 14/45 or 13.3 percent points. Figure 3A shows how the probability of having a profitable monopolist newspaper before the repeal of the stamped paper tax varies with the size of the population. Figure 3B shows the same probability distribution afterwards. The “dots” in both Figures 3A and 3B represent towns that were excluded from newspapers before as well as after the shock. The “plusses” are towns that did not have a newspaper before the tax shock, but saw entry of a monopolist news provider as a result of the change in the tax law. Comparing Figures 3A and B reveals how fiscal policy can contribute to potential market expansion and how the decrease in minimum efficient scale gave rise to widening the availability of newspapers.

The estimated averages of the predicted profits, $\hat{\Pi}_j$, suggest a substantial increase of profitability in all sectors after the 1869 tax reform. That $\hat{\psi}_1 < 0$ before the repeal is evidence of the fact that preceding the 1869 tax law many of the existing monopolist newspapers were performing unprofitably, possibly because they received subsidies, as they were the official – controlled – information platforms of the local governments. These subsidies were discontinued after the tax repeal to balance budgets. The parameter estimates are also in accordance with the theoretical predictions. Interestingly, we find that monopolies were not likely to be found in the neighborhood of the provinces' largest cities. Set up costs are found

to be inversely related to the concentration of the market ($\hat{\gamma}_{1\tau} > \hat{\gamma}_{2\tau}$). And indeed, before as well as after the repeal wealthier towns had lower set-up costs ($\hat{\gamma}_{2\tau} < 0$).

Given the distance from the nearest large city, the choice of the city to set up new businesses depends on the city's recent growth in population. The fact that towns were chosen with the largest population growth shows the rationality of the newspaper entrepreneurs in the 19th century was no different from what it is today. This has clear policy implications for local governments. If the most thriving towns -- those towns that people chose to come to live in -- have the highest probability of being chosen as the most profitable business locations, not only do fiscal incentives matter for business location choices. On top of that, governmental policies aimed at making a town attractive to live in adds to its future economic prosperity as well.

The effect of the 1869 tax repeal on competition and market structure

The results from Table 5 allow us to compute the change in competition between different market structures. The threshold population sizes for single and multiple firms markets are computed as follows

$$\tilde{S}_{1\tau} = \frac{\hat{\psi}_{1\tau} - \hat{\alpha}_{\tau} \hat{\delta}_{\tau} \overline{PerGrPop}_{\tau} - \hat{\beta}_{1\tau} \overline{Dist}_{1\tau} + \hat{\gamma}_{1\tau} \overline{EFS}_{1\tau}}{\hat{\alpha}_{\tau}},$$

and

$$\tilde{S}_{2\tau} = \frac{\hat{\psi}_{2\tau} - \hat{\alpha}_{\tau} \hat{\delta}_{\tau} \overline{PerGrPop}_{\tau} - (\hat{\beta}_{1\tau} \overline{Dist}_{1\tau}^{\tau} + \hat{\beta}_{2\tau} \overline{Dist}_{2\tau}) + (\hat{\gamma}_{1\tau} \overline{EFS}_{1\tau} + \hat{\gamma}_{2\tau} \overline{EFS}_{2\tau})}{\hat{\alpha}_{\tau}},$$

where the upper bars refer to the within group variable means before and after the shock. The entry thresholds are then computed as $\frac{\bar{S}_{2\tau}}{\bar{S}_{1\tau}} = \frac{\tilde{S}_{2\tau}/2}{\tilde{S}_{1\tau}}$. The results of this exercise are presented in Table 6. They show a substantial decrease in the minimum efficient scale for all market structures as a result from the abolishment of the stamped paper tax. This confirms the prediction of the theoretical model that $S(\tau) > S(0)$. And it is consistent with recent findings for the United States that the scale of local production depends on the size of the city chosen (Holmes, 1999). Table 6 also shows that as a result of the tax repeal the profitability for each firm in multiple firms markets almost doubled, rising from 1.36 to 2.59, confirming the theoretical prediction that $\partial \Pi / \partial \tau < 0$.

5. Conclusions

In this paper we designed a model about what happened in 1869 when the Netherlands repealed a newspaper stamp tax. Firms' variable costs declined and new newspapers entered in response. The quasi-experiment is used to draw inferences about newspapers' unobserved profits. The results show that the tax significantly lowered the population necessary to support a given market structure. We find that this particular relaxing fiscal policy had a large impact on location choices of firms and the availability of new products.

The choice where to start a new business depends on the growth in demand (population) of potential locations (markets, cities). In our analysis we measured the growth of a decade. Our results have important policy implications. Cities aiming at prosperity compete for growth. Successful ones see more people choosing to live and work there. As a result new businesses are founded. Fiscal incentives thus matter for business location choices. But maybe more vital is that thriving policy endears a town to people who are positively inclined towards working for future wealth.

The results presented in this paper are of general interest and can support any policy related debate about the effects of taxation and entry limitation on profitability, market structures, location choices, development, and the growth of new industries and of emerging markets. Although of historical interest as well and holding true for a specific industry in a small open economy, the study's broader contribution is to better understand the relation between fiscal policy and industrial organization. The 1869 tax reform act stimulated the profitability of firms, encouraged markets to grow, advanced competition, and boosted the development of the young and entrepreneurial industry of daily newspapers. Fiscal policy that suppresses the spread of knowledge to the general public is shown to undermine economic growth, development, and prosperity. After more than 150 years of freedom of speech the topic of government intervention on the availability of information cannot be of more relevance than today when the new multi-media communication opportunities challenge governments to face the increasing worldwide trade possibilities through internet exchange, and to decide if and how to develop fiscal policies for electronic trade for financing their own future prosperity.

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TABLE 1A
STAMPED NEWSPAPER TAX REVENUES PER PROVINCE IN THE NETHERLANDS IN 1826

PROVINCE	LARGEST CITY	NUMBER OF STAMPED PAPERS (x 1,000)	STAMPED PAPER TAX REVENUES (x 1,000 Dfl)
North Holland	Amsterdam	2,206	44.1
South Holland	Rotterdam	726	14.5
North Brabant	's Hertogenbosch	40	0.8
Zeeland	Middelburg	82	1.6
Friesland	Leeuwarden	286	5.7
Utrecht	Utrecht	60	1.2
Gelderland	Arnhem	137	2.7
Overijssel	Zwolle	37	0.7
Drenthe	Assen	9	0.2
Groningen	Groningen	156	3.1
Limburg	Maastricht	42	0.8
TOTAL		3,782	75.6

Source: Hemels, 1992, page 170

TABLE 1B
TARIFF RULES OF STAMPED PAPER TAX ON APRIL 1st, 1849

Size (in palm ²)	Tariff (in Dfl)
from 0 to 2	0,00
from 2 to 15	0,01
from 15 to 20	0,01½
from 20 to 25	0,02
from 25 to 30	0,02½
from 30 to 35	0,03
from 35 to 40	0,03½
from 40 to 45	0,04
for every additional 10 (or part of)	Add 0,00½

Source: Hemels, 1992, page 47

TABLE 2
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)	
<u>I: TOWNS WHERE NEWSPAPERS WERE ADDED</u>			
Amsterdam	5	10	264.1
Rotterdam	1	4	117.1
The Hague	1	2	91.3
Groningen	2	3	38.0
Arnhem	1	3	32.3
Maastricht	2	3	28.5
's-Hertogenbosch	<u>2</u>	<u>3</u>	<u>24.4</u>
TOTAL I	14	28	595.7
<u>II: TOWNS WHERE NEWSPAPERS FIRST APPEARED</u>			
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	0	<u>1</u>	<u>5.4</u>
TOTAL II	0	7	86.3
<u>III: TOWNS WHERE THE NUMBER OF NEWSPAPERS (>0) DID NOT CHANGE</u>			
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 3

DEMOGRAPHICS OF DUTCH TOWNS WITH AND WITHOUT NEWSPAPERS

		TOWNS WITHOUT NEWSPAPERS (with 5,000 people or more)		SINGLE NEWSPAPER TOWNS		MULTIPLE NEWSPAPERS TOWNS	
		<i>Pre-1869</i>	<i>Post-1869</i>	<i>Pre-1869</i>	<i>Post-1869</i>	<i>Pre-1869</i>	<i>Post-1869</i>
N ^o of Towns		45	38	24	28	7	10
<u>Population variables¹:</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 ² 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 variables¹:</u>							
<i>Area</i>	Town's surface area in 1,000 km ²	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)

¹ Standard deviations are given between brackets

TABLE 4
DESCRIPTIVE STATISTICS FOR THREE TYPES OF NEWSPAPERS

		EXISTING NEWSPAPERS		FIRST ENTRY		ENTRY INTO EXISTING MARKET	
N° of Firms		41		7		14	
<u>Firm specific variables¹:</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 variables¹:</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 5
ORDERED ENTRY PROBABILITIES BEFORE AND AFTER THE 1869 TAX REFORM

		Pre-1869 Tax Reform		Post-1869 Tax Reform	
<u>Variables:</u>					
		<u>Estimates</u>	<u>S.e.</u>	<u>Estimates</u>	<u>S.e.</u>
<i>Pop1000</i>	(α)	.024 [*]	.010	.243 ^{**}	.059
<i>PerGrPop</i>	(α^{**})	-.050	.038	-.104 [*]	.050
<i>Dist1</i>	(β_1)	.019	1.19	2.60	1.41
<i>Dist2</i>	(β_2)	-11.3 ^{**}	2.58	-13.1 ^{**}	3.82
<i>EFs1</i>	(γ_1)	6.89 [*]	2.87	6.72	3.60
<i>EFs2</i>	(γ_2)	-8.78 [*]	3.97	-9.26	5.01
<u>Cut points:</u>					
	$\hat{\psi}_1$	-1.39 ^{**}	.589	.79	.84
	$\hat{\psi}_2$.81	.583	5.68 ^{**}	1.58
<u>Predicted profits:</u>					
		<u>Mean</u>	<u>St.dev.</u>	<u>Mean</u>	<u>St.dev.</u>
	$\hat{\Pi}_0$ (No news)	-4.10	2.49	-2.21	2.13
	$\hat{\Pi}_1$ (Single firm news)	-.520	.819	2.89 [*]	1.53
	$\hat{\Pi}_2$ (Multiple firm news)	1.15	2.36	16.2	18.1
<u>Model specification tests:</u>					
		<u>True</u>	<u>Predicted</u>	<u>True</u>	<u>Predicted</u>
	%N ₀ (No news)	59.2	59.6	50.0	49.9
	%N ₁ (Single firm news)	31.6	31.0	36.8	36.6
	%N ₂ (Multiple firms news)	9.2	9.4	13.2	13.5
	Number of observations	76	76	76	76
		<u>$\chi^2(5)$</u>	<u>p-value</u>	<u>$\chi^2(5)$</u>	<u>p-value</u>
	LR-test	71.5	.000	115.2	.000
		<u>Value</u>		<u>Value</u>	
	Pseudo-R ²	.526		.773	

¹ Standard errors are given between brackets

^{*} p-value \in [.01 ; .05]

^{**} p-value < .01

TABLE 6
 CHANGES IN COMPETITION DUE TO THE 1869 TAX REFORM ACT

	\tilde{S}_1	\tilde{S}_2	$\tilde{S}_2/2$	\tilde{S}_2/\tilde{S}_1
Before 1869 Tax Reform	34,319*	93,013	46,507	1.355
After 1869 Tax Reform	5,350	27,698	13,849	2.589

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

PICTURE I: Repeal of the "Stamped Paper Tax"

STAATSBLAD

VAN HET

KONINGRIJK DER NEDERLANDEN.

(N^o. 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^o. 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 Gravenhage, den 9den April 1869.

WILLEM.

De Minister van Financien,

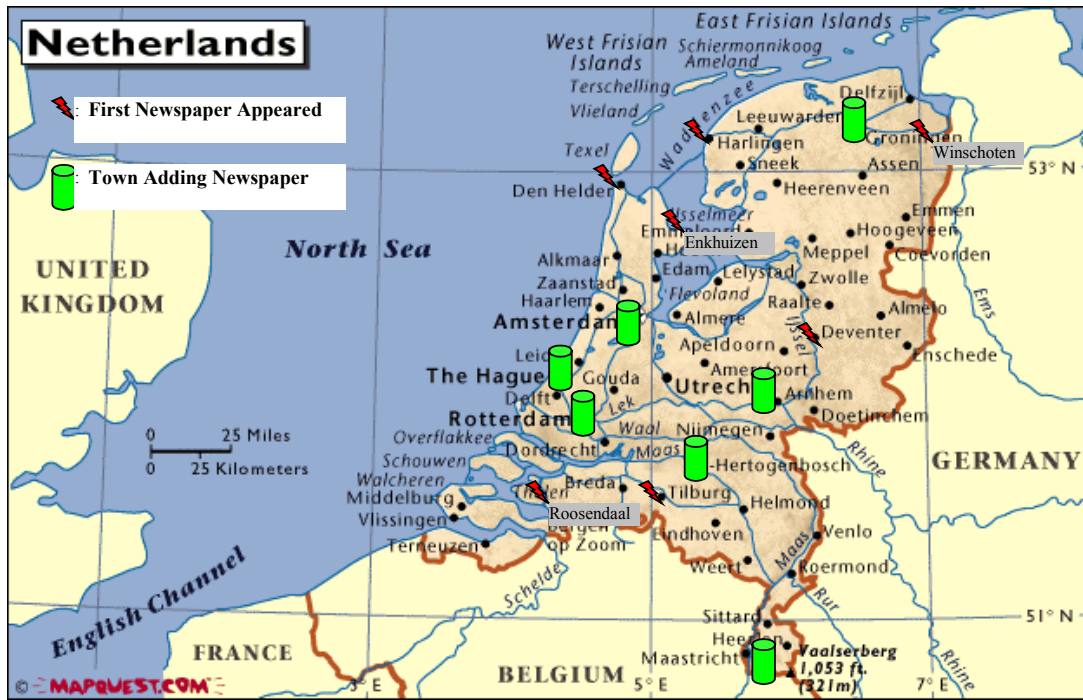
VAN BOSSE.

Uitgegeven den tienden April 1869.

De Minister van Justitie,

VAN LILAAR.

Picture II: Map of Entry Locations and Major Towns in The Netherlands



Source: <http://www.mapquest.com> (downloaded on October 21st, 2001)

Figure 1
 The Lyfe Cycle of Daily Newspapers in The Netherlands
 1848 - 1996

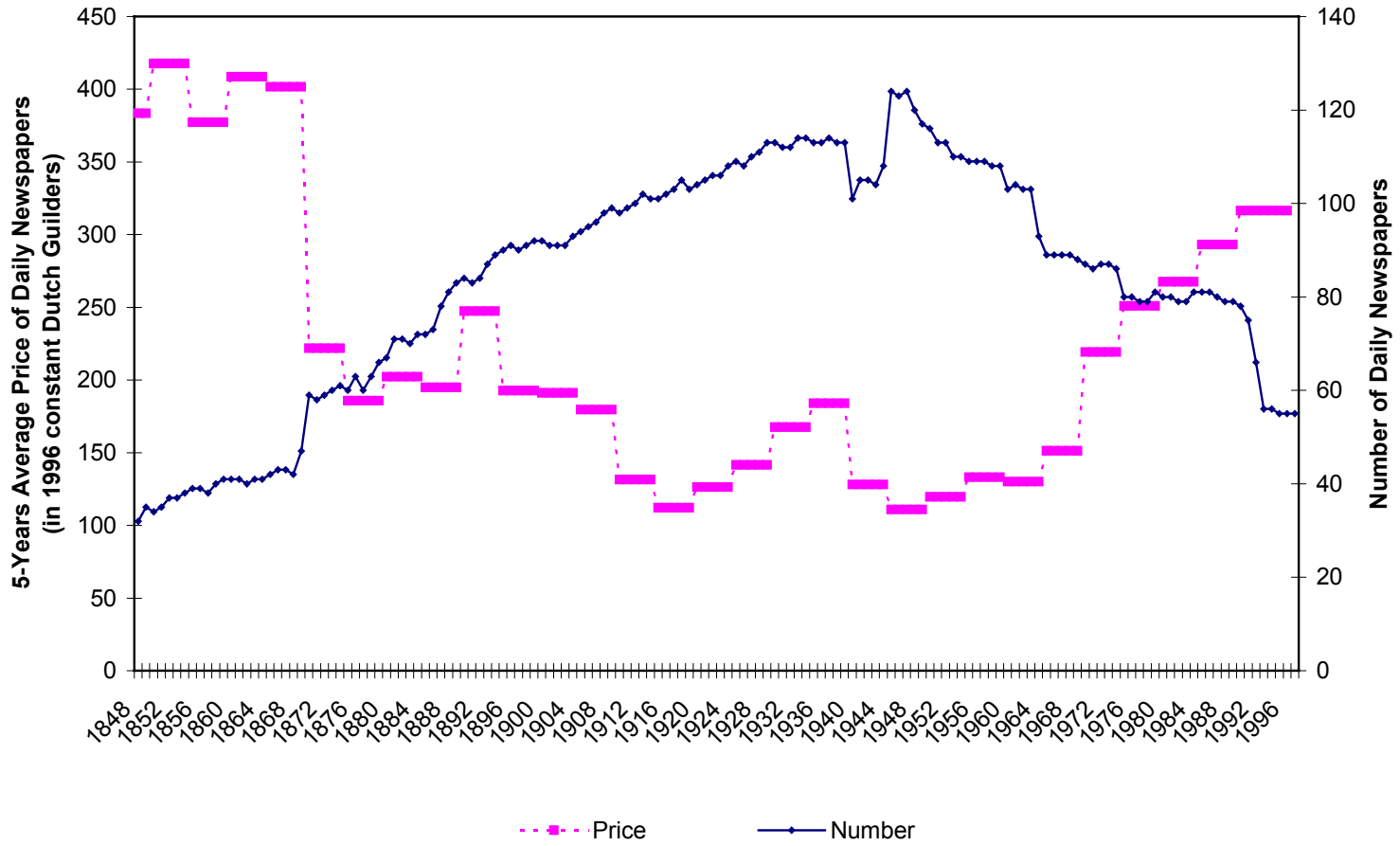


FIGURE 2: THE ENTRY EFFECT OF TAX CHANGES ON PRICES AND QUANTITIES

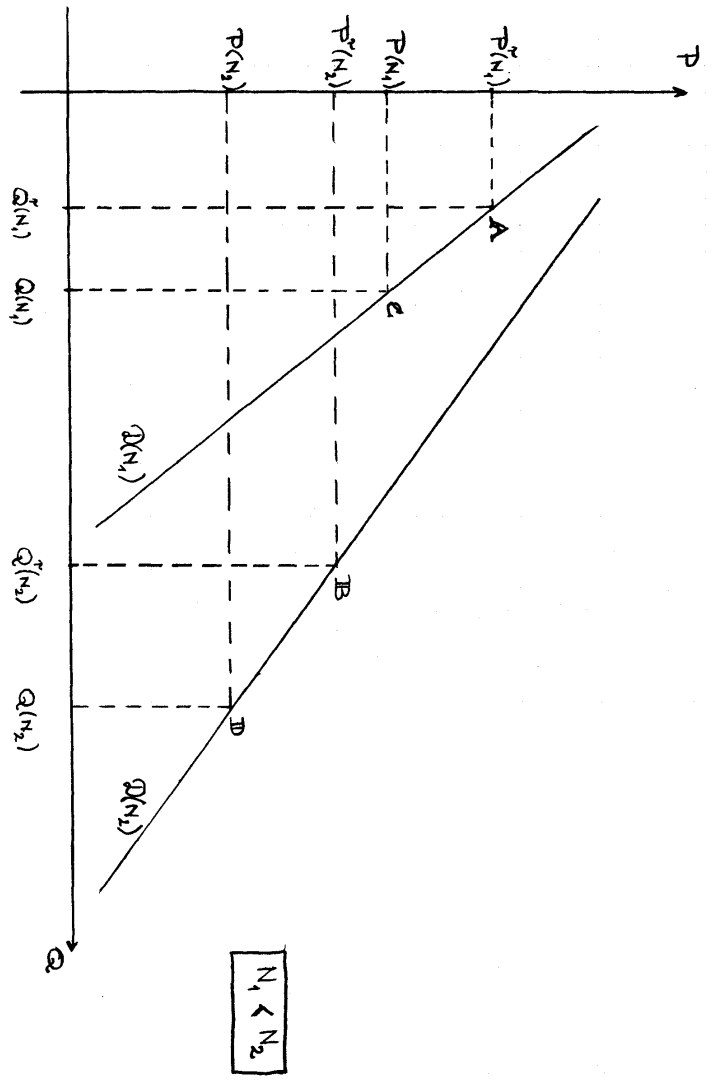


FIGURE 3A

Pre-1869 Probability of Profitable Single Newspaper Entry

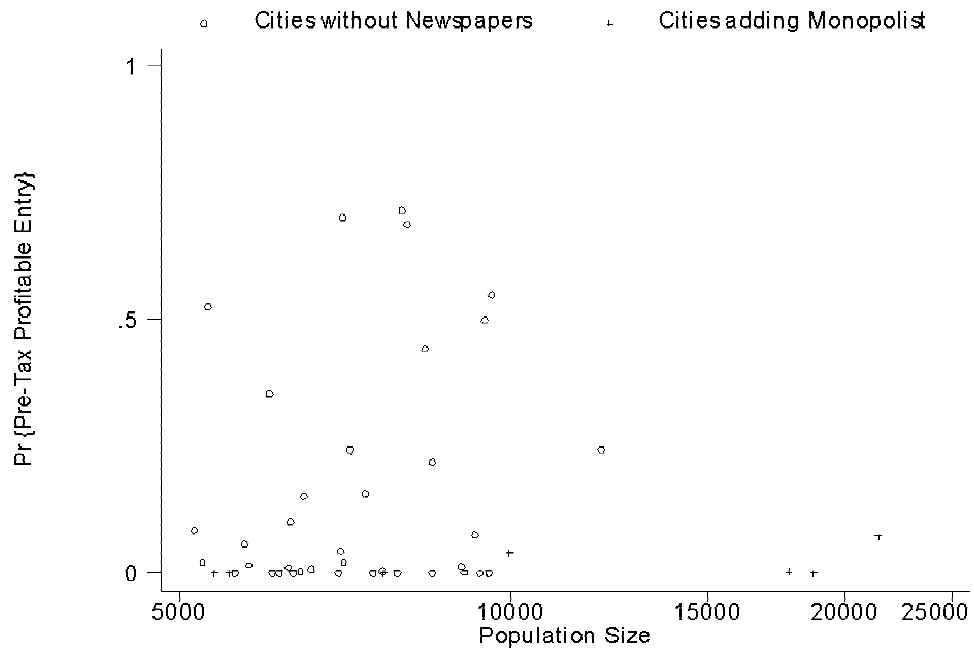
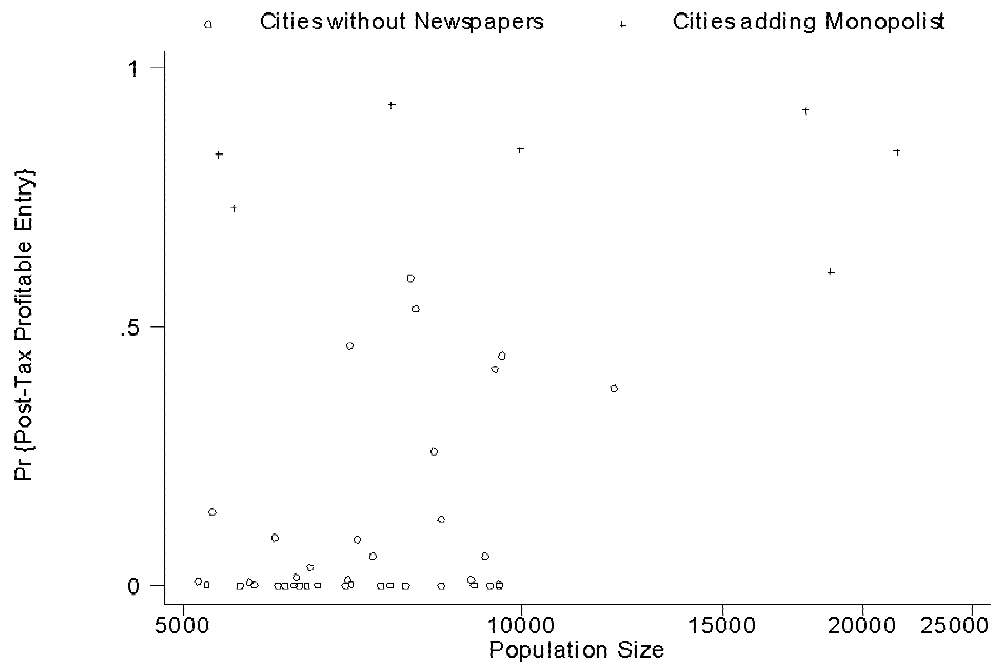


FIGURE 3B

Post-1869 Probability of Profitable Single Newspaper Entry



Endnotes

ⁱ The historical information on the “stamped paper tax” is based on Joan Hemels (1969, 1992).

ⁱⁱ Segregation or religious compartmentalization of the Netherlands newspaper market developed much more than two decades later in the late 1890s.

ⁱⁱⁱ The town of 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.

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