Switching Costs in
Local Finnish Retail Bank Lending

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Abstract:

Competition in the banking industry has been under scrutiny from both Nordic and European competition authorities, and switching costs have been found as a plausible reason for weak consumer mobility. (Switching costs are the costs faced by consumers when changing from one supplier to another.) This thesis examines the existence and magnitude of switching costs in Finnish retail bank lending, possibly providing a primer for authority intervention.

A review of theoretical switching cost models reveals several important features of banking affecting market performance. Most important is the long-term character of customer relationships enabling banks to price discriminate between new and old customers as well as providing incumbent banks with an informational advantage over competitors concerning customer creditworthiness. The Finnish retail bank market in particular displays several characteristics nurturing switching costs: substantial physical distances between towns create fragmented markets where customers become informationally captured to local banks; markets are segmented based on history; and bank services are bundled together rendering focused purchasing very advantageous.

Switching costs facing customers choosing either a local cooperative or savings banks are examined by estimating price elasticities and cross price elasticities with regard to lending. Financial report data on outstanding loans and interest income are used to approximate loan output and price for 37 cooperative-savings bank pairs during 1999-2008. The obtained panel is analyzed in two LSDV-models, one for each bank category. The resulting price and cross price elasticity estimates are below one in absolute value, in line with earlier research, indicating substantial switching costs. The results are robust to minor changes in model formulation. Interestingly enough, cooperative bank customers appear more loyal than savings bank customers - which seems to be reflected in higher return rates on total assets. Plausible explanations lie both in ownership structure (many cooperative bank customers are owner-members) and in the well developed loyalty program offered by many cooperative banks. Yet the results need to be interpreted with care as misspecifikation tests indicate various weaknesses.

Switching cost size is estimated with a method based on the undercut-proof equilibrium method presented by Shy [2002]. Switching costs amount to roughly 50% of the charged interest rates for both cooperative and savings banks, and are roughly constant over time. The result is higher than earlier research on switching costs in bank lending, but lower than estimates employing the same method on other markets.

The study establish a picture of significant switching costs in Finnish bank lending, although the impact from competition in other bank services remains to be examined.

Keywords: switching cost, banking, demand elasticity, panel data, undercut-proof property
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1 Introduction

Switching costs arise when consumers have to spend time, effort or money in order to change suppliers. These costs associated with switching are presumably present in many different markets. A good example is the banking industry. High enough switching costs may completely discourage consumers from switching and lock them in with their current supplier. That is, consumers might not change supplier even though a competitor offers lower prices. A less price sensitive demand enables firms to raise prices, which is why switching costs have received its share of attention from competition authorities (for example, Fernandez et al. [2003]).

Banking is one industry often considered as characterized by substantial switching costs. Banking products are difficult to compare, changing bank account number is tiresome and alternative bank branches may be located far away, to mention a few reasons. Both the Directorate-General for Competition at the European Commission\(^1\) and the Nordic competition authorities\(^2\) have regarded switching costs as reasons behind low consumer mobility in their respective inquiries into the retail banking market. However, others argue that low customer mobility has nothing to do with switching costs but with the fact that consumers are simply satisfied with their current banks (Schäfer [2008]). (And even if switching costs are existent, the literature is not completely unanimous on their impact on competition.) Furthermore, if recent developments in banking technology have diminished the importance of physical branches, remaining switching costs ought to be less problematic than, say, ten or twenty years ago.

A starting point for discussing any need for action should be to establish whether switching costs are present or not, and in case they are, if they are high enough to threaten competition. That is the aim of this thesis.

1.1 Purpose

The purpose of the thesis is twofold:

1. To examine whether switching costs are present in Finnish retail bank lending.

2. In case switching costs are present, to estimate their magnitude.

1.2 Limitations

Banks provide fundamental services in the economy; they transfer capital from surplus to deficit units by linking together savers and borrowers and acting as an


intermediary. Although both companies and private persons alike need banking services, they have different needs and are to some extent customers of different banks. This study focuses only on retail banking, what Smidt et al. [2006] define as providing banking services primarily to households and small and medium sized enterprises (SMEs). Larger corporations have other possibilities for acquiring these services, and are hence excluded from the study.

The study further focuses solely on bank lending, as switching costs are considered more important in lending than in deposits and payment services.

1.3 Methodology and Data

The potential existence of switching costs is investigated both by simply surveying market characteristics and by empirically analyzing price elasticities of demand for loans. The size of switching costs is subsequently measured using the quick-and-easy method suggested by Shy [2002].

A panel data set on quantities and prices is constructed using data on loans extended and income from loans extended, collected directly from individual banks’ financial reports (publicly available from the National Board of Patents and Registration of Finland). The panel data regression is performed as a fixed effects model, estimated using least squares with dummy variables both for time constant and individual fixed effects.

1.4 Outline

Section 2 defines switching costs, lists sources of switching costs with examples from banking when applicable and presents the general impact switching costs hold on competition. Section 3 surveys the theoretical switching cost literature by characterizing the specific banking features that conceivably give rise to switching costs, and discusses potential consequences for competition. Section 4 describes commonly used methods for empirical switching cost analysis. Section 5 reports results of earlier empirical research on switching costs in banking while section 6 presents the Finnish retail banking industry. Section 7 explains and motivates the applied models and estimation methods, section 8 present the data used. Section 9 reports and analyzes the estimation results. Section 10 concludes and section 11 provides a summary in Swedish.
2 Introduction to Switching Costs

A general assumption in economic analysis is that consumers strive to maximize their personal utility and firms strive to maximize their profits. When consumers maximize utility and firms maximize profits in a market economy, the market mechanism produces an efficient allocation of goods and services. This microeconomic cornerstone, the so-called fundamental theorem of welfare economics, states that individuals driven by pure self-interest actually promote general welfare through increased allocative and productive efficiency. (Milgrom and Roberts [1992])

Maximum efficiency is reached in the perfectly competitive market. In perfect competition, buyers are perfectly informed about products and prices and switch freely and immediately from one supplier to another. Competition makes price differences impossible and pushes prices down to the lowest level possible - marginal cost. Perfect competition is obviously only a theoretical benchmark, since perfect information and immediate movement are impossible in reality, but real-world competition promotes welfare in the same way. Firms are forced to improve products and production technologies and to lower prices in order to retain old and attract new customers, resulting in a more efficient resource allocation. If existing competition allows firms to charge high prices and make excessive profits new firms enter the market by charging lower prices than the incumbents, forcing them to respond with lower prices. (Cabral [2000])

Customer mobility, or customers’ possibilities to switch supplier, is consequently central to promote efficiency and welfare. Different types of switching costs may, however, hinder customer mobility or even lock them in with their current supplier. They are broadly speaking the costs consumers have to bear when changing suppliers even if goods are practically identical (Thompson and Cats-Baril [2002]). They confer market power on firms, giving them an opportunity to raise prices above the welfare-maximizing level i.e. above marginal cost. (Shy [2002])

Only if consumers buy the same good several times is it possible for them to switch suppliers between purchases. Switching costs cannot arise without recurrent purchasing, but since many goods are bought repeatedly switching costs arise in many markets. Especially if costumers and suppliers engage in continuous relationships customers may find changing suppliers difficult. Banking is a prime example of a switching cost market and has, to some extent, been subjected to both theoretical and empirical switching cost research. For example Tarkka [1995] analyzed switching costs’ effects on bank deposit markets finding that they confer market power on banks by relaxing competition and providing banks with an opportunity to offer somewhat less favourable terms. As banks offer services both in depositing and lending as well as payment services switching costs can arise due to a variety of reasons.
2.1 Switching Cost Categories

Switching costs might constitute a direct cost, for example fees for breaking a contract, but are most often indirect costs due to incompatibility between the current purchase and previous investments (Farrell and Klemperer [2007]). Switching costs make initially homogeneous products become differentiated after the first purchase: one brand is compatible with previous investments, other brands are not (Kim et al. [2003]). These investments may come in many different shapes, and Klemperer [1995] listed six switching cost sources:

“Need for compatibility with existing equipment”

Systems of competing brands often differ physically from each other, rendering it impossible to buy different parts from different suppliers. With mutually incompatible systems the only possibility to change supplier is to renew the whole system, making the old investment worthless. Examples include razors and blades or printers and refill cartridges. Having bought a razor, consumers are forced to buy refill blades from the same manufacturer since blades and razors of different brands rarely fit together. Otherwise they are forced to buy completely new razors making the old ones redundant.

The market for razor blades or refill cartridges are examples of so called aftermarkets, which are often characterized by switching costs: The purchase of a durable good (razor or printer) is followed by purchases of consumable goods (razor blades or refill cartridges). Similar aftermarkets arise for services: An elevator installation means buying several maintenance service years. Without sufficient competition in aftermarkets, consumers become locked in to their current durable good manufacturer. (Shapiro [1995] in Fernandez et al. [2003])

“Transaction costs of switching suppliers”

Although two suppliers offer practically identical goods, the switch itself sometimes induces high transaction costs. For example changing banks means getting new bank account numbers and informing relevant parties of the change (Klemperer [1987a]). This effort might be substantial especially for companies having to inform all customers of any change.

Switching banks and terminating services such as current accounts, timed deposit accounts or investment funds may even involve direct costs, so called closing fees, in some countries (Directorate-General for Competition [2007]). Banks in Finland charge nothing for closing current accounts (Directorate-General for Competition [2007]) but are allowed to charge a limited compensation for early repayment of loans if the loan exceeds 17,000 euro, if the interest rate is fixed for at least three years and if the same bank would at the time offer a cheaper loan (Smidt et al. [2006]). Banks within the Nordic countries have further agreed upon procedures to facilitate customer switching in order to reduce switching costs (ibid).

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3The average closing fee in the European Union is 2.43 euro, but in most EU countries banks do not charge customers for closing accounts.
“Costs of learning to use new brands”

When changing computer applications, for example spreadsheet software, time and effort go into learning the new interface even if the old and new software are functionally identical. The investment made into learning the old application becomes worthless. For example Carlson et al. [2000] considered learning costs a conceivable obstacle to changing internet bank systems.

“Uncertainty about the quality of untested brands”

Repurchasing a good of known quality is less risky than buying a new brand - “you know what you’ve got but not what you’ll get”. The switching costs here represent the premium consumers are willing to pay in order to get the known quality rather than the competing brand’s unknown quality. One example is medicine, where consumers often buy the more expensive well-known brand rather than the less expensive generic drug. Zephirin [1994] showed how quality uncertainty creates switching costs in bank depositing. When depositors value service quality but have poor information on different alternatives, switching costs arise as a trade-off between known interest rates and uncertain service quality.

“Discount coupons and similar devices”

Firms create artificial switching costs to lock in customers, generating an opportunity to raise prices above marginal cost. Airline frequent-flyer programs and loyalty programs offered by retail stores are two examples. These programs make it more favourable to purchase repeatedly from the same supplier rather than purchasing from several different suppliers, since the program grants discounts, cash back bonuses or similar benefits.

Bank product bundling is very common and functions like a loyalty program: Focusing purchases render discounts on each product. Mankila [1999] noted that bundling reduces selling, marketing and production costs but more importantly stimulates existing customers’ demand for additional services. Mankila [1999] further noted that bundling eases competition by creating switching costs and increasing customer loyalty. Retail banks both in Sweden and Finland use price bundling extensively (ibid) and according to the survey conducted by Juul [2006] 79% of responding banks used some sort of loyalty program. Both Smidt et al. [2006] and Directorate-General for Competition [2007] mentioned bundling as a barrier to customer mobility partly because bundling makes price comparison difficult.

“Psychological costs of switching, or non-economic ‘brand-loyalty’”

Although there may be no economic reason for brand loyalty, consumers still face psychological switching costs due to addictions or habits. Furthermore, preferences tend to change towards known and already used goods, resulting in preference-based brand loyalty and limited switching.
2.2 Search and Shopping Costs

Klemperer [1995] further mentioned search costs and shopping costs as closely related phenomena, but did not count them as switching costs. Search costs are the costs customers incur when looking for product information and prices of competing brands. Fernandez et al. [2003] argued that although search costs and switching costs often arise together, search costs are also incurred before having made the first purchase. However, Smidt et al. [2006] pointed out that most people become bank customers of the same bank as their parents, meaning that search costs arise only after the first purchase is made. Certainly, comparing prices and meeting with different bank consultants when searching for alternatives is time consuming (ibid).

Shopping costs arise when buying different products from different suppliers, for example buying groceries from several specialized stores instead of buying everything from a supermarket. Switching costs and shopping costs differ in that switching costs generate economies of scope across time periods (purchasing repeatedly from same supplier eliminates switching costs), whereas shopping costs generate economies of scope within a single time period (purchasing centralized from same supplier eliminates shopping costs) (Fernandez et al. [2003]).

2.3 How Switching Costs Affect Markets - A Basic Model

Despite firms setting prices and consumers making purchase decisions in several consecutive periods, they are rarely able to make agreements and commit to prices over more than one period at a time. Using these short-term contracts instead of life cycle contracts creates inefficiencies: Consumers cannot distinguish the most favourable firm in the long run, possibly leading to wasteful resource usage with prices set too high or inefficient firms remaining in the market. Switching cost modelling tries to explain these inefficiencies and predict the effect on market performance. (Fernandez et al. [2003])

The theoretical literature on how switching costs affect market performance is extensive. Switching cost modelling started in the 1960’s when Selten [1965] examined a model of oligopolistic competition with “demand inertia”, assuming that a firm’s current sales partly depend on the differences between its own and its competitors’ previous-period prices. Consumer behaviour modelling on the other hand gained pace in the 1980’s. von Weizsacker [1984] was, according to his own words, probably the first to present a mathematical model studying switching costs’ effect on competition, followed by Klemperer [1987a,b].

2.3.1 Bertrand Competition without Switching Costs

In price competition, when identical firms (marginal cost same for all) compete with homogeneous products and perfectly informed consumers have constant identical preferences, consumers become infinitely price sensitive and switch immediately to the supplier offering the lowest price. Consequently, any firm setting a price higher than the others loses all customers, whereas any firm
setting a price just slightly lower than the rest captures the whole market. Pure Bertrand competition eliminates all price differences and pushes prices down to marginal cost. (Shy [1995])

As a result, the demand facing each firm is discontinuous at the price \( c \): pricing below means capturing the whole market (and making a loss), pricing above implies losing all customers. Without any changes in the setting, the price equilibrium consistently generates identical prices that are equal to marginal cost also in subsequent time periods. (Shy [1995]) Notably, market share distribution is neither important nor explicitly determined in this setting.

### 2.3.2 Bertrand Competition with Switching Costs

Varian [2001] presented a two-period model in a similar setting, but with consumers facing switching costs and becoming locked-in after the first purchase (slightly modified here):

Identical firms with marginal cost \( c \) compete Bertrand style. Goods are homogeneous and non-durable, and need to be purchased repeatedly. The number of consumers is constant and preferences are identical. In period two, when consumers already have made a purchase, each faces uniform exogenously given switching costs \( S \) high enough to discourage from switching. In this case neither firm can offer - without making a loss - a price low enough to induce switching, implying that the market is effectively divided. Consequently, each firm is able to act as a monopolist over its respective market share, charging the price \( c + S \) and receiving monopoly profits \( S \) from each consumer.

In period one consumers have yet not made the first purchase and yet not become locked-in to a supplier. Firms now compete for consumers that later become locked in to the chosen supplier. When competition between firms lasts in two periods firms aim for maximum total profit. Without discounting total profit simply equals the sum of profits from each period. Since market shares obtained in the first period determine the profits in the second period (when consumers are locked in), firms initially compete fiercely, offering very low prices. In the first period each is willing to make losses up to \(-S\) per customer, because this loss is subsequently covered by the monopoly profits earned in the second period. Competition pushes down period one prices as low as possible, i.e. until the losses completely eat up the period two monopoly profits, resulting in a period one price of \( c - S \).

Over the two periods consumers pay the total price \((c + S) + (c - S) = 2c\), two times the marginal cost or the same as in a regular two-period Bertrand setting. Total profits are zero as in regular Bertrand competition, but market dynamics are very different. This pricing pattern, where firms first price aggressively and then price high, is generally known as “bargains then rip-offs” (Fernandez et al. [2003]). Firms initially “invest” in market shares after which they then “harvest” their customer base (ibid). This pricing pattern of introductory offers and subsequently raised prices can be seen in many different markets, Klemperer [1995] for example noted that banks often attract students with free banking services and gifts but start imposing high charges after graduation - when the students
are already locked-in. Since market shares completely determine profits in the second period, attaining them in the first period becomes strategically very important. A large customer base today means opportunities for pricing high and harvesting tomorrow. Switching costs can thus partly explain why firms put emphasis on market shares in their strategies. Nevertheless, this model cannot explain the resulting distribution of market share. A growing market or a low discount rate increasing the significance of future profits makes market shares and investing in them even more important (Farrell and Klemperer [2007]).

However, Varian [2001] pointed out, the model relies on the assumption of short-term contracts: In period one, firms cannot determine prices for period two. If firms could commit to future prices, consumers would choose the overall most favourable offer and the model would break down into ordinary one-period Bertrand competition. In the early model of von Weizsacker [1984], firms were assumed able of committing to future prices. When price cuts are expected to be permanent, the gains from lower life-time prices probably outweighs the one-time switching costs. If consumers believe firms can commit to future prices, they become very sensitive to price changes and move immediately if a firm offers lower prices. von Weizsacker [1984] showed that in this case switching costs actually increase competition and lower prices. Klemperer [1987a] criticized this assumption as unjustified in many markets. Most switching cost models thereafter appear to assume that firms cannot commit to future prices.

2.3.3 No Switching At All?

The model presented above provides the intuition behind markets with switching costs, and at least the intertemporal pricing pattern with introductory offers can be seen in many markets, but otherwise it is much simplified and somewhat unrealistic. In real life products are differentiated, consumers exit and enter markets, preferences alter and firms are rarely identical. However, assuming that switching costs create complete lock-in after the initial purchase is perhaps the most unrealistic feature. In reality consumers do switch suppliers even if it is costly and firms do succeed in poaching rivals’ customers using various offers. Yet, according to Farrell and Klemperer [2007], most switching cost models assume that there is no switching in equilibrium. The problem with modelling consumers changing suppliers when facing switching costs was illustrated in Shy [2001] (slightly modified to correspond to the model above):

The two firms $A$ and $B$ compete Bertrand style with homogeneous products. Marginal costs are assumed to be zero. In period one a number of $N_A$ consumers buy from firm $A$ and $N_B$ from firm $B$. In period two all consumers face switching cost $S \geq 0$ if they wish to change supplier. Products have thus become differentiated in period two due to switching costs. The (dis)utility for a consumer who previously bought from firm $A$ is

$$ U_A \stackrel{def}{=} \begin{cases} -p_A & \text{if buying from } A \\ -p_B - S & \text{if buying from } B \end{cases} $$  

(1)
and the (dis)utility for a consumer who previously bought from firm B is

\[ U_B \overset{\text{def}}{=} \begin{cases} -p_A - S & \text{if buying from A} \\ -p_B & \text{if buying from B.} \end{cases} \] (2)

If firm A wishes to poach customers from firm B it has to offer a lower price than firm B does, and the price difference has to be larger than the switching cost \( S \) to make it worthwhile for consumers to switch. Market shares depend on pricing decisions, and, similar to the regular Bertrand case, demand facing each firm is discontinuous: pricing low enough means capturing the whole market, pricing too high means losing all customers, and pricing somewhere in between means retaining old customers without attracting new. The market shares in period two, \( n_A \) and \( n_B \) respectively, become

\[
 n_A = \begin{cases} 0 & \text{if } p_A > p_B + S \\ N_A & \text{if } p_B - S \leq p_A \leq p_B + S \\ N_A + N_B & \text{if } p_A < p_B - S \end{cases} \] (3)

and

\[
 n_B = \begin{cases} 0 & \text{if } p_B > p_A + S \\ N_B & \text{if } p_A - S \leq p_B \leq p_A + S \\ N_A + N_B & \text{if } p_B < p_A - S \end{cases} \] (4)

Shy [2001] then showed that it is impossible to solve for a Nash-Bertrand equilibrium\(^4\), here denoted \((p^N_A, p^N_B)\), in this setting:

In equilibrium the difference between firm A’s and firm B’s prices can be larger, smaller or equal to the switching cost \( S \), producing three separate cases\(^5\).

1. The price difference in equilibrium is larger than the switching cost, \( p^N_A - p^N_B > S \iff p^N_A > p^N_B + S \). Firm B prices low enough to capture the whole market according to equation (4) and firm A makes zero profit. Here firm A can get a positive profit by reducing its price to \( p^N_B + S \) in order to retain its customers from period one. But since firm A has incentives to deviate when the price difference exceeds the switching costs, the prices do not constitute a Nash-Bertrand equilibrium. (Same line of argument if \( p^N_B - p^N_A > S \).)

\(^4\)Intuitively, a Nash equilibrium is a pair of strategies where firm A’s choice is optimal given firm B’s choice, and firm B’s choice is optimal given firm A’s choice (Varian [2006]). That is, an equilibrium where no firm can unilaterally change its strategy in a way that would improve its payoff (Cabral [2000]). A Nash-Bertrand equilibrium is thus a Nash equilibrium in prices, here a pair of prices that neither firm has incentives to change.

\(^5\)The underlying intuition is that a higher price increases profits as long as it does not reduce market share.
2. The price difference is smaller than the switching cost, $p^N_A - p^N_B < S \iff p^N_A < p^N_B + S$. Firm A prices low enough to capture the whole market according to equation (3). However, firm A can still increase profits by slightly raising its price; as long as it is lower than $p^N_B + S$ firm A still captures the whole market. But since firm A has incentives to deviate when the price difference is smaller than the switching costs, the prices do not constitute a Nash-Bertrand equilibrium. (Same line of argument if $p^N_B - p^N_A < S$.)

3. The price difference is equal to the switching cost, $p^N_A - p^N_B = S$. Firm A prices higher than firm B, but still low enough not to lose any customers from period one. Firm B can thus increase profit by raising its price slightly as long as $p^N_B = p^N_A - S < p^N_A + S$, i.e. as long as the price difference does not exceed the switching costs. (Same line of argument if $p^N_B - p^N_A = S$.)

If allowing for switching in equilibrium leads to the non-existence of a Nash-Bertrand equilibrium it is understandable that most models assume that switching costs create complete lock-in. The underlying reason for a non-existent Nash-Bertrand equilibrium in the model above is the assumption of homogeneous switching costs. One way around this problem is using differentiated switching costs, as for example in Chen [1997] and Gehrig and Stenbacka [2004] where firms recognize customer purchase histories and offer different prices to old and new customers. Shy [2002] instead built on the analytics above and presented a new equilibrium concept. Dubé et al. [2008] presents yet another solution to the problem of a non-existent equilibrium by introducing imperfect lock-in and randomness in consumer demand. Dubé et al. [2008] actually argued that switching costs lower rather than raises prices: When customers are not completely locked in, investing becomes more attractive than harvesting and the optimal choice between harvesting and investing depend on the magnitude of switching costs - higher switching costs mean tighter lock-in and higher prices. But according to Dubé et al. [2008], prices often fall under a wide range of plausible switching costs levels.

The general opinion in theoretical switching cost literature is still that prices are higher with than without switching costs. Klemperer [1995] listed three reasons: First, when firms make their pricing decisions they discount their future profits. Any positive discount factor puts more emphasis on today’s profits, which makes harvesting more attractive than investing and implies that prices are higher than without switching costs. The higher the discount factor, the higher the price. Second, firms with larger market shares prices less aggressively, which creates incentives for firms to let their competitors grow and become less aggressive in the future. And by pricing high firms loose customers to their competitors. Third, rational consumers expect to be locked in and as a result they are less price sensitive. Faced with inelastic demand there is little point for firms to price aggressively and receive low profits.
3 Bank Industry Features Affecting Switching Cost Impact

The model in section 2.3.2 is a very much simplified version of reality. The impact of switching costs on market performance depends greatly on specific product, firm and consumer characteristics.

3.1 Homogeneous Products, Spatial Differentiation

Retail banks offer primarily services in the three categories: depositing, lending and payment systems, but products are rarely differentiated neither horizontally nor vertically\(^6\). Asset management services offered mainly by investment banks, on the other hand, present more differentiation in return-risk combination and investment advice (Vesala [2000]).

Differentiation in the banking market is instead principally due to differentiation in location, in branch networks. As noted for example in Smidt et al. [2006], physical, geographical distance between banks creates transportation costs, implicitly creating spatial differentiation dividing market into local sub-markets and hindering switching. Despite the technological development competition in lending still seems to be regional: Petersen and Rajan [2002] reported that the median distance between bank (lender) and borrower in the United States is 4 miles (approximately 6.44 kilometers) and Degryse and Ongena [2005] reported a median distance in Belgium of 4 minutes and 20 seconds, calculated as 2.25 km.

3.1.1 Modelling Differentiation

Product or locational differentiation is in theoretical modelling often expressed as suggested by Hotelling [1929]: The unit interval represents product characteristics ranging from one extreme (0) to the other (1). Consumers are spread out over the interval according to preferences and firms place themselves at different locations on the interval. Consumers are forced to travel and incur a transportation cost - forced to some extent to compromise their preferences - in order to reach a firm and buy a product. Product differentiation implies that firms are not competing for the exact same customers, and competition is consequently more relaxed than with homogeneous goods. (Cabral [2000])

3.1.2 Differentiation in a Market with Switching Costs

Concerning product differentiation in general, Klemperer [1992] showed that it actually may strengthen competition in a market with switching costs. Assume firms produce similar, but not identical, products. If consumers value variation, the desire to try something new might exceed the cost of switching suppliers meaning that firms have to attract customers with lower prices. If firms instead

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\(^6\)Horizontal differentiation refers to differences in products’ characteristics, such as car colours or jeans models, while vertical differentiation refers to differences in quality.
produce identical goods, there is no point for consumers to change supplier and incur the switching cost. Quite contrary to the regular assumption, product differentiation may thus enhance competition in a market with switching costs. Switching costs consequently create incentives for firms to forgo differentiation and produce identical products. Instead, switching costs create incentives for firms to increase product lines. If consumers face switching (or shopping) costs when buying from different suppliers, it may be a serious disadvantage not to offer the whole product range - especially if a competitor does offer it (Klemperer [1995]). Klemperer and Padilla [1997] showed that firms may even offer too wide a product portfolio, seen from the social standpoint. Switching costs may thus lead firms to produce too many products each but with too little variety between products of different firms (Fernandez et al. [2003]).

Spatial differentiation is rather different, physical transportation costs are real costs unlikely overcome by desire for variation - as bank products in themselves are very similar. Yet Vesala [2000] argued that modelling differentiation in a spatial framework becomes less and less appropriate in the banking industry because technological development (ATM networks, phone and especially internet banking) reduces the importance of distance and increases the threat of entry also from actors without physical branches.

3.2 Long-Term Competition

Since many Nordic banks count their origins back to the 19th century they see generations come and go with consumers continuously entering and exiting the bank market. Modelling these dynamics is consequently central to correctly capture the effects of switching costs. Neither is a two-period model adequate to portrait market dynamics when banks are long-lived and compete in several subsequent time periods.

3.2.1 Continuous Consumer Entry

If new consumers enter the market in period two in the Varian [2001] model, the simple harvest-invest pricing pattern no longer holds. Klemperer [1995] argued that unless firms are able to distinguish between new and old consumers, firms have to choose between pricing low to attract new consumers and pricing high to exploit old customers. The firm’s pricing strategy generally depends on the size of its market share: Small firms act aggressively and price low to attract new consumers - which they can exploit in the future. Large firms are more lazy (the so called “fat cat” effect (Farrell and Klemperer [2007])) and price high to exploit their existing large customer base. If switching costs are low enough then the larger firm’s customers will eventually switch to the smaller firms, and market shares will fluctuate as time goes by (Fernandez et al. [2003]). According to Padilla [1992] (referred in Fernandez et al. [2003]), competition for the new

7 However, banks are generally able to price discriminate. More on price discrimination in section 3.5.1.
consumers in the second period pushes prices down compared with when the market size is constant.

3.2.2 Multi-Period Competition

When firms compete in many periods they continuously face the trade-off between harvesting and investing. The results of using a multi-period seem yet not to differ too much from using a two-period model. As in two-period models, prices and profits are higher than without switching costs, prices depend on market shares and market shares fluctuate over time (Beggs and Klemperer [1992], Padilla [1995]). If, however, firms with an existing customer base focus on harvesting and leaves the unattached customers to new entrants, entry of new firms is encouraged. When this is happening in each period, Farrell and Shapiro [1988] found that it may even be possible for inefficient firms to enter the market.

In multi-period models, discounting the future in today’s decision-making becomes more important than in two-period models. Future profits depend on today’s market shares and future purchase choices depend on today’s choices. When firms put less emphasis on the future prices rise, since they prefer harvesting to investing. When customers put less emphasis on the future prices fall, since they become more sensitive to price differences today and firms have to compete more aggressively to attract customers. (Beggs and Klemperer [1992])

3.2.3 Collusion

Since banks compete over long time periods and in several markets (depositing, lending and payment services), banking is an industry where collusion seems plausible (Cabral [2000]). According to Farrell and Klemperer [2007], the impact of switching cost on collusion has not yet been well explored and results point in different directions. If switching costs dampen competition in mature markets when firms harvest their customer bases, there is little point in cooperating since competition already is low, but the result may look collusive from the outside (Fernandez et al. [2003]). On the other hand, switching costs may make it easier to agree on cooperation: Markets become naturally divided after customers have made their first purchase and have become locked in with different firms (Klemperer [1987a]). Klemperer [1987a] also pointed out that switching costs facilitate collusion monitoring since very large price cuts are needed to steal competitors’ customers. Deviating from agreements is anyway less attractive precisely because it is more difficult to steal customers, but it is at the same time more difficult to punish deviators (Farrell and Klemperer [2007]).

3.3 Consumer Behaviour

Market performance ultimately depends on consumer behaviour, as firms adjust strategies to it. The effect of switching costs depend on consumers’ preferences and especially future changes in preferences. For example in connection to
opening a bank account, do consumers consider possible future mortgage needs when choosing bank?

3.3.1 Changing Preferences

When products are differentiated, consumers have to compare both prices between products and how well the different products agree with their preferences. Sometimes this comparison means a trade-off: More preferable product but higher price and vice versa. If consumer preferences change, so does the optimal product and consumers change supplier. Since switching costs make it harder to change suppliers consumers are more likely buy the same brand tomorrow as they bought today even if their preferences alter. They switch to cheaper (presumably less preferable) alternatives only if they expect the price cut to be more permanent than their tastes. (Farrell and Klemperer [2007])

Klemperer [1987b] showed that the more consumer preferences change, the more responsive are consumers to price cuts and the more competitive is the market.

3.3.2 Knowledge of Switching Costs

Crucial is also consumers’ knowledge about their own switching costs. It turns out that switching costs have very different impact on market performance depending on whether consumers are shortsighted or if consumers foresee the “bargains then rip-offs” pricing patterns and expect to be locked in. In banking, it is reasonable to argue consumers being both: parents opening a bank account for their child do probably not consider the possibility of future lock-in whereas someone taking a mortgage probably expects to remain customer at least during the whole repayment period. Foreseeing lock-in also depends on how well consumers know their switching costs and possible changes in switching costs.

If consumers are shortsighted, they do not care about future prices and they ignore the possibility of becoming locked in after the first purchase. In separate period, shortsighted consumers compare the price of the current supplier with the switching cost and price of a competing supplier and choose the most favourable alternative. In a market with shortsighted consumers where only a minority of consumers are old and locked in, firms have greater incentives to invest in their market share and the resulting intense competition may push prices low - even lower than in a market without switching costs. If a majority of consumers are old and locked in, on the other hand, firms are likely to harvest their existing customer base by charging high prices. (Fernandez et al. [2003])

Rational consumers foresee the “bargains then rip-offs” pricing pattern, they realize that firms have incentives to raise prices after locking consumers in with introductory offers. The cost of switching is likely to exceed future gains since the new supplier’s price is assumed rise in the future which means that hunting the lowest price and frequently switching suppliers become less attractive. When consumers are less responsive to competitors’ price cuts firms can safely raise prices without loosing customers. (Farrell and Klemperer [2007])
3.4 Significant Economies of Scale

Banking is an industry characterized by significant economies of scale. Banks act as intermediaries transferring capital from surplus to deficit units by linking together savers and borrowers. When matching inflows and outflows, they make it possible for borrowers to take large long-term loans, although individual savers provide only small short-term deposits. In this process, banks evaluate the credit quality of borrowers and monitor their repayments on behalf of lenders (depositors). In both these activities size is a facilitator: Matching flows becomes more predictable the larger the flows and risk evaluation improves with experience. (Howells and Bain [2008])

These economies of scale function as entry barriers in themselves, and switching costs only emphasize the effect. When customers are locked in to the incumbent firm it is hard for new firms to price low enough to attract customers. It is difficult for new firms to enter the market if a majority of consumers is locked in to the incumbent and large scale entry is necessary for successful operations (Farrell and Klemperer [2007]). However, as discussed in section 3.2.2, small scale entry, perhaps focusing on special niches, may yet be feasible and even encouraged by switching costs (Klemperer [1987c]).

3.5 Long-Term Customer Relationships

Bank-customer relationships are generally long-term, adding two extra dimensions to switching cost analysis: price discrimination possibilities and relationship banking consequences.

3.5.1 Discrimination Between Old and New Customers

According to Farrell and Klemperer [2007], the main aspect determining the effects of switching costs is whether firms can or cannot distinguish and price discriminate between new and old customers. Most theoretical models assume firms cannot charge different prices to new and old customers, which holds when all customers buys the same products. The main reason is that allowing price discrimination requires allowing switching in equilibrium, which is troublesome (see section 2.3.3).

In some markets it is easier to distinguish between customer groups than in others, for example aftermarkets where new customers buy a primary durable product (e.g. printer) and old customers buy spare parts or “follow on” products (e.g. refill cartridges). The new information technology has made it possible to collect and store purchase information on individual customers (Tåg [2004]). Products or services where a relationship emerges between supplier and customer such as banking or insurance are other obvious examples.

When firms are able to price discriminate harvesting and investing are simultaneously possible. The familiar “bargains then rip-offs” pattern remains even when unattached consumers enter the market. Profits from old locked-in customers subsidize low-price offers to potential customers. Large firms and small
firms alike price aggressively to attract new customers and pricing strategies become independent of market share. Moreover, market shares of large firms is no longer expected to decrease with time. (Fernandez et al. [2003])

Chen [1997] showed that switching costs are enough to explain why firms use low-price introductory offers. Introductory prices are lower the higher the expected switching costs and overall prices are lower than without price discrimination, but are increasing in switching costs. Prices are independent of market shares. The market for old locked-in customers is more competitive with price discrimination than without, implying that firms are worse off with price discrimination than without. Consumers switch more than without introductory offers, but the total impact on consumers is ambiguous.

Shaffer and Zhang [2000] expanded the model in Chen [1997], and found that it sometimes is more favourable for firms to offer discounts to their own customers rather than their competitor’s customers. Introductory offers to competitor’s customers is always optimal if only one firm can price discriminate or if all customers are equally loyal. But if both firms can price discriminate and some customers are less loyal than others, it might be more favourable to offer discounts to the own customers rather than the rival’s customers.

Gehrig and Stenbacka [2004] analyzed customer poaching in a duopoly model with differentiated products and overcame the problem with switching in equilibrium by allowing for heterogeneous switching costs among consumers. They introduced heterogeneity in switching costs by making them conditional on consumers’ transportation cost, or the degree of differentiation: more differentiated products implies larger switching costs. They managed to show that firms have incentives to maximize switching costs (through maximized differentiation) because larger switching costs increases the profits gained from poaching the rival’s customers.

### 3.5.2 Relationship Banking

According to Kim et al. [2003] the main source of switching costs in bank lending is asymmetric information. Generally, asymmetric information in banking refers to the fact that borrowers know the risk that they will default on loans but the lenders do not. This information asymmetry give rise to various difficulties and cause lenders to engage in activities such as screening applicants and monitoring borrowers. In the switching cost and relationship banking literature, however, information asymmetry between competing banks is under scrutiny. Bank-customer relationships are often long-term, and when a customer changes to a new bank the new bank does not know the borrower’s quality as the old bank does. A low risk borrower is conceivably considered a high risk borrower resulting in unfavourable loan conditions. The customer’s cost of switching lenders is the lost value of the relationship with the old bank.

Freixas and Rochet [2008] defined relationship banking as what a bank does when it makes an “investment in providing financial services that will allow dealing repeatedly with the same customer in a more efficient way”. Sharpe [1990] and Rajan [1992] were the first to examine relationship banking, and came up...
with results very similar to switching cost models. Sharpe [1990] showed that since a bank learns about its customers in the lending process, the bank gains an informational advantage over competing banks concerning its own customers. More knowledge reduces uncertainty and renders it possible to make better, more specific offers to high quality customers. Uninformed competitors cannot match the old bank’s offer, because they then risk ending up with only low quality borrowers. High quality customers become ‘informationally captured’ and exploited by banks. (Although von Thadden [2004] pointed out that empirically the model predicts only a “limited informational capture”.) Due to the opportunity of later earning rents on locked-in customers, banks initially offer lower interest rates to all borrowers. As a result of the fierce initial competition, banks will lend more to risky borrowers than they would with symmetric information between banks.

Rajan [1992] explored firms’ choices between bank financing and market financing. Bank financing is more flexible than market financing, but informational advantages give banks costly bargaining power over firms’ profits. By choosing different borrowing sources and ranking the debt claims, firms try to restrict banks’ bargaining power and opportunities to extract rents. Rajan [1992] found that high quality borrowers with good reputation prefer market financing over bank financing.

A bank will invest in relationship lending if it can appropriate some of the benefits from the relationship. A firm gains from extended credit availability, but, since the lock-in is costly, a firm will invest in relationship banking only if it has limited access to market finance. (Freixas and Rochet [2008])

Vesala [2005, 2007] distinguished between switching costs (from various origins) and the informational advantage gained in a banking relationship and examined how switching costs affect the profits available from relationship based lending. He found that the value of the informational advantage is at first decreasing and then increasing with the size of switching costs. Very low switching costs discourage competing banks from making offers, since it is feasible also for low quality borrowers to switch banks, which in turn lock in high quality borrowers to their current bank and make it impossible for banks to extract rents. Very high switching costs, on the other hand, create lock-in on their own and banks are again able to extract rents.

### 3.5.3 Information Sharing

If switching costs in lending arise due to asymmetric information between banks, then some kind of *information sharing* could reduce these switching costs. Padilla and Pagano [1997] noted that the fear of being exploited due to informational lock-in might discourage borrowers from performing well as a large part of the resulting profits would be taken by the bank. Padilla and Pagano [1997] found that this incentive problem could be overcome if banks committed themselves to share information with competing banks. Competition would be fiercer, interest rates lower and banks profits lower. But if banks retain at least some initial informational advantage then these losses could be compensated for.
by the higher profits earned by more motivated borrowers.

Gehrig and Stenbacka [2007] analyzed the competitive effects of information sharing in a credit market with switching costs and found that information sharing not necessarily promotes market efficiency. Without information sharing, competing banks cannot make offers that are better than the old bank’s offer without risking to attract low quality borrowers which means that customers become informationally captured. When banks have knowledge about their competitors’ customers, on the other hand, they can target their offers exclusively to high quality borrowers and may succeed in attracting them away from their old bank. Information sharing thus reduces banks’ returns from customer relationships and therefore weakens competition for formation of relationships, lower harvesting profits make investing in market shares less attractive. Gehrig and Stenbacka [2007] argued that the relaxed competition for relationship formation means that new high quality borrowers, without an established credit record, get worse offers with information sharing than they would get without it. Information sharing consequently redistributes surplus from new borrowers to banks. When there are no switching costs, however, information sharing increases competition (Gehrig and Stenbacka [2007]).
4 Common Methods for Empirically Examining Switching Costs

Although the theoretical literature on switching costs is extensive, empirical research on how switching costs actually affect different markets is comparatively scarce. Furthermore, only few empirical investigations have estimated the magnitude of switching costs, despite several theoretical models suggesting that switching costs affect market performance. (Farrell and Klemperer [2007])

The reason for lack of empirical research is rather simple: Switching costs are rarely directly observable, and consequently not directly measurable. Switching costs most often constitute a utility loss rather than an immediate cost, which implies that switching costs must be examined through observing consumer preferences or firm behaviour. (Shy [2002])

4.1 Direct Estimation: Analyzing Consumer Preferences

When faced with different product alternatives, consumers choose the one that gives them the greatest utility. Consumer choices depend on the qualities of the different product alternatives, prices of the different alternatives and naturally on the individual consumer’s characteristics. In the case of repeated purchases in markets with switching costs, consumer choices also depend on purchase histories. The most direct way to estimate switching costs is thus to examine consumer preferences, what Fernandez et al. [2003] called *direct methods* of estimating switching costs. If switching costs exist and are significant they should affect consumer choices. The preferences of otherwise similar consumers should differ depending on whether the consumers are new in the market or whether they have already made a purchase such that old customers’ preferences are biased towards the product bought in the previous period.

4.1.1 Modelling Consumer Choices

If consumers make choices in order to maximize utility, then the product purchased at a specific time to a specific price represent the highest possible utility among the available alternatives for that individual consumer. The purchase choice, the utility, is derived from a number of product characteristics. Using information on consumer characteristics, product qualities, prices and purchase decisions over time it is then possible to construct each individual consumer’s utility function. Due to the complexity of human behaviour, however, choices are not deterministic but contain some randomness. *Choice modelling* therefore implies modelling probabilities that certain product qualities produce the highest utility and become chosen by consumers. (Fernandez et al. [2003])

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8Choice modelling is based on the *random utility framework* outlined in McFadden [1974] that describes how demand in a population can be formulated from individual consumers’ choices.
The general form for the utility function of individual $i$ choosing product $j$ in this time period is

$$U_{ij} = \beta X_{ij} + \gamma Z_{ij} + \lambda W_{ij} + e_{ij}$$

(5)

where

- $U$ denotes utility;
- $X$ denotes a vector of observed product characteristics;
- $Z$ denotes a vector of consumer characteristics; and
- $W$ is a vector of dummy variables (one for each product in the market) reflecting which product was chosen in the previous time period.

- The parameter vectors $\beta$, $\gamma$ and $\lambda$ denote the weights of each variable in the utility function.

- $e_{ij}$ is the random error representing the difference between the true and the modelled utility of product $j$ for consumer $i$; it is the unobserved individual preferences and measurement errors.

Since $e_{ij}$ represents the randomness in consumers’ choices, calculations of probabilities for choosing product $j$ depends on the probability distribution assumed for $e_{ij}$. If there are no switching costs the probability for choosing product $j$ would be the same for both new and old consumers of product $j$. If there are switching costs, then the probability for old customers to choose product $j$ would be higher than the probability for otherwise identical new customers. (Fernandez et al. [2003])

Furthermore, the parameter $\lambda$ directly indicates the existence of switching costs. If consumer $i$ bought product '2' yesterday but buys product '4' today, and $\lambda_2$ is negative and statistically different from zero, then the estimated value of $\lambda_2$ represents the utility loss consumer $i$ had to incur when changing from product '2' to product '4'. Product '2' thus has switching costs. When switching costs are known, the information on product qualities and consumer characteristics can be used to identify the factors determining the switching costs. (Fernandez et al. [2003])

Investigating switching costs by modelling consumer preferences gives detailed information, but requires detailed data on products and purchase decisions of individual customers from competing firms for at least two consecutive time periods - data that is not easily acquired. This information can be obtained by tracking actual purchase histories (revealed preferences). Today many firms, especially on-line firms, collect data on their customers, but receiving data from more than one firm is difficult. The other possibility is to use surveys and simply ask consumers about their preferences (stated preferences), but questionnaires need to be very carefully designed to make them resemble real life situations. (Fernandez et al. [2003])
4.1.2 Observing Consumer Behaviour

Fernandez et al. [2003] pointed out that some information on consumer preferences and switching costs can be obtained simply by observing consumer behaviour:

The level of switching could be seen as an obvious measure of switching costs: High switching costs = low levels of switching, and vice versa. This conclusion may nevertheless be very wrong for several reasons. Firstly, low switching costs might mean fierce competition that drives prices down when firms try to prevent switching, with low switching as a result. Secondly, when firms price discriminate between old and new customers and price low to attract new customers, old customers are encouraged to switch, despite possibly high switching costs. Thirdly, some customers’ switching costs may be low enough to make switching worthwhile even without explicit introductory offers. Fourthly, with switching costs market shares become valuable which means that firms may become more aggressive in attracting new customers to the extent that they pay customers’ switching costs.

Comparing the choices between old and new customers captures the same idea as choice modelling: If there are no switching costs and new and old consumers share the same preferences, then they should make similar choices. But when disproportionately many old customers buy from their current supplier compared with new customers, switching costs might be present.

4.2 Indirect Estimation: Analyzing Firm Pricing Strategies

Switching costs do not only affect consumer preferences, but have an impact on firms as well. Whether or not firms are aware of their existence, switching costs affect pricing decisions when firms strive to maximize profits. Data on firms (prices, market shares, loyalty programs etc.) is often more easily available than information on individual consumers and offers methods to examine switching costs indirectly.

4.2.1 Estimating Demand Elasticities

With perfect competition, consumers quickly shift to whichever firm offering the lowest price. But if consumers become locked in to their current supplier due to switching costs, they react less easily to competitors’ price cuts. That is, their demand becomes less elastic. (Fernandez et al. [2003])

The price elasticity of demand measures how the demanded quantity responds to changes in price and is defined as the percent change in quantity divided by the percent change in price. The cross price elasticity of demand measures how the demanded quantity of one product responds to changes in the price of another good and is defined as the percent change in quantity of product \( i \) divided by the percent change in price of product \( j \): 

\[
\epsilon = \frac{\Delta q_i / q_i}{\Delta p_j / p_j} = \frac{\partial q_i}{q_i} \frac{\Delta p_j}{p_j}
\]

and when \( \Delta \to 0 \) the elasticity is defined in derivatives as 

\[
\epsilon = \frac{\partial q_i}{q_i} \frac{dp_j}{dp_j}.
\]

The elasticity
can also be expressed as $\frac{d \log q_i}{d \log p_j}$, the proof involves applying the chain rule repeatedly. Combining $\frac{d \log q_i}{d \log p_j} = \frac{dq_i}{dq_j} \frac{dq_j}{d \log p_j}$, with $\frac{dq_i}{dq_j} = \frac{dq_i}{dp_j} = \frac{d \log q_i}{d \log p_j}$ gives that $\frac{d \log q_i}{d \log p_j} = \frac{dq_i}{dp_j}$. (Varian [2006])

For a normal good the own price elasticity is always negative (the higher the price, the lower the demanded quantity). Inelastic demand has an own price elasticity below one in absolute value, unit elastic demand ditto equal to one and elastic demand ditto above one. Turning to cross price elasticity, a positive cross price elasticity means that products $i$ and $j$ are substitutes. When product $j$ becomes more expensive, the demand for product $i$ increases. The higher the cross price elasticity, the closer as substitutes are the products and for perfect substitutes the cross price elasticity goes towards infinity. A negative cross price elasticity means instead that products $i$ and $j$ are complements. When product $j$ becomes more expensive, the demand for product $i$ decreases. (Varian [2006])

When products are functionally identical (close substitutes) the cross price elasticity is a useful indicator of switching costs as it measures how easily consumers switch suppliers in response to price changes. A common regression model for estimating cross price elasticities is

$$Q_{it} = \beta_0 + \beta_1 P_{it} + \beta_2 P_{jt} + \beta_3 D_{it} + \sum_{j=1}^{n-1} \gamma_j I_j + \sum_{k=1}^{T-1} \alpha_k T_k + e_{it} \tag{6}$$

where

- $Q_{it}$ is the quantity of product $i$ sold in period $t$;
- $P_{it}$ is the price of product $i$ in period $t$;
- $P_{jt}$ is the price of all $j$ potential substitutes in period $t$;
- $D_{it}$ is a vector of demand-shift variables;
- $I_j$ and $T_k$ are individual and time fixed effects (0/1 dummy variables); and
- $e_{it}$ is the random error which can be thought of as representing random shifts in demand (Fernandez et al. [2003]).

Here $\beta_2$ is the main parameter of interest, as its size and statistical significance measures how the sold quantity of product $i$ is affected by changes in the price of product $j$. A low cross price elasticity points to high switching costs. A low own price elasticity, $\beta_1$, also indicates the presence of switching costs; if firms can raise prices without loosing customers then customers may be locked in due to switching costs. (Fernandez et al. [2003])

Another possibility is to use the logarithmic elasticity expression to get direct estimates of the cross price elasticity: $\epsilon = \frac{d \ln q_i}{d \ln p_j} \Rightarrow d \ln q_i = \epsilon \times d \ln p_j$.

Using the cross price elasticity becomes more problematic when products are differentiated. If consumers appreciate specific product qualities they are reluctant to shift to a different competing product even if the competing product is
cheaper. In that case, a low cross price elasticity could simply point to highly differentiated products. When products are differentiated it is more meaningful to examine how consumption patterns change over time. If switching costs are present then consumers stick to their current supplier and consumption of a specific product will be linked over time. Today’s consumption depends positively on yesterday’s consumption due to lock-in effects. Today’s consumption will also depend positively on tomorrow’s consumption, since firms consider the effect on market shares (that determine sales tomorrow) when setting prices today. If the firm wants a high consumption tomorrow, it has to set a price that ensures a high consumption today. Estimating the impact of past and future consumption on current consumption could thus indicate the existence of switching costs. (Fernandez et al. [2003])

For differentiated products the regression model for estimating cross price elasticities over time periods takes the form

\[ Q_{it} = \beta_0 + \beta_1 P_{it} + \beta_2 P_{jt} + \beta_3 Q_{jt-1} + \beta_4 Q_{jt+1} + \beta_5 D_{it} + \sum_{j=1}^{n-1} \gamma_j I_j + \sum_{k=1}^{T-1} \alpha_k T_k + \epsilon_{it} \]

(7)

where

- \(Q_{it}\) is the quantity of product \(i\) sold in period \(t\);
- \(P_{it}\) is the price of product \(i\) in period \(t\);
- \(P_{jt}\) is the price of all \(j\) potential substitutes in period \(t\);
- \(Q_{jt-1}\) and \(Q_{jt+1}\) is the quantity of all \(j\) potential substitutes sold in periods \(t - 1\) and \(t + 1\);
- \(D_{it}\) is a vector of demand-shift variables;
- \(I_j\) and \(T_k\) are individual and time fixed effects (0/1 dummy variables);
- \(\epsilon_{it}\) is the random error which can be thought of as representing random shifts in demand (Fernandez et al. [2003]).

Here \(\beta_3\) and \(\beta_4\) are the parameters of main interest since they measure stickiness of consumption over time. Negative values (an increase in competitors’ past or future market shares means lower sales today for firm \(i\)) indicate that switching costs are present. Still, observed consumption rigidity is not enough to prove the existence of switching costs as many other factors could cause consumption patterns to be sticky.

Drawbacks of estimating elasticities to examine switching costs is that the estimation produces no information on the type of switching cost. Furthermore, a correct interpretation of the results requires that other factors affecting demand is adequately controlled for. (Fernandez et al. [2003])
4.2.2 Estimating Impact on Prices

The existence of switching costs should be reflected in prices or price cost margins, since firms consider switching costs when making pricing decisions. A straightforward way to examine switching costs is thus to analyze their impact on prices. As switching costs are rarely directly observable, proxies must be used. To find the correct proxies, detailed knowledge about the sources of switching costs or about exogenous events known to affect switching costs is required. So called reduced form econometric models are then used to reflect how the interaction between supply and demand produce equilibrium prices (without actually deriving supply and demand functions). The models include variables on costs, demand, market structure and existence of switching costs. (Fernandez et al. [2003])

When market conditions, proxies and relevant exogenous events have been identified, there are three alternative estimation methods:

The first is to estimate the impact of switching cost proxies on prices. This method is suitable when no exogenous event is observed, but there are price differences between firms or between consumer groups that can be attributed to differences in switching costs. The general regression model takes the form

\[ P_i = \beta_0 + \beta_1 SCP_i + \beta_2 C_i + \beta_3 D_i + \beta_4 S_i + e_i \]  

(8)

where

- \( P_i \) is the price or price cost margin for firm or consumer group \( i \);
- \( SCP_i \) is one or various switching cost proxies;
- \( C_i \) is a vector of cost variables (not included if the price cost margin is used);
- \( D_i \) is a vector of variables affecting demand;
- \( S_i \) is a vector of variables describing market structure; and
- \( e_i \) is the random error (Fernandez et al. [2003]).

Obviously \( \beta_1 \) is the parameter of interest, both its statistical significance and its size compared to the general price level give information on switching costs. A strongly significant and large coefficient indicates that switching costs are important in the investigated market. If the null hypothesis - that the coefficient is statistically equal to zero - cannot be rejected, however, the reason could be either that switching costs do not exist, that they do not affect prices or that the chosen proxy is unsuitable for measuring switching costs. (Fernandez et al. [2003])

The second method is to estimate the impact of an event on prices, which is useful when an exogenous event affecting switching costs is observed. With price discrimination the event is assumed to affect consumer groups differently, without price discrimination the difference in impact on prices is assumed to be
between firms. When estimating the impact of an event on prices or price-cost
margins the general model is

\[ P_{it} = \beta_0 + \beta_1 D_{Eit} + \beta_2 C_{it} + \beta_3 D_{it} + \beta_4 S_{it} + \sum_{j=1}^{n-1} \gamma_j I_j + \sum_{k=1}^{T-1} \alpha_k T_k + e_{it} \]  

where

- \( P_{it} \) is the price or price cost margin for firm or consumer group \( i \) in period \( t \);
- \( D_{Eit} \) is a dummy variable equal to 0 before and equal to 1 after the event;
- \( C_{it} \) is a vector of cost variables (not included if the price cost margin is
  used);
- \( D_{it} \) is a vector of variables affecting demand;
- \( S_{it} \) is a vector of variables describing market structure;
- \( I_j \) and \( T_k \) are individual and time fixed effects (0/1 dummy variables);
  and
- \( e_{it} \) is the random error (Fernandez et al. [2003]).

Here the parameter of interest is \( \beta_1 \) measuring if and to what extent the exoge-
nous event has an effect on prices. A large and strongly significant coefficient
indicate that the event does affect switching costs. But as in the first estimation
method, if the null hypothesis is not rejected it is difficult to draw any
conclusions at all. (Fernandez et al. [2003])

When switching cost proxies are both known and known to have changed
e.g. due to an exogenous event it is possible to measure \textit{the impact of differences
in the evolution of switching costs}. The third method is thus a combination of
the first two and is the one that best isolates the impact of switching costs on
prices. Consequently the model looks like

\[ P_{it} = \beta_0 + \beta_1 SCP_{it} + \beta_2 D_{Eit} + \beta_3 C_{it} + \beta_4 D_{it} + \beta_5 S_{it} + \sum_{j=1}^{n-1} \gamma_j I_j + \sum_{k=1}^{T-1} \alpha_k T_k + e_{it} \]  

where the variables are defined as in the two earlier models. The variable \( DE \)
now captures changes in switching costs due to the exogenous event that are
not captured by the switching cost proxy \( SCP \). In this model, and in the two
earlier, it is possible to include interaction variables such as \( SCP \times I \) or \( DE \times I \)
to test whether the impact of switching costs/switching cost changes on prices
differ across different consumer types or firms. (Fernandez et al. [2003])
4.2.3 Observing Firm Behaviour

As with examining purchasing decisions, it is possible to gain some insights on the significance of switching costs simply by observing firm behaviour instead of performing formal econometric analyses. If firms are able to price discriminate between old and new consumers they are likely to charge higher prices to old locked-in customers in the presence of switching costs. Introductory offers or other kinds of considerable differences in prices paid by existing and new customers could indicate that the market is characterized by switching costs. (Fernandez et al. [2003])

4.2.4 Measuring Switching Cost Magnitude: The Undercut-Proof Property

The theoretical literature emphasize that size of switching costs is crucial for determining their effect on market performance, especially whether switching costs are high enough to completely prevent switching in equilibrium. Despite this, the methods treated this far - and a large part of the empirical research - do not measure the size of switching costs but only give information on the existence and importance of switching costs. (Kim et al. [2003])

Shy [2002] developed a very simple method for estimating the magnitude of switching cost using merely information on market shares and prices. The method is based on the undercut-proof property concept (originally developed in Morgan and Shy [2000] for markets with product differentiation), which is a solution to the non-existence of a Nash-Bertrand equilibrium presented in section 2.3.3.

The Undercut-Proof Equilibrium

The setting is described in section 2.3.3. Profits in the current time period are $\pi_A = p_A n_A$ and $\pi_B = p_B n_B$. A Nash-Bertrand equilibrium would be a pair of non-negative prices $\{p_A^N, p_B^N\}$, such that for a given $p_B^N$, firm $A$ chooses $p_A^N$ to maximize $\pi_A$ and, for a given $p_A^N$, firm $B$ chooses $p_B^N$ to maximize $\pi_B$ (Shy [2002]). Section 2.3.3 showed that a Nash-Bertrand equilibrium does not exist in pure strategies\(^9\), but an undercut-proof equilibrium does. Shy [2002]:

**Definition 1.** Firm $i$ undercuts firm $j$, if firm $i$ sets its price such that $p_i < p_j - S$, $i = A, B$ and $i \neq j$. That is, if firm $i$ 'subsidizes' the switching cost of firm $j$’s customers.

Prices represent an undercut-proof equilibrium if it is impossible for any firm to increase profits by undercutting the competitor while it is impossible for any firm to raise its price without being profitably undercut by the competitor. The undercut-proof property is formally presented as in Shy [2002]

\(^9\)In a pure strategy, each firm makes one choice and stays with it. In mixed strategies, firms’ choices are randomized and depend on the assigned probabilities. (Varian [2006]). According to Shy [2002], Shilony [1977] developed solutions for mixed strategies in a similar model.
Definition 2. A pair of prices \( \{p^U_A, p^U_B\} \) satisfies the undercut-proof property (UPP) if

(a) For a given \( p^U_B \) and \( n^U_B \), firm A chooses the highest price \( p^U_A \) subject to the constraint
\[
\pi^U_B = p^U_B n^U_B \geq (p^U_A - S)(N_A + N_B).
\]

(b) For a given \( p^U_A \) and \( n^U_A \), firm B chooses the highest price \( p^U_B \) subject to the constraint
\[
\pi^U_A = p^U_A n^U_A \geq (p^U_B - S)(N_A + N_B).
\]

(c) The distribution of consumers between the firms is determined in equations (3) and (4).

Firm A sets the highest price possible in order to maximize profits, but the price is still sufficiently low to prevent firm B from undercutting and taking the whole market. Firm A’s price is set low enough to make firm B’s profit from not undercutting, \( p^U_B n^U_B \), larger than the profit firm B would make when undercutting and capturing the whole market, \( (p^U_A - S)(N_A + N_B) \). But since both firms set prices as high as possible, the inequalities hold as equalities. These equalities give the unique pair of prices \( \{p^U_A, p^U_B\} \) where

\[
p^U_A = \frac{(N_A + N_B)(N_A + 2N_B)S}{(N_A)^2 + N_A N_B + (N_B)^2}
\]

(11)

and

\[
p^U_B = \frac{(N_A + N_B)(2N_A + N_B)S}{(N_A)^2 + N_A N_B + (N_B)^2}.
\]

(12)

Solving for the Switching Costs

Inserting equations (11) and (12) in the equalities of definition 2 gives that \( n^U_A = N_A \) and \( n^U_B = N_B \). Consequently, the profit functions of the undercut-proof equilibrium (given in definition 2) can be written as

\[
p_B N_B = (p_A - S_A)(N_A + N_B)
\]

(13)

\[
p_A N_A = (p_B - S_B)(N_A + N_B)
\]

(14)

Although switching costs across consumers are assumed homogeneous, the model in Shy [2002] allows for some heterogeneity in the form of firm-specific switching costs, i.e. different firms presumably have different capabilities of retaining customers. Solving for the switching costs gives

\[
S_A = p_A - \frac{p_B N_B}{N_A + N_B}
\]

(15)

\[
S_B = p_B - \frac{p_A N_A}{N_A + N_B}
\]

(16)

Shy [2002] as well as Morgan and Shy [2000] further developed the model to allow for competition between several firms. This method directly measures the size of switching costs using easily available data on prices and market shares, but it does not give any information on the sources of switching costs which would be useful when considering possible policy implications.
5 Earlier Research on Switching Costs in Banking

Simply by observing bank behaviour, the existence of switching costs in the financial industry becomes rather obvious. Klemperer [1995] noted clear invest-harvest pricing strategies in banking: Banks offer students free banking services while studying but start charging high fees when students graduate. Another example given in Klemperer [1995] is that when banks introduce new account types they often initially offer well-above-market interest rates for opening an account. The financial industry has consequently been subject to some empirical research, both by economists and by marketing researchers. One example of the latter is Colgate and Lang [2001], who through a customer survey examined the reasons why they refrain from changing service supplier in the retail banking and retail insurance industries within New Zealand.

Closely related to research on switching costs is research on duration, scope and number of bank relationships. These characteristics are important determinants of switching costs and banks opportunities to extract rents, but the empirical results are somewhat mixed. (Degryse et al. [2009] and Degryse and Ongena [2008]).

Degryse and Ongena [2008] noted that switching costs in one product market may be connected to behaviour in another product market. A difficulty with interpreting empirical studies on switching costs in banking is that they often focus on a either deposits, credit cards or loans while consumers often make switching decisions based on product bundles rather than single products. Consumers do not even always have a choice since cross-selling of products is very common (Directorate-General for Competition [2006]). Switching costs related to one product in a bundle may reflect differences in price or quality of other products in the bundle. Hence there is a risk that the measured impact of switching costs in a single market might be overestimated.

5.1 Deposits and Current Accounts

Kiser [2002] surveyed 500 US households on their decisions to either stay with or switch their suppliers of current or savings accounts. Kiser found that about a third had never change depository institutions and that 34% cited inconvenience of switching as a reason for not changing banks. The study further supported earlier evidence that bank competition is local; the primary reason for changing banks was moving to another town. Location, alongside of service, was further an important reason for staying with the current bank.

Consumers moving between towns imply that local bank markets experience continuous entry and exit of bank customers. Klemperer [1987b] constructed a theoretical model where new consumers enter the market each period. Since new consumers are not locked in to any supplier, firms have to compete for them and the competition pushes prices down. The larger the fraction of new consumers, the fiercer the competition and the lower the prices. And vice versa. Sharpe
[1997] used this model as a starting point to investigate how bank retail deposit interest rates depend on the proportion of locked-in customers\(^\text{10}\) using figures on US household migration as a proxy for the proportion of new customers in a local banking market. Sharpe tested two interest rates, the six-month certificate of deposit and the money market deposit account, and regressed them on market concentration ratios, migration data, market growth rates and cost variables, using ordinary least squares on panel data. The result demonstrated that household migration had a significantly positive impact on deposit interest rates, entry of new customers did increase competition. The study also showed that the magnitude of this effect depends to some extent on the market structure.

Gondat-Larralde and Nier [2006] confirmed the existence of switching costs in the bank deposit market having analyzed the connection between prices and market shares in the UK current accounts market. When regressing interest rates on market shares and various bank characteristics they found a positive relationship between market share and price, which points to significant switching costs in the current accounts market: small banks invest in market share while large banks harvest existing customers.

Shy [2002] calculated switching cost in the Finnish current account market using his undercut-proof property based method presented in section 4.2.4. Consumers pay both direct fees for maintaining accounts and fees for making transactions. Since fee payments are annual whereas switching banks is presumably a once-in-a-lifetime operation, Shy utilized the discounted sum of life-time fees as price. Each bank’s total number of accounts were used as market share. The estimated switching costs were very high, for the three largest banks included they exceeded 80% of the price for an account.

5.2 Credit Cards

Various authors have examined rigidity in credit card interest rates and concluded that a likely reason is consumer switching costs. Ausubel [1991] was probably the first to investigate why a market seemingly characterized by perfect competition exhibit sticky prices and high profits. Using data on credit card interest rates and cost of funding Ausubel showed that interest rates did not correlate with costs and that credit card issuers earned three to five times the ordinary banking return. Ausubel attributed the competitive failure to search and switching costs, adverse selection with respect to customers’ creditworthiness (high risk borrowers get no other funding) and consumers failing to consider future interest payments in their credit card choices, but did not formally test these explanations.

Calem and Mester [1995] continued the study of Ausubel [1991] and used household survey data to investigate whether search and switching costs create adverse selection such that unilateral interest rate cuts attract only less profitable (high-risk and/or low-balance) customers. They tested whether cardholder borrowing is correlated with the propensity to search for better offers

\(^{10}\)As interest rates on deposits are an expense to banks, fiercer competition would mean higher rates.
by regressing households’ credit card debt on economic, demographic and attitudinal variables, including willingness to shop around. The results showed that consumers who search for the best rates tend to incur less credit card debt. They further tested whether households with large outstanding balances are more likely to be denied new credit by regressing turn-down rates on credit card debt as well as economic, demographic, attitudinal variables and some control variables. According to the estimates, households with large balances are more likely to be rejected since banks are unable to distinguish between households intending to switch and households intending to increase their indebtedness. (High-balance customers were, however, found to default on their debt more often.) These two results mean that interest rate cuts attract less profitable customers which result in sticky interest rates. Calem et al. [2006] repeated the study with more recent survey data, and found that informational asymmetries still create barriers for high-balance customers.

Stango [2002] focused on the prediction that higher switching costs should be associated with higher prices. He examined firm-level switching costs by regressing calculated interest rates on detailed data on several card issuers: Using proxy variables for issuer-specific switching costs, characteristics of competitors and control variables including costs and competition features. He found that switching costs are essential in pricing decisions and can explain price differences of 100-150 basis points between new and old customers of commercial banks, but switching costs are not important for not-for-profit credit unions. The regressions further demonstrated a relationship between default rates and switching costs, which is in line with e.g. the study by Calem and Mester [1995].

5.3 Lending

Barone et al. [2006] examined switching costs in local loan markets by empirically testing two specific theoretical predictions: First, whether firms charge low prices to attract new customers while charging high to old, presumably locked in customers. Second, whether switching costs increase state dependence, i.e. increases the probability that firms will choose the same bank tomorrow as they did today. They used detailed data on firm-bank relationships and interest rates for four Italian provinces.

Price discrimination was tested by regressing interest rates charged by bank $i$ to firm $j$ on bank and firm characteristics, bank market share and a dummy variable equal to one if bank $i$ had become the main lender to firm $j$ between the two investigated periods (a negative coefficient value would then indicate that bank $i$ had made an introductory offer to firm $j$). The variable bank market share had a positive impact on interest rate which indicated switching costs; larger firms price higher (the fat-cat effect). Most importantly though, the regression showed banks offering interest rate discounts on 0.53-0.84 percentage points to new firms. (Barone et al. [2006])

Applying choice modelling, the probability of firm $j$ choosing bank $i$ was estimated using information on firm characteristics, firm-bank relationship characteristics and a variable indicating whether bank $i$ had become the main lender to
firm \( j \) between the two investigated periods. The calculated probability of firm \( j \) choosing bank \( i \) was significantly higher if firm \( j \) had been bank \( i \)'s customer in the previous than if firm \( i \) had been a customer of any other bank. Barone et al. [2006] further obtained point estimates of switching cost by calculating willingness to pay, i.e. calculating how much banks are able to raise interest rates before customers change banks, and got results varying between 10.7 and 16.7 percentage points (depending on the province).

Ioannidou and Ongena [2008] looked at newly granted loans, using Bolivian credit register data, and compared loan conditions offered to firms who chose to keep borrowing from their old banks with conditions given to firms who chose to change banks. Subsequently they investigated banks' behaviour in the periods following the switch. Matching firm and loan characteristics they found that firms choosing to switch banks received loans with interest rates 0.89 percentage points lower than loans granted those who stayed with their bank. (Average interest rate 13.28% among switching loans and 13.56% among non-switching loans.) Interest rates on new loans offered after a switch initially decreased even further (0.36 percentage points over the next one and a half year), but started rising again and after three to four years the firm was back at square one.

Both Barone et al. [2006] and Ioannidou and Ongena [2008] used detailed, borrower specific data which generally is hard to come by. Kim et al. [2003] demonstrated an empirical model for estimating switching costs using more easily attainable firm level data, and were the first ones to present empirical estimations on switching costs in bank lending.

Prices and switching costs determine consumers’ purchase choices and consequently the probabilities of consumers switching between firms. The more consumers are likely to switch to firm \( i \), and less likely to switch from it, the higher is the demand faced by firm \( i \). But since firm level data only give information on net switching, net in- or outflow of customers, Kim et al. [2003] expressed demand as functions of market shares (larger market share, more locked-in customers, larger demand). Firms then set prices to maximize profits, taking into account the effect on market shares. Using data on market shares (loans extended), prices (interest rates calculated from interest income) and costs Kim et al. [2003] calculated a point estimate of switching costs in the Norwegian bank market to 4.12%, around a third of the average market rate.

The estimation method based on the undercut-proof property presented in section 4.2.4 relies on the same underlying logic: firms maximize profits knowing the impact of switching costs on consumer behaviour. Andersson and Berglund [2004] used the UPP (slightly extended to consider the cost of capital) to estimate switching costs in the Swedish mortgage market and reported similar magnitudes as Kim et al. [2003]; switching costs of 1-1.5% or approximately a third of the average market rate.
6 The Finnish Retail Banking Industry

Stockholms Banco (a.k.a. Palmstruchska banken) was first to provide banking services via a branch in Turku 1663-67, but was succeeded after its bankruptcy 1668 by Riksens ständers bank (today the Swedish central bank Riksbanken) without branches in Finland. Riksbanken then functioned as a commercial bank, with customers in Finland, and only 1805 was a commercial bank founded in Turku (which had to close after the political separation in 1809). Bank of Finland (today Finland’s central bank), was founded in 1811-12 and aimed at continuing Riksbanken’s operations but a lack of resources and uniform coin standards reduced its possibilities. (Pipping [1962])

The savings banks movement originated in Germany in the middle of the 18th century and reached Turku and Helsinki in the 1820’s. The two savings banks were consequently the first banks to operate independently in Finland. Their purpose was to stimulate saving (and to some extent render credit granting possible) among people of small means as a way to restrain them from excess spending and relieve poverty instead of merely giving passivising parish relief. During the 1840’s and 1850’s savings banks were founded in towns around the country. In the 1860’s Finland received an own monetary unit, the markka, facilitating banking operations. In 1860 Mortgage Society of Finland was founded for agricultural credit granting and two years later Finland’s first commercial bank Förenings-Banken i Finland (Suomen Yhdys-Pankki) started operating to provide trade and industry with much needed capital. (Karlsson [2006]) Both savings and commercial banks grew in number over the following decades and new bank types arose (Fogelholm [2004]). In 1887 the state owned Postal Savings Bank, providing saving services in connection with post offices, started operating and in 1902 cooperative banks were born (ibid). As with savings banks, cooperative banks primarily aimed at relieving poverty but in rural areas rather than in towns. Customers were cooperative members and owners at the same time, the idea was to join forces in the countryside and involve people in spontaneous work to improve their financial standing.\(^{11}\)

The 20th century involved great industrial development and urbanization. Banks merged to form larger entities and the differences between cooperative, savings and commercial banks dwindled (Fogelholm [2004]). In the 1980’s, the strictly regulated Finnish banking market was stepwise liberalized and deregulated; for example could lending rates be set more freely, foreign borrowing was allowed, and saving was no longer mandatory for receiving credit. During this period the economy in general and the banking sector in particular boomed. But boom was followed by bust and in the early 1990’s Finland experienced a severe banking crisis, even forcing the government to intervene, which radically changed the market structure. Pre-crisis the market was dominated by five bank groups; the three commercial banks Suomen Yhdyspankki, Kansallis-Osake-Pankki and the state owned Postal Savings Bank, the savings bank group and the cooperative banks. The savings banks suffered the most during the cri-

\(^{11}\)www.op.fi, accessed 2 Sep 2009.
sis. Finally their central bank was taken over by the Bank of Finland and Savings Bank Finland, created from several merged local savings bank, was subsequently split up and sold to the four remaining large bank groups. (Vesala [1995])

The crisis resulted in a market structure that broadly remains today\(^\text{12}\).

6.1 Banks

6.1.1 Commercial Banks

A total of 15 commercial banks operate in Finland, of which Nordea, OP-Pohjola and Sampo are significantly larger than the other with a combined market share exceeding 90\% (Directorate-General for Competition [2007]). Since both Nordea and Sampo are subsidiaries of Nordic bank groups, more than half of the Finnish banking market is in foreign ownership.

Nordea Bank is, according to the bank itself, the largest financial group in the Nordic and Baltic Sea region, and its history began when Finnish Merita Bank (formed by a merger of Kansallis-Osake-Pankki and Suomen Yhdyspankki in 1995) and Swedish Nordbanken formed MeritaNordbanken in 1997. During 2000, Danish Unibank and Norwegian Christiania Bank og Kreditkasse were integrated into what was to become the Nordea Group, and in 2001 the name Nordea was launched. Nordea Bank Finland plc is a part of Nordea Bank Ab (publ), registered in Sweden.\(^\text{13}\) Nordea Bank Finland is by far the largest bank in Finland, with total assets several times larger than the second largest bank. Total assets amounted to 219 412 million euros and net operating profit to 1 588 million euros in 2008 (FSA web pages)\(^\text{14}\).

Pohjola Bank is part of the OP-Pohjola Group (see section 6.1.3) and focuses on corporate and investment banking rather than retail banking (www.pohjola.fi, accessed 30 Nov 2009.). Pohjola Bank’s total assets amounted to 30 088 million euros and net operating profit to 50 million euros in 2008 (FSA web pages).

Sampo Bank’s origins derive from the state owned Postal Savings Bank, later Leonia Bank, and received its current name when Leonia Bank merged with Sampo Insurance Company in 2000-2001. In late 2006 the Danish company Danske Bank A/S announced its acquisition of Sampo Bank and since February 2007 Sampo Bank has been a part of Danske Bank Group.\(^\text{15}\) Total assets amounted to 27 586 million euros and net operating profit to 192 million euros in 2008 (FSA web pages). By balance sheet total, Danske Bank is the largest bank in the Nordic Countries. (Kallonen [2009]).


Aktia Group was formed during the crisis in the early 1990’s when the Savings Bank of Helsinki merged with a number of savings banks based in the coastal areas creating a mainly Swedish-speaking larger bank. Aktia is to a large extent owned by non-profit organizations and is still present principally in the bilingual coastal area. Aktia further serves as the central financial institute for local savings and cooperative banks.\textsuperscript{16} Total assets amounted to 6 911 million euros and net operating profit (loss) to -10 million euros in 2008 (FSA web pages).

The Bank of Aland was founded in 1919 with the aim to offer bank services locally on the Aland Islands and expanded to Helsinki in 1982. Despite the bank now being present in a handful cities on the mainland, its profile is more of a small exclusive bank than that of a bank competing with the larger banks. As a curiosity, the Bank of Aland was the only Finnish bank not receiving state support during the crisis in the early 1990’s.\textsuperscript{17} Total assets amounted to 2 749 million euros and net operating profit to 16.4 million euros in 2008 (FSA web pages).

In 2008, fourteen deposit-taking foreign banks had branches in Finland of which Swedish Handelsbanken was the largest with offices nationwide and market shares of 5.1\% and 2.5\% in loans to and deposits from the public respectively (Kallonen [2009]).

The last few years have seen some completely new niche banks, beside branches of more foreign banks, in the Finnish bank market. Among them, Tapiola Bank was founded in 2004, as an expansion into financial services for individual customers by the insurance company Tapiola Group (dating back to 1857).\textsuperscript{18} S-Bank Ltd is a subsidiary bank of the S-Group (a group of cooperative enterprises providing services such as supermarkets, hotels and agricultural trade for its members) and began operating in October 2007 by converting the savings of its customer-owners into bank deposits.\textsuperscript{19} Sofia Bank began its operations in January 2009 focusing on providing mainly depositing and asset management services.\textsuperscript{20} Furthermore, a handful of investment banks and asset management companies such as eQ, Evli and FIM has today legal status as deposit banks.\textsuperscript{21}

6.1.2 Savings Banks

The Savings Banks Group includes 38 independent savings banks and the Finnish Savings Banks Association (the central organization), the Savings Banks’ Guarantee Fund and the Savings Banks’ Research Foundation. The savings banks’ market share is 5.2\% as measured by deposits (Kallonen [2009]), with the Savings Banks being in an especially strong position with regard to households and

\textsuperscript{17}www.alandsbanken.fi, accessed 20 Jan 2009.
\textsuperscript{21}A full list is found from the Financial Supervisory Authority web pages.
agriculture. The individual banks are generally small but varying in size with 2008 balance sheet totals ranging from 20 to 720 million euros.\textsuperscript{22} Total assets amounted to 6 715 million euros and net operating profit to 68 million euros in 2008 (FSA web pages). Although the savings banks operate independently, they were in May 2002 granted an exemption rendering joint agreement on price recommendations of banking services possible. The argument was that competition takes place between bank groups and that the savings banks group holds a market share well below 10\%.\textsuperscript{23}

6.1.3 Cooperative Banks

\textit{OP-Pohjola Group} is made up of independent member cooperative banks (227 member banks in 2008, Kallonen [2009]) and the Group’s central institution OP-Pohjola Group Central Cooperative with subsidiaries and closely related companies. OP-Pohjola consequently dates back to 1902 and the first cooperative financial institution but launched a new cooperation model in 1997, combining the solvency of the entire Group with local decision-making. Although most banks joined in, a few banks left out. In 2005, the OP Bank Group merged with the non-life insurer Pohjola Group which resulted in the financial services group OP-Pohjola Group.\textsuperscript{24} OP-Pohjola Group Member banks are mutually responsible for activities of the whole group (Juul [2006]), among European cooperative banks OP-Pohjola’s structure is in the middle range of centralization with a strong consolidated sub-group (Directorate-General for Competition [2007]). Total assets for all member cooperative banks amounted to 37 964 million euros and net operating profit to 444 million euros in 2008 (FSA web pages). OP-Pohjola Group had, not very surprisingly, the largest number of branches in Finland, 604 in 2007 (compared with 345 for Nordea). (Kallonen [2009]).

The \textit{Finnish Local Cooperative Bank Group} consists of 42 independent cooperative banks each operating in its own region. The banks are mainly located in rural areas, although they also have expanded their business into growth areas. As with savings banks, the local cooperative banks focus on households and smaller enterprises. The individual banks are similarly small but varying in size, balance sheet totals varied from 11 to 639 million euros in 2008.\textsuperscript{25} Total assets amounted to 3 886 million euros and operating profit to 53 million euros in 2008 (FSA web pages).

The savings banks, local cooperative banks and Aktia cooperate and service to some extent each others’ customers in their respective branches.

\textsuperscript{22}www.saastopankki.fi, accessed 2 Sep 2009.
\textsuperscript{24}www.op.fi, accessed 2 Sep 2009.
\textsuperscript{25}www.paikallisosuuspankit.fi, accessed 2 Sep 2009.
6.2 Competition in the Finnish Bank Market

The number of banks in Finland is high, 336 banks operated 1,672 branches in Finland at the end of 2007 (Kallonen [2009]). The high number is due to the large number of cooperative banks operating locally, some independently but most as members of the OP-Pohjola Group (ibid). Despite the large number of banks, the Finnish banking industry is often characterized as highly concentrated (e.g. Speyer [2004]).

6.2.1 Market Concentration

Maximum market power is held by a monopoly, who can set prices without fear of being undercut, whereas firms in perfect competition have no market power but has to set their prices equal to market price. Market structure is thus to some extent related to market power; larger firms generally have more market power than small firms. Market structure further affects the possibilities for firms to collude to gain market power; a few equally large firms cooperate more easily than many firms of different sizes. Market share concentration thus matters, and different ratios are used to describe market concentration. (Cabral [2000])

Juhl Pedersen et al. [2006] calculated concentration ratios using bank’s total assets as market shares, representing separate legal entities even if these entities were part of a consolidated bank group and got a CR5\(^{26}\) of 83.1% and an HHI\(^{27}\) of 2,730 in Finland in 2005. However, as Nordea Bank holds such large a market share, concentration figures vary greatly depending on how Nordea is treated. The legal status and accounting entities in the Nordea Group have altered during recent years. Smidt et al. [2006] used total assets for bank groups and obtained a CR4 of 95% for Finland in 2004 while Juul [2006] reported a deposit CR5 of 87% in 2005. Using information from the Financial Supervisory Authority on total assets of domestic bank groups\(^{28}\) in 2008 gives a CR5 of 97% and an HHI as large as 4,555. Both the US Department of Justice\(^{29}\) and the European Commission\(^{30}\) consider an HHI below 1,000 to characterize low concentration, an HHI between 1,000 and 1,800 as denoting moderate concentration and a market with an HHI above 1,800 as highly concentrated. Thus the Finnish banking market is very concentrated, which could be an indication of lax competition. Nevertheless

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\(^{26}\)In Juhl Pedersen et al. [2006], the CR5 is “the percentage share of the five largest credit institutions’ total assets in total assets of all credit institutions”.

\(^{27}\)The Herfindahl-Hirschman index is a measure of market concentration and is calculated as the sum of the squares of all firms’ market shares. Measuring market shares in percent produces an index ranging from 0 to 10,000. A monopoly with 100% market share means an HHI of 10,000 while a market where each firm holds 1% gives an HHI of 100. Consequently, a high index implies a concentrated market. (Cabral [2000])

\(^{28}\)Due to data availability only domestic banks are included, even though foreign bank branches account for almost 5% of total bank assets in Finland 2008 (Statistics Finland, http://pxweb2.stat.fi/Database/StatFin/Rah/lai/lai_fi.asp accessed 30 Nov 2009). The list of bank groups included is found in appendix A.


Kim et al. [2005] argued that interest rate markups, seen as a measure of banks’ market power, are not influenced by market concentration. Also Juhl Pedersen et al. [2006] characterized competition in the Finnish banking market as intense, mainly due to highly growth oriented strategies implemented through lower interest margins especially in the mortgage market.

Although the general measure of bank market shares is total assets, market concentration measures depend on market definitions. Firstly, the adequate geographic market is hardly the national market as banking competition in general is local (see section 3.1). Secondly, statistical comparisons rarely distinguish retail banking from other financial services. Thirdly, product market definitions vary between individual products as lending, depositing and payment services, and so-called cluster approaches combining certain products to entities as SME banking. This study examines lending to private customers and SMEs, and using Financial Supervisory Authority figures on claims on the public and public sector entities (proxying lending to private customers and firms of different sizes) produces a slightly different picture on the national level: CR5 is 96% and the HHI is down to 3 174. Still high, but clearly lower than when comparing total assets.

6.2.2 Customer Mobility

Juul [2006] noted that customer mobility in the Nordic banking sector is smaller than in other industries. He asked the five largest banks in each country of their customer in- and outflows (65% of banks responded), in Finland banks received on average 5.1% new household customers and lost 2.1% old ones in 2004. Still, the numbers do not tell whether consumers changed bank or simply increased their number of bank relationships. According to ECB data, Finns hold around two current accounts per capita (Directorate-General for Competition [2007]). In 2005, customer churn in Finnish banking (4.23% consumers, 6.27% SME) was significantly lower than the EU-25 average (7.78% consumers, 12.63% SME) and bank-customer relationship longevity clearly longer, 17.44 years for consumers and 13.98 years for SMEs compared with 9.74 years and 7.93 years respectively (Directorate-General for Competition [2007]).

6.2.3 Earlier Research

Rantala [1988] was the first to analyze lending rate competition (after deregulation) in different competitive settings. Rantala used a method similar to the Bresnahan-Lau method and found evidence of imperfect competition, since not only market rates, but also deposit rates and demand had an influence on lending rates. Suominen [1994] used the Bresnahan-Lau method on loans before

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\[32\] A method for estimating the degree of competitiveness using industry price and output data through examining firms’ reactions to changes in the slope of the demand function. Monopoly firms, oligopoly firms and firms in perfect competition are expected to react differently. Presented in Bresnahan [1982] and generalized in Lau [1982]. (Suominen [1994])
deregulation in 1986 and on loans and deposits after the deregulation. Suominen too concluded competition to be imperfect, with banks holding more monopoly power in the deposit than in the loan market. Surprisingly enough, competition appeared less intense after deregulation, which Suominen contributed to strong market growth in the late 1980's making collusion easier.

Vesala [1995] examined competition in the Finnish banking industry from 1985 to 1992, from deregulation to crisis, using different empirical methods. Firstly Vesala used the Panzar-Rosse method estimating revenue functions, income as a function of different inputs (e.g. deposits), with cross-sectional data on all individual banks in order to determine banks’ market power\footnote{Market power is measured as how much changes in factor prices are reflected in revenues. The inputs' coefficients in the regression are summed up and the sum is given the symbol $H$. The size of $H$ is then interpreted: $H \leq 0$ implies monopoly or perfect cartel, $0 < H < 1$ means monopolistic competition with free entry, $H = 1$ means perfect competition. (Vesala [1995]) More in Panzar and Rosse [1987].}. The H-statistic was positive for all years, varying between 0.2 and 0.5 indicating a market characterized by monopolistic competition and free entry during all years except 1989-90. The results for 1989-90 indicated perfect competition, which conceivably reflected effects of deregulation.

Secondly, Vesala [1995] investigated whether banks behaviour did change in the late 1980's, shifting focus from short-term profitability to growth due to the economic boom. Employing a switching regression model on industry-level data Vesala found more competitive conduct during the latter part of 1989 (although competition through the whole period was rather intense), indicating that price competition was exceptionally tight then. Vesala concluded that cyclical conditions had a greater impact on bank’s competitive behaviour than market share fluctuations.

Lastly, Vesala [1995] analyzed interdependencies between competition in loan and deposit markets. Vesala found strong interdependencies, competitive behaviour in one market affects conduct in the other, but that the loan market is not as influenced by the deposit market as the opposite indicating fiercer competition in the loan market. Vesala further found that commercial banks managed exercising less monopoly power than savings and cooperative banks, most likely because commercial banks compete for corporate loans whereas small banks function locally granting loans mainly to households.

As Vesala [1995], Kauko [2007] used the Panzar-Rosse method applying it to cross-sectional data on a large number of cooperative banks outside of Helsinki for 1996 and 2006. The H-statistic varied between 0.2 and 0.3 in 1996 and around 0.4 in 2006, implying hardening competition although the results were not statistically significant.

Vesala [2000] studied the impact of banks’ branch and ATM networks on market power between 1986 and 1996. The results showed that market power due to differentiation in service networks was larger in household than in corporate lending, and larger in depositing and in lending, but that the market power was diminishing through time owing to technological development. Vesala also controlled for collusion and observed that differentiation is a greater source of
market power than collusion.

6.3 Switching Costs in the Finnish Bank Market

Several aspects of the Finnish bank market create suspicions of significant switching costs in retail bank lending:

*Physical distance* is an obvious feature. Finland is a scarcely populated country with a population density of 16 compared to the EU27 average of 114 and a larger number of inhabitants per branch and ATM than the average (ECB [2008]). Sheer physical distance produce local bank monopolies in the rural areas, since competing branches may be several kilometers away, providing incumbent banks with opportunities to raise loan interest rates. Degryse and Ongena [2005] found transportation costs to be the main reason for spatial price discrimination. Petersen and Rajan [2002] showed that although technological development and subsequently increased productivity have diminished the importance of distance between borrowers and lenders, banks are still close to their borrowers (compared to other lender types). The bank lending nature evidently demands closer contact, which is especially true in small firm lending where much needed information is soft rather than hard. In small societies the *information asymmetries* between local banks and national banks become distinct; social contacts or family bands between customers and local bank employees are more common and social control is stricter than in larger communities. The long *history* of especially local savings and cooperative banks (described earlier in this section), their close ties to the original business areas and their historical role in developing the society possibly create emotional connections and psychological switching costs for customers. When a family in generations has been customer of a specific bank - and perhaps engaged in running it - future generations conceivably more or less automatically continue the relationship. With time symbioses between local firms and banks may have arisen: firms stay loyal to banks whereupon banks protect their customer’s business by not granting loans to competitors firms. Furthermore, in some bilingual areas changing banks across the *language border* is inconceivable. Two banks competing in the same region may, for mainly historical reasons, serve more or less exclusively the Swedish and Finnish speaking population respectively. The national characteristics consequently give rise to a breeding ground for market power through switching costs.

In addition, bank conduct in itself make switching banks difficult. Banks create artificial switching costs through extensive product tying and bundling, creating barriers to changing suppliers of individual products (Smidt et al. [2006]). Information sharing (assumed to reduce switching costs) is achieved through a privately owned credit register, but provides only negative information, i.e.

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34Hard information refers to easily available information from financial reports and payment information while soft information only with difficulty is communicated to others, for example character and reliability of firm managers (Petersen and Rajan [2002]). Unlike publicly listed companies small firms need not disclose much information, emphasizing the importance of extracting soft information through relationship banking (ibid).
data on financial difficulties (Directorate-General for Competition [2007]). Local banks in small villages thus have great advantages in evaluating customers’ credit worthiness. Finally, although banks have agreed on procedures for facilitating bank switching (Smidt et al. [2006]), consumer groups find it difficult to compare alternatives due to insufficient price transparency (Directorate-General for Competition [2007]).

Theoretical models predict industries characterized by significant scale economies and switching costs to be dominated by large firms but experience some small scale entry (see section 3.4). The Finnish banking market certainly is highly concentrated and dominated by large banks, and new entry during the last 20 years has been limited to smaller niche banks. Despite by some being characterized as intense, research shows that competition is imperfect and that banks hold some market power especially in the household sector (section 6.2).

The market structure indicates the presence of switching costs, an apprehension strengthened by observing bank behaviour (as suggested in section 4.2.3): Banking services are bought repeatedly and bank-customer relationships are by default - relationships. Banks can easily price discriminate between old and new customers and introductory offers aimed at e.g. students are permanently present pricing strategies.
7 Econometric Models and Estimation Methods

As discussed in section 6.3, switching costs are likely to be present in Finnish bank lending. National as well as European level competition authorities consider switching costs as hampering competition and potentially hurting consumers. The purpose of the empirical analysis is to

1. examine whether switching costs are present in Finnish retail bank lending or not, and
2. estimate the size of these switching costs.

7.1 Examining Switching Costs Existence

Kim et al. [2003] developed a method for explicitly measuring switching cost magnitude and applied it to the Norwegian bank market. A possibility for investigating the Finnish bank market would consequently be to replicate their study on Finnish material. Yet data requirements (data on all banks needed) and estimation methods (an equation system simultaneously estimated using non-linear 3SLS) renders this method less useful in this study.

Section 4 lists different commonly utilized methods for estimating and examining the presence of switching costs, depending on market situation and data availability. Switching costs are directly reflected in consumer conduct, but using choice modelling as suggested in section 4.1 for scrutinizing purchase behaviour requires data on individual consumers’ purchase choices which is generally unavailable and equally inaccessible to this study. Remains to analyze firms’ pricing strategies, as suggested in section 4.2. Analyzing the impact of switching costs on prices as explained in section 4.2.2 is an easily comprehensible way, but besides detailed knowledge of switching cost characteristics it demands either a feasible proxy for switching costs or that an occurred event has changed, reduced or increased, switching costs. Neither is easily detectable and applicable in this case.

However, estimating price elasticities of demand, described in section 4.2.1, is feasible. Since bank loans as products safely can be considered homogeneous estimating cross price elasticities of demand by observing competition between banks produces more information than estimating own price elasticities by observing purchase patterns change over time. (The latter could actually cause difficulties, since a individual private customer rarely take larger loans such as mortgages repeatedly.)

A few small adjustments to the situation in question: Firstly, using the equality \( \epsilon = \frac{d \ln q_i}{d \ln p_j} \) presented in section 4.2.1 the elasticity is given directly from regressing the first differenced log of output on the first differenced log of price, or \( d \log q_i = \epsilon \cdot d \log p_j \). Secondly, as banking competition should be considered regional (see section 3.1) the econometric model estimates the cross price elasticities of demand for loans extended by local cooperative and savings
banks respectively.

\[
Q_{ct} = \beta_0 + \beta_1 P_{ct} + \beta_2 P_{st} + \beta_3 CB + \sum_{j=1}^{n-1} \gamma_j I_j + \sum_{k=1}^{T-1} \alpha_k T_k + e_{it} \tag{17}
\]

\[
Q_{st} = \beta_0 + \beta_1 P_{st} + \beta_2 P_{ct} + \beta_3 CB + \sum_{j=1}^{n-1} \gamma_j I_j + \sum_{k=1}^{T-1} \alpha_k T_k + e_{it} \tag{18}
\]

where

- \(Q_{ct}\) and \(Q_{st}\) denote bank output, in differenced logs, at time \(t\) by the cooperative and the savings bank respectively;
- \(P_{ct}\) and \(P_{st}\) denote interest rate charged, in differenced logs, at time \(t\) by the cooperative and savings bank respectively;
- \(CB\) is a dummy variable indicating competition from commercial bank branches equaling 1 when commercial bank branches are present in the local market and 0 otherwise;
- \(I_j\) is a vector of individual fixed effects (0/1 dummy variables) capturing characteristics constant over time but varying between regional markets (e.g. industrial composition and dispersion of habitation) and \(n\) is the number of savings-cooperative bank pairs;
- \(T_k\) is a vector of time fixed effects (0/1 dummy variables) capturing characteristics constant between regions but varying with time (e.g. general interest rate and price levels) and \(T\) is the number of time periods.
- \(e_{it}\) is the presumably random error representing everything affecting demand (reflected in bank output) not captured by the model, such as service perception and customer-bank relationship in other product categories.

Data and variables are described more detailed in section 8.

The interesting parameters are \(\beta_1\) measuring own price elasticity and \(\beta_2\) measuring cross-price elasticity, the other variables act mainly as control variables. The parameter \(\beta_1\) is thus expected to be negative and a low absolute value indicates the presence of switching costs. The parameter \(\beta_2\) is expected to be positive and a low positive value indicates the presence of switching costs. The parameter \(\beta_3\) captures the impact of other competition and is expected to be negative, as increased competition is expected to decrease the output from each bank.

### Justification of the Model

The model’s primary advantage is the clear connection to economic theory. It is derived directly from demand elasticity definitions and consequently easily understandable and interpretable. However, justified application warrants a few further clarifications.
Treating prices as exogenous: Model (17) states that produced/sold quantity is determined by endogenously given prices set unilaterally by banks although economic theory explains that prices and quantity are simultaneously determined through interaction between supply and demand (Varian [2006]). Only monopolies and firms with great market power have the opportunity to set prices independently (ibid). However, research on Finnish bank competition shows that competition is far from perfect and that banks hold substantial market power (section 6.2.3). With that in mind, assuming banks setting prices and consumer demand subsequently determining output is an acceptable simplification.

Considering savings and cooperative banks only: For the individual consumer choosing between banks the difference between a national commercial bank’s local branch, a local savings bank and a local cooperative bank is negligible. Private customers and SMEs face similar product offers and bank operations. However, when scrutinizing bank conduct and collecting data on local operations the difference is crucial. Although bank competition, and consequently operating decisions, is local (see section 3.1) acquiring information on commercial banks’ different branches’ operations is difficult as commercial banks report detailed financial data solely on the entire bank taken together. Including commercial banks in the sample is thus impossible. The study is reduced to examining competition between local savings and cooperative banks (one of each paired together), but competition from commercial banks is roughly captured by a dummy variable.

7.1.2 Data Structure

The study utilizes panel data, a two dimensional data structure with a cross-sectional and a time series dimension, i.e. panel data means following some specific individuals across time (Wooldridge [2009]). The cross-sectional dimension allows for generalization of the results, the estimation describes more than the competition in a specific region between two specific savings and cooperative banks. The time series dimension increases the number of observations and allows controlling for unobserved effects constant over time. Due to the rich information content panel data has become increasingly popular in empirical economics. Yet the estimation methods are demanding and not completely developed, why it is beyond the scope of this thesis to correctly consider all aspects and utilize all intrinsic possibilities offered by a panel data set.

Unfortunately it is rarely possible to obtain panel data sets with complete data on all individuals for all time period. Mostly some observations are missing, resulting in an unbalanced panel. Estimating unbalanced panels does not differ greatly from estimating balanced panels if the missing observations are random in the sample and not correlated with the error term, i.e. the missing observations do not represent some characteristic in the data not explicitly reflected in the model. The panel used in this study is indeed unbalanced, but the missing observations seems to be random. (Wooldridge [2009])
7.1.3 Estimation Method

The purpose of econometric analysis is generally to explain fluctuations in one variable as a function of other variables, in this case studying how loans extended by bank \( i \) ceteris paribus (holding all other affecting factors constant) varies with changes in the interest rate charged by bank \( j \). The regression models (17) and (18) describe the relationship between the variables and through regression analysis using actual observations the parameters defining the relationship are estimated. Most economic variables are affected by many different variables and it is impossible to detect and include them all in the regression model, resulting in an error term \( e \) representing the unobserved variables left out of the model. The least squares methods are the most commonly applied methods for parameter estimation and implies finding the parameter estimate minimizing the squares of the differences, residuals, between values generated from the estimated relationship and the actually observed values. (Wooldridge [2009])

For panel data estimation several least square variations are possible, suitable for different model specifications. The main dividing line goes between how the heterogeneity of individuals and time periods is captured. If these differences are uncorrelated with all independent variables they are simply part of the error term, i.e. the effects not explicitly included in the model, a so called random effect model is appropriate. However, in this study both time and individual effects are probably correlated with the independent variables. For example, the general interest rate level (constant across individuals, changes over time) affects total demand and is certainly correlated with the interest rates charged by banks. And each region has characteristics such as industrial composition affecting both demand and interest margins that are (roughly) constant over time but differ between regions. Hence a fixed effects model capturing these constant effects is more suitable. (Park [2009])

Fixed effects can be captured in different ways. One possibility is first differencing, to examine the change in variables instead of variables themselves: The time constant effect is simply subtracted from the equation as it appears both at time \( t \) and time \( t - 1 \). Another possibility of eliminating fixed effects is subtracting the equation’s time mean (which includes the time constant effect) from the equation at each time period (each including the time constant effect). The resulting estimator is the so called within estimator, since the OLS uses the same variation within each cross-section. Related is the between estimator, controlling for effects constant between individuals but changing over time. However, a third method allows controlling for fixed effects in both dimensions: including dummy variables for each time period and each individual. The dummy variables capture fixed effects in both dimensions and are considered part of the intercept, each individual in each time period thus has a unique intercept in the regression model while slopes and error variances are the same for all. (Wooldridge [2009])

These two-way effect models (dummies for both dimensions) are called least squares with dummy variable, or LSDV, and have two qualities desirable for this study. Firstly, LSDV controls for both fixed effect types. Secondly, LSDV is
based on OLS in term of estimation and is thus easily estimated also with limited econometric knowledge. Although it has drawbacks (captures only region specific effects, not bank specific effects and the resulting large number of variables consumes degrees of freedom) the pros outweigh the cons. Furthermore, in this study the dummy variable parameters are uninteresting, their purpose is only to eliminate fixed effects that otherwise could distort the results. In order to avoid perfect multicollinearity, the dummy variable trap, only $n - 1$ individual dummies and $T - 1$ time dummies are included. (Park [2009])

Least squares estimations make demands on the investigated model in order to produce true parameter estimates (Wooldridge [2009]):

- The population model needs to be linear in parameters, i.e. credibly represented as in equations (17) and (18). Deriving the econometric model directly from economic theory should at least implicitly fulfill this assumption.

- The cross section sample needs to be randomly chosen. The sample used is not randomly chosen (the data collection process is described in section 8.1), involving decreased prospects of generalizing the results.

- The explanatory variables are not allowed to be constant, and perfect linear relationships are not allowed between explanatory variables. With a linear model, perfect linear relationships between explanatory variables make it impossible to distinguish between the explanatory variables’ respective impact on the dependent variable. In this study, none of the collected variables are constant (see example in 8.4) and perfect linear relationships seem unlikely. Still a high degree of correlation between the interest rates is very plausible - and problematic - and discussed in section 9.4.

- Absolutely central to least squares estimations is having exogenous explanatory variables and fixed effects (captured by time and individual dummy variables), i.e. they need to be unrelated with the random error. Otherwise the parameter estimates are biased; they represent not only the intended ceteris paribus impact of the explanatory variables on the dependent variable but also the unobserved factors’ impact on the dependent variable. Endogeneity may arise in underspecified models where important variables have been excluded, but is despite its importance difficult to detect. Some specification issues are discussed more in detail in section 9.4.

The assumptions above are required for unbiased fixed effect-estimators. Moreover, to test whether parameter estimates truly are significantly different from zero the following conditions need to be met:

- The error term variance need to be constant given any values of the explanatory variables and the fixed effects, since heteroskedasticity causes parameter variance estimates to become biased and hypothesis testing
using t-tests to become invalid. Heteroskedasticity is nevertheless easily compensated for in larger samples by estimating heteroskedasticity-robust standard errors. Because testing for heteroskedasticity in panel data sets is troublesome, robust errors are employed as a matter of precaution in this study.

- The error terms need to be uncorrelated across time, i.e. no serial correlation. Autocorrelation is further discussed in section 9.4.
- With small samples, the error terms need to be normally distributed. The utilized sample is considered large enough, with a cross-sectional dimension larger than the time series dimension, to rely on asymptotic approximations, i.e. without explicitly stating it the error term can be treated as normally distributed.

Equations (17) and (18) are estimated with Static Panel Methods in PcGive, OxMetrics6.

### 7.2 Estimating Switching Cost Magnitude

Unless demand elasticity estimations explicitly establish non-existing switching costs in Finnish retail banking, their size is subsequently estimated using the quick-and-easy method developed by Shy [2002]. Switching costs facing cooperative bank customers ($SC_{ct}$) and savings bank customers ($SC_{st}$) respectively take the form

$$SC_{ct} = p_{ct} - \frac{p_{st}q_{st}}{q_{ct} + q_{st}}$$  \hspace{1cm} (19)

$$SC_{st} = p_{st} - \frac{p_{ct}q_{ct}}{q_{ct} + q_{st}}$$  \hspace{1cm} (20)

where

- $p_{ct}$ and $p_{st}$ denote interest rate charged (price) at time $t$ by the cooperative and savings bank respectively (presented in section 8);
- $q_{ct}$ and $q_{st}$ denote loans extended (quantity) at time $t$ by the cooperative and savings bank respectively (presented in section 8).
The econometric models examine competition between locally functioning savings and cooperative banks. Since savings banks are quite few today, their number serves as a starting point. Each savings bank is paired up with the cooperative bank operating in the same geographical area, independent cooperative banks and members of the OP-Pohjola Group are treated equally. Lists of branch networks for savings bank, independent cooperative banks and member cooperative banks are found from their respective web pages\(^\text{35}\). With a total of 38 independent savings banks currently existing, 38 pairs are assembled. However, the banks operating mainly in the capital Helsinki, Nooa Savings Bank and Helsinki OP Bank, are excluded as the extensive restructuring of Helsinki OP Bank during the last years renders comparisons very difficult. Thus, 37 bank pairs are included in the study. The list of all pairs is found in appendix B.

### 8.1 Data Collection

Local banks often have their 'home town' in the name, functioning as a starting point for matching banks: Banks with corresponding name were assumed to compete in the same area, even if they often had expanded with branches to different neighbouring towns. (Both savings banks and cooperative banks have undergone several mergers and acquisitions during the years, changing the names. Information in appendix B.) The savings banks without an obvious namesake were paired together with a cooperative bank according to similarities in branch networks\(^\text{36}\), determined through offices’ postal codes\(^\text{37}\) and Google Maps\(^\text{38}\).

The sample data is collected over several years. The chosen time period is 1999-2008 (ten years) or the time period during which Finland has been a part of the Economic and Monetary Union\(^\text{39}\) and has had the euro as official currency.

All data is collected directly from the banks’ annual financial reports found in the databases at the National Board of Patents and Registration of Finland. Most reports were drawn up in euro, but those in markka are converted to euro using the conversion rate of EUR 1 = FIM 5.94573.


\(^{39}\)From Bank of Finland’s web page: “At the start of Stage 3 on 1 January 1999, the conversion rates between the currencies of the countries participating in the euro area were irrevocably fixed and the euro was adopted as the area’s single currency.” http://www.bof.fi/en/suomen_pankki/eurojarjestelma/talous_ja_rahaliitto_emu.htm, accessed 12 Aug 2009.
8.2 Dependent Variable

8.2.1 Bank Output (Quantity Demanded)

Bank output, denoted $Q_{ct}$ and $Q_{st}$ for cooperative and savings banks respectively, is the amount of loans extended by a bank during year $t$ measured in euro, in logarithms and first differenced. The differencing reduces the number of time periods with one, resulting in only nine years of data.

Data on individual loans is not publicly available, but aggregated data from banks’ financial statements is collectible from the databases at the National Board of Patents and Registration of Finland. Loans extended is proxied using the balance sheet item ‘Receivables from the public and public sector entities’, which is likely dominated by loans to private customers and to a lesser extent SMEs. For any cooperative bank the variable takes the form

$$Q_{ct} = d\log(\text{'Receivables from the public and public sector entities' year } t).$$

The balance sheet item ‘Receivables ... ’ is a stock variable, whereas demanded quantity is a flow variable. Hence it would probably be more accurate to use the change in ‘Receivables ... ’ as dependent variable instead of the level. However, loans extended were treated as bank output in Kim et al. [2003] (on switching costs in Norwegian banking, see section 5.3 for details) and the same measure is used here in order to facilitate comparisons with earlier research.

When estimating switching cost size, bank output $q_{ct}$ and $q_{st}$ respectively is taken directly as the balance sheet item ‘Receivables from the public and public sector entities’.

8.3 Explanatory Variables

8.3.1 Interest Rate (Price)

Price on loans, denoted $P_{ct}$ and $P_{st}$ for cooperative and savings banks respectively, is the interest rate charged on loans extended by a bank $i$ during year $t$ measured as a percentage, in logarithms and first differenced. As mentioned is it not possible to obtain data on individual loans, instead is average interest rate on all loans extended is calculated by dividing banks’ interest income received from ‘Receivables from the public and public sector entities’ (specified in the notes to the income statement) by the mean of loans extended at the beginning and the end of the year. For any cooperative bank the variable takes the form

$$P_{ct} = d\log\left(\frac{\text{interest income from 'Receivables ... ' year } t}{(\text{'Receivables ... ' year } t + \text{'Receivables ... ' year } t - 1)/2}\right).$$

A quantity measured as change in loans extended would require a price reflecting the interest rate charged on new loans, but in the current situation the price rather reflects the general interest rate level assuming new loans being granted to fairly similar conditions as old ones. Furthermore, giving equal weight to ‘Receivables ... ’ at time $t$ and time $t - 1$ probably exaggerates the impact.
of new loans, since only a fourth of outstanding mortgages are granted during the year in question\textsuperscript{40}. However, this definition was used in Kim et al. [2003], and using the same variable definitions facilitate comparisons.

When estimating switching cost size, prices $p_{ct}$ and $p_{st}$ are calculated as above but not in logarithms and not differenced.

8.3.2 Competition from Commercial Banks

Demand for loans extended by savings and cooperative banks is obviously affected by potential competition from local branches of commercial banks. The dummy variable $CB_{c} / CB_{s}$ is a dummy-variable indicating the presence of a commercial bank branch (Nordea, Sampo, Tapiola, Handelsbanken or Ålandsbanken). The dummy is coded 1 if at least half the branches of the savings and cooperative banks in question faces competition from a local commercial bank branch and 0 otherwise. Commercial bank branches are assumed to have remained the same during the investigated time period, although the information obtained concerns 2009. Information on branches from the Federation of Finnish Financial Services\textsuperscript{41}.

8.4 Descriptive Statistics

Figure 1 presents variables (neither in logarithms nor differenced, for clarity) for one bank pair, namely Ekenäs Savings Bank and Cooperative Bank Raseborg located in the coastal areas of southern Finland which is fairly representative for the whole sample. The variables differ in size between the two banks, but are very similar in development. The time period is too short for thoroughly examining trends and breaks conceivably creating estimation difficulties, but the graphical representation provides some intuitive results. The dependent variables, loans extended, follow an upward trend as expected, outstanding loan balance increase over time. This time trend is captured by time dummies. The interest rates fluctuate with business cycle, the general economic boom around 2004-2005 is clearly reflected in lower interest rate although the regional economic growth follows a different pattern. The variables show no obvious shift or break that needs to be accounted for in the model.

\textsuperscript{40}http://www.bof.fi/se/tilastot/tase_ja_korko/index.htm accessed 28 Oct 2009.

Table 1: Descriptive statistics on aggregated savings and cooperative banks respectively.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Min</th>
<th>Mean</th>
<th>Max</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans extended, coop. (1 000 €)</td>
<td>3 324</td>
<td>92 978</td>
<td>557 460</td>
<td>100 240</td>
</tr>
<tr>
<td>Loans extended, savings (1 000 €)</td>
<td>2 518</td>
<td>181 560</td>
<td>4 118 800</td>
<td>398 240</td>
</tr>
<tr>
<td>Interest rate, coop. (%)</td>
<td>3.42</td>
<td>4.98</td>
<td>6.85</td>
<td>0.91</td>
</tr>
<tr>
<td>Interest rate, savings (%)</td>
<td>1.84</td>
<td>5.13</td>
<td>7.19</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Figure 1: Example of original variable values for the bank pair Ekenäs Savings Bank-Cooperative Bank Raseborg.

Table 1 presents descriptive statistics of the used variables (neither in logarithms nor differenced, for clarity) for all banks in the sample, for all time periods. Obvious is the large size dispersion in loans extended, ranging from 2.5 millions to 4 billions between different savings banks and from 3.3 millions to 0.6 billions between different cooperative banks. The dispersion in interest rates is interestingly larger among savings banks than among cooperative banks, similarly as loans extended. As banking is an industry characterized by economies of scale this might cause difficulties in the estimation, although these numbers are small in comparison with the large commercial banks and even larger numbers than these might be needed to achieve economies of scale.
8.5 Data Problems

8.5.1 Missing Observations

Unfortunately some banks have during some years neglected handing in financial reports, creating gaps in the data set. Since these gaps appear completely random, they should not affect the estimations in any other way than reducing the sample size (Wooldridge [2009]).

8.5.2 Measurement Errors

A handful numbers were reported inexacty, in the magnitude thousands of euros instead of exact euros. The magnitude is yet correct and the expected effect on estimation results is merely blurring not distorting.

Another factor affecting the data set is changes in reporting standards. Since the financial year starting 1.1.2005, banks are allowed to draw up financial reports according to international accounting standards (IAS). If they choose not to apply the IAS, banks are anyway required to valuate and report their financial instruments to market value corresponding to the IAS42. For some banks this slightly increased the valuation of “Receivables from the public and public sector entities”, resulting in a larger output but a lower calculated interest rate. For a few banks this also increased the amount of interest earned from “Receivables from the public and public sector entities”, resulting in a larger output and a higher calculated interest rate. The former result is more frequent in the sample, but the expected effect on the results is ambiguous, depending on whether the price gap between the paired banks is reduced or enlarged. The overall impact should anyway be marginal as the changes concern only a limited number of observations.

In addition to changes in accounting standards financial reporting is affected by mergers and acquisitions during the chosen time period. Or, rather, the sample size is affected. In order to more accurately reflect local competition only pre-merger data has been used in cases where mergers have occurred between 1999 and 2008. This further reduces the sample size.

---

9 Estimation Results and Analysis

This section presents the regression results from estimating equations (17) and (18) respectively. The purpose is to empirically investigate if loan demand is inelastic or not (as inelastic demand indicates switching costs) - given that this question is even answerable using the economic model and data described in earlier sections.

9.1 Equation (17) Cooperative Banks

Applying LSDV-estimation with robust standard errors on equation (17) yields the \( \beta \)-coefficient estimates shown in table 2.

<table>
<thead>
<tr>
<th>Variable</th>
<th>( \beta )-estimate</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own interest rate, ( P_{ct} )</td>
<td>-0.309***</td>
<td>0.117</td>
</tr>
<tr>
<td>Rival’s interest rate, ( P_{st} )</td>
<td>0.006</td>
<td>0.057</td>
</tr>
<tr>
<td>Commercial bank, ( CB_c )</td>
<td>-0.050***</td>
<td>0.008</td>
</tr>
<tr>
<td>Individual dummies ( I_j )</td>
<td>36</td>
<td>(37 individuals)</td>
</tr>
<tr>
<td>Time dummies ( T_k )</td>
<td>8</td>
<td>(9 time periods)</td>
</tr>
<tr>
<td>Observations</td>
<td>272</td>
<td></td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.247</td>
<td></td>
</tr>
</tbody>
</table>

*** Different from zero at 1% significance level
** Different from zero at 5% significance level
* Different from zero at 10% significance level

9.1.1 Own Price Elasticity

The parameter estimate for \( P_{ct} \) directly measures the cooperative bank’s own price elasticity, i.e. the expected percentage change in demand for loans when the bank changes the interest rate. The significant estimate -0.309 is negative as expected (a raised interest rate decreases demand for loans) and small in absolute value (less than 1) indicating an inelastic demand. The low price elasticity might indicate the presence of switching costs; if firms can raise prices without losing customers then customers may be locked in due to switching costs.

9.1.2 Cross Price Elasticity

The parameter estimate for \( P_{st} \) measures the cross price elasticity, i.e. the expected percentage change in demand for loans when the competing bank changes its interest rate. The estimate 0.006 is positive as expected (demand for the cooperative bank’s loans increases as the savings bank’s interest rate increases) and very small in value. The parameter estimate is not even significantly different from zero, i.e. the null hypothesis \( \beta_2 = 0 \) cannot be rejected. Failure to
reject the null hypothesis might indicate a true parameter equal to zero, implying that the demand for loans facing cooperative banks is completely unaffected by savings banks’ prices - perhaps due to severe lock-in created by switching cost. However, failure to reject the null hypothesis might equally well be due to insufficient data or model misspecification.

9.1.3 Competition from Commercial Banks

The dummy variable $CB_c$ has a strongly significant $\beta$-estimate of expected sign, -0.050, although the practical significance is rather small. Still competition from rivaling commercial bank branches appears to reduce the demand for loans provided by the cooperative bank.

9.1.4 Overall Model Significance

The model’s overall significance, i.e. the restricted model with all coefficients set equal zero and where none of the explanatory have any impact on the dependent variable, is tested using a Wald test. The $\chi^2$-statistic with three degrees of freedom is 141.5, thus highly significant implying that the explanatory variables jointly do explain some variation in the demand for loans. The $R^2$ measures the fraction of sample variation in loans demanded explained by the independent variables, indicating that only 24.7% of fluctuations in loan demand can be attributed to interest rates charged by both the cooperative bank and the savings bank as well as competition from commercial banks and branch network. As the equation includes both individual and time fixed effects the obtained $R^2$ is very low, clearly showing that the explanatory variable set is insufficient.

9.1.5 Examination of New Loans

Employing outstanding loans as output means including loans granted several years ago in the regression (further discussion in section 9.4.3). More interesting from a competition perspective might be to distinctly examine the effect interest rates charged on new loans have on demand for new loans, i.e. considering flow variables instead of stock variables. However, data on individual loans and loan terms is not publicly available. New loans are therefore approximated by the change in ‘Receivables from the public and public sector entities’, and an average interest rate on these new loans are calculated by dividing the change in interest income by the amount of new loans. To complement the results above, equation (17) is regressed on new loans and new interest rates yielding the estimates presented in table 3.
Table 3: Results from estimating equation (17) on new loans.

<table>
<thead>
<tr>
<th>Variable</th>
<th>β-estimate</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own interest rate, $P_{ct}$</td>
<td>-0.911***</td>
<td>0.093</td>
</tr>
<tr>
<td>Rival’s interest rate, $P_{st}$</td>
<td>0.020</td>
<td>0.046</td>
</tr>
<tr>
<td>Commercial bank, $CB_c$</td>
<td>-0.213</td>
<td>0.131</td>
</tr>
<tr>
<td>Individual dummies $I_j$</td>
<td>35</td>
<td>(36 individuals)</td>
</tr>
<tr>
<td>Time dummies $T_k$</td>
<td>5</td>
<td>(6 time periods)</td>
</tr>
<tr>
<td>Observations</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.723</td>
<td></td>
</tr>
</tbody>
</table>

*** Different from zero at 1% significance level
** Different from zero at 5% significance level
* Different from zero at 10% significance level

The parameter estimates are in line with the parameters obtained using stock variables, although the figures are somewhat larger. Demand for new loans seems more sensitive to changes both in own price (close to unit elasticity), changes in rival’s price and competition from commercial banks. This is in line with intuition since new borrowers should be more sensitive to price differences than old borrowers, as old borrowers unlike new ones face switching costs when changing banks. Still the only estimate significantly different from zero is the own price elasticity. A $\chi^2$–statistic with three degrees of freedom of 130.6 yet indicates that the model does explain some variation in loan output, further supported by an $R^2$ of 72.3%. (However, panel data regressions including both individual and time specific dummies generally produce high $R^2$-values.)

However, this model has one major drawback: sample selection. Most banks in the sample have continuously increased their outstanding loans (generating positive changes and consequently positive approximations of new granted loans) while interest incomes have both decreased and increased over time (both negative and positive changes). Since changes in loans and changes in interest income are utilized in logarithms, negative values cannot be used. This unfortunately excludes more than half the sample, for example all observations from the years 2002-04\(^{43}\), resulting in greatly reduced predictive power and generalization possibilities as well as plausibly distorted parameter estimates.

9.2 Equation (18) Savings Banks

The results from estimating equation (18) are shown in table 4.

Table 4: Results from estimating equation (18).

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\beta$-estimate</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own interest rate, $P_{st}$</td>
<td>-0.116</td>
<td>0.122</td>
</tr>
<tr>
<td>Rival's interest rate, $P_{ct}$</td>
<td>-0.107</td>
<td>0.128</td>
</tr>
<tr>
<td>Commercial bank, $CB_{c}$</td>
<td>-0.050***</td>
<td>0.009</td>
</tr>
<tr>
<td>Individual dummies $I_{j}$</td>
<td>36</td>
<td>(37 individuals)</td>
</tr>
<tr>
<td>Time dummies $T_{k}$</td>
<td>8</td>
<td>(9 time periods)</td>
</tr>
<tr>
<td>Observations</td>
<td>271</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.327</td>
<td></td>
</tr>
</tbody>
</table>

*** Different from zero at 1% significance level
** Different from zero at 5% significance level
* Different from zero at 10% significance level

9.2.1 Own Price Elasticity

The parameter estimate for $P_{st}$ directly measures the savings bank’s own price elasticity, i.e. the expected percentage change in demand for loans when the bank changes the interest rate. The estimate -0.116 is negative as expected (a raised interest rate decreases demand for loans) and small in absolute value (less than 1) indicating an inelastic demand. The low price elasticity might indicate the presence of switching costs; if firms can raise prices without loosing customers then customers may be locked in due to switching costs. However, the parameter estimate is not significantly different from zero making interpretation problematic. Nevertheless, failure to reject the null hypothesis $\beta_1 = 0$ might suggest that the interest rate charged is not important in determining loan demand.

9.2.2 Cross Price Elasticity

The parameter estimate for $P_{st}$ measures the cross price elasticity, i.e. the expected percentage change in demand for loans when the competing bank changes its interest rate. The estimate -0.107 is negative, not positive as expected and further practically small as well as statistically insignificant. Consequently interpretation becomes dubious. Nevertheless, failure to reject the null hypothesis $\beta_1 = 0$ might suggest that the rival’s interest rate is not important in determining loan demand.

9.2.3 Competition from Commercial Banks

The dummy variable $CB_{c}$ has a strongly significant $\beta$-estimate of expected sign, -0.050, although the practical significance is small. Competition from rivaling commercial bank branches thus appears to affect demand for loans provided by savings banks similarly as it affects demand for cooperative banks’ loans.
9.2.4 Overall Model Significance

Although the parameter estimates are not quite as expected, and neither own price elasticity nor cross price elasticity are statistically significant, the Wald test claims high overall significance with the $\chi^2$—statistic equalling 72.31. The $R^2$ is even higher than for equation (17), 32.7% of loan demand variation is explained by the included explanatory variables. Yet the odd parameter estimates suggests some data problems or model misspecifications.

9.2.5 Examination of New Loans

Similarly as with cooperative banks (section 9.1.5), demand elasticities for new loans were estimated and the results are presented in table 5.

Table 5: Results from estimating equation (18) on new loans.

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\beta$-estimate</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own interest rate, $P_{ct}$</td>
<td>-0.897***</td>
<td>0.052</td>
</tr>
<tr>
<td>Rival’s interest rate, $P_{st}$</td>
<td>-0.131</td>
<td>0.099</td>
</tr>
<tr>
<td>Commercial bank, $CB_c$</td>
<td>1.900***</td>
<td>0.117</td>
</tr>
<tr>
<td>Individual dummies $I_j$</td>
<td>35</td>
<td>(36 individuals)</td>
</tr>
<tr>
<td>Time dummies $T_k$</td>
<td>5</td>
<td>(6 time periods)</td>
</tr>
<tr>
<td>Observations</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.837</td>
<td></td>
</tr>
</tbody>
</table>

*** Different from zero at 1% significance level
** Different from zero at 5% significance level
* Different from zero at 10% significance level

These parameter estimates for savings bank generally support earlier results, although the figures are slightly larger. Demand for new loans seems more sensitive to changes in own interest rate, as the own price elasticity estimate is close to unit elasticity. Cross price elasticity is still against expectations negative, and competition from commercial banks seems, strangely enough, to increase rather than decrease savings bank output. Yet both the $\chi^2$—statistic with three degrees of freedom of 332.8 and an $R^2$ of 83.7% indicate that the model has some predictive power. (However, panel data regressions including both individual and time specific dummies generally produce high $R^2$-values.) The drawbacks are the same as accounted for in section 9.1.5; the sample selection problem is likely to produce at least somewhat distorted results with very little predictive power.

9.3 Comparison between Savings and Cooperative Banks

Although interpreting the results demands caution, comparing estimation results from equations (17) and (18) indicates different switching costs for customers of cooperative banks and savings banks. The competitive impact from
commercial banks, the variable \( CB \), is the same for both bank types. Yet both own price elasticity measured by \( \beta_1 \) and cross price elasticity measured by \( \beta_2 \) differ. An increase in saving bank interest rates decreases savings bank output and increases cooperative bank output, although the effect is marginal. An increase in cooperative bank interest rates, on the other hand, decreases cooperative bank output but does not increase savings bank output. This might indicate that higher prices causes savings bank customers to switch banks, while cooperative bank customers simply reduce their borrowing. One possible interpretation is that cooperative bank customers are more loyal and/or face higher switching costs than savings bank customers.

### 9.4 Potential Estimation Problems

Whereas the econometric estimations are done using actually observed data on bank output and prices, the estimated equations (17) and (18) are mere conjectures. The true data generating models are unknown and potentially very different from the estimated equations. Moreover, the LSDV estimation method make further demands (listed in section 7.1.3). Testing these assumptions made about the model is thus crucial in proper econometric analysis. Testing and correcting for all possible flaws is nevertheless beyond the scope of this study, but inspired by Doornik and Hendry [2007] this section addresses a few practical problems. However, most important is realizing that correlation between variables does not immediately imply causality, especially when investigating time series data. Correlation may arise simply due to high degrees of serial correlation in two mutually-independent series or because both are affected by an underlying third factor.

#### 9.4.1 Multicollinearity

With perfect collinearity, perfect linear relationships between explanatory variables, the estimate variances are undefined and least squares estimation impossible. Multicollinearity, high correlation between explanatory variables, does not equal perfect collinearity but is still troublesome as correlation increases variances and consequently decreases estimation precision. Coefficients estimated under multicollinearity might simply be misleading. Having many explanatory variables obviously augments the risk of multicollinearity, and having both time and individual dummy variable undeniably means many variables. A sign of multicollinearity is obtaining insignificant parameter estimates in an overall significant model. (Doornik and Hendry [2007])

Both equation (17) and (18) are thus clearly suspects of suffering from multicollinearity. Detecting multicollinearity is easily done by regressing each explanatory variable on all other regressors; a high \( R^2 \) points to multicollinearity. Regressing \( P_{st} \) and \( P_{st} \) on the other explanatory variables certainly both produces a \( R^2 \) over 0.9, and multicollinearity must be considered a problem.
9.4.2 Autocorrelation

A serially correlated error causes fluctuation in dependent variable (it does not only depend on the explanatory variables and a random error term, but also on the error term from earlier time periods) that least squares normally associates with fluctuations in explanatory variables. Autocorrelation reduces parameter estimate precision and precludes hypothesis testing - i.e. the estimated model becomes less interpretable. Analyzing the unobserved error terms is impossible and must be substituted with analyzing the residuals from equations estimation.

Testing equations (17) and (18) displays at least first and second order residual autocorrelation (residuals are correlated with residuals from both one and two periods back in time) in both models. However, although this might indicate error autocorrelation it may equally well arise simply due to poor model design (discussed below). To correct for serially correlated errors, Wooldridge [2009] suggests transforming the data and using generalized least squares instead of ordinary least squares estimation. Estimating equations (17) and (18) using the generalized least squares provided by PcGive reduces residual autocorrelation but does not markedly alter either estimates or their statistical significance.

9.4.3 Dynamic Specification

The dependent variable is often highly correlated over time, as for example in this study: Since mortgages have long payback-time, on average 20 years\textsuperscript{44}, outstanding loans on the balance sheet consist to a a large extent of the same loans as last years’ balance sheet item. Including lags of the dependent variable as regressors (and, lags of independent variables) is likely to substantially enhance the models’ explanatory power in this study and reduce residual autocorrelation. For all that, estimating dynamic panel data methods demands using estimation methods such as the generalized methods of moments and is beyond the intended scope of this study.

9.4.4 Simultaneity and Endogeneity

Fernandez et al. [2003] emphasized the endogeneity risk caused by estimating simultaneously determined variables separately. Although prices here are assumed exogenous due to market power, prices and quantities are generally determined by the intersection of supply and demand. Furthermore, competing banks interact in price setting and in order to reflect this interaction the two equations would ideally be estimated simultaneously, or at least as so called seemingly unrelated regression equations. Even so, the equations are estimated separately since PcGive does not allow for more than one endogenous variable when estimating panel data.


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9.4.5 Non-Stationarity

Analyzing time series processes demands that the probability distributions are constant over time, it demands stationarity. If for example the mean changes over time making predictions is impossible (Wooldridge [2009]). Although not advisable, stationarity has usually been regarded as approximately valid for time series of short duration (Adak [1998]), and nine time periods cannot be considered as other than short. The time-series used is thus not tested for non-stationarity.

9.4.6 Robustness

As mentioned earlier, equations (17) and (18) are estimated also using a generalized least squares method, without any marked differences in parameter estimates. Furthermore, different (insignificant) control variables such as regional GDP growth and number of branches are in turn included in the equations, also without changing the results. Also estimating equations (17) and (18) on new loans yield similar results. The results, although marred by various problems, thus seem fairly robust to minor specifications alterations.

9.5 Estimating Switching Cost Size with the UPP

The results from estimating equations (17) and (18) must be interpreted with caution. Nevertheless, the results do not explicitly rule out existence of switching costs. Assuming switching costs are existent in Finnish retail banking, a natural subsequent step is to estimate their magnitude. This is most easily achieved applying the undercut-proof property presented in section 4.2.4 on the collected data.

Switching costs are calculated for each bank pair according to equations (19) and (20) one year at a time and subsequently averaged as presented in table 6.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cooperative Banks</th>
<th>Savings Banks</th>
<th>Nbr of Obs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$SC_{ct} %$</td>
<td>Share of $p_{ct}$</td>
<td>$SC_{st} %$</td>
</tr>
<tr>
<td>1999</td>
<td>2.74</td>
<td>51%</td>
<td>2.81</td>
</tr>
<tr>
<td>2000</td>
<td>3.24</td>
<td>52%</td>
<td>3.07</td>
</tr>
<tr>
<td>2001</td>
<td>3.15</td>
<td>50%</td>
<td>3.37</td>
</tr>
<tr>
<td>2002</td>
<td>2.60</td>
<td>49%</td>
<td>2.88</td>
</tr>
<tr>
<td>2003</td>
<td>2.12</td>
<td>49%</td>
<td>2.38</td>
</tr>
<tr>
<td>2004</td>
<td>1.98</td>
<td>50%</td>
<td>2.04</td>
</tr>
<tr>
<td>2005</td>
<td>1.89</td>
<td>50%</td>
<td>2.03</td>
</tr>
<tr>
<td>2006</td>
<td>2.03</td>
<td>49%</td>
<td>2.27</td>
</tr>
<tr>
<td>2007</td>
<td>2.49</td>
<td>49%</td>
<td>2.76</td>
</tr>
<tr>
<td>2008</td>
<td>2.78</td>
<td>50%</td>
<td>3.01</td>
</tr>
</tbody>
</table>

Table 6: Switching costs size 1999-2008.
Quite contrary to results discussed in section 9.3 switching costs appear similar across banks, both cooperative and savings bank customers face switching costs amounting to roughly a half of the interest rate charged.

9.6 Analysis and Comparison with Earlier Research

9.6.1 Switching Costs Do Exist

Theoretical predictions, earlier research and market specific characteristics clearly state that switching costs are very plausible in Finnish retail banking. The empirical investigation has analyzed whether switching costs exists or not by estimating cross price elasticities of demand for loans provided by local cooperative and savings banks. The results must be interpreted with great caution, since the models suffer from both multicollinearity and residual autocorrelation as well as possible non-stationarity. Moreover, only few estimated coefficients turned out significant. Bearing this in mind, the coefficient estimates still indicate price insensitivity, which in turn conceivably indicates the presence of switching costs as predicted. Plausible causes for switching costs in local bank lending are not formally examined but discussed in section 6.3.

Berg and Kim [1994] estimated market demand elasticity for banking services in Norway using total assets plus deposits as output and interest rate margins and found a demand elasticity estimate of -0.307. Although not measuring the exact same demand their results are very close to the results in this study (-0.309 for cooperative banks and -0.116 for savings banks), further supporting the claim that demand for banking products is rather inelastic. Then again, Berg and Kim [1998] estimated a market demand elasticity in Norwegian retail bank lending to -0.9017, i.e. much more elastic but in line with this study’s elasticity estimates on new loans. Vesala [1995] found a market demand elasticity in Finnish bank lending close to -0.6, a value right between the results obtained in this study. However, as Berg and Kim [1998] pointed out, demand elasticities perceived by individual banks may differ from market demand elasticities due to different degrees of market imperfections. This study includes only countryside banks, but including banks from larger cities that presumably face more intense competition might produce larger elasticities. Coccorese [2005] estimated a model resembling the one used in this study on data from the eight largest Italian banks receiving own price elasticities between -0.8 and -1.7 and cross price elasticities between 0.7 and 1.4. As in this study, the own price elasticity is higher than the cross price elasticity. Coccorese’s figures are as expected larger, as he focuses on national competition where information asymmetries (causing lock-ins and reducing elasticities) conceivably are less severe than in regional competition.

As Dick [2008] (who estimated demand elasticities in the US deposit market) observed, demand elasticities around -0.3 are theoretically not profit maximizing. With inelastic demand firms should be able to increase revenues by raising prices, since the loss in quantity sold is smaller than the price increase (Varian [2006]). Since banks appear not to have utilized this opportunity some comple-
mentary explanation is needed.

9.6.2 Switching Costs Are Substantial

To find out whether switching costs should be considered a substantial problem or not, their magnitude was estimated corresponding to approximately half the interest rate charged using the under-cut proof property. Interestingly enough switching costs are roughly constant over time, although for example Kauko [2007] demonstrated enhanced banking competition between 1996 and 2006.

Switching cost size have rarely been estimated (see section 5). Yet compared with switching costs in the rather similar Norwegian loan market (a third, Kim et al. [2003]) and Swedish mortgage market (a third, Andersson and Berglund [2004]) the switching cost estimate of 50% appears almost unreasonably high. Conceivable reasons for higher switching costs in Finland, and similarly lower demand elasticities, are mentioned in section 6.3; long distances between competing branches in the scarcely populated Finnish countryside; the special character of cooperative and savings banks (historically, cooperative banks have provided services for farmers when savings banks have provided services for workers and inherited habits are tough to break); and language barriers.

However, looking at other switching cost estimations using the UPP reveals generally very high results - over 80% of price for bank deposit services (Shy [2002]), 70% of price in the airline industry (Carlsson and Löfgren [2006]) and around 80% in on-line real estate advertising (Tåg [2004]) - indicating that the UPP in itself possibly exaggerates switching cost magnitude. Conclusions should be limited to establishing that switching cost most likely are substantial in Finnish retail banking.

9.6.3 Cooperative Bank Customers Are More Loyal

The results suggest that cooperative bank customers are more loyal than savings bank customers. One possible explanation could be found in their different origins, still reflected in customer structures today (see section 6). Savings banks were created by relatively wealthy citizens in order to relieve urban poverty whereas cooperative banks, although initiated by politicians and business people, were founded and owned cooperatively by rural inhabitants of small means. Today savings bank customers are mainly merely bank customers while cooperative bank customers often are owner-members (over 1.2 million in 2008) with opportunities to participate in their bank’s administration and decision-making\(^{45}\). Cooperative owner-members further receive loyalty benefits that are used to pay for banking or insurance services, i.e. similar to frequent-flyer programs offered by airlines (see section 2.1).

A plausible consequence of loyal customers should be higher profits. Table 7 presents return on assets (operating profit/average balance sheet total) for 2006-2008 for the examined bank groups, savings banks and cooperative banks (both independent banks and banks belonging to OP-Pohjola Group). The

numbers are taken from the Financial Supervisory Authority’s web pages\(^{46}\) and clearly show larger returns for both cooperative bank groups than for savings banks, which is consistent with cooperative bank customers being more loyal than savings bank customers.

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Savings banks</td>
<td>1.3</td>
<td>1.6</td>
<td>1.1</td>
</tr>
<tr>
<td>Local cooperative banks</td>
<td>1.4</td>
<td>1.6</td>
<td>1.4</td>
</tr>
<tr>
<td>Members of OP-Pohjola Group</td>
<td>1.5</td>
<td>1.6</td>
<td>1.2</td>
</tr>
</tbody>
</table>

### 9.6.4 Generalization of Results

Any generalization of estimation results is limited to retail banking, and as such focusing on private customers and SMEs. The sample does not include commercial banks and is not randomly chosen, the latter generally a prerequisite for making broader generalizations. Moreover, only banks from the countryside are included in the sample. However, following the line of argument presented in Kauko [2007], all firms operating in a market are part of the same competitive situation and the results can be seen as valid also for commercial bank branches operating outside the Helsinki area.

### 9.6.5 Market Definition

Proper competition analysis presupposes a clearly defined market to analyze, with respect to both the product dimension and the geographical dimension. Motta [2004] defines the relevant market as a set of products and sold in a geographical where competing firms “exercise competitive constraints on each other”, i.e. with respect to which products/areas are firms (un)able to profitably raise prices.

The *relevant product market* comprises all products regarded as substitutes\(^{47}\). The product market definition utilized in this study is that loans from one bank can easily be substituted for loans from another bank. The crucial underlying assumption, however, is that loans can be considered in isolation. Most importantly, the investigation assumes that demand for bank loans is independent of demand for other banking products. Yet bundling of bank products is generally considered a major contributing factor in creating switching costs.

The *relevant geographical market* comprises the area where competing firms face similar competitive conditions that are distinguished from neighbouring


This study has assumed the geographical market definition to be a small local one (although borders of individual markets might be less than perfectly defined). If not, if customers choose banks from all over the country, examining competition between local cooperative and savings bank provides barely half the picture.

9.6.6 Switching Cost Character

Using aggregate firm-level data inevitably assumes different customer groups to be homogeneous. In reality, private customers and small enterprises probably act differently and young consumers are conceivably more mobile than older (shorter bank relationships, more familiar with technology etc.).

9.6.7 Potential Improvements and Suggestions for Further Research

Starting with the estimation method, analyzing a dynamic model with lags of both dependent and independent variables instead of a static would probably reduce misspecification problems and increase the explanatory power. Furthermore, price and quantity is generally determined simultaneously through interaction between supply and demand as well as through competition between firms. Estimating simultaneous equations would eliminate potential endogeneity problems.

However, the most significant improvement would be to consider loans, deposits and payment system services in the same investigation since consumers choose banks, not individual products from different banks. How to aggregate bank output over different product categories is yet far from clear-cut (Kim [1986]). Applying similar methods as in this study to deposit and payment services respectively might nevertheless provide additional insight on the characterization of switching costs in banking.

9.6.8 Contribution

This thesis has surveyed theoretical switching cost literature from a banking perspective, and listed features of banking potentially promoting emergence of switching costs. The Finnish retail banking market has been evaluated against this background and empirically investigated with respect to switching costs. The empirical results need to be interpreted cautiously, but indicate the presence of substantial switching costs. Although possible sources of switching costs have been presented, the case specific switching cost types have not been established. In case switching costs generally are considered a problem that needs to be addressed, which by no means is an easily answered question as it depends on the underlying causes, this study provides support for taking some kind of measures.

10 Conclusion

The intuitive review as well as the empirical analysis of the Finnish retail bank lending market suggests the presence of substantial switching costs. Estimated own price and cross price elasticities are close to zero while estimated switching costs constitute around half the interest rate. Although somewhat exaggerated these results are in line with earlier research, stating that switching costs are an important phenomenon in banking. The results further confirm the impression of fairly weak competition in Finnish banking. Any kind of authority intervention would still require careful investigation of the causes for switching costs. It is certainly plausible that low consumer mobility interpreted as signs of soft competition rather reflects customer satisfaction, as satisfied consumers are naturally less likely to change banks. Some authors even see a trade-off between stability and competition in banking regulation (Freixas and Rochet [2008]), since well functioning, stable financial institutions are crucial for the whole economy. The recent financial crisis yet illustrates the problem with “too big to fail” complex financial institutions. Social gains from obtaining significant economies of scale might not compensate for monitoring costs (most likely not for bail-outs).

As with this study, a general shortcoming in empirical switching cost literature is characterization of switching costs and their consequences. Switching costs are often assumed homogeneous across consumers, firms or time periods, or all at once, although common sense states that switching costs are more likely to be heterogeneous across all these dimensions. Furthermore, switching cost sources are rarely identified which precludes proper analysis. Equally important would be to examine the consequences of switching costs. Do firms gain on the expense of consumers? How much is competition harmed by switching costs? Or do switching costs instead increase competition as firms compete fiercely for valuable market shares? Should switching costs at all be a concern for competition authorities? Examining switching costs in banking further means difficulties in defining the relevant market. Product wise most studies examine either deposits or lending or credit cards. Few use the cluster approach to combine services despite consumers choosing bank probably choose a portfolio of products rather than individual products. The geographic market definition is not clear-cut either, is the relevant market local, regional or national - or even cross-national in Europe, as the Single European Payments Area aims at reducing obstacles caused by national borders\textsuperscript{49}.

Switching costs are examined by economists and marketing researchers alike, with slightly different purposes and methods. As a generalization, economists use quantitative data on price and output to empirically estimate switching costs while marketing researchers conduct consumer surveys to examine reasons for switching. Combining these approaches may produce interesting results and remedy empirical shortcomings concerning switching cost drivers as well as consequences.

11 Svensk sammanfattning

11.1 Introduktion

Konkurrens ökar den allmänna välfärden genom att företag kontinuerligt tvingas förbättra sina produkter och effektivera sin produktion såväl i syfte att locka nya som att hålla kvar tidigare kunder. Fungerande konkurrens kräver således att kunder relativt enkelt kan byta leverantör om de är missnöjda med sin nuvarande eller om en annan leverantör erbjuder samma produkt till ett lägre pris. Olika typer av byteskostnader (eng. switching costs) kan dock göra det kostsamt att byta leverantör eller till och med låsa kunden till den nuvarande leverantören. Byteskostnader är kostnader som åläggs en kund som byter varuleverantör även när produkterna är praktiskt taget identiska (Thompson och Cats-Baril [2002]) och ger således företag en möjlighet att höja sina priser utan att förlora kunder (Shy [2002]). Konsumenter antas möta olika former av byteskostnader på många marknader, varav bankmarknaden är ett exempel. Såväl Europeiska kommissionen50 som nordiska konkurrensmyndigheter51 har diskuterat byteskostnader som en möjlig orsak till låg kundrörlighet och bristande konkurrens inom banksektorn.

11.1.1 Syfte

Syftet med denna avhandling är att undersöka huruvida byteskostnader existerar på den finska banklånemarknaden och i sådant fall estimera deras storlek.

11.1.2 Begränsningar

Banker erbjuder primärt tjänster i tre kategorier: inlåning, utlåning och betalningssystem. Den här avhandlingen fokuserar enbart på byteskostnader inom utlåning, eftersom byteskostnaderna kan antas vara mer betydande där än inom inlåning och betalningssystem. Vidare begränsas undersökningen till utlåning åt privatpersoner och små företag, eftersom större företag har andra möjligheter att täcka sina finansieringsbehov.

11.2 Byteskostnader

Byteskostnader utgörs ibland av direkta avgifter, till exempel för att säga upp ett kontrakt, men utgörs för det mesta av indirekta kostnader som uppstår på grund av att det aktuella inköpet är inkompatibelt med tidigare investeringar (Farrell och Klemperer [2001]). Byteskostnader medför att produkter som betraktats som homogena blir differentierade efter det första köpet: Endast ett

varumärke är kompatibelt med tidigare inköp, inte andra, vilket medför att initialinvesteringen måste göras på nytt vid leverantörsbyte (Kim et al. [2003]). Klemperer [1995] listade sex orsaker till att byteskostnader uppstår:

- Behov av kompatibilitet med existerande utrustning.
- Transaktionskostnader av att byta leverantör.
- Kostnader för att lära sig använda nya märken.
- Osäkerhet gällande kvaliteten hos konkurrerande varumärken.
- Rabattkuponger, stamkundsprogram och liknande.
- Psykologiska byteskostnader, vanor och märkeslojalitet.


11.2.1 Bankverksamhetens särdrag och byteskostnader

*Produktdifferentiering genom lokaliseringsbeslut*


*Konsumentbeteende*

Utfallet på en marknad beror på konsumenternas beteende eftersom företag anpassar sin prissättning efter hur konsumenterna agerar. Kortsiktigt tänkande
konsumenter beaktar inte risken för inlåsning utan nappar på introduktionser-
bjudanden och blir sedan inlåsta, vilket innebär att introduktionserbjudanden
blir ett attraktivt sätt för företag att locka kunder (Fernandez et al. [2003]).
Rationella konsumenter förutser däremot möjligheten att introduktionserbju-
danden följs av högre priser och blir därför mindre villiga att byta leveran-
tör trots introduktionserbjudanden från konkurrenter, och denna lägre bytesvil-
lighet medför att företagen lättare kan höja priserna utan risk att förlora kun-
der (Farrell och Klemperer [2007]). Bankkunder kan tänkas vara av båge typer:
Föäldrar som öppnar bankkonto åt sina barn betraktar knappast risken att barn-
et i framtiden är läst till den valda banken medan någon som lyfter bostadsflan
antagligen planerar förbli bankkund åtminstone tills lånet är avbetalt.

**Banker konkurrerar över lång tid med varandra**

I den enkla modellen presenterad i Varian [2001] antogs att alla konsumenter i
period två var inlåsta till en leverantör. Banker är generellt dock långlivade,
så nya kunder trädde kontinuerligt in på marknaden och förändrar villkoren för
optimal prissättning. När företagen står inför valet att antingen utnyttja sin
existerande kundbas och ta ut höga priser eller attrahera nya kunder med låga
priser menade Farrell och Klemperer [2007] att stora företag ofta väljer att luta
sig tillbaka och inkassera vinsten från sina existerande kunder. Konkurrenter har
då möjlighet att ta marknadsandelar genom att erbjuda lägre priser eller rikta
in sig mot kundgrupper med lägre byteskostnader, vilket medför att stora före-
tag småningom tappar kunder och att marknadsandelarna förändras över tiden
(Fernandez et al. [2003]). I en bransch präglad av skalörliga såsom bankbran-
schen (se till exempel Howells och Bain [2008]) kan det vara svårt för nya företag
tro träda in på marknaden ifall storskaligt inträdande krävs för lönsamhet, vilket
förstärks av att byteskostnader läser in kunder. Dock kan småskaligt inträdde
gymmas av byteskostnader, ifall marknadsledaren fokuserar på att mjölka sina
gamla kunder och lämnar nya obundna kunder obeaktade (Klemperer [1987c]).

**Långa kundförhållanden**

De flesta banker har långsiktiga förhållanden till sina kunder, vilket medför att
två aspekter blir synnerligen viktiga att beakta vid analys av byteskostnadars
effekt på konkurrensen: prisdiskriminering och informationsasymmetrier mellan
banker.

Enligt Farrell och Klemperer [2007] är den avgörande aspekten för hur
byteskostnader påverkar konkurrensen huruvida företag kan skilja på och pris-
diskriminerar mellan nya och existerande kunder eller inte. Om företag kan iden-
tifiera nya kunder, såsom vid bankverksamhet, så kan de ge introduktionserbju-
danden åt dem samtidigt som de mjölkar existerande kunder med högre priser.
Möjlighet att stjäla konkurrentens kunder utan att ge upp marginalerna på
gamla kunder gör konkurrensen intensivare jämfört med situationen när företag
måste välja mellan att prissätta högt eller lågt, men enligt Chen [1997] är den
sammanslagna effekten på konsumentvälfraden ändå inte helt entydig.

11.2.2 Empiriska metoder för att undersöka byteskostnader


**Analys av konsumentbeteende**

Konsumenter antas generellt sträva efter att maximera sin nytta utifrån sina preferenser (i jämförelse med produktens egenskaper) och produktens pris. Genom att analysera köpbeslut vid olika produktegenskaper och konsumentkaraktärskan man direkt estimera byteskostnader utgående från de val konsumenter gör. Analysen ger mycket information, men kräver detaljerat data om såväl produkter och konsumenter som om individuella köper, vilket generellt är svårtillgängligt. Dock kan en enkel observation av konsumentbeteende ge en fingervisning om betydelsen av byteskostnader. En möjlighet är att jämföra andelen gamla och nya kunder som väljer en viss leverantör: Ifall de i övrigt har liknande preferenser men leverantörens gamla köper av denne kan detta bero på byteskostnader. (Fernandez et al. [2003])

**Analys av prissättningsstrategier**

Byteskostnader påverkar givetvis även företagens prissättning, och företagsspecifik data är generellt sett lättare att få tag på än kundspecifik data. Byteskostnader kan analyseras antingen genom att undersöka deras inverkan på priser eller genom att estimera efterfrågeelasticiteter. Med tillräcklig information om byteskostnadernas karaktär kan man undersöka eventuell prisinverkan genom att använda en proxy för byteskostnader eller undersöka prissituationen före och efter en händelse som förväntats påverka byteskostnaderna. I annat fall är det möjligt att undersöka efterfrågans prisänskänsla: Om en marknad karakteriseras av byteskostnader förväntas inläsningseffekten göra konsumenter mindre känsliga för förändringar både i den egna leverantörens pris och i konkurrerande leverantörers pris. (Fernandez et al. [2003])

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11.3 Finska bankmarknaden

Finska bankmarknaden karakteriseras av ett fåtal stora affärsbanker och en stor mängd lokala spar- och andelsbanker. Nordea är den absolut största banken, med en marknadsandel räknad i totala tillgångar på över 60%, och är idag en nordisk bank som uppstått genom en rad fusioner och företagsköp. Näst största affärsbankerna är OP-Pohjola och Sampo, följt av banker som Aktia, Ålandsbanken och svenska Handelsbanken. Därtill finns en rad mindre, nischade affärsbanker, bland annat S-banken, Evli och FIM. (Kallonen [2009])

Förutom affärsbanker finns sparbanker och andelsbanker, varav en del av de senare är självständiga medan andra samarbetar inom sammanslutningen OP-Pohjola (som tillsammans utgör näst största bankgruppen efter Nordea). Sparbanker uppstod på 1800-talet för att avhjälpa fattigdom i städer och fanns tidigare i så gott som alla litet större samhällen i Finland. Under bankkrisen på 90-talet gick dock många av sparbankerna samman och efter ett flertal omstruktureringar och företagsköp ingår de idag antingen i Aktia eller i Nordea. Kvar finns 38 självständiga sparbanker som betjänar främst privatpersoner och mindre företag. Andelsbankerna grundades och ägdes kooperativt i syfte att avhjälpa fattigdomen på landsbygden under det tidiga 1900-talet. Idag har de flesta andelsbankerna gatt samman för att bilda bankkoncernen OP-Pohjola, men 42 andelsbanker är fortfarande självständiga. Ån idag är många kunder också ägare som därmed har möjlighet att delta i andelsbankens beslutsfattande. (Karlsson [2006])

11.3.1 Konkurrensen på finska bankmarknaden


inkomster (Panzar och Rosse [1987]), och fann att marknaden snarast präglas av monopolistisk konkurrens.

11.3.2 Byteskostnader på finska bankmarknaden

En rad särdrag hos den finska bankmarknaden tyder på att byteskostnader mycket väl kan förekomma. Finland är ett glest befolkat land, så det geografiska avståndet mellan konkurrerande banker skapar konkreta transportkostnader som hindrar enkla bankbyten. En följd av detta är att många banker verkar i små samhällen där banktjänstemän känner de flesta kunder väl, vilket skapar stora informationsasymmetrier på grund av att konkurrerande banker inte har samma lokalkännsedom. Därtill är Finland tvåspråkigt, och i vissa områden anses det omöjligt att göra affärer över språkgränserna vilket begränsar konkurrensen. Bankerna bidrar dessutom aktivt till att skapa byteskostnader genom olika lojalitetsprogram där det blir förnuftigare att köpa paket av banktjänster jämfört med enskilda produkter (Mankila [1999]). Utvecklingen på bankmarknaden antyder vidare att byteskostnader existerar, de stora bankkoncernerna är de samma som för tjugotvå år sedan (har bara fusionerats och bytt namn) och enbart små nischbanker har inträtt på marknaden de senaste åren.

11.4 Empirisk metod och data

Eftersom bankversamhet, i synnerhet utlåning, är lokal så undersöks i denna studie konkurrensen mellan lokala spar- och andelsbanker. Varje självständig sparbank har parats ihop med en andelsbank (antingen självständig eller medlem i sammanslutningen av andelsbanker) utgående från bankernas namn, som ofta innehåller namnet på deras huvudort, alternativt enligt likheter i kontorsnätverk som utretts med hjälp av kontorens postnummer och Google Maps. Totalt uppnåddes 37 bankpar, verksamma främst på finska landsbygden. Data på individuella lån och lånevillkor är inte offentligt tillgängligt, istället har aggregerat data om bankernas utlåning insamlats från respektive banks bokslut ur Patent- och registerstyrelsens databaser för tidsperioden 1999-2008, dvs. den tid Finland haft euro som valuta.

11.4.1 Undersökning av byteskostnadens existens

Denna studie har undersökt byteskostnader genom att estimera priselasticiteter. Efterfrågans priselasticitet mäter hur mycket den efterfrågade mängden förändras när priset förändras och definieras $\epsilon = \frac{\% \Delta q_i}{\% \Delta p_i} = \frac{\Delta q_i}{\Delta p_i}$, vilket också kan uttryckas som $\epsilon = \frac{d \log q_i}{d \log p_i}$, då $\Delta \to 0$ (Varian [2006]). Detta betyder att elasticiteten fås direkt genom att regresera den differentierade logaritmen av den sålda mängden på den differentierade logaritmen av priset eftersom $d \log q_i = \epsilon \cdot d \log p_i$. Efterfrågans korspriselasticitet mäter hur den efterfrågade mängden förändras när konkurrenten ändrar sitt pris, $\epsilon = \frac{\% \Delta q_i}{\% \Delta p_j} = \frac{d \log q_i}{d \log p_j}$.
De estimerade regressionsmodellerna för andels- respektive sparbanker (betecknade med c respektive s) är

\[ Q_{ct} = \beta_0 + \beta_1 P_{ct} + \beta_2 P_{st} + \beta_3 CB_c + \sum_{j=1}^{n-1} \gamma_j I_j + \sum_{k=1}^{T-1} \alpha_k T_k + e_{it} \]  

\[ Q_{st} = \beta_0 + \beta_1 P_{st} + \beta_2 P_{ct} + \beta_3 CB_s + \sum_{j=1}^{n-1} \gamma_j I_j + \sum_{k=1}^{T-1} \alpha_k T_k + e_{it} \]  

där

- \( Q_{it} \) betecknar såld kvantitet för bank \( i \) år \( t \), mätt i balansräkningsposten “Fordringar på allmänheten och offentlig sektor” för respektive bank, logaritmerad och differentierad;

- \( P_{it} \) betecknar pris på sålda lån för bank \( i \) år \( t \), en genomsnittsränta som uträknats genom att dividera ränteintäkter från “Fordringar på allmänheten och offentlig sektor” (ur noterna till resultaträkningen) med medeltalet av mängden fordringar i början och slutet av det aktuella året, logaritmerad och differentierad;

- \( CB_i \) är en dummyvariabel som anger om bank \( i \) konkurrerar med affärsbanker (tar värdet 1 ifall någon affärsbank verkar på minst hälften av de orter bank \( i \) verkar på, värdet 0 annars);

- \( I_j \) är en vektor med en dummyvariabel för varje individ (bankpar), fångar individspecifika effekter som är approximativt konstanta över tiden (t.ex. utlåningens sammansättning och befolkningstäthet);

- \( T_k \) är en vektor med en dummyvariabel för varje tidsperiod (år), fångar effekter som varierar över tiden men inte mellan individer (t.ex. tillväxt och räntenivå);

- \( e_{it} \) är en slumpmässigt fördelad felterm innehållande allt som inte fångas av modellens övriga variabler, såsom efterfrågan på andra banktjänster.

Det erhållna datat är så kallat paneldata med både en tidsdimension och en tvärsnittsdimension. Ekvationerna (21) och (22) estimeras med minstakvadratmetoden som modeller med fixa effekter fångade genom dummyvariabler (Wooldridge [2009]) i statistikprogrammet PcGive, OxMetrics6.

11.4.2 Estimering av (eventuella) byteskostnadernas storlek

Byteskostnaderna får andelsbankskunder (\(SC_{ct}\)) respektive sparbankskunder (\(SC_{st}\)) beräknas enligt

\[
SC_{ct} = p_{ct} - \frac{p_{st}q_{st}}{q_{ct} + q_{st}}
\]

\[
SC_{st} = p_{st} - \frac{p_{ct}q_{ct}}{q_{ct} + q_{st}}
\]

där

- \(q_{it}\) betecknar mängden sålda lån år \(t\) för bank \(i\), mätt som balansräckningsposten "Fordringar på allmänheten och offentlig sektor";
- \(p_{it}\) betecknar priset (räntan) på sålda lån år \(t\) för bank \(i\), genomsnittsränta som uträknats genom att dividera ränteintäkter från "Fordringar på allmänheten och offentlig sektor" (ur noterna till resultaträkningen) med medeltalet av mängden fordringar i början och slutet av det aktuella året.

11.5 Tidigare empirisk forskning om byteskostnader på bankmarknaden


11.5.1 Depositioner och konton


11.5.2 Kreditkort


11.5.3 Lån


11.6 Resultat och analys

11.6.1 Estimeringsresultat efterfrågeelasticiteter

Resultatet från estimeringen av ekvationerna (21) och (22) redovisas i tabell 8:

<table>
<thead>
<tr>
<th>Variabel</th>
<th>Andelsbank β-estimat</th>
<th>Andelsbank SD</th>
<th>Sparbank β-estimat</th>
<th>Sparbank SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egen räntan, $P_t$</td>
<td>-0.309***</td>
<td>0.117</td>
<td>-0.116</td>
<td>0.122</td>
</tr>
<tr>
<td>Konkurrentens ränta, $P_{jt}$</td>
<td>0.006</td>
<td>0.057</td>
<td>-0.107</td>
<td>0.128</td>
</tr>
<tr>
<td>Affärsbank, $CB$</td>
<td>-0.050***</td>
<td>0.008</td>
<td>-0.050***</td>
<td>0.009</td>
</tr>
<tr>
<td>Individdummy. $I_j$</td>
<td>36</td>
<td>(37 ind.)</td>
<td>36</td>
<td>(37 ind.)</td>
</tr>
<tr>
<td>Tidsdummy $T_k$</td>
<td>8</td>
<td>(9 år)</td>
<td>8</td>
<td>(9 år)</td>
</tr>
<tr>
<td>Antal observationer</td>
<td>272</td>
<td></td>
<td>271</td>
<td></td>
</tr>
</tbody>
</table>

$R^2$ 0.247 0.327

*** Signifikant skild från noll på 1-procentnivån
** Signifikant skild från noll på 5-procentnivån
* Signifikant skild från noll på 10-procentnivån

Efterfrågans priselasticitet är som väntat negativ och liten i absolut värde för både andelsbanker (-0.309) och sparbanker (-0.116). Korspriselasticiteterna är likaså små i absoluta tal (0.006 respektive -0.107), men förvånande nog negativ för sparbanker - om andelsbankerna sänker räntan skulle sparbankernas utlåning alltså öka. Få estimat är dock signifikant skilda från noll, vilket egentligen stöder hypotesen om att byteskostnader existerar på lånemarknaden: Räntan verkar inte ha särdeles stor inverkan på den efterfrågade mängden. Konkurrens från affärsbanker sänker som förväntat efterfrågan på andels- och sparbankernas lån. Skillnaden mellan estimaten för andels- och sparbanker tyder på att
andelsbankskunder är mer lojala än sparbankskunder, vilket också tar sig uttryck i aningen högre avkastning på det totala kapitalet för andels- än för sparbanker. Anledningar till detta kan dels vara skillnader i ägarstruktur (många andelsbankskunder också ägare), dels att sammanslutningen av andelsbanker har ett välutvecklat lojalitetsprogram för att belöna kunder som koncentrerar sina banktjänster.

Resultaten bör dock tolkas med stor försiktighet. Få av parametrarna är signifikanta, och förklaringsgraden $R^2$ är mycket låg trots mångden inkluderade dummyvariabler. Ett Waldtest dock visar att modellen som helhet ändå förklarar en del av variationen i utlåning. Misspecifikationstest indikerar att modellerna lider av viss multikollinearitet och autokorrelation (eventuellt även av icke-stationäritet, som dock inte testats för), vilket ytterligare begränsar tolkningsutrymmet. Resultaten verkar dock relativt robusta: Varken mindre modellförändringar eller byte av estimeringsmetod till den generaliserade momentmetoden (GMM) förändrade resultaten nämnvärt. Därtill ger en estimering av efterfrågeelasticiteter på nya lån (approximerat som förändringen in lånestock från ett år till ett annat) stöd för resultaten i tabell 8, men med aningen större elasticitet mätt i absoluta belopp (egna priselasticiteter kring -0,9 och korspriselasticiteter kring 0,02) och högre $R^2$ (över 0,8).


11.6.2 Estimering av byteskostnader

Eftersom elasticitetsestimeringen visat att byteskostnader är mycket troligen förekommande på länemarknaden så skattas deras storlek med ekvationerna (21) och (22). Resultaten redovisas i tabell 9.

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<table>
<thead>
<tr>
<th></th>
<th>Andelsbanker</th>
<th>Sparbanker</th>
<th>Observationer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$SC_{ct}$ [%]</td>
<td>Andel av $p_{ct}$</td>
<td>$SC_{st}$ [%]</td>
</tr>
<tr>
<td>1999</td>
<td>2.74</td>
<td>51%</td>
<td>2.81</td>
</tr>
<tr>
<td>2000</td>
<td>3.24</td>
<td>52%</td>
<td>3.07</td>
</tr>
<tr>
<td>2001</td>
<td>3.15</td>
<td>50%</td>
<td>3.37</td>
</tr>
<tr>
<td>2002</td>
<td>2.60</td>
<td>49%</td>
<td>2.88</td>
</tr>
<tr>
<td>2003</td>
<td>2.12</td>
<td>49%</td>
<td>2.38</td>
</tr>
<tr>
<td>2004</td>
<td>1.98</td>
<td>50%</td>
<td>2.04</td>
</tr>
<tr>
<td>2005</td>
<td>1.89</td>
<td>50%</td>
<td>2.03</td>
</tr>
<tr>
<td>2006</td>
<td>2.03</td>
<td>49%</td>
<td>2.27</td>
</tr>
<tr>
<td>2007</td>
<td>2.49</td>
<td>49%</td>
<td>2.76</td>
</tr>
<tr>
<td>2008</td>
<td>2.78</td>
<td>50%</td>
<td>3.01</td>
</tr>
</tbody>
</table>


11.7 Avslutande kommentarer

References


ECB. EU banking structures, October 2008.


A Domestic Banks

Domestic deposit-taking credit institutions (banks) included in the market definition in section 6.2.1 (OP-Pohjola Group includes member banks of the amalgamation of the co-operative banks as well as Pohjola Bank, Helsinki OP Bank, and OP-Kotipankki):

- Savings banks
- Local cooperative banks
- OP-Pohjola Group
- Aktia Bank
- eQ Bank
- Evli Bank
- FIM Bank
- Nordea Bank Finland
- Sampo Bank
- SEB Gyllenберg Private Bank
- Sofia Bank
- S-Bank
- Suomen Asuntohypopankki
- Tapiola Bank
- Bank of Åland

Deposit-taking branches of foreign credit institutions excluded from the market in section 6.2.1 (due to data availability):

- ABN AMRO Bank
- DnB NORD
- Calyon Bank
- Carnegie Investment Bank
- Citibank International
- Danske Bank
- Deutsche Bank
- DnB NOR Bank
- EFG Investment Bank
- Forex Bank
- Royal Bank of Scotland
- Skandinaviska Enskilda Banken
- Svenska Handelsbanken
- Swedbank
B  Bank Pairs

The bank pairs used, one savings bank (sparbank/säästöpankki) and one co-operative bank (andelsbank/osuuspankki). The abbreviations after each co-operative bank denote membership in the OP-Pohjola Group (OP) or indicate independence (Pop).

Länsi-Uudenmaan Säästöpankki and Länsi-Uudenmaan Osuuspankki (OP)
Kiikistä Säästöpankki and Kiikisten Osuuspankki (OP)
Etelä-Karjalan Säästöpankki and Etelä-Karjalan Osuuspankki (OP)
Huittisten Säästöpankki and Huittisten Osuuspankki (OP)
Ikaalisten Säästöpankki and Ikaalisten Osuuspankki (OP)
Kuortaneen Säästöpankki and Kuortaneen Osuuspankki (OP)
Lammin Säästöpankki and Lammin Osuuspankki (Pop)
Övermark Sparbank and Övermark Andelsbank (OP)
Someron Säästöpankki and Someron Osuuspankki (OP)
Luopioisten Säästöpankki and Luopioisten Osuuspankki (OP)
Kortesjärven Säästöpankki and Kortesjärven Osuuspankki (Pop)
Parkanon Säästöpankki and Parkanon Osuuspankki (OP)
Myrskylän Säästöpankki and Myrskylän Osuuspankki (OP)
Ylihärmän Säästöpankki and Ylihärmän Osuuspankki (Pop)
Liedon Säästöpankki and Liedon Osuuspankki (Pop)
Sysmän Säästöpankki and Sysmän Osuuspankki (OP)
Nagu Sparbank and Nagu Andelsbank (OP)
Mietoisten Säästöpankki and Mietoisten Osuuspankki (Pop)
Suodenniemen Säästöpankki and Suodenniemen Osuuspankki (OP)
Hauhon Säästöpankki and Hauhon Osuuspankki (OP)
Längelmäen Säästöpankki and Jämsän Seudun Osuuspankki (Pop)
Eurajoen Säästöpankki and Eurajoen Osuuspankki (OP)
Säästöpankki Optia and Lisahmen Osuuspankki (OP)
Ekenäs Sparbank and Andelsbanken Raseborg (OP)
Eriärven Säästöpankki and Oriveden Seudun Osuuspankki (OP)
Yttermark Sparbank and Vasa Andelsbank (OP)
Pyhärannan Säästöpankki and Rauman Seudun Osuuspankki (OP)
Padasjoen Säästöpankki and Päijät-Hämeen Osuuspankki (OP)
Töysän Säästöpankki Oy and Alavuden Seudun Osuuspankki (OP)
Suomenniemen Säästöpankki and Etelä-Savon Osuuspankki (OP)
Rengon Säästöpankki and Riihimäen Seudun Osuuspankki (OP)
Kalammink Säästöpankki and Vakka-Suomen Osuuspankki (OP)
Tuuloksenen Säästöpankki and Hämeenlinnan Seudun Osuuspankki (OP)
Kvevlax Sparbank and Östra Korsholms Andelsbank (OP)
Vörä Sparbank and Vasa Andelsbank (OP)
Kristinestads Sparbank and Sydbottens Andelsbank (Pop)
Närpes Sparbank and Korsnäs Andelsbank (OP)
Nooa Säästöpankki Oy and Helsingin Op Pankki Oyj / Okopankki Oyj (OP)
Länsi-Uudenmaan Säästöpankki was formed through a merger of Nummen and Pusulan Säästöpankki in 1991.

Länsi-Uudenmaan Osuuspankki was formed through a merger of Kirkonnummen, Vihdin-Karkkilan, Selin, Pusulan, Nummen, Lohjan Seudun and Karjalohjan Osuuspankki in 1991-92.

Huittisten Osuuspankki merged with Palojoen Osuuspankki in 1997.

Ikaalisten Osuuspankki merged with Aureenlopen Osuuspankki in 1996.

Nagu Sparbank merged with Korpo and Houtskär Sparbank to form Skärgårdssparbanken in 2003.

Suodenniemen Osuuspankki merged with Vammalan Seudun Osuuspankki in 2004.

Jämsän Seudun Osuuspankki merged with Längelmäen Osuuspankki in 1996.

Eurajoen Osuuspankki merged with Rauman Seudun, Porin Seudun and Kankaanpääni Osuuspankki to form Länsi-Suomen Osuuspankki in 2006.

Säästöpankki Optia originated as Iisalmen, changed to Ylä-Savon and merged with Kiuruveden, Lapinlahden and Pyhäjärven Säästöpankki in 1969 to form Optia.

Päijät-Hämeen Osuuspankki was formed through a merger of Lahden Seudun (1990), Iitin (2004) and Hämeenkosken Osuuspankki (2006).

Vakka-Suomen Osuuspankki was formed through a merger of Laitilan and Uudenkaupungin Seudun Osuuspankki in 2000.

Sydbottens Andelsbank merged with Kauhajoen and Päämäneen Osuuspankki in 2004.