Competition in Swedish Local Banking Markets

by

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Abstract

While urban and metropolitan customers more and more use online banking as the principal delivery channel for accessing banking services, rural bank customers still rely on the physical network (branches) as the prime access channel. This means that high customer loyalty and entry barriers can be expected to prevail in rural banking. In light of this, the paper highlights rural banking conditions, and, more specifically, aims to evaluate the degree of competition in rural banking markets. For this purpose, a variation of the Bresnahan and Reiss (1991b) entry model is estimated using ordered probit and Poisson regression. According to the results, entry thresholds increase more than proportionately with each additional entry, suggesting that profit margins shrink as a result of new entry. The resulting pro-competitive effect is most pronounced in markets with a relatively few number of competitors, i.e. in markets accommodating fewer than the median number of four market players. Finally, the results suggest that a greater share of "multi-market banks" in a given market promotes local competition – a result which parallels a number of international studies.

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1. Introduction

According to a recent survey (Svenskt Kvalitetsindex, 2006) rural bank customers still rely on the physical network (branches) as the prime distribution channel for conducting retail banking services such as savings and lending, while for urban citizens online banking has become the prime channel. Amongst other things, this difference suggests that rural banking is still associated with high customer loyalty and persistent entry barriers, while in urban markets, by contrast, the extensive use of internet banking is expected to have reduced entry barriers and thus enabled increased competition. However, if competition indeed works improperly in Swedish rural banking, this could ultimately jeopardize the mission statement of the national program for rural development[1], i.e. an "ecologically, economically and sustainable development of the Swedish countryside", due to the role local banks play as the hub of the economy in rural parts. In light of this, I consider it to be of importance to undertake a study which examines competitive conditions in Swedish rural banking.

The study includes banks providing retail bank services to the countryside through a network of branches and which were in operation 1998-2002. The market is dominated by five large players, of which four are domestic and one is foreign. Their combined market share amounts to around 90 % in terms of total assets. These banks have in common a widespread network of branches covering an extensive geographic area, in some cases the whole country. The rest of the market is typically made up by comparatively very small banks that operate on a local scale. Nonetheless, these banks might enjoy a substantial or even dominant market share in their own local area. These banks are essentially made up of savings banks or former savings banks that have converted to joint stock companies.

[1] The national program is part of a EU program for developing the countryside during the period 2007-2013.

The paper assumes that the market for retail branch banking is local in scope. Besides the growing body of international research supporting this view, the assumption can also be justified on the ground that the Swedish retail banking industry is partially comprised by local banks that often find themselves competing side-by-side with larger banks in terms of geographic scope (henceforth referred to as multi-market banks[2]). In addition, some of these multi-market banks explicitly pursue a strategy tailored to fit local conditions, involving extensive local presence and decentralised decision-making.

For reasons explained later in the paper, local banking markets are proxied by local labour market areas. The median rural local labour market area has a population of 27 250, a number which corresponds fairly well to the median population of a rural U.S. county (24 000). U.S. rural counties have typically been used as spatial proxies for local banking markets, while in Europe the concept of local banking markets appears to be undeveloped.

A recent strand of the empirical industrial organisation literature uses game-theoretic entry models in order to estimate the degree of competition. The papers by Bresnahan & Reiss (1987, 1990, 1991b) and Berry (1992) are typically considered as the landmark work in this field. In this research context, the degree of competition is inferred from the impact additional entry has on the equilibrium price level (the toughness of price competition).

A simultaneous-move game theoretic model in the spirit of Bresnahan & Reiss (1991b) is employed, where competitors in the first stage decide on whether or not to enter a particular local market. Conditional on entry, they in the second stage

[2] As far as I can figure out, the terms "multi-market bank" and "single-market bank" emanates from U.S. research within the same field. Since I find this terminology convenient, I adopt it. However, the definition of these terms given later in the paper should not be confused with definitions appearing elsewhere.

participate in a price game (what matters are that they know the mode of game *ex ante*).

According to the results, "entry" of an additional firm always lowers per-firm margins (or raises the minimum per-firm market size[3] needed to cover fixed costs and thus be able to survive in long-rum equilibrium), suggesting the existence of rents that progressively diminishes with the entry of additional banks. Moreover, the results show that entry has the largest impact on per-firm margins in those markets that are most highly concentrated. In light of the results obtained we note that if the industry were already perfectly competitive, entry would not further reduce per-firm margins and, if incumbents were to collude, entry would again have no impact on per-firm margins. Per-firm margins that change as a result of entry indicate market equilibria characterized by an intermediate level of competition. It is a notable fact that the results obtained parallel those of Cetorelli (2002), who estimates entry thresholds for a cross-section of U.S. local rural banking markets, in the sense that competition increases with every entry in the markets and that the competitive change is most pronounced in markets with two or three incumbents.

The paper concludes the following: (1) Swedish retail branch banking is a business that is indeed conducted locally; (2) profit margins in this industry appears to be quite high in the most concentrated local markets; (3) although margins are high in market with few competitors, they fall substantially with each additional entrant; (4) there is no empirical evidence of contestability; (5) there is no empirical support for collusive behaviour; (6) product differentiation appears to be limited and (7) a greater presence of large ("multi-market") banks seems to have a pro-competitive effect on profit-margins.

[3] This mimimum level of per-firm market size is referred to as the per-firm entry threshold.

The rest of the paper is organized as follows. Chapter 2: section 2.1 reviews the recent literature on entry models and their applications to banking, while sections 2.2-2.3 are devoted to a discussion of the relevance of local banking with respect to the U.S. and Europe/Sweden, respectively. In Chapter 3 the methodology employed is thoroughly described, while chapter 4: section 4.1 describes and motivates the definition of local markets employed. With a proper market definition in place, section 4.2 describes and analyzes the market level data. Subsequently, in chapter 5, the results are presented and interpreted. Finally, chapter 6 concludes.

2. Background

2.1 Endogenous entry and banking – Review of the literature

Much of the recent literature on oligopolistic entry builds on the discrete-choice game theoretic entry models developed by Bresnahan & Reiss (1990, 1991a, 1991b). Within their original framework, homogeneous firms' profitability strategies are represented by discrete entry decisions that reflect underlying (1) market demand and cost characteristics; (2) the mode and intensity of post-entry competition; and (3) the simultaneous entry decisions of competitors. By assuming that firms enter only if they are able to make non-negative profits in equilibrium, the model provides a one-to-one-mapping from Nash equilibria to observed number of entrants (market structure). The role of the econometrician is to exploit information about latent firm profitability based on the endogenous market structure in order to infer the intensity of competition in the market.

Cetorelli (2002) adopts the methodology proposed by Bresnahan and Reiss (1991b) in order to assess the intensity of competition in U.S. local banking markets (rural counties). According to the results, entry into markets with the fewest number

of competitors entails substantially larger pro-competitive effects (suggesting existing firms are making excessive rents) than in markets with five or more banks (suggesting that in rural banking, five competitors may be enough to achieve adequately competitive conditions).

The papers by Berry (1992) and Scott Morton (1999) extend the analysis by letting firm heterogeneity influence the entry decision. Building on these papers, Juan (2002) examines whether entry decisions are mainly influenced by local banking market conditions or firm characteristics. The study, which was carried out using data for the Spanish retail banking sector, essentially confirmed Sutton's "symmetry principle"[4] according to which firm heterogeneity (such as differences in size) does not have an impact on the entry decision. In contrast, the ambitious paper by Felici & Pagnini (2004) shows that both local market features and entrant characteristics are important. That is, based on a rather extensive analysis of the determinants of entry into a sample of Italian local banking markets, the authors were able to establish that larger banks have a higher probability of entering a new market.

The static entry models recently developed by Toivanen & Waterson (1999), Mazzeo (2002) and Seim (2004) allow for firm heterogeneity by endogenizing product type choice as well as the entry decision. For a cross-section of U.S. rural labour market areas, Cohen & Mazzeo (2004) examine competition among retail depository institutions using the Mazzeo (2002) framework. They consider a sequential-move Stackelberg game, where both the number and type of financial institutions (multi-market banks, single-market banks and thrift institutions) are included as arguments in the reduced-form profit function. In essence, their conclusions are twofold: 1) differentiation between the three different types is

[4] See Sutton (1998).

significant, and 2) the nature and extent of product differentiation depends on whether the market is more or less rural, in terms of the proximity to Metropolitan Statistical Areas.

2.2 Relevance of local banking: The case of the U.S.

Recent international research on the geographic scope of banking markets have found evidence that households and small businesses still tend to obtain several important financial services from nearby institutions. Moreover, costumers tend to cluster their purchase of financial services at a single financial institution [e.g. Kwast, Starr-McCluer & Wolken (1997); Amel & Starr-McCluer, (2002)]. Furthermore, several studies have investigated the relationship between deposit/loan interest rates and local market concentration. For example, Berger & Hannan (1989), Calem & Carlino (1991), and Hannan (1997), all find evidence of a negative relationship between local market HHI[5] and the deposit rate offered, suggesting that local market conditions determine banks' pricing policy. On the other hand, Radecki (1998) shows that multi-market banks tend to offer uniform deposit interest rates across MSAs, suggesting that banking markets are not local in nature. Using similar survey data, Heitfield (1999) confirms these findings for multi-market banks, but also obtains significant differences in the deposit interest rates offered by single-market institutions across markets. Subsequently, Heitfield & Prager (2002) apply similar techniques to a much larger sample of banks covering a broader range of markets (i.e. urban as well as rural markets). Actually, for most types of deposit accounts, a significant negative relationship between local market concentration and price behaviour is obtained, reinforcing the view that local market conditions dictate banks' pricing behaviour.

[5] Herfindahl-Hirshman concentration index.

The most recent research trend has been to focus on differences in pricing policy across different institution types. In this context, Hannan & Prager (2003) and Park & Pennacchi (2004) develop spatial models of bank pricing in order to analyze differences in pricing behaviour between multi-market and single-market banks. The findings of these two papers show that multi-market banks, due to their funding advantage vis-à-vis their single-market counterparts, tend to offer lower deposit interest rates *and* loan rates. Moreover, the larger the market share of multi-market institutions and the more concentrated the local market, the larger the impact of the funding advantage, and hence the lower the local market's equilibrium interest rates. As long as the funding advantage is not offset by a loan operating cost disadvantage, a larger market share of multi-market banks promotes retail lending competition, while simultaneously harming competition in retail deposit business, leaving the overall effect ambiguous. However, in relatively concentrated local markets, the competitive effect on the loan side is likely to be more pronounced so that increased multi-market bank presence most likely reduces single-market bank profit and thus promotes local competition (Park & Pennacchi, 2004).

Hannan & Prager (2006) point out additional characteristics that potentially are relevant to the issue of how large bank competition affects local bank profitability: By virtue of their presence in many local markets, large banks may derive a benefit from geographic diversification, allowing them to offer lower loan rates for a given level of loan-specific risk, whereas local banks, on the other hand, have to collect their capital and issue their loans locally. In addition, by virtue of their size, large banks may offer a wider range of products and may as well offer products more efficiently than local banks. They conclude that, for rural banking markets, a greater presence of large banks is associated with a large, significant reduction in profitability for local banks.

Furthermore, the magnitude of the reduction in profitability is larger the more concentrated the local market and the smaller the local banks are.

2.3 The relevance of local banking: The case of Europe and Sweden

A fundamental assumption underpinning the present framework is that the market for retail banking services that are provided through a network of branches indeed is local in scope. However, the local banking framework addresses two important issues: (1) the relevance of geographic proximity within retail banking. After the adoption of online banking, it may appear that geographic proximity has become less important. (2) No general clear-cut definition of a local banking market exists. Although there is empirical evidence related to the U.S. that banking markets such as retail banking are still local in scope, as outlined in section 2.2, the same issue very much remains an open question with respect to the euro area. This is understandable due to, on the one hand, the dearth of empirical evidence on this subject, and, on the other hand, to the fact that the European Commission so far has tended to assume that financial services such as retail banking are national in scope. This assumption can be explained by the absence of competition concerns in merger decisions relating to financial services, which has made a thorough analysis of the retail banking market unnecessary. However, the commission has left room for a regional definition in retail banking, and points out in its report[6] that at least some of the retail products (e.g. personal loans, small business banking) appear to be regional/local in scope, based on criteria such as the preference of banking customers for local suppliers, the significance of a dense branch network and the need for geographic proximity.

[6] See European commission paper (2006): *Interim Report II Current Accounts and Related Services* , available at: http://ec.europa.eu/comm/competition/antitrust/others/sector_inquiries/financial_services/interim_report_2.pdf

Recently, the Nordic competition authorities published the report "Competition in Nordic Retail Banking".[7] The report concludes that all Nordic retail markets are still dominated by a few large domestic banks with mainly loyal domestic clients. Although it is true that, on the one hand, markets have witnessed entry of new players (e.g. ICA bank and Danske Bank relating to the Swedish market), and, on the other hand, there has been increased investments in neighbouring countries, entry barriers are considered as persistently high, as well as concentration and profitability. This result is even more striking in view of the increased reliance on internet banking. Internet banking reduces the need for a physical branch network and weakens customer-banking relationships. However, as pointed out in the report, retail banking belongs to a family of financial services that for households represent a substantial element of trust. Consumers may wish to remain with their well-known (local) providers of banking services despite better (but perhaps perceived as uncertain) deals being available. Such loyalty and consumer immobility constitute an entry barrier impeding effective (local) competition, and speaks to the existence of geographically delineated markets with rather few incumbents.

Unfortunately, the report is not explicit on the issue of geographic scope, with the exception of the Norwegian case. Thus, inquiries made by the Norwegian Competition Authority show that in competition for small and medium-sized enterprises, accessibility to the bank, local presence and a well established branch network are important features in the Norwegian retail banking market. Moreover, in relation to the DnB NOR merger case, it was established that the relevant market for most retail banking products were local or regional.

[7] See Konkurrensverket (2006).

Turning to Sweden, the existent operation of the free-standing savings banks tacitly suggests the existence of local/regional banking markets, albeit yet to be defined. A recent survey by Svenskt Kvalitetsindex (2006) adds to the growing body of evidence that local banking is still highly relevant, despite the introduction of online banking. Thus, the survey measures the degree of client satisfaction as well as loyalty among bank customers in Sweden for the period 1997-2006. As it turns out, rural bank customers, who are relatively more prone to traditional branch banking[8], are more satisfied *and* more loyal than their urban counterparts. Put differently, those banks that pursue a business strategy involving branch banking and tailor their business strategy to fit local (rural) conditions, enjoy a higher degree of customer satisfaction and loyalty – a result which clearly adds to the conclusion that in Sweden local banking continues to play a vital role.

3. The methodology

3.1 Endogenous entry and ordered discrete-choice analysis

The aim of this section is to examine the *toughness of price competition*,[9] i.e. the relationship between the equilibrium price level and the number of competitors, in an industry that can be considered as offering homogenous services (Swedish retail branch banking), using a modified version of the entry model proposed by Bresnahan & Reiss (BR) in a sequence of papers (1987, 1990, 1991b). A two-stage game-theoretic model is employed, where banks in the first stage decide simultaneously on whether or not to enter a particular local market. Because the typical local market is fairly concentrated (median number of competitors is four) the market structure hypothesis postulates that markets are oligopolistic rather than competitive – implying

[8] Thus, according to the same survey, only 38% of free-standing savings banks' clients use internet as the prime channel. For other banks, internet has become the prime distribution channel.
[9] See Sutton (1991).

that banks base their entry decisions not only on market demand and fixed costs of production, but on expectations about competitors' entry/operating decisions as well. Subsequently, conditional on entry, competitors play a price or quantity game (essentially, they know *a priori* the form of the game).

In essence, the toughness of price competition is inferred from the estimated relationship between the observed number of competitors and the minimum market size necessary to support the corresponding number of firms. Given an observed market structure, it is assumed that each incumbent is profitable, while the market cannot profitably support an additional entrant. In this way, the model provides a one-to-one mapping from Nash equilibria of the game to the observed number of firms.

The BR framework is essentially a static cross-sectional one, as it examines the existing market structure rather than actual entry. No distinction is made between continuation of market operations and new entry. I follow this approach, using a pooled cross-sectional data set (1998-2002).

Let banks in a representative local banking market face a market demand function of the form[10]:

$$Q = d(p, \mathbf{x})S \qquad [3.1]$$

where $d(p, \mathbf{x})$ is the demand of a representative customer in the market; p is market price; $\mathbf{x}$ is a vector of exogenous market demand variables; and S is market size (population). It is assumed that S does not affect $d(p, \mathbf{x})$, so that a change in S correspond to a proportional change in total market demand, Q.

Given that n symmetric banks choose to enter the market, post-entry equilibrium profits for each bank will be given by:

[10] For notational convenience, market subscripts are omitted throughout this section.

$$\pi_n = (p_n - c_n)d(p_n, \mathbf{x}_n)\frac{S}{n} - F \equiv V_n \frac{S}{n} - F \qquad [3.2]$$

where c denotes variable costs; $(S/n) \equiv s$ is per-firm market size; V_n denotes per customer variable profits; and F is a fixed (sunk) entry cost.

An nth firm will choose to enter a market with *n-1* incumbents only if per-firm demand and hence variable profits is high enough to cover the fixed entry cost:

$$V_n s - F \geq 0 \qquad [3.3]$$

Since this expression is strictly increasing in per-firm market size, s, there exists a minimum value of s satisfying [3.3], for which n firms are just able to break even, corresponding to the zero-profit condition $V_n s - F = 0$. This per-firm market size level, denoted s_n, is known as the per-firm entry threshold. Solving for s_n:

$$s_n = \frac{F}{V_n} \qquad [3.4]$$

Thus s_n is increasing in F and decreasing in V_n. The intuition is clear: if entry causes the equilibrium price level and hence V_n to fall, banks need to compensate for this through a higher level of demand (per firm market size). Assuming a homogenous product industry, where subsequent entrants face the same cost structure, changes in s_n as n increases will be driven exclusively by changes in the price level and thus variable profits, V_n. Given a downward sloping demand curve, the equilibrium price level p_n is a decreasing function of *n*, as long as incumbents do not perfectly collude.

If p_n were observable, the most straightforward way to assess the toughness of competition in the industry would by to estimate the relationship between p_n and *n*. However, since p_n is not observable at the disaggregated (local) market level considered here, the chosen framework utilizes that the (estimable) relationship

between s_n and *n* may serve as a proxy for the (non-estimable) relationship between p_n and *n.* The estimated sequence of adjacent entry thresholds $s_1, s_2, ..., s_n$ reveals how additional entry affects profit margins (through p_n), and hence the degree of competition in equilibrium. Specifically, we infer changes in competition from adjacent entry threshold ratios s_{n+1}/s_n . If $s_{n+1}/s_n > 1$, entry of an n+1 firm has a pro-competitive impact, while if $s_{n+1}/s_n = 1$ competition does not change.

The estimated sequence of adjacent thresholds will trace out a path which is consistent with some mode of competition. It is instructive to analyze the implications of entry for three benchmark market structures: joint monopoly profit maximization; Cournot-Nash competition and perfect competition. If banks maximize joint monopoly profits, p_n will not be driven down as a result of additional entry, and hence s_n will remain unaffected as *n* increases. In a perfectly competitive industry, s_n will also be unaffected by additional entry since p_n is already at marginal cost level and cannot fall below this level post-entry.

In the case of Cournot behaviour, p_n must fall as a result of entry because incumbents do not change their output decisions as a result of entry. The prediction is that profit margins gradually decrease and s_n increase (at a decreasing rate), as *n* increases.

BR (1991b) estimates a profit function whose deterministic part is of the following form:

$$\overline{\pi}_{n,m} = V(n, \mathbf{x})S - F(\mathbf{w}) \qquad [3.5]$$

where the notations introduced above apply. $\mathbf{w}$ is a vector of per capita cost shifters. The effect of competition are accounted for by letting $V(\cdot)$ be a decreasing function of

n. $V(\cdot)$ and $F(\cdot)$ are specified as linear functions, which allow for a separate identification of the effect of entry on variable profits (*toughness of price competition*) versus fixed costs. The problem with the original BR specification is however that it is difficult to estimate; to separately identify variable profits and fixed costs parameters turn out to be difficult in practice.

For tractability purposes, the following reduced-form profit function specification is adopted:[11]

$$\pi_n = \bar{\pi}_n + \varepsilon \equiv \alpha \ln S + \mathbf{x}'\boldsymbol{\beta} - \mathbf{d}_n'\boldsymbol{\gamma}_n + \varepsilon \qquad [3.6]$$

where introduced notations still apply. $\bar{\pi}_n$ represents the deterministic part of profits while ε captures unobserved profits. ε is a market-level error term, assumed to follow a normal distribution, be additively separable from $\bar{\pi}_n$, independently distributed across markets, and identical for all banks within a given market. $\mathbf{d}_n$ is a vector of dummy variables indicating whether the number of banks in a given market equals *n*. α, $\boldsymbol{\beta}$ and $\boldsymbol{\gamma}_n$ are parameters to be estimated. The set of parameters $\boldsymbol{\gamma}_n$, which can be thought of as measuring the entry effect of the n^{th} bank on per-firm profits, are subsequently used to calculate entry thresholds. Market size S enters in log form[12], in order to ensure that the computed entry thresholds are non-negative.

In coherence with the entry model, potential entrants, at stage 1, simultaneously decide on whether to or not to enter. An *n*th entrant are assumed to enter if $E[\pi_n] \geq 0$,

[11] This specification is slightly different from the original BR model. Like the BR profit function, it can be interpreted as the log of demand (market-size) term multiplied by a variable profits term that depend on the number of market competitors (Mazzeo, 2002). .

[12] Cf. e.g. Genesove (2004) and Cleeren *et al*., (2006). Cleeren et al. (2006) remarks that the log form is consistent with a specification in which firms influence the ratio of variable profits to fixed costs, so that it becomes unnecessary to separately identify the effects of entry on variable profits and fixed costs, respectively.

implying a certain outcome in terms of market players. In order to ensure that the generated outcome is consistent with Nash equilibrium, it is further assumed that:[13]

$$\pi_n \geq 0 \text{ and } \pi_{n+1} < 0 \qquad [3.7]$$

That is, if an outcome of n banks is observed, we infer that the preferred strategy by the n^{th} bank was to enter since it is able to make profits in equilibrium, while the preferred strategy of the $(n+1)^{th}$ was to stay out of the market.

Since π_n is a latent (unobserved) variable, we estimate [3.6] using an ordered probit model, where the dependent variable is the number of firms in a given market. The relationship between unobserved profits and the observed number of firms is given by:

$$\text{Number of firms} = n \text{ if } \gamma_n < \alpha \ln S + \mathbf{x}'\boldsymbol{\beta} + \varepsilon \leq \gamma_{n+1} \qquad [3.8]$$

The probability of observing n banks in a given market m is:

$$P_{m,n} =$$

$$\begin{cases} P(\pi_2 < 0) = 1 - \Phi(\overline{\pi}_2) & \text{if } n \leq 1 \\ P(\pi_n \geq 0 \text{ and } \pi_{n+1} < 0) = \Phi(\overline{\pi}_n) - \Phi(\overline{\pi}_{n+1}) & \text{if } 0 < n < \hat{n} \\ P(\pi_{\hat{n}} > 0) = \Phi(\overline{\pi}_{\hat{n}}) & \text{if } \hat{n} \leq n \end{cases} \qquad [3.9]$$

where $\Phi(\cdot)$ denotes the cumulative normal density function. Category $\hat{n}$ represents an aggregation of observations corresponding to $n = 7$ or more. This aggregation is made because of an insufficient number of markets with more than 7 banks; the ordered probit model requires a sufficient number of observations in each category.

The ordered probit model is estimated using maximum likelihood. As the ordered probit model only identify the parameters up to a scale factor, some normalization is required. I follow common practice and set the intercept term in $\boldsymbol{\beta}$

[13] Cf. Bresnahan & Reiss (1991a).

equal to zero. The log likelihood function to be maximized with respect to the elements of the vector $\{\alpha, \boldsymbol{\beta}\}$ along with the set of "cut points" $\{\gamma_2, \gamma_3, \ldots, \gamma_{\hat{n}}\}$ is then given by:

$$\begin{cases} \ln \ell = \sum_{m=1}^{M} \sum_{n=1}^{\hat{n}} d_{m,n} \ln(P_{m,n}) \\ \text{s.t.} \\ \gamma_1 = -\infty < \gamma_2 < \ldots < \gamma_{\hat{n}} < \gamma_{\hat{n}+1} = \infty \end{cases} \qquad [3.9]$$

where the indicator variable $d_{m,n}$ equals one if *n* institutions are observed in market *m* and zero otherwise. The restriction is imposed in order to ensure that all probabilities given by [3.8] are positive. Assuming that the usual regularity conditions are fulfilled, the maximum likelihood estimators $\{\hat{\alpha}, \hat{\boldsymbol{\beta}}, \hat{\boldsymbol{\gamma}}_n\}$ are consistent, asymptotically normal and efficient.[14]

3.2 Endogenous entry and event count analysis

As a complement to the ordered probit model, "entry thresholds" are also estimated using the log-linear Poisson model for count data.[15] The probability of observing *n* banks in market *m* is:

$$P(\text{No.of firms} = n) \quad = \frac{e^{-\lambda_m} \lambda_m{}^n}{n!}, \qquad \text{for } n = 0,1,2, \ldots \qquad [3.10]$$

where λ_m is the conditional mean parameter. The log-linear formulation implies that:

$$\lambda_m(\mathbf{x}_m, \boldsymbol{\delta}) = E(n \mid \mathbf{x}_m, \boldsymbol{\delta}) = \exp(\mathbf{x}_m' \boldsymbol{\delta}) \qquad [3.11]$$

where $\mathbf{x}_m$ is a vector including the same market characteristics as above and $\boldsymbol{\delta} \equiv \{\alpha_p \ \boldsymbol{\beta}_p\}$ is a vector of parameters to be estimated.

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[14] See e.g. Greene (1997).
[15] This idea follows Asplund & Sandin (1999).

The parameters in [3.10] are estimated using maximum likelihood. Given independent observations, the log-likelihood function is (*M* denotes the number of markets):

$$\ln \ell(\boldsymbol{\delta}) = \sum_{m=1}^{M} \{n\mathbf{x}'_m\boldsymbol{\delta} - \exp(\mathbf{x}'_m\boldsymbol{\delta}) - \ln n!\} \qquad [3.12]$$

The Hessian of $\ln \ell(\delta)$ is:

$$\frac{\partial^2 \ln \ell(\boldsymbol{\delta})}{\partial\boldsymbol{\delta}\partial\boldsymbol{\delta}'} = -\sum_{m=1}^{M} \lambda_m \mathbf{x}_m \mathbf{x}'_m \qquad [3.13]$$

This expression is negative definite for all $\mathbf{x}$ and $\boldsymbol{\delta}$. That is, $\ln \ell(\boldsymbol{\delta})$ is globally concave, implying that convergence is guaranteed.

In order for statistical inference based on the maximum likelihood standard errors and t statistics to be valid, both the conditional mean λ_m and conditional variance must be correctly specified. For the Poisson maximum likelihood model this requires an assumption of equidispersion, that is, equality of λ_m and conditional variance. If this assumption fails to hold because the count data are overdispersed[16] (as is often the case), the Poisson maximum likelihood model still generates consistent estimates provided the conditional mean is correctly specified, but the standard errors will be severely downward biased (Cameron & Trivedi, 1998).[17] Test of overdispersion is performed using the likelihood ratio test provided in the Stata software package. Actually, the test does not reject the null hypothesis of equidispersion at any reasonable level of significance.

[16] That is, the conditional variance exceeds the conditional mean.

[17] Cameron and Trivedi (1998) describe the restriction of equidispersion as qualitatively analogous to homoscedasticity in the linear model. However, a failure of the Poisson assumption of equidispersion may potentially have much larger effect on the estimated standard errors.

4. The data

This chapter is divided into two. Section 4.1 describes the nature of local banking in Sweden and provides arguments for the adopted local banking market definition. Given an accurate market definition, market level profitability is supposed to depend on factors that captures market demand and cost characteristics. These factors are proxied by observable variables that constitute a vector of exogenous market variables that enter the estimated reduced form profit function. The definition and description of the exogenous market variables is the subject of section 4.2.

4.1 Definition and analysis of Swedish local banking markets

The Swedish retail branch banking market is made up of, on the one hand banks that are purely local in geographic scope, and, on the other hand, banks that are active in a much wider geographic area, typically the whole country. Among the latter, some have chosen to pursue an explicit decentralized business strategy, tailored to fit conditions in local areas, while others' strategies are more or less centralized, involving uniform interest rates etc.

The retail branch banking market is dominated by four domestic large players: Svenska Handelsbanken (27%), SEB (24%), Nordea 16%) and Swedbank (15%).[18] Although these banks pursue different strategies, they have much in common. *Inter alia*, they all constitute financial conglomerates with a geographic scope extending beyond the Nordic countries. Furthermore, they all continue to rely on a widespread network of branches across the country. Branch banking is considered as an important complement to the ever-growing online banking user-base.

[18] These figures are based on total assets, in 2004.

The fifth largest bank, Danske Bank i Sverige, is foreign and pursues a decentralized business strategy and operates through different province banks, such as Östgöta Enskilda Bank (Stockholm), Bohusbanken (Göteborg) , and Skånes Provinsbank.[19] The total market share of Danske Bank i Sverige is around 8% in total assets. The rest of the retail branch banking market is made up of saving banks or converted savings banks (joint-stock banks) which operate locally, or at most, regionally. There were 68 savings banks and 12 converted savings banks in operation at the end of 2006.

During the last decade, insurance and retail companies have founded niche banks such as Länsförsäkringar Bank, Skandiabanken, ICA-Banken and Ikano-Banken, which focus on the retail banking market. True enough, these internet-based banks have gained some limited market-share in certain segments at the expense of the four large players, but on an overall basis they are not considered as a serious threat since they do not offer a complete range of products. Of particular relevance for the present study is the limited adoption rate of internet-banking among rural customers (SKI, 2006), since predominance of branch banking more or less constitutes a necessary prerequisite for the present methodology to apply.

As clear from the foregoing market description, retail branch banks show a great deal of asymmetry with respect to geographic scope – some are purely local, while others are present in almost every local area across the country. This fact in itself clearly speaks to the existence of local banking markets, corresponding to independent geographical submarkets (albeit ambiguous and undefined) in Sweden, where branches of different banks offer competing products/services. In each

[19] The province banks are: Bohusbanken, Gävleborgs Provinsbank, Hallands Provinsbank, Närkes Provinsbank, Skaraborgs Provinsbank, Skånes Provinsbank, Smålandsbanken, Sundsvallsbanken, Sörmlands Provinsbank, Upplandsbanken, Värmlands Provinsbank, Västmanlands Provinsbank, Älvsborgs Provinsbank and Östgöta Enskilda Bank. All these banks operate as independent units in their respective local markets.

independent submarket, different banks compete with each other through branches. Furthermore, the degree of substitution between banks belonging to the same submarket is expected to be quite high, reflecting fairly homogenous products and intra-market competition, while it should be zero or close to zero across markets, reflecting that submarkets are independent from the demand side.

Unfortunately, there exists no clear-cut universal definition of a local banking market, neither in Sweden nor elsewhere. With reference to the U.S., the Federal Reserve Banks broadly defines a local banking market as an economically integrated area that includes and surrounds a central city or a large town. In applied research, counties[20] have typically been considered as reasonable approximations of local banking markets. However, as remarked by Cohen and Mazzeo (2003), such political boundaries would be inappropriate if they do not represent meaningful economic distinctions. They propose to use local labour market areas (LMAs), corresponding to independent geographical submarkets with respect to demand and supply of labour, as approximations of local banking markets. Based on commuting patterns between counties, U.S. LMAs are defined as integrated economic areas by the Bureau of Labour Statistics. Thus LMAs are recognized as functional territorial units, not administrative ones.

In the present paper, I adopt the Swedish correspondence of LMAs, i.e. the local labour markets (LLMs) developed by Statistiska Centralbyrån and ERU[21] as the basis for delineating local banking markets. The definition of LLMs[22] is based on municipalities as the smallest building blocks. Depending on the pattern of commuting streams, an LLM may correspond to a single municipality/ rural district,

[20] The median population of a U.S. county is around 24 000.
[21] Expertgruppen för forskning om regional utveckling.
[22] See the website: http://www.scb.se/templates/Standard____20125.asp for details about the criteria used to define the LLMs.

or, alternatively, involve a cluster of municipalities/rural districts. The grouping of municipalities into LLMs is shown in Table A3 in the appendix.

According to the division scheme based on the revision undertaken in 1998, (adopted here) the number of LLMs is 100. Historically, the LLM division scheme has been revised every fifth year, in order to reflect commuting streams in an up-to-date manner. The last decades have witnessed a fall in the number of LLMs, reflecting a process of extended commuting streams.

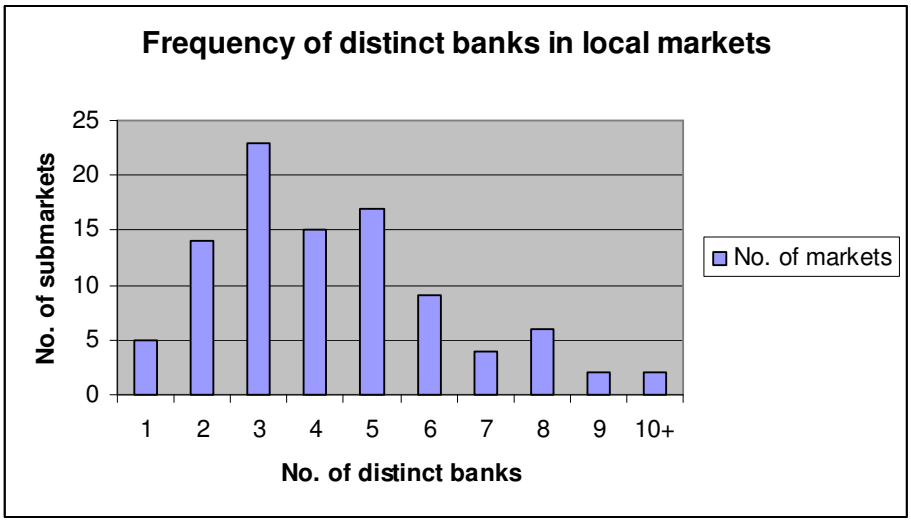
The three largest LLMs, i.e. the metropolitan areas of Stockholm, Gothenburg and Malmo are excluded from the study on the following grounds: (1) the study concerns rural conditions; (2) these markets are considerably larger than the median LLM and likely to contain distinct submarkets.

The median market population of the remaining 97 LLMs is 27 250, which corresponds fairly well to the median population of a U.S. county; 24 000.[23] The minimum population is 3 046 while the maximum population is 297 079. Only three of these markets have a population above 200 000 and a further 16 markets have a population above 100 000.

The number and identification of banks in a particular LLM is determined by aggregating the number of different banks that have a presence in the municipalities belonging to the LLM. As Figure 4.1 shows, a majority of the LLMs accommodate a rather few number of banks. Thus, the median number of distinct banks is equal to 4, while more than 75% contain less than six banks. Apparently, this distribution is interesting from a competitive viewpoint, since *a priori* the fewer the market competitors, the easier it would be to successfully coordinate a cartel.

[23] As a further comparison, the Swedish counties (län) have a median population about ten times as large as that of the median LLM.

Figure 4.1



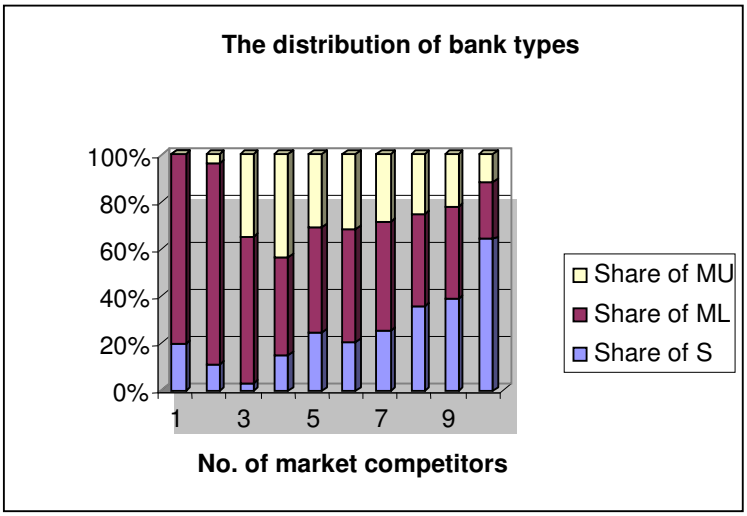
Source: Statistics Sweden, Branschregistret and own calculations

However, bank heterogeneity with respect to e.g. ownership type or geographic scope is likely to affect the assumed relationship between market structure and competition, and hence the likelihood of entry. For example, the savings (local) banks are distinct from their national commercial counterparts in that they pursue additional objectives to pure profit maximization. While true enough, this does not suggest that savings banks do not strive for high profits. After all, savings banks have no owners to turn to in order to raise new capital, so their only way to cope is to make enough profits. However, if indeed savings banks primarily pursue goals other than profit maximization, markets with a predominance of savings banks are more likely to see high (low) profits persist, because the equilibrating (competitive) mechanisms of entry and exit are likely to be weak or inoperative (Goddard *et al*., 2004). Thus if anything, this suggests, *a priori*, that markets where only savings banks are present are less prone to competition than markets where commercial banks exert an influence.

As outlined in Chapter 2, there is a growing body of U.S. research investigating the impact of product differentiation (e.g. multi-market banks vs. single market banks) on market profitability and competition in retail banking. Whether the results obtained have relevance for markets in other countries is an empirical question left to be determined. At least it cannot be ruled out *a priori*. In order to account for potential differences in pricing behaviour between different types of banks, I classify banks into categories. Banks within a given category are assumed to be symmetric. A given bank is defined as a multi-market bank if it has a market presence in at least two distinct local markets, otherwise it is considered as a single-market bank (S). Among the group of multi-market banks, a further distinction is made according to whether the bank applies a uniform pricing across markets (MU), or pursue a localized pricing strategy (ML).[24] (The classification of individual banks into these categories is shown in Table A4 in appendix). Figure 4.2 below displays the distribution of different bank types in relation to the number of competitors. Apparently, multi-market banks are particularly prevalent, relatively speaking, in the most concentrated markets. If interpreted in accordance with Park & Pennacchi (2004), the scope for local banks to earn excess profits should be more limited than the market structure hypothesis would predict.

[24] This distinction is not always trivial. In unclear cases, the distinction has been based on telephone interviews.

Figure 4.2



Source: Own calculations

4.2 Exogenous market variables

Several local market characteristics may affect bank profitability and hence the likelihood of entry. Besides the level of population (in logs), market demand for banking services is expected to increase in per capita income, the employment rate, the number of farms and the number of local establishments. Per-capita income (*INC*) is measured as the pre-taxed yearly average labour income for the working-age population (20-64). The employment rate (*EMP*) is measured as the employed share of the working-age population. The number of local establishments *FIRMS* is included as a general measure of market prosperity. The number of farmings *FARMS* reflects the rural characteristics of many markets.

On the cost side, the rateable value for premises (*RENT*) is included. *RENT* is calculated as the ratio of total rateable values of all premises to the total area of

premises, expressed in SEK/m^2. It is expected that entry should be relatively less likely in markets where *RENT* is high, all else equal.[25]

Data on these exogenous market variables were obtained from Statistics Sweden.[26] Table 4.1 reports descriptive sample statistics. It appears that the cross-sectional variation in the number of local establishments is particularly large.

Table 4.1: Sample statistics

Variable	Mean	Std.Dev	Min	Max
LPOP	10.3	1.15	8.02	12.6
INC	168	12.7	141	205
EMP	0.74	0.042	0.53	0.86
FARMS	1353	1253	79	5643
FIRMS	4193	4475	236	24404
RENT	2303	804	1115	5494

Notes: The sample consists of 97 markets, observed over the period 1998-2002.

Table 4.1 reports sample statistics of the exogenous market variables used. Data on these variables were collected for the period 1998-2002.

As reported above, recent international research (e.g. Park & Pennacchi, 2004; Hannan & Prager 2006) finds that greater presence of multi-market banks in rural, concentrated local markets promotes local competition by reducing the profitability of single-market banks. In essence, multi-market banks enjoy a funding advantage which enables them to exercise a competitive pressure upon their single-market counterparts.[27] In the spirit of this, I want to examine if market composition is an issue of relevance to competition also in Sweden. Thus I consider the following hypothesis: the greater the market-share of large banks pursuing a local presence strategy (MLs), the more competitive the market, *ceteris paribus*, and hence the lower

[25] Other input costs, such as salary costs, are ignored because their cross-sectional variation is expected to be small.
[26] Data on *FIRM* and *FARM* were obtained from Statistics Sweden's Business Register, while data on *RENT* were obtained from Statistics Sweden's Register of Real Estate Assessments. The other data were taken from Statistics Sweden's website.
[27] Multi-market banks may enjoy additional advantages (cf. Hannan & Prager, 2006).

the probability of entry. A binary variable *MULTI* is defined, which takes a value of one if a given market has a market-share of MLs exceeding the median value, and zero otherwise. *MULTI* enters [3.6] lagged by one year, consistent with a setting where potential entrants take market composition as exogenously given when they decide on whether or not to enter a market.

5. Results

The reduced form profit function [3.6] is estimated both with and without the inclusion of the composition indicator variable *MULTI*. Table 5.1 below reports the results from the ordered probit (OP) estimation without including this variable. As shown, most of the coefficients have their *a priori* expected signs, except for those of *INC* and *FARM*. Thus higher population, employment rate and more local establishments increase bank profitability, in turn increasing the likelihood of entry, while an increase in the rateable value of premises lowers profits. However, only *LPOP* and *EMP* are significant at the 5% level.[28] The overall fit, in terms of pseudo R-square, is 0.32.

Table A1 in appendix reports ordered probit estimation results where *MULTI* is included. Interestingly, the coefficient of this variable is negative and significant, indicating that a greater market share of multi-market banks lowers profitability and hence the likelihood of entry, *ceteris paribus*. This result is clearly in accordance with the hypothesis stated above. As shown, the rest of the coefficients are only slightly modified. The results of the Poisson regression (PR) analysis are more or less similar, as shown in Table A2.

[28] One problem is that *LPOP*, *FIRM* and *FARM* are correlated with each other. The simple correlation between *LPOP* and *FIRM* exceeds 0.8. In order to mitigate potential multicollinearity problems, I re-estimated the model with FIRM and/or FARM dropped. This change induced only a negligible effect on significant coefficients and overall goodness of fit.

Table 5.1: Results from ordered probit estimation

Parameter	Coefficient	Std. Err	z	P>|z|	[95% Conf. Interval]	
LPOP	1.43	0.129	11.11	0.000	1.18	1.68
INC	-6.33	4.74	-1.34	0.182	-15.6	2.96
EMP	5.47	1.45	3.78	0.000	2.64	8.31
FARM	-0.0539	0.104	-0.52	0.605	-0.258	0.150
FIRM	0.0284	0.0391	0.73	0.467	-0.0481	0.105
RENT	-0.139	0.108	-1.29	0.196	-0.351	0.0720
γ_2	14.27	1.338				
γ_3	15.63	1.367				
γ_4	17.19	1.427				
γ_5	17.95	1.439				
γ_6	18.89	1.452				
γ_{7+}	19.58	1.455				

Notes: All markets with 7 or more banks are aggregated into one category.
No. of obs = 485. LR chi2(6)= 584.91. Pseudo R^2=0.32. Log likelihood=-613.2.

The OP model generates estimated threshold parameters (cut points) $\hat{\gamma}_2, \hat{\gamma}_3, \ldots, \hat{\gamma}_{\hat{n}}$ which have no economic interpretation *per se* but can be used to calculate the more informative entry thresholds. Using [3.8] the minimum market size necessary to support *n* firms is given by:

$$S_n = \exp\left\{\frac{\hat{\gamma}_n - \bar{\mathbf{x}}'\hat{\boldsymbol{\beta}}}{\hat{\alpha}}\right\} \qquad [5.1]$$

where regressors are set at their sample mean. Per-firm entry thresholds are calculated as $s_n = S_n / n$.

In the PR model, the necessary per-firm market size to support *n* firms is calculated using [3.11]. Evaluating covariates at their sample means, we obtain:

$$\lambda = n = \exp(\bar{\mathbf{x}}_m'\boldsymbol{\delta}) \qquad [5.2]$$

from which S_n can be solved for.

The calculated entry thresholds appear in Table 5.2. Focusing first on the sequence of entry thresholds generated by the ordered probit model, it is clear that additional entry always promotes competition, since ratios always exceed one.

Furthermore, the highest ratios correspond to the most concentrated markets (duopolies and triopolies), suggesting that the pro-competitive effect of entry is larger in these markets.

Table 5.2

Per-bank Entry threshold calculations

Thresholds	OP	OP per firm	OP per firm ratio	PR	PR per firm	PR per firm ratio
1->2	3154	1577	-	5462	2731	-
2->3	8196	2732	1,73	14802	4934	1,81
3->4	24280	6070	2,22	30028	7507	1,52
4->5	41428	8286	1,37	51979	10396	1,38
5->6	79955	13326	1,61	81381	13564	1,30
6->7+	129330	18476	1,39	118884	16983	1,25

These results do not lend empirical support to the hypothesis of contestability.[29] If local markets were contestable, no distinct concentration-profit margins relationship would be obtained. Furthermore, the fact that each adjacent entry threshold is considerably larger than one is consistent with the assumption of a homogeneous product industry. However, in contradiction to the prediction of the Cournot model the relationship between entry threshold ratios and the number of firms does not describe a monotonically decreasing relationship. It is not straightforward to explain the non-monotonic pattern. For example, the fact that s_4 is considerably larger than s_3 is hard to reconcile with an explanation that the first three firms form a cartel, which a fourth entrant breaks up, since the arrival of a third entrant also entails considerable pro-competitive effects. At least we can conclude the following: (1) Profit margins must be quite high in the most concentrated markets, despite the heavy

[29] A contestable market has low barriers to entry and exit. If the market is perfectly contestable, entry and exit are totally costless, i.e. there are no sunk entry costs. A high degree of contestability (potential competition) may render a market perfectly competitive regardless if the industry is highly concentrated or not.

predominance of multi-market banks in these markets (cf. Fig. 4.2) and (2) there is no empirical support for the view that rural banks offer differentiated services.

As shown in the far right column of Table 5.2, the sequence of entry thresholds generated by the Poisson regression model describes a monotonically decreasing relationship between the number of firms and entry threshold ratios. In similarity with the "OP" sequence, threshold ratios are highest "in the beginning", subsequently falling gradually and rather slowly towards one. In essence, the conclusions drawn above are confirmed.

6. Conclusions

While urban and metropolitan customers more and more use online banking as the principal delivery channel for accessing banking services, rural bank customers still rely on the physical network (branches) as the prime access channel. This means that high customer loyalty and entry barriers can be expected to prevail in rural banking. In light of this, the purpose of the present paper has been to shed some light on the intensity (or lack of) of competition in Swedish retail branch (local) banking. For this purpose, a variation of the Bresnahan and Reiss (1991b) entry model was estimated using ordered probit and Poisson regression. According to the results, the following conclusions were drawn: (1) Swedish retail branch banking is a business that is indeed conducted locally; (2) profit margins in this industry appears to be quite high in the most concentrated local markets; (3) although margins are relatively high in market with few competitors, they fall substantially with each additional entrant; (4) there is no empirical evidence of contestability; (5) there is no empirical support for collusive behaviour; (6) product differentiation appears to be limited and (7) a greater presence of large ("multi-market") banks seems to have a pro-competitive effect on profit-margins.

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Appendix:

Table A1

Ordered Probit Estimation. Dep. Var. = No. of Market Competitors.

Parameter	Coefficient	Std. Err	z	P>|z|	[95% Conf.	Interval]
LPOP	1.36	0.131	10.37	0.000	1.10	1.62
INC	-5.65	4.77	-1.18	0.236	-15.0	3.70
EMP	4.95	1.46	3.40	0.001	2.10	7.81
FARM	-0.0313	0.105	-0.30	0.767	-0.237	0.175
FIRM	0.0228	0.0394	0.58	0.563	-0.0544	0.100
RENT	-0.108	0.109	-0.99	0.322	-0.105	0.321
MULTI	-0.635	0.112	-5.67	0.000	-0.854	-0.415
γ_2	12.93	1.376	(Ancillary parameters)			
γ_3	14.30	1.405				
γ_4	15.96	1.466				
γ_5	16.79	1.478				
γ_6	17.74	1.491				
γ_{7+}	18.45	1.493				

Notes: All markets with 7 or more banks are aggregated into one category.
No. of obs = 485. LR chi2(7)=617.27. Pseudo R^2=0.34. Log likelihood=-597.0.

Table A2

Poisson Maximum Likelihood estimation. Dep. Var. = No. of market players.

Parameter	Coefficient	Std. Err	z	P>|z|	[95% Conf.	Interval]
LPOP	0.371	0.0514	7.21	0.000	0.270	0.472
INC	-1.83	2.11	-0.87	0.387	-5.96	2.31
EMP	1.42	0.733	1.94	0.053	-0.0183	2.85
FARM	0.00330	0.0358	0.09	0.927	-0.0668	0.0734
FIRM	-0.00390	0.0118	-0.33	0.742	-0.0271	0.0193
RENT	-0.0573	0.0451	-1.27	0.204	-0.0312	0.146
MULTI	-0.185	0.0506	-3.66	0.000	-0.284	-0.0862
constant	-2.96	0.602	-4.91	0.000	-4.14	-1.78

Notes: No. of obs = 485. LR chi2(7)=370.16. Pseudo R^2=0.18. Log likelihood=-864.9.

Table A3: Local Banking Markets

Local Labour Markets	Municipalities included
Nyköping	Nyköping; Oxelösund
Katrineholm	Katrineholm; Vingåker
Eskilstuna	Eskilstuna; Flen
Linköping	Boxholm; Kinda; Linköping; Motala; Mjölby; Vadstena; Åtvidaberg; Ödeshög
Norrköping	Finspång; Norrköping; Söderköping; Valdemarsvik
Gislaved	Gislaved; Gnosjö; Hylte; Tranemo
Jönköping	Aneby; Habo; Jönköping; Mullsjö; Vaggeryd
Nässjö	Eksjö; Nässjö
Värnamo	Värnamo
Vetlanda	Sävsjö; Vetlanda
Tranås	Tranås; Ydre
Älmhult	Osby; Älmhult
Markaryd	Markaryd
Växjö	Alvesta; Lessebo; Tingsryd; Uppvidinge; Växjö
Ljungby	Ljungby
Hultsfred	Hultsfred
Emmaboda	Emmaboda
Kalmar	Borgholm; Kalmar; Mörbylånga; Nybro; Torsås
Oskarshamn	Högsby; Mönsterås; Oskarshamn
Västervik	Västervik
Vimmerby	Vimmerby
Gotland	Gotland
Olofström	Karlshamn; Olofström
Karlskrona	Karlskrona; Ronneby
Perstorp	Perstorp
Helsingborg	Bjuv; Båstad; Helsingborg; Höganäs; Klippan; Landskrona; Svalöv; Åstorp; Ängelholm; Örkelljunga
Kristianstad	Bromölla; Hässleholm; Kristianstad; Sölvesborg; Östra Göinge
Simrishamn	Simrishamn; Tomelilla
Halmstad	Halmstad; Laholm
Falkenberg	Falkenberg
Varberg	Varberg
Bengtsfors	Bengtsfors; Dals-Ed
Lysekil	Lysekil; Sotenäs
Strömstad	Strömstad; Tanum
Trollhättan	Färgelanda; Grästorp; Lilla Edet; Mellerud; Munkedal; Trollhättan; Uddevalla; Vänersborg
Borås	Borås; Herrljunga; Mark; Svenljunga; Ulricehamn
Lidköping	Essunga; Götene; Lidköping; Vara
Skövde	Falköping; Gullspång; Hjo; Karlsborg; Mariestad; Skara; Skövde; Tibro; Tidaholm; Töreboda
Torsby	Sunne; Torsby
Munkfors	Munkfors
Årjäng	Årjäng
Karlstad	Forshaga; Grums; Hammarö; Karlstad; Kil
Kristinehamn	Kristinehamn
Filipstad	Filipstad
Hagfors	Hagfors
Arvika	Arvika; Eda
Säffle	Säffle; Åmål

Local Labour Markets	Municipalities included
Laxå	Laxå
Hällefors	Hällefors
Örebro	Askersund; Hallsberg; Kumla; Lekeberg; Lindesberg; Nora; Örebro
Karlskoga	Degerfors; Karlskoga; Storfors
Västerås	Hallstahammar; Sala; Surahammar;Västerås
Fagersta	Fagersta; Norberg; Skinnskatteberg
Köping	Arboga; Kungsör; Köping
Vansbro	Vansbro
Malung	Malung
Älvdalen	Älvdalen
Mora	Mora; Orsa
Falun	Borlänge; Falun; Gagnef; Leksand; Rättvik; Säter
Avesta	Avesta; Hedemora
Ludvika	Ljusnarsberg; Ludvika; Smedjebacken
Hofors	Hofors
Ljusdal	Ljusdal
Gävle	Gävle; Ockelbo; Sandviken; Älvkarleby
Söderhamn	Söderhamn
Bollnäs	Bollnäs; Ovanåker
Hudiksvall	Hudiksvall; Nordanstig
Ånge	Ånge
Härnösand	Härnösand
Sundsvall	Sundsvall; Timrå
Kramfors	Kramfors
Sollefteå	Sollefteå
Örnsköldsvik	Örnsköldsvik
Strömsund	Strömsund
Åre	Åre
Härjedalen	Härjedalen
Östersund	Berg; Bräcke; Krokom; Ragunda; Östersund
Storuman	Storuman
Sorsele	Sorsele
Dorotea	Dorotea
Vilhelmina	Vilhelmina
Åsele	Åsele
Umeå	Bjurholm; Nordmaling; Robertsfors; Vindeln; Vännäs; Umeå
Lycksele	Lycksele; Malå
Skellefteå	Norsjö; Skellefteå
Arvidsjaur	Arvidsjaur
Arjeplog	Arjeplog
Jokkmokk	Jokkmokk
Överkalix	Överkalix
Kalix	Kalix
Övertorneå	Övertorneå
Pajala	Pajala
Gällivare	Gällivare
Älvsbyn	Älvsbyn
Luleå	Boden; Luleå; Piteå
Haparanda	Haparanda
Kiruna	Kiruna

Table A4: The sample of banks

Company name	Strategy
SKANDINAVISKA ENSKILDA BANKEN AB	MU
FÖRENINGSSPARB. SJUHÄRAD AB	S
NORDEA BANK SVERIGE AB (PUBL)	MU
LÄNSFÖRSÄKRINGAR BANK AB	ML
SVENSKA HANDELSBANKEN AB	ML
ESKILSTUNA REKARNE SPARBANK AB	S
FÖRENINGSSPARBANKEN ÖLAND AB	S
SÖDERHAMNS SPARBANK AB	S
BERGSLAGENS SPARBANK AB (PRIVAT)	MU
SPARBANKEN SKARABORG AB	ML
VARBERGS SPARBANK AB	ML
SPARBANKEN LIDKÖPING AB	S
VIMMERBY SPARBANK AB	S
TJUSTBYGDENS SPARBANK AB	S
SPARBANKEN GRIPEN AB	S
FÖRENINGSSPARBANKEN AB	ML
DANSKE BANK I SVERIGE AB	ML
SPARBANKEN NORD	ML
ULRICEHAMNS SPARBANK	S
SALA SPARBANK	S
SPARBANKEN I KARLSHAMN	S
WESTRA WERMLANDS SPARBANK	ML
SPARBANKEN VÄSTRA MÄLARDALEN	S
FALKENBERGS SPARBANK	MU
SPARBANKEN SYD	S
KRISTIANSTADS SPARBANK	S
HUDIKSVALLS SPARBANK	S
LEKSANDS SPARBANK	S
SPARBANKEN TRANEMO	S
SÖDRA DALARNAS SPARBANK	S
NORDALS HÄRADS SPARBANK	MU
TIDAHOLMS SPARBANK	MU
FRYKSDALENS SPARBANK	S
VALDEMARSVIKS SPARBANK	MU
SÖLVESBORG MJÄLLBY SPARBANK	S
KINDA SPARBANK	S
ÅTVIDABERGS SPARBANK	S
HÖGSBY SPARBANK	S
ÅSE OCH VISTE HÄRADS SPARBANK	S
VADSTENA SPARBANK	S
MARKARYDS SPARBANK	S

Company name	Strategy
ALMUNDSRYDS SPARBANK	S
ALSKOGS SPARBANK	S
ATTMARS SPARBANK	S
BJURSÅS SPARBANK	S
BURS PASTORATS SPARBANK	S
DALHEMS SPARBANK	S
EKEBY SPARBANK	S
ESKELHEMS SPARBANK	S
FARSTORPS SPARBANK	S
GARDA-LAU SPARBANK	S
GLIMÅKRA SPARBANK	S
GÖTERYDS SPARBANK	S
HISHULTS SPARBANK	S
HÄRADSSPARBANKEN MÖNSTERÅS	S
IVETOFTA SPARBANK I BROMÖLLA	S
JÄRVSÖ SPARBANK	S
LEKEBERGS SPARBANK	S
KYRKHULTS SPARBANK	S
LÅNGASJÖ SOCKENS SPARBANK	S
LÖNNEBERGA SPARBANK	S
MJÖBÄCKS SPARBANK	S
NORRBÄRKE SPARBANK	S
NÄRS SPARBANK	S
RÖKE SOCKENS SPARBANK	S
SIDENSJÖ SPARBANK	S
SKATELÖVS OCH VÄSTRA TORSÅS SB	S
SKÅNES FAGERHULTS SPARBANK	S
SÖDRA HESTRA SPARBANK	S
TUNA-VENA SPARBANK	MU
TYRINGE SPARBANK	S
VALLBY SPARBANK	S
VINSLÖVS SPARBANK	S
VIRSERUMS SPARBANK	S
ÅLEMS SPARBANK	S
ÅRYDS SPARBANK	S
ÄLMEBODA SPARBANK	S
SNAPPHANEBYGDENS SPARBANK	MU
SPARBANKEN TANUM	S
LAHOLMS SPARBANK	S
SPARBANKEN SÖRMLAND	ML

Notes: S= Single market banks; ML= Multi-market banks, pursuing a localstrategy; MU= Multi-market banks pursuing a uniform strategy.