



An Econometric Analysis of the Merger Decisions of the Swedish Competition Authority during 1993-2009*

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Abstract


The purpose of this master's thesis is to analyse the determinants of merger control decisions of the Swedish Competition Authority, (SCA), and to what extent economic factors are important. The result is based upon a sample of 149 mergers notified to the SCA during the period 1993-2009. The thesis is based on public information.

The results of the thesis contribute to the understanding of the application of Swedish merger control enforcement. Three determinants are found to have a consistent significant influence over both analysed decision stages; post merger market share, entry barriers and increasing demand. A fourth determinant failing firm suggests that there exists both a sincere and an insincere failing firm defence. A fifth determinant excess capacity is found to have a significant influence over the first analysed decision stage.

An improvement of the merger control process is proposed. The investigative process is costly and a prolonged process is undesirable for all parties. In order to strengthen merger control transparency a uniform decision structure in which all cases are treated consistently, including the grounds of the decisions of the SCA, is proposed, otherwise transparency is inadequate. Knowledge concerning previous merger decisions may increase predictability and affect whether future mergers will take place.

Key words: Merger Review, Competition Policy, Logistic Method, Marginal Effect, and Centred Discrete Change.

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1 Introduction

This master's thesis, is to my knowledge, the first econometric analysis of merger enforcement in Sweden. The results contribute to the understanding of the application of merger control. This thesis is motivated by the fact that knowledge concerning the previous merger decisions of the Swedish Competition Authority, (SCA), may increase predictability, and also affect whether a merger is considered achievable, and what the merging parties should examine concerning relevant markets prior to submitting a notification to the SCA.

With increased predictability, consistency, and transparency of merger control decisions, firms as well as consumers will benefit. The aim of merger regulation is to protect an efficient competition, which will benefit consumers by providing a broad range of choices and appropriate price levels. Inefficient competition prevents an efficient use of resources and lead to unnecessary costs to consumers. The investigative process is costly both for the SCA and for the firms involved.

The purpose of the thesis is to analyse and identify the determinants of merger control decisions of the SCA and analyse to what extent economic factors are important, as well as the predictability and the consistency of merger control.

During the period 1993-2009, approximately 2200 mergers were notified to the SCA. Most of the notified mergers were found to raise no competitive concerns. The data collection process demanded acquiring documentation from the SCA. An original data set of 149 mergers was created. The data set consists of *all* 69 in-depth phase-2 investigations undertaken between 1993 and 2009 and a stratified random sample, the control group of 80 phase-1 investigations undertaken by the SCA during the period. The acquired information was quantified, mainly into binary variables. Information was missing in certain cases due to the fact that the information was regarded as classified or the information was neither provided by the notifying parties nor by the SCA.

Seven hypotheses were formulated to explain the two dependent variables: A) whether a merger is subject to an in-depth phase-2 investigation or a merger is cleared and there are no grounds for action after a phase-1 investigation by the SCA and B) whether case concerns are identified after a phase-2 investigation or a merger is cleared by the SCA. Neither in the new Competition Act, nor in the legislative history are the conditions described under which the SCA may initiate an in-depth phase-2 investigation.

If the SCA identifies case concerns after a phase-2 investigation, this may prolong the process even further. *Case concerns* are in the thesis defined as; the SCA clears the merger after certain undertakings/ remedies are made by the merging parties, or the merging parties withdraw the notification after phase-2, assuming that the merger would not have

been cleared unconditionally,¹ or the merger is challenged, and the SCA applies for a summons to the Stockholm District Court.

The thesis focuses on the merger decisions in Sweden. Previous studies have employed similar approaches in analysing e.g. the European Commission's merger decisions, or the Canadian Bureau of Competition Policy's merger decisions, and have found significant effects of high post merger market shares and high entry barriers on merger decisions. High post merger market share and high entry barriers are also found important in this thesis. Additional determinants that are also found to be important in this thesis are increasing demand, failing firm, and excess capacity.

The thesis is based on public information. Anyone can request documents from the SCA to verify the findings. This is important in order for the research to be verifiable and not limited by confidentiality agreements.

A logistic regression modelling approach was applied in analysing the determinants of merger control. Several measurements of goodness-of-fit were used to assess the models, McFaddens pseudo R^2 , McFaddens pseudo adjusted R^2 , the percent of correctly classified cases, AIC, et cetera.

The thesis proceeds as follows. After an introduction into economics of competition, a description of the Swedish merger regulation with a brief historical review follows. The most relevant previous studies are presented in section 3. The hypotheses, the applied logistic econometric methodology, the data collection process, and the construction of the data set are described in section 4. The results are presented in section 5 along with graphical depictions of how the probability of the outcome varies under altered assumptions, e.g. higher or lower entry barriers, the application of failing firm defence, et cetera. Conclusions follow in section 6. Robustness checks of the results follow in the appendices.

2 Economics and Competition Policy

2.1 An introduction to the economics of competition

A possible description of competition policy is according to Motta (2004) "*the set of policies and laws which ensure that competition in the marketplace is not restricted in such a way as to reduce economic welfare*".² The description emphasises economic reasoning.

Firms merge for diverse reasons. Not all mergers take place for anticompetitive motives or to enhance product efficiency. There may be economic gains from mergers that lead to greater profitability. There are two main types of cost savings from mergers; pecuniary- and real economic savings. Pecuniary economics are monetary savings resulting from buying goods or services at lower expense. Real economics are true cost savings

¹ Bergman Jakobsson and Razo (2005) p 725, writes "...it has been suggested that cases aborted or withdrawn in phase-2 should be viewed as prohibitions"

² Motta (2004) p 30

due to increased specialisation, reallocation of resources, restructuring production capacity or scale economics. Benefits from joint production and benefits due to scale are known as synergies.

A merger may result in economic losses. Mergers may cause a higher degree of market concentration and this may reduce the variety of products available in the market, reduce the quality of the products, or dampen technical progress. Whenever the number of competitors in a relevant market is reduced, either due to a merger, or due to a market exit, the merged firms, as well as the competitors have incentives to raise the price level. The risk increases with a higher degree of post merger concentration.

The Williamson (1968) simple analytic model involves comparing cost savings from a merger with price increases coming from strengthened market power. The strengthened market power may come from each firm's quantity decision having a large impact on price, or may come from increased concentration, resulting in competition being replaced with some form of collusion.³

The concept of market power is crucial in assessing mergers and in applying competition policy. Market power is usually defined as the ability of a firm to raise prices above the level that would prevail under competitive conditions, and thereby increase profits. The lowest possible price a firm can charge without making a loss is the price that equals the marginal cost of production. Market power is thereby defined as the difference between the prices charged by a firm and its marginal costs of production.⁴ A practically applicable measure of market power is the market share of the firms in the relevant market. The post merger market share of a firm alone is not sufficient to determine the degree of its market power. Even if the result of a merger is that a firm obtains a high market share, it cannot increase prices substantially if entry into the market is unproblematic, or if a strong buyer uses its countervailing buyer power and threatens to switch to a competing supplier.

In this thesis market power is used in the sense of *large enough* market power. It will be arbitrary to some extent since only competing firms that are *large enough* are described in the related documentation of the cases.⁵ Since market power decreases with increasing number of firms in a market, it is possible to conclude that the larger the number of firms, the higher is the welfare. Nevertheless, this is not necessary the case. Given that firms incur fixed costs, there is a trade-off between on the one hand more competition

³ Williamson (1968)

⁴ A theoretical measure of market power is the Lerner index. It is defined as the firm's mark-up over the price $L_i = \frac{(p_i - mc_i)}{p_i}$. The Lerner index increases with increased mark-up, which is a desirable feature of an index for assessing market power. Nevertheless, the Lerner index is not applicable in practical merger cases in assessing market power. A more practically applicable measure of market power is the market share of the firms in the relevant market. Firms may have limited incentives to reveal sufficient information concerning their cost structure.

⁵ The requirements of the SCA of the information that the parties should provide when notifying a merger has changed over the period. In some cases all relevant firms that are viewed as competitors are described, regardless of size, while in other cases only relevant firms with a market share of e.g. exceeding 15 percent are described.

and lower prices in the market, which benefits consumers and increases consumer welfare and allocative efficiency, and on the other hand, the duplication of fixed costs, which is a loss of productive efficiency.

According to economic theory, the incentive to raise prices work through unilateral effects. Unilateral effects imply that a merger eliminates important competitive constraints on one or more firms, after which they would receive an increase in market power without resorting to a coordinated action with other firms. Usually it is the firms included in the merger that increase their market power, but it can also be a third party, which may increase its market power and decrease both consumer surplus and welfare. Nevertheless, if a merger increases the efficiency of the merging firms, then the net effect on welfare of the merger is ambiguous, as the increased market power can be outweighed by the price decrease as a result of efficiency gains. Factors that affect unilateral market power are concentration, market shares, capacities, entry barriers, demand growth, countervailing buyer power, and failing firm defence. Firms that potentially may enter a market may constrain a firm's ability to increase its prices by the threat or possibility of entering the market. If entry is easy, rapid and costless, a firm is not able to charge a high margin to enter the market. When a firm enters a new market, it may require significant sunk costs, e.g. advertising, research, investment in facilities, plants, machines, et cetera. Entry barriers can take on various forms.

Modelling the theoretical effects of mergers is difficult. Farrell and Shapiro (1990) analysed the output and welfare effects of mergers using a Cournot oligopoly model.⁶ The authors focused on the external effects of a merger. They concluded that economies of scale and or *learning effects* necessary for a merger to lower price, are greater, the larger are the market shares of the merging firms and the less elastic is industry demand.⁷ Motta (2004) analysed unilateral effects of a merger, after describing several weaknesses of the Cournot model. He found that merger profitability could be restored in the Cournot model if one assumes that the merger entails sufficiently large efficiency gains.⁸

Pro-collusive effects or coordinated effects imply that a merger alters the competition in such a way that firms are more likely to coordinate their behaviour by e.g. price increases post merger, or that a consequence of a merger ease pre-existing coordination. Generally, it is a question of mergers that create or strengthen a collective dominant position in the market. The term tacit collusion is also used in a context of coordinated effects when there is no explicit agreement. Factors that affect pro-collusive behaviour are entry barriers.

⁶ Oligopoly refers to interactions with a small number of firms in a market. In a simple Cournot model, each firm chooses its output so as to maximize its profits given its belief about the other firm's choice. In equilibrium each firm finds that its expectation about the other firms choice is confirmed. A Cournot equilibrium in which each firm has a small market share implies that price will be close to marginal cost, i.e. the industry is nearly competitive.

⁷ Modelling mergers using a standard Cournot model is limited in the sense that the market is characterised by selling homogenous goods. The results may not apply in markets with heterogeneous goods. In using a Cournot oligopoly model, Farrell and Shapiro (1990), assume that the firms behave as Cournot competitors, both before and after the merger; the authors also ignore the probability of collusion. Finally the authors conclude that there is no fully satisfactory way to model the probability of successful explicit collusion in oligopoly. See Farrell and Shapiro (1990) for full derivation and mathematical proofs.

⁸ Motta (2004) pp 243

ers, information exchange among firms, absence of countervailing power and the existence of retail price maintenance. Countervailing factors, e.g. synergies, may counteract increased market power or market concentration. Nevertheless, countervailing factors must be merger specific and benefit consumers.

2.2 Swedish merger regulation

Competition policies have gradually been implemented in Sweden. In 1925, a law was introduced that gave authorities the power to investigate firms with dominant positions, e.g. monopolistic enterprises and associations. As no enforcement agency was established, the effect of the law was limited. In 1953, the Restrictive Trade Practices Act was introduced, the law discouraged competitive restrictions in the industry.⁹ Resale price maintenance and collusive practice were prohibited *per se*. An Ombudsman-position for free trade was created¹⁰ with the task of negotiating away harmful restrictions of competition. Further, the Council for Free Trade was formed,¹¹ which later became the Market Court.¹² In 1957, the Price and Cartel Office was created,¹³ with the task of investigating competition specific industries. The governmental Price and Cartel Office later changed name to the Price and Competition Authority.¹⁴ In 1983, a new competition law was introduced; it included clear rules inspired by the development in Europe.¹⁵ The main differences were the introduction of merger control and strengthened powers to impose prohibitions and sanctions. On application by the Ombudsman, decisions like prohibiting a merger could be taken by the Market Court. There was no general obligation to notify mergers in advance, but the Ombudsman could order a firm to notify a merger.

In 1992-1993, Sweden began a major strengthening of competition policy as a consequence of harmonisation towards the competition rules in the Treaty of Rome and the competition rules in the EEA agreement.¹⁶ Regulatory reforms aiming at liberalising parts of the economy had already begun with the liberalisation of business opening hours in the early 1970s, and the financial markets in the 1980s. The taxi market was liberalised in 1990, domestic air transport market and telephone market in 1993, postal service market in 1993-1994, and electricity market in 1996. The railroad market was liberalised during 1988-1993.¹⁷

The main object of the SCA, since its commencement of July 1, 1993, has been to perform the duties following from the Competition Act (1993:20), hereafter “the Act”.¹⁸

⁹ In Swedish *lagen (1953:603) om motverkande i vissa fall av konkurrensbegränsning inom näringslivet*.

¹⁰ In Swedish *Näringsfrihetsombudsman*

¹¹ In Swedish *Näringsfrihetsrådet*

¹² In Swedish *Marknadsdomstolen*

¹³ In Swedish *Statens pris- och kartellnämnd*

¹⁴ In Swedish *Statens pris- och konkurrensverk*

¹⁵ SCA (2010)

¹⁶ *EES-avtalet*/ The EEA Agreement came into force in Sweden in 1993. Sweden joined the European Union in 1995.

¹⁷ Statskontoret (2004)

¹⁸ The Competition Act (1993:20) can be viewed as an adjustment to EU Competition Law, Council Regulation 4064/89 of 21 December 1989 on merger control in the European Community.

The motives behind the Act were domestic needs. The government bill stated that competition is crucial for dynamic growth in the Swedish economy. Competition in important sectors of the economy was seen as insufficient and competitive pressures needed strengthening.¹⁹ The primary purpose of the Act was to prohibit restrictive agreements, prohibit abuse of dominant position and control mergers.²⁰ The Act introduced rules corresponding to the EC legislation²¹ prohibition of anticompetitive agreements and abuse of dominant positions as well as a modern system of notifications of mergers and concentrations.

The SCA has never had neither the right to impose fines on companies for infringement of the Act nor the ability to block mergers and concentrations. This is a fundamental difference compared to the rights of the European Commission, who has the authority to prohibit mergers. The SCA must give in an application for a summons to the Stockholm District Court to obtain judgement that imposes a sanction or blocks a merger. The decision of the Stockholm District Court can be appealed to the Market Court, which is the final instance.

As the harmonisation process towards EU regulation continued, a number of modifications and amendments have been made to the Act. In 1994, parts of the agricultural sector were exempted. In 1997, new thresholds for notification of mergers and acquisitions were implemented. In 2000 the Swedish merger control was further harmonised with EU rules, e.g. replacing “*acquisition*” by “*concentration*”.²² In 2001, the thresholds for mandatory notification were changed, and an exemption for taxi firms was amended. Since 2001, the SCA was allowed to apply the EU competition rules.²³

EU merger regulation has affected the merger regulation of the EU member countries. As the European Commission placed stronger emphasis on economic models and on quantitative methods in merger investigations, an effect was that the merger legislation of May 2004 was amended.²⁴ Since May 1, 2004 the SCA, as well as other competition authorities and courts in EU Member States have an obligation to apply EU competition law, as national competition law, provided that it is appropriate.²⁵ A merger can only be examined under the Swedish Competition Act, if EU legislation is not applicable.²⁶ The European Commission has exclusive competence to assess concentrations that have a community dimension in accordance with the EC Merger Regulation.²⁷

¹⁹ OECD (2007) p. 9

²⁰ Wetter *et al* (2009) p. 9

²¹ The merger regulation that was introduced in 1990 has become a central instrument of EU Competition Policy.

²² Throughout this thesis the term “*merger*” is used to describe, *acquisitions*, *concentrations* and *mergers*.

²³ Article 81 of the EC Treaty deals with restrictive agreements. Agreements between firms that lead to restriction of competition are prohibited. Article 82 of the EC Treaty prohibits the abuse of a dominant position.

²⁴ Council Regulation (EC) No 139/2004 of January 20, 2004.

²⁵ Council Regulation (EC) No 1/ 2003 of December 16, 2002. Council Regulation (EC) No 139/2004 of January 20, 2004.

²⁶ EU Competition law, rules applicable to Merger Control, situation as at July 14, 2009.

²⁷ If the annual turnover of the combined business exceeds specified threshold in terms of global and European sales, the merger must be notified to the European Commission. The European Commission has the exclusive power to

Swedish merger control legislation is, since November 1, 2008 regulated by the Swedish Competition Act (2008:579), hereafter “the new Act”. The SCA has had four Director General’s during the period 1993-2009, and one Acting Director General.²⁸

It is the turnover thresholds of the acquiring and the acquired firm that determine whether a merger is subject to mandatory notification to the SCA. The notification rules have changed during the last 17 years, the reasons have been to improve the precision of merger control. See table 1.

Table 1 Mandatory notifications to the SCA with turnover requirements for mergers 1993-2009

<i>Time Period</i>	<i>Combined world-wide turnover</i>	<i>Turnover for the acquiring firm in Sweden</i>	A. <i>Combined aggregate turnover of all firms concerned, the preceding financial year</i>	B. <i>At least two of the firms concerned had a turnover in Sweden the preceding financial year</i>
Jul 1993 - Jul 1997	> SEK 4 000 000 000			
Jul 1997 - Mar 2000	> SEK 4 000 000 000	> SEK 100 000 000		
Apr 2000 -Oct 2008	> SEK 4 000 000 000			> SEK 100 000 000
Nov 2008 -			> SEK 1 000 000 000	> SEK 200 000 000

If the turnover requirement (A), is fulfilled, but does not exceed requirement (B), the SCA may require a merging party to notify, if particular grounds exist. A party in a merger have the right to voluntarily notify the merger, whenever the turnover requirement (A) is fulfilled.²⁹

A merger can only be prohibited if it is likely to significantly impede the existence or development of effective competition in Sweden as a whole, or a substantial part of the country.³⁰ The conditions before 2004 stated that the SCA could attempt to prohibit a merger through a court process based on the concept of dominance. The assessment included both a test of dominance (“to create or strengthen a dominant position”) and a competitive test (“to inhibit or likely to impede competition in a substantial way”). The required conditions partly overlapped. The material examination in the EU law changed in 2004, to the so-called SIEC test (*Significant Impediment to Effective Competition*). Article 2(3) of the amended EC merger regulation reads: “*A concentration which would significantly impede effective competition in the common market or a substantial part of it, in particular as a result of the creation or strengthening of a dominant position, shall be declared incompatible with the common market.*”³¹

investigate mergers with a community dimension. The main benchmark for determining which mergers have EU dimensions is that the worldwide turnover of the merging firms is over EUR 5 000 million and that their EU turnover is over EUR 250 million. (Council Regulation (EC) No 139/2004 of January 20, 2004)

²⁸ Jörgen Holgersson was Director General 1992-1999. Ann-Christin Nykvist was Director General 1999-2002. Claes Norgren was Director General 2003-2008. Jan-Erik Ljusberg, was acting Director General 2008-2009. Dan Sjöblom is Director General since 2009, and is appointed until 2015.

²⁹ The new Act (2008:579), Chapter 4, Control of concentrations, Notification of a concentration, § 7.

³⁰ The new Act (2008:579), Chapter 4, Control of concentrations, Action on a concentration, § 1.

³¹ The previous merger regulation, Article 2(3) reads: “*A concentration which creates or strengthens a dominant position which would significantly impede effective competition in the common market or a substantial part of it shall be declared incompatible with the common market.*”

The test of dominance used by the SCA, did not correspond to the SIEC test used by the European Commission. When the new Act became law in Sweden in 2008 the test of the SCA was adjusted to achieve greater legal equivalence so as to correspond to the SIEC test in the EC merger regulation. A prohibition based on the SIEC test does not presuppose that a dominant position is created or strengthened, although it is often said to be the case.³² Instead, the market structure and the competitive pressure post merger are assessed.

There is a clear two-stage discontinuity of merger decisions taken by the SCA.

The first decision stage is whether a merger is subject to a phase-2 investigation or cleared after a phase-1 investigation. From the date of receiving a complete notification, the SCA has 25 working days to conduct a phase-1 investigation, in which either to make a decision that there are no grounds for action or that the SCA will initiate a special in-depth phase-2 investigation.³³ The phase-1 investigation period is increased to 35 working days if any of the merging parties offer commitments.³⁴ No action may be taken by the parties to put the merger into effect during the investigative period. Neither in the new Act nor in the legislative history are the conditions described under which the SCA may initiate a special in-depth phase-2 investigation.³⁵

The second decision stage is whether *case concerns* are identified after a phase-2 investigation or the merger is cleared. Case concerns are in this thesis defined as the SCA clears the merger after certain undertakings/ remedies are made by the merging parties or the merging parties withdraw the notification after a phase-2 investigation, assuming that the merger would not have been cleared unconditionally,³⁶ or the merger is challenged by the SCA, and the authority applies for a summons to the Stockholm District Court.

A phase-2 investigation prolongs the investigative period by up to three month, in which the SCA may initiate court proceedings, i.e. give in an application for a summons to the Stockholm District Court.³⁷ The time period may be prolonged by the Stockholm District Court providing the notifying parties agree to it or there are particular reasons.³⁸ If an appeal is made against the judgment of the Stockholm District Court, the Market Court will judge within three months.³⁹

Negotiating the conditions of a merger between firms and the notification procedure to the competition authority is cumbersome and subject to large costs. Knowledge concerning the previous merger decisions of the SCA; the factors that determine the SCA's

³² Wetter *et al* (2009) p.723

³³ Before April 1, 2000, the Swedish Competition Authority had 30 days to conduct a phase-1 investigation.

³⁴ The new Act (2008:579), Chapter 4, Control of concentrations, Special investigations of concentrations, § 11.

³⁵ Wetter *et al* (2009) p 794

³⁶ Bergman Jakobsson and Razo (2005) p 725, writes "...it has been suggested that cases aborted or withdrawn in phase-2 should be viewed as prohibitions".

³⁷ The new Act (2008:579), Chapter 4, Control of concentrations, Action on a concentration, § 13.

³⁸ The new Act (2008:579), Chapter 4, Control of concentrations, Action on a concentration, § 14.

³⁹ The new Act (2008:579), Chapter 4, Control of concentrations, Action on a concentration, § 16.

decision to initiate a phase-2 investigation, and the factors that determine whether the SCA identifies case concerns after phase-2, may increase predictability and affect whether future mergers are considered achievable, and what the merging parties should examine concerning relevant markets prior to submitting a notification to the SCA.

The process may be prolonged further, either due to negotiation and assessment of undertakings/ remedies or preparations for a court process. Even a withdrawal of the notification from the merging parties may be associated with considerable costs and perhaps loss of prestige.

3 Previous studies

There are, to my knowledge, no previous related studies focusing on econometric analysis, during 1993-2009, of merger enforcement in Sweden. The most relevant previous studies are; one study that analysed the Canadian Bureau of Competition Policy's merger decisions, four studies that analysed the European Commission's merger decisions, and one study that analysed the SCA's court processes.

Kehemani and Shapiro (1993) analysed the application of the Canadian merger provisions by the Bureau of Competition Policy. The authors analysed a sample of 98 decisions between June 1986 and July 1989. The final sample included 75 cases. The authors used a probit regression modelling approach. The authors found that decisions were not solely based on the post merger market share. Import competition and the existences of entry barriers significantly influenced the outcome.

Williams, Lindsay and Leci (2003) analysed a sample of 245 of the 787 of the European Commission's merger decisions between January 2000 and June 2002. The authors used a probit regression modelling approach. The authors found that the post merger market share, and the increase in market share had a positive significant influence on the merger being prohibited or cleared after undertakings. The authors found that if entry barriers were low, mergers with a high post merger market share were likely to be cleared. The authors also found that the existence of buyer power did not affect the outcome.

Bergman, Jakobsson and Razo (2005) analysed a sample of 96 of the European Commission's merger decisions using a logistic regression modelling approach.⁴⁰ The authors found that variables related to welfare effects had influenced the European Commission's decisions. The higher the post merger market share, the higher was the probability of a phase-2 investigation. The probability of the European Commission identifying case concerns also increased. The authors also found that if high entry barriers and collusion were identified as likely post merger, the merger was likely to be prohibited.

Duso, Neven and Röller (2007) analysed a sample of 167 of the European Commission's merger decisions between 1990 and 2002. The authors used a probit regression model-

⁴⁰ Bergman, Jakobsson and Razo (2005) used a sample of 49 phase-1 cases, 17 prohibitions and 30 other phase-2 cases.

ling approach. The authors analysed the mergers competitive consequences by the reaction of the stock market price of competitors to the merging firms. The authors found that the decisions of the European Commission were influenced by market definition and length of investigation.

Andreasson and Sundqvist (2008) analysed the effect of EC merger regulation before and after 2004. The authors used a sample of 123 of the European Commission's merger decisions using a logistic regression modelling approach. The authors focused on what determined whether a merger is prohibited and found that the variable post merger market share was a significant determinant in merger decisions, and that it appeared to be less significant after 2004 than before. The authors suggested that this was because the European Commission focused more on complementary factors with the new regulation; the presence of entry barriers and whether merging firms were close competitors.

Simonsson (2005) qualitatively evaluated the court processes of the SCA during 1993-2004 from a legal perspective. The author found that the main reason why the SCA had lost all merger court processes was due to the fact that the Stockholm District Court and the Market Court had reached other judicial analyses than the SCA. During the period prior to the deepened EU harmonisation year 2000, Swedish courts did not assess cases according to the model applied by the European Commission, nevertheless the assessment rather contained a non insignificant discretionary element. The author exemplified this in two specific merger cases.⁴¹ The author concluded that the SCA should improve its overall court process *success frequency*, from 54-59 percent (all court processes included, not only merger), during 1993-2004, to 75-80 percent in order to achieve a similar success rate as the European Commission.⁴²

4 Research design

During the period 1993-2009, approximately 2200 mergers were notified to the SCA. Most mergers notified to the SCA were found to raise no competitive concerns.

An original dataset was created using a sample of 149 decisions taken by the SCA. The data set consists of *all* 69 phase-2 investigations undertaken between 1993 and 2009 and a stratified random sample of 80 phase-1 investigations undertaken by the SCA between July 1, 1993 and December 31, 2009. The phase-2 decisions of the SCA correspond to 3.29% of all notified mergers in which the SCA has reached a decision after an investigation was initiated.⁴³

Changes in the merger legislation during the period may have affected the number of notified mergers to the SCA. The number of notified cases has fluctuated over the period 1993-2009, as can be seen in table 2 below. No phase-2 investigations were initiated

⁴¹ Simonsson (2005) pp 93-94. Swelab, T 8-669-96, Optiroc, NCC and Stråbruken MD 1998:10

⁴² Simonsson (2005) p 119.

⁴³ The 69 phase-2 cases were also subject to phase-1 investigation. The comparative statistic of the European Commission's is approximately 3.70%. <http://ec.europa.eu/competition/mergers/statistics.pdf> (2010-04-06)

in 2002, 2003, and in 2006. The SCA has not been successful in attempting to prohibit a merger through the application of a summons to the Stockholm District Court, as can be seen in the last two rows in table 2.

Table 2 The number of notified mergers 1993-2009, and the sample case population ⁴⁴

	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	Total
Number of notified mergers in which the SCA has reached a decision	58	187	237	284	219	140	165	119	83	69	47	65	87	110	104	87	36	2097
Randomly stratified sample of notified mergers	5	16	32	31	26	11	14	11	8	4	3	8	7	8	7	10	3	204
Phase-1 sample stratified on years	4	10	15	18	15	10	11	7	6	4	3	4	6	8	6	6	2	135
Phase- 1 randomly drawn sample not received in due time.	1	3	6	10	6	7	2	1	4	3	0	2	2	4	2	2	0	55
Full sample in data set	4	13	26	21	20	4	12	10	4	1	3	6	5	4	5	8	3	149
Phase-1 sample in data set. Information acquired before April 13, 2010 (the control group)	3	7	9	8	9	3	9	6	2	1	3	2	4	4	4	4	2	80
Phase-2 sample (all phase-2 cases)	1	6	17	13	11	1	3	4	2	0	0	4	1	0	1	4	1	69
Phase-2 cases cleared	1	3	11	10	5	0	2	0	1	0	0	1	1	0	1	2	0	38
Phase-2 cases with concerns	-	3	6	3	6	1	1	4	1	-	-	3	-	-	-	2	1	31
Phase-2 cases that were cleared after undertakings/ remedies	-	3	3	1	5	-	-	3	-	-	-	1	-	-	-	1	-	17
Phase-2 cases where the parties withdrew the notification after phase-2	-	-	3	-	-	1	1	-	1	-	-	1	-	-	-	-	-	7
The SCA applied for a summons at the Stockholm District Court (to prohibit the merger)	-	-	-	2	1	-	-	1	-	-	-	1	-	-	-	1	1	7
The parties withdrew the notification after the SCA sent summons to the Stockholm District Court	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	1	3
The Stockholm District Court ruled against the SCA's summons. (One case was dismissed due to a formality reason.)	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-	1	-	4

4.1 The hypotheses

Relying on the previous description of the economics of competition, as well as on the merger regulation in Sweden, and previous studies, a number of hypotheses were formulated. The purpose is to analyse and identify the determinants of the merger control decisions of the SCA and analyse to what extent economic factors are important, as well as the predictability and consistency of the merger control. Seven hypotheses were formulated to explain the two dependent variables:

- A) Whether a merger is subject to a phase-2 investigation, or if a merger is cleared and there are no grounds for action by the SCA after a phase-1 investigation.
- B) Whether *case concerns* are identified after a phase-2 investigation, or if a merger is cleared by the SCA.

The hypotheses are based upon the assumption that mergers with certain characteristics ought to have a higher probability of being subject to a phase-2 investigation than mergers cleared after a phase-1 investigation, and that mergers with certain characteristics

⁴⁴ Through scrutinising the decision of the SCA, and the case list on annexes; phase-2 cases were found to be cleared after undertakings/ remedies in 17 cases. According to the statistical summary of the SCA, mergers were cleared in 16 cases after undertakings/ remedies. The summary statistics of the SCA covers the entire period 1993-2009 and does not show the yearly variation. (http://www.kkv.se/t/Page_372.aspx 2010-05-19). OECD (2007), p. 20, has also concluded that 17 phase-2 mergers were cleared after undertakings/ remedies. In two phase-2 cases, (in 1996 and 1997), appeals were made to the Market Court. The Market Court ruled against the SCA's summons.

ought to have a higher probability of identified *case concerns* after a phase-2 investigation than mergers cleared.

The A) hypotheses refer to the first decision stage and the B) hypotheses refer to the second decision stage. The hypotheses are tested using a logistic regression approach. The variables are described in section 4.4.

H 1. Dominance: market share and concentration (HHI).

A) A high post merger market share and a high post merger HHI will have a positive significant influence over the outcome of a merger being subject to a phase-2 investigation or cleared after a phase-1 investigation.

B) A high post merger market share and a high post merger HHI will have a positive significant influence over the outcome of identified case concerns after a phase-2 investigation than mergers cleared.

H 2. Increase in dominance: increase in market share and increase in concentration (HHI).

A) A high increase in market share and a high increase in HHI will have a positive significant influence over the outcome of a merger being subject to a phase-2 investigation or cleared after a phase-1 investigation.

B) A high increase in market share and a high increase in HHI will have a positive significant influence over the outcome of identified case concerns after a phase-2 investigation than mergers cleared.

H 3. Entry barriers and excess capacity.

A) Entry barriers and excess capacity will have a positive significant influence over the outcome of a merger being subject to a phase-2 investigation or cleared after a phase-1 investigation.

B) Entry barriers and excess capacity will have a positive significant influence over the outcome of identified case concerns after a phase-2 investigation than mergers cleared.

H 4. Dynamic market: increasing demand.

A) Increasing demand will have a negative significant influence over the outcome of a merger being subject to a phase-2 investigation or cleared after a phase-1 investigation.

B) Increasing demand will have a negative significant influence over the outcome of identified case concerns after a phase-2 investigation than mergers cleared.

H 5. Failing firm.

A) Mergers, in which failing firm defence is used, will have a negative significant influence over the outcome of a merger being subject to a phase-2 investigation or cleared after a phase-1 investigation.

B) Mergers, in which failing firm defence is used, will have a positive significant influence over the outcome of identified case concerns after a phase-2 investigation than mergers cleared.

The reason for diverging hypotheses in H5 is because it is reasonable to assume the existence of two types of failing firm defences; a sincere and an insincere failing firm defence. A merger, in which a sincere, verifiable failing firm defence is used, is likely to be cleared after a phase-1 investigation and not subject to a phase-2 investigation. Hence

the sign of the estimated coefficient ought to be negative. Given that the merger was not cleared after a phase-1 investigation and subject to a phase-2 investigation, an insincere, unverifiable failing firm defence is likely to be revealed in the in-depth phase-2 investigation, and subsequently, case concerns are identified. Hence the sign of the estimated coefficient ought to be positive.

H 6. Structural change.

- A) A merger notified between 2000-2009 compared to a merger notified between 1993-1999, will have a negative significant influence over the outcome of a merger being subject to a phase-2 investigation, than mergers cleared after a phase-1 investigation.
- B) A merger notified between 2000-2009 compared to a merger notified between 1993-1999, will have an insignificant influence over the outcome of identified case concerns after a phase-2 investigation, than mergers cleared.

The reason for diverging hypotheses in H6 is because the purpose of legislative changes was to increase the precision of merger control. As a consequence it is reasonable to assume that merger control prior to 2000 was less precise in the initial stage than merger control after year 2000. It is further reasonable to assume that true identified case concerns have not changed during the period.

H 7. Close competitors, import competition, technological development, efficiency gains, and countervailing buyer power.

- A) These factors will not have a significant influence over the outcome of a merger being subject to a phase-2 investigation or cleared after a phase-1 investigation.
- B) These factors will not have a significant influence over the outcome of identified case concerns after a phase-2 investigation than mergers cleared.

4.2 Econometric methodology

There is a clear two-stage discontinuity of merger decisions taken by the SCA. These stages form two binary dependent variables that are explained by a number of independent variables, both binary and continuous. The first decision stage is whether a merger is subject to a phase-2 investigation or not. The second decision stage is whether case concerns are identified after a phase-2 investigation or not.

The two most used approaches for regression models with binary outcomes are binary logistic and binary probit models. A logistic regression modelling approach is applied in the thesis. The two methods give approximately similar results; it is graphically shown in figure 1d, section 5.1, and figure 2d, appendix 2. There is no compelling reason to choose one method over the other. The logistic method is chosen in the thesis because it is to some extent mathematically simpler.

Binary variables have two values, typically coded as 0 for a negative outcome, an event not occurring (or unlikely to occur), and 1 for a positive outcome, an event occurring (or likely to occur).

The logistic regression model of a binary dependent variable Y with multiple independent variables is

$$\Pr(Y = 1|X_1, X_2, X_3, \dots, X_k) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3, \dots, + \beta_k X_k$$

$$\Pr(Y = 1|X_1, X_2, X_3, \dots, X_k) = F(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3, \dots, + \beta_k X_k) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3, \dots, + \beta_k X_k)}}$$

where the dependent variable Y is binary, i.e. $Y = 1$ whether the merger is subject to a phase-2 investigation and $Y = 0$ otherwise (cleared after a phase-1 investigation), or $Y = 1$ if the SCA has identified concerns with the merger after a phase-2 investigation and $Y = 0$ otherwise (cleared after a phase-2 investigation). F is the cumulative standard logistic distribution function, and $X_1, X_2, X_3, \dots, X_k$ are the independent variables. The logistic coefficients, $\beta_0, \beta_1, \beta_2, \dots, \beta_k$ are interpreted by computing predicted probabilities and differences in predicted probabilities. The logistic coefficients are estimated by maximum likelihood estimation.

The cumulative standard logistic distribution function can also be written as $\Pr_i = \frac{1}{1 + e^{-z_i}} = \frac{e^{z_i}}{1 + e^{z_i}}$ where $Z_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i}, \dots, + \beta_k X_{ki}$. If \Pr_i is the probability whether a merger is subject to a phase-2 investigation, then $(1 - \Pr_i)$ is the probability of a merger being cleared after a phase-1 investigation, $(1 - \Pr_i) = \frac{1}{1 + e^{z_i}}$. Therefore, $\frac{\Pr_i}{(1 - \Pr_i)} = \frac{1 + e^{-z_i}}{1 + e^{z_i}} = e^{-z_i}$.

The odds ratio in favour of a merger being subject to a phase-2 investigation to the merger being cleared after a phase-1 investigation is

$$\frac{\Pr_i(Y = 1|X_{ki})}{(1 - \Pr_i(Y = 1|X_{ki}))} = \frac{\frac{1}{1 + e^{-z}}}{1 - \frac{1}{1 + e^{-z}}} = \frac{\frac{1}{1 + e^{-z}}}{\frac{1 + e^{-z} - 1}{1 + e^{-z}}} = \frac{1}{1 + e^{-z} - 1} = \frac{1}{e^{-z}} = e^z = e^{\beta_0 + \beta_1 X_{1i} + \dots + \beta_k X_{ki}}$$

Taking the natural log of the expression gives the *logit*. It ranges from minus infinity to infinity. $L_i = \ln\left(\frac{\Pr_i(Y = 1|X_{ki})}{(1 - \Pr_i(Y = 1|X_{ki}))}\right) = Z_i$, where $Z_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i}, \dots, + \beta_k X_{ki}$.

The interpretation of the logistic regression model with a single X independent variable is that β_1 , the slope in the model specification, measures the change in L for a unit change in X_1 , that is, whether the value of the log-odds, in favour of a merger is subject to a phase-2 investigation, changes as some independent variable changes by 1-unit, e.g. the post merger market share increases by 1 percent. The intercept β_0 is whether the value of the log-odds, in favour of a merger, is subject to a phase-2 investigation, if post merger market shares do not change. Although the example of the interpretation of the logistic regression model only includes a single X independent variable, it is possible to add as many as seem appropriate.⁴⁵

⁴⁵ For maximum likelihood (ML) estimation, the desirable properties of consistency, normality, and efficiency are asymptotic. Asymptotic means that these properties have been proven to hold as the sample size approaches infinity. If there are several independent variables in a model, more observations are needed in order for the desirable properties of ML estimation to hold. According to Long (1997), in the literature of the covariance structure model, the rule of at least five observations per independent variable is often given. A rule of at least ten observations per independent variable seems more reasonable according to Long, a rule followed in this thesis. Further, if the data are ill conditioned (e.g. independent variables are highly collinear) or if there is little variation in the dependent variable (e.g. nearly all of

Marginal effect and centred discrete change

The partial change in probability is also called marginal effect.⁴⁶ The sign of the estimated coefficient determines the sign of the marginal effect.

One caveat in interpreting the marginal effects is, given nonlinearity of a model specification, a difficulty to translate the marginal effect into the change that will occur if there is a discrete change by a 1-unit change in X_k . Long (1997) writes that the marginal effects may be inappropriate for binary independent variables and instead suggests the use of centred discrete change. A 1-unit increase in X_k from its mean will have the same effect as a 1-unit decrease from its mean when the probability equals to 0.5.^{47 48}

Hence, both marginal effects and centred discrete changes are calculated and interpreted when appropriate in the thesis. A centred discrete change is calculated to show how the probability of a phase-2 investigation or the probability of a phase-2 investigation with concerns changes, as a change in the mean of the variable takes place, from variable mean -0.5 to variable mean +0.5, i.e. a 1-unit increase.

Measures of fit

McFaddens pseudo R^2 is a measure of goodness-of-fit. It is a likelihood-ratio index, comparing a logistic regression model with only an intercept to a logistic regression model with all independent variables.⁴⁹ If the regression model $(M_{Intercept}) = (M_{Full})$, then $R^2_{McFadden}$ can equal 0, but $R^2_{McFadden}$ can never equal 1. Because $R^2_{McFadden}$ increases with the amount of added independent variables, an adjusted measurement, McFaddens adjusted pseudo R^2 is also appropriate to calculate.

$\bar{R}^2_{AdjustedMcFadden} = 1 - \frac{\ln \hat{L}(M_{Full}) - K^*}{\ln \hat{L}(M_{Intercept})}$, where K^* is the number of parameters. Both McFadden

pseudo R^2 and McFadden adjusted pseudo R^2 are presented for all model specifications.

The percent of correctly classified cases is a common measure of goodness-of-fit for a logistic model. It is a measure based on observed and expected counts and is the propor-

the outcomes take the value 1), a larger sample is required. As a consequence of using the ML method, instead of using the T-statistic to evaluate the statistical significance of an independent variable, the standard normal Z-statistic is used. Whenever the sample size is large enough, the T-statistic and Z-statistic converge.

⁴⁶ The marginal effect is computed by taking the partial derivative of

$$\Pr(Y = 1 | X_1, X_2, X_3, \dots, X_k) = F(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3, \dots, + \beta_k X_k)$$

$$\frac{\partial \Pr(Y = 1 | \mathbf{X})}{\partial X_k} = \lambda(\mathbf{X}\beta) \beta_k = \frac{\exp(\mathbf{X}\beta)}{(1 + \exp(\mathbf{X}\beta))^2} \beta_k = \Pr(Y = 1 | \mathbf{X}) (1 - \Pr(Y = 1 | \mathbf{X})) \beta_k$$

The marginal effect is the slope of the probability curve relating X_k to $\Pr(Y = 1 | \mathbf{X})$ holding all other variables constant (e.g. at their means).

⁴⁷ Long (1997) p 77

⁴⁸ Centred discrete change is defined as

$$\frac{\Delta \Pr(Y = 1 | \bar{\mathbf{X}})}{\Delta X_k} = \Pr(Y = 1 | \bar{\mathbf{X}}, \bar{X}_k + 0.5) - \Pr(Y = 1 | \bar{\mathbf{X}}, \bar{X}_k - 0.5)$$

⁴⁹ It is defined as $R^2_{McFadden} = 1 - \frac{\ln \hat{L}(M_{Full})}{\ln \hat{L}(M_{Intercept})}$.

tion of correct predictions.⁵⁰ Table 3 below, shows how the percent of correctly classified cases are calculated.

	Predicted outcome $\hat{Y}=1$	Predicted outcome $\hat{Y}=0$	Row total	Percent correctly classified = $\frac{(n_{11}correct + n_{22}correct)}{(n_{11} + n_{12} + n_{21} + n_{22})}$
Observed outcome Y=1	n ₁₁ correct	n ₁₂ incorrect	n ₁₁ + n ₁₂	
Observed outcome Y=0	n ₂₁ incorrect	n ₂₂ correct	n ₂₁ + n ₂₂	
Column total	n ₁₁ + n ₂₁	n ₁₂ + n ₂₂	N	

The model selection was also based on the Akaike’s Information Criterion, (AIC).⁵¹

4.3 Data Collection

The data collection process demanded gathering information from the SCA’s decisions and the merging firms’ notification to the SCA.

The right of public access to official records⁵² in Sweden means that everybody has a right to inspect documents sent to and from public authorities. The purpose is to provide an opportunity for public control.⁵³ Prior to giving out a public document, the authority must consider whether the information is public or classified (secret), in accordance with the Publicity and Official Secrets Act.⁵⁴

In order to request the documents in each case, all phase-1 and phase-2 cases had to be identified. See table 2, for detailed information. There is not any published complete list. Cases were identified through searches at InfoTorg Juridik,⁵⁵ the SCA’s online diary,⁵⁶ through direct complementary requests to the SCA of all phase-2 investigations prior to 1998, and finally, some cases were identified through descriptions in literature.⁵⁷ Through this process, all 69 phase-2 investigations were identified.

The process also entailed identifying a suitable control group of cases that had not been subject to phase-2 investigations. A list was compiled of the identified phase-1 cases in

⁵⁰ Long (1997) p 107

⁵¹ In addition to AIC, Bayesian Information Criterion (BIC) are used in the model selection. Models with lower values are preferred, rather than models with higher values. $AIC = T \ln(\text{sum of squared residuals}) + 2n$, where n is the number of parameters to be estimated and T is the number of usable observations. See e.g. Enders (2004) for details concerning the model selection criterions; AIC and BIC.

⁵² The right of public access to official records is a free translation of “offentlighetsprincipen”. This right has existed since 1766.

⁵³ The obligation of the public authorities to serve requests from the public is ruled by the Administrative Law. Förvaltningslag (1986:223).

⁵⁴ The public has only the right to read documents that are considered public. Offentlighets- och sekretesslag (2009:400).

⁵⁵ InfoTorg Juridik is a legal portal that contains regulations, rulings, legislative history, European law, judicial practices, administrative practices, legal news, references to the Swedish law books and journals. The legal portal is available through Stockholm University. Decisions prior to 1998 are available in InfoTorg Juridik, not through the SCA online diary.

⁵⁶ Decisions taken 1998 and onwards are published. Nevertheless, due to changed search criterions over the years, the online diary is not complete.

⁵⁷ Wetter *et al* (2009) and Simonsson (2005).

which the SCA reached a decision.⁵⁸ Through searches at InfoTorg Juridik, 2083 unique cases were identified where decisions were reached after phase-1 investigation. In addition 14 cases identified elsewhere were added to the list.⁵⁹ The total population of identified cases 1993-2009 ran up to 2097.⁶⁰ The 69 identified phase-2 cases were removed from the population since they already constituted a part of the full sample, so they would not interfere with the control group sample. The case numbers were sorted according to year in ascending order. In order to aim for an appropriate sized control group, approximately a 7 % random sample, stratified on year, was drawn. The population of 2028 cases was classified into 17 subgroups, the stratum, i.e. the years 1993-2009. The selection was proportional, assuring that all stratum were represented in the sample. 142 cases were selected as the control group. 7 cases were removed after sampling since it was revealed that 7 mergers did not fulfil the mandatory notification requirement, and the SCA did not initiate a proper phase-1 investigation. The remaining 135 cases were requested from the SCA. Necessary information was not acquired in due time in 55 cases. The control group consists of 80 phase-1 cases. The full sample in the data set consists of 149 merger cases, which approximately corresponds to 7.1 percent of the population.

When relevant cases had been identified, the process entailed acquiring all notifications, the case list of annexes, the decisions of the SCA to undertake a phase-2 investigation and the final decisions, whether it was a decision from the SCA or a decision from the Stockholm District Court or from the Market Court.⁶¹ Requests for documents were put forward. Practically all documents were subject to a review of classified information. According to the Publicity and Official Secrets Act, requested documents are to be “*urgently reviewed*”.⁶²

Phase-2 case documents were requested from the SCA between January 19, 2010 and February 2, 2010. All requested phase-2 documents were acquired in due time for the data set compilation, between January 28, 2010 and March 3, 2010. Phase-1 case documents were requested from the SCA between February 22, 2010 and March 3, 2010. Documents of 80 phase-1 cases were received between March 16, 2010 and April 13, 2010. Documents of 55 phase-1 cases were not received in due time to be included in the thesis.⁶³

⁵⁸ Note that only mergers that fulfilled the notification requirements were subject to a phase-1 investigation by the SCA. Hence, mergers not fulfilling the notification requirements were removed from the compiled list of cases.

⁵⁹ Wetter *et al* (2009) and Simonsson (2005).

⁶⁰ A larger number of cases have been notified to the SCA. According to the authority’s website, 2230 mergers/ concentrations have been notified. Nevertheless, due to withdrawal of notifications, withdrawal of notifications not subject to the notification rules and other reasons, the population from which the random stratified sample is drawn, is smaller.

⁶¹ For phase-1 cases, requests were put forward to the SCA to receive the notification and the case list of annexes for each specific case. The decisions were acquired from the legal portal InfoTorg Juridik.

⁶² “*prövas skýndsamt*” is translated as “*urgently reviewed*”.

⁶³ The given timeframe unfortunately prevents the inclusion of these cases. The deadline for receiving documentation to allow for sufficient time to codify the data was set to April 19, 2010.

4.4 The data set, variable definitions and descriptive statistics

In order to perform an econometric analysis and examine the economic determinants of the decision process of the SCA, and to what extent economics factors are important as well as the predictability and the consistency of merger control, the notifications, the case list of annexes, the decisions to undertake a phase-2 investigation and the final decisions were quantified. Information was missing in certain cases due to two main reasons; either the information was regarded as classified, or the information was neither provided by the notifying party nor by the SCA.

All possible information was codified in order to identify the factors that influence merger decisions. Each market was codified into 101 variables identifying competitors, market structure, unilateral and coordinated effects, entry barriers, and gains from merger. The data set contains general information of each case,⁶⁴ specific information about notifying firm(s), acquired firm(s),⁶⁵ undertakings/ remedies, et cetera. Further, the data set contains information about the relevant market(s).

The industry sector of each case was codified according to the SNI 2007 industry classification.⁶⁶ The SNI code consists of 5 parts, of which the first part is shown in appendix 1. The distribution is shown for both phase-1 and phase-2 cases. The table indicates that many notified mergers relate to sector C, the manufacturing industry sector, to sector G, the trade industry sector, or to sector J, the information and communication industry sector.

The variables were chosen based on previous studies of mergers, and previous quantitative empirical studies of the European Commission's decision process, merger legislation and case documentation.

Dependent variables

Since there is a clear two-stage discontinuity of merger decisions taken by the SCA, two binary dependent variables were analysed.

The first decision stage represent the *dependent variable* **phase-2**, whether a notified merger is subject to a phase-2 investigation by the SCA. It equals zero if the merger is not subject to a phase-2 investigation, hence cleared after phase-1, and it equals 1 if the merger is subject to a phase-2 investigation.

The second decision stage represents the *dependent variable* **phase-2 concerns**, whether the SCA identifies case concerns after a phase-2 investigation or not. Case concerns are broadly defined as grounds for intervention; i.e. the SCA clears the merger after certain undertakings/ remedies are made by the merging parties or the merger is challenged by

⁶⁴ Case number, the availability of documents, related case numbers, decision dates, decisions, director general at the Swedish Competition Authority, et cetera.

⁶⁵ Acquiring firm(s), acquired firm(s), relevant controlling firm(s), corporate registration numbers (*organisationsnummer*), nationality of acquiring firm(s) and acquired firm(s), worldwide turnover, and turnover in Sweden, et cetera.

⁶⁶ The two most aggregated levels of the SNI 2007 (one letter code and two digit code) correspond to the NACE Rev. 2 and ISIC classifications. Industry classification code is neither supplied in the notification nor in the SCA's decision.

the SCA, and the authority applies for a summons to the Stockholm District Court, or the merging parties withdraw the notification after a phase-2 investigation, assuming that the merger would not have been cleared unconditionally. Limitations in the actual number of phase-2 cases with identified concerns prevent separate analyses of the three different defined phase-2 concerns. See table 4 below for descriptive statistics. Also see table 2 above for the fluctuation of phase-2 cases and phase-2 cases with concerns during the period 1993-2009.

Independent variables

Post merger market shares. This variable is calculated based on the sales of the firms either in value or in volume as a proportion of the total sales or volume generated in the market(s). Since market shares sometimes are classified, and whenever an interval is given, the midpoint of the interval is taken as the most likely market share. The information provided in the notification is based on subjective considerations of the notifying party. When market shares in the notification and in the decision of the SCA diverge, the market share given by the SCA is assumed to be least subjective. Due to confidentiality, no information was given in 32 out of 149 cases.⁶⁷ See table 4 for descriptive statistics.

Measures of market concentration are rarely calculated or mentioned in the decisions of the SCA. Empirical evidence has shown that a high concentration in an industry is a signal of a high price cost margin.⁶⁸ Concentration measures the ability of merging firms to exert market power, as it depends on the number of competitive firms. The Herfindahl Hirschman index (HHI) is a measure of market level of concentration. The HHI is calculated by squaring the firm's market shares in a particular market.

Post merger HHI. This variable measures the concentration in the relevant market. Information about competitors in the relevant market is either described in the notification of the firms or in the decision of the SCA. Sometimes market shares of all competitors' are not given, and hence cannot influence the post merger HHI composition. Nevertheless, in order to calculate post merger HHI, the market shares of the competitors are assumed to be *small enough* not to influence the level of concentration in the relevant market.

Market share increase. This variable is the difference between the post merger market share and the market share of the acquired firm in the same relevant market.

HHI increase. This variable measures the difference between the pre- and post merger HHI concentration. The relation between the level of post merger HHI and the level of HHI increase of a merger is graphically shown in figures 3a-3b, appendix 2.

Five specific variables and one general variable of entry barriers were identified. Barriers to entry can be regarded as particular severe if more than one of these barriers is men-

⁶⁷ Out of the full sample in data set, 149 cases, information was given in 117 cases, hence information was not given in 32 cases.

⁶⁸ Viscusi, Harrington and Vernon (2005) p 161

tioned. To capture this, a variable **Entry barriers 0-6** was created. It is a measurement of six entry barriers, taking the value of 6 if all types of entry barriers are regarded as high, and et cetera for values 5, 4, 3, 2, 1, and 0 if none is mentioned.

The five specific variables and one general variable of entry barriers are; Timeliness, which is a variable if new competitors cannot enter within two years. Sufficiency, which is a variable if a new entrant cannot defeat competitive concerns. Scale, which is a variable if scale economics make entry difficult. Essential facilities, which is a variable if essential facility make entry difficult. IPR, which is a variable if intellectual property rights make entry difficult. Entry, which is a variable if entry barriers are only mentioned in a general sense as being high.

Descriptive statistics for the variable *Entry barriers 0-6* is found in table 4 below. Descriptive statistics for all variables that constitute *Entry barriers 0-6* can be found in table 8, appendix 2.

For the following codified binary variables, the value is interpreted as zero if the issue to which they relate is not mentioned in the documents, e.g. if entry barriers are not mentioned, they are assumed to be low or nonexistent, hence they are codified as zero, and otherwise codified as one.

Structural change. This variable measures the impact of the changes in merger legislation that took place year 2000, due to harmonisation to EU competition rules. It is a measure of the period 2000-2009 against the period 1993-1999.

Excess capacity. This variable shows if the existing capacity of the firms in the relevant market is just enough to satisfy the current demand. If the firms in the market have a higher capacity than is being used, then it is reasonable to assume that firms are able to react to price increases and increase their production. Nonetheless, while excess capacity in a market may be the outcome of natural reasons, it may also be the outcome of allocated quotas or potentially collusive practice.

Increasing demand. This variable is codified as 1 if the demand in the relevant market is characterised as increasing and zero otherwise. Demand growth stimulates competition; new firms are likely to enter which will reduce the risk of collusion.

Failing firm. This variable considers what will happen to the firm(s) if the merger does not take place. A failing firm is a firm that in absence of a merger would not survive and hence exit the market.

Close competitors. This variable is codified as 1 if the merging firms are described as close competitors and zero otherwise.

Import competition. This variable is codified as 1 if the firms on the relevant market are subject to import competition and zero otherwise.

There are a few additional variables that are described in the appendix 2. These are found not to be at the core of the analysis as the variables presented in the main model specifications, but are interesting nonetheless. The results can be found in appendix 3-5.

Variables	# Obs.	Mean	Std. dev.	# Obs. =1	% Obs. =1
<i>Phase-2 (=1, otherwise=0)</i>	149	0,4631	0,5003	69	46%
<i>Phase-2 identified case concerns=1, otherwise=0</i>	149	0,2109	0,4093	31	21%
Phase-2 clear (=1, otherwise=0)	69	0,5507	0,5011	38	55%
Phase-2 clear with undertakings (=1, otherwise=0)	69	0,2464	0,4341	17	25%
Application for a summons (=1, otherwise=0)	69	0,1014	0,3041	7	10%
Notification withdrawn after phase-2 (=1, otherwise=0)	69	0,1014	0,3041	7	10%
Market Share Increase ^a	93	15,5242	19,4464		
HHI Increase ^a	121	376,0854	688,3837		
Post Merger Market Share (midpoint) ^a	117	38,1276	25,2329		
Post Merger HHI (midpoint) ^a	118	2727,6500	2427,8550		
Entry Barriers 0-6 (Scale: 0=no or low barriers to entry, 1, 2, 3, 4, 5, and 6=high barriers to entry) ^b	149	0,5772	1,2202		
Structural Change, 2000-2009 compared to 1993-1999	149	0,3289	0,4714	49	33%
Excess Capacity (=1, otherwise=0)	149	0,1812	0,3865	27	18%
Increasing Demand (=1, otherwise=0)	149	0,1275	0,3347	19	13%
Failing Firm (=1, otherwise=0)	149	0,0940	0,2928	14	9%
Close Competitors (=1, otherwise=0)	149	0,1477	0,3560	22	15%
Import Competition (=1, otherwise=0)	149	0,1544	0,3625	23	15%

Explanatory variables in *bold italics*. ^a Indicates continuous variables, and ^b indicates a discrete variable.

5 Results

The results whether a merger is subject to a phase-2 investigation by the SCA are presented in section 5.1. The results whether case concerns are identified after a phase-2 investigation or a merger is cleared by the SCA are presented in section 5.2. A summary of the results follows in section 5.3.

Section 5.1 and 5.2 are organised as follows. The results of the hypotheses are first presented. The selection process of the preferred model, the marginal effect, the centred discrete change, and a graphical depiction of the preferred model, given altered assumptions follow.

All logistic regression models are estimated with robust standard errors.⁶⁹ Robustness checks can be found in appendix 3-5.

The number of observations in each model depends on the included independent variables. The software Stata⁷⁰ performs by default a listwise deletion of incomplete cases in logistic regressions; hence this affects the number of observations in each model specification.

⁶⁹ Robust standard errors are also known as Huber, White or sandwich standard errors. The standard errors are robust in the sense that they provide correct standard errors even if the underlying assumptions of the model are not fulfilled.

⁷⁰ All estimations are performed in the software Stata/IC 10.1 for Mac.

5.1 Whether a merger is subject to a phase-2 investigation or cleared

Six logistic regression models are presented in table 5 below. Model specifications 1-6 classify correctly between 72.88 - 83.76 percent of all mergers. The model specifications 1-6 confirm the assumption that there are significant differences in the characteristics of mergers cleared by the SCA after phase-1 investigation and mergers that are subject to a phase-2 investigation by the SCA.

Measurements of goodness-of-fit are presented for all models. The marginal effect presented next to the coefficient value in model specifications 1-6, shows the effect of a 1-unit change of each independent variable of the probability of a merger being subject to a phase-2 investigation. The centred discrete change (mean value $-/+ 0.5$) is presented for model specifications 3 and 5. Graphical results from the preferred model, given altered assumptions, are presented in figures 1a-1d.

The results of the hypotheses

The hypotheses stated in section 4.1 are either accepted or not accepted. Some hypotheses are partially accepted. A partial acceptance to a hypothesis implies that it may be sensitive to either the inclusion of another independent variable or is only valid under certain circumstances.

H 1 A) Dominance: market share and concentration (HHI). The hypothesis is accepted. *Post merger market share* has a positive significant influence when a merger is subject to a phase-2 investigation; see model specifications 1-3. *Post merger HHI* has a positive significant influence when a merger is subject to a phase-2 investigation; see model specifications 4-6. All estimated coefficients are significant at the 1 percent level.

H 2 A) Increase in dominance: increase in market share and increase in concentration (HHI). The hypothesis is partially accepted. The hypothesis is not accepted for an increase in market shares, see appendix 3, models 1-2. *An increase in market share* has no significant influence over the probability of a merger being subject to a phase-2 investigation. Nevertheless, the hypothesis is accepted for *HHI increase*, which has a positive significant influence over the probability of a merger being subject to a phase-2 investigation at the 5-10 percent significance level in model specifications 4-6 in table 5.

H 3 A) Entry barriers and excess capacity. The hypotheses are partially accepted. It is accepted for model specifications 1-3. *The existence of entry barriers and excess capacity in the relevant market* have a significant positive influence over the outcome. The variables are significant at the 5-10 percent level. The variables increase the probability of a merger being subject to a phase-2 investigation. The hypothesis is partially accepted for model specifications 4-6, the variable *entry barriers* is only positive significant in model 4, without the inclusion of e.g. excess capacity. With the inclusion of more independent variables, entry barriers become insignificant in model specifications 5-6. The variable *excess capacity* has a positive significant influence over the outcome in model specifications 5-6. The variable is significant at the 1 percent level.

H 4 A) Increasing demand. The hypothesis is partially accepted. The existence of a market being characterised as having an *increasing demand* has a negative significant influence over the probability of a merger being subject to a phase-2 investigation in model specifications 1-3. It is significant at the 1-5 percent level. Nevertheless, the hypothesis is not accepted in model specifications 5-6, the variable increasing demand is not significant.

H 5 A) Failing firm. The hypothesis is partially accepted. The existence of *failing firm* defence has a negative significant influence over the outcome. The variable reduces the probability of a merger being subject to a phase-2 investigation. The variable is significant at the 10 percent level in model specification 3. The hypothesis is not accepted for model specification 4.

H 6 A) Structural change. The hypothesis is accepted. The variable *structural change* measures the impact of changes in merger legislation that took place year 2000-2009 compared to the period 1993-1999. The variable has a negative significant influence over the probability of a merger being subject to a phase-2 investigation in model specifications 1-6. It is significant at the 1-5 percent level. The implication of this is that given that the merger is notified after year 2000, the probability of being subject to a phase-2 investigation is lower than if the merger was notified before year 2000.

H 7 A) Close competitors, import competition, technological development, efficiency gains, and countervailing buyer power. The hypothesis is accepted. The variables are not significant in model specification 6 in table 5 and in appendix 3, model specifications 4-9.

The preferred model

The conclusion from the goodness-of-fit measurements is that model specification 3, in table 5, is best suited to explain the determinants of a merger being subject to a phase-2 investigation.

The model specification consists of the variables; post merger market share, entry barriers 0-6, structural change, increasing demand, excess capacity in market and failing firm. All independent variables are significant at the 1-10 percent level. 83.76 percent of the 117 mergers analysed in model 3 are overall correctly classified. A more thorough analysis shows that 84.75 percent of mergers that actually were subject to an in-depth phase-2 investigation, were correctly classified, and that 82.76 percent of mergers actually cleared after phase-1, were correctly classified.⁷¹

Model specification 3 has both the highest pseudo R^2 (0.49), and adjusted pseudo R^2 (0.41). The pseudo R^2 can be interpreted as an approximate variance in the accounted outcome. Model 3 is also the preferred model, according to the lowest estimated values of the information criteria (AIC).

⁷¹ A Graphical ROC curve analysis of model specification 3 in table 5, is shown in appendix 6.

Table 5 Whether a merger is subject to a phase-2 investigation or a merger is cleared after a phase-1 investigation.

Model specifications 1-6

	Model 1 Phase-2			Model 2 Phase-2			Model 3 Phase-2			Model 4 Phase-2			Model 5 Phase-2			Model 6 Phase-2			
	Coefficient Value	Marginal Effect		Coefficient Value	Marginal Effect	Centred Discrete Change (mean+/-0.5)	Coefficient Value	Marginal Effect	Centred Discrete Change (mean+/-0.5)	Coefficient Value	Marginal Effect	Centred Discrete Change (mean+/-0.5)	Coefficient Value	Marginal Effect	Centred Discrete Change (mean+/-0.5)	Coefficient Value	Marginal Effect	Centred Discrete Change (mean+/-0.5)	
Independent variables:																			
HHI Increase	-	-	-	-	-	-	0.00161*	0.000376**	0.000188	0.00165*	0.000379**	0.0004	0.00136*	0.000310*	0.0004	0.000730	0.000310*	0.000161	
Post Merger Market Share	0.0919*** (0.0171)	0.0216*** (0.00379)	0.0863*** (0.0161)	0.0987*** (0.0180)	0.0229*** (0.00427)	0.0229*** (0.00427)	0.0987*** (0.0180)	0.0229*** (0.00427)	0.0229*** (0.00427)	0.0987*** (0.0180)	0.0229*** (0.00427)	0.0229*** (0.00427)	0.0987*** (0.0180)	0.0229*** (0.00427)	0.0229*** (0.00427)	0.0987*** (0.0180)	0.0229*** (0.00427)	0.0229*** (0.00427)	0.0987*** (0.0180)
Post Merger HHI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Entry Barriers 0-6	0.833** (0.332)	0.195*** (0.0758)	0.735* (0.378)	0.706* (0.376)	0.173** (0.0834)	0.164** (0.0821)	0.706* (0.376)	0.173** (0.0834)	0.164** (0.0821)	0.706* (0.376)	0.173** (0.0834)	0.164** (0.0821)	0.706* (0.376)	0.173** (0.0834)	0.164** (0.0821)	0.706* (0.376)	0.173** (0.0834)	0.164** (0.0821)	0.706* (0.376)
Structural Change 2000-2009 compared to 1993-1999	-2.018** (0.789)	-0.466*** (0.154)	-1.891*** (0.732)	-2.081*** (0.754)	-0.440*** (0.148)	-0.478*** (0.146)	-2.081*** (0.754)	-0.440*** (0.148)	-0.478*** (0.146)	-2.081*** (0.754)	-0.440*** (0.148)	-0.478*** (0.146)	-2.081*** (0.754)	-0.440*** (0.148)	-0.478*** (0.146)	-2.081*** (0.754)	-0.440*** (0.148)	-0.478*** (0.146)	-2.081*** (0.754)
Increasing Demand	-2.474*** (0.943)	-0.530*** (0.135)	-2.044** (0.939)	-2.340** (0.998)	-0.463*** (0.163)	-0.514*** (0.155)	-2.340** (0.998)	-0.463*** (0.163)	-0.514*** (0.155)	-2.340** (0.998)	-0.463*** (0.163)	-0.514*** (0.155)	-2.340** (0.998)	-0.463*** (0.163)	-0.514*** (0.155)	-2.340** (0.998)	-0.463*** (0.163)	-0.514*** (0.155)	-2.340** (0.998)
Excess Capacity in Market	-	-	1.779** (0.880)	2.003** (0.804)	0.337*** (0.113)	0.361*** (0.0975)	2.003** (0.804)	0.337*** (0.113)	0.361*** (0.0975)	2.003** (0.804)	0.337*** (0.113)	0.361*** (0.0975)	2.003** (0.804)	0.337*** (0.113)	0.361*** (0.0975)	2.003** (0.804)	0.337*** (0.113)	0.361*** (0.0975)	2.003** (0.804)
Failing Firm	-	-	-	-1.730* (0.984)	-	-0.406** (0.197)	-1.730* (0.984)	-	-0.406** (0.197)	-1.730* (0.984)	-	-0.406** (0.197)	-1.730* (0.984)	-	-0.406** (0.197)	-1.730* (0.984)	-	-0.406** (0.197)	-1.730* (0.984)
Close Competitors	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Import Competition	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Constant	-2.785*** (0.545)	-	-2.951*** (0.574)	-3.152*** (0.598)	-	-	-1.415*** (0.367)	-	-	-1.415*** (0.367)	-	-	-1.415*** (0.367)	-	-	-1.415*** (0.367)	-	-	-1.415*** (0.367)
Observations	117	-	117	117	-	-	118	-	-	118	-	-	118	-	-	118	-	-	118
Correctly classified	80.34%	-	83.76%	83.76%	-	-	72.88%	-	-	83.05%	-	-	82.20%	-	-	82.20%	-	-	82.20%
Pseudo R ²	0.44	-	0.48	0.49	-	-	0.316	-	-	0.41	-	-	0.41	-	-	0.41	-	-	0.41
Pseudo R ² Adjusted	0.38	-	0.4	0.41	-	-	0.242	-	-	0.3	-	-	0.3	-	-	0.3	-	-	0.3
AIC	100.63	-	96.93	96.19	-	-	123.754	-	-	111.04	-	-	114.02	-	-	114.02	-	-	114.02
BIC	114.44	-	113.5	115.52	-	-	140.3781	-	-	130.44	-	-	138.96	-	-	138.96	-	-	138.96

Robust standard errors in parentheses. *** Indicates significance at the 1 percent level (p<0.01), ** indicates significance at the 5 percent level (p<0.05) and * indicates significance at the 10 percent level (p<0.1)

The mean sample characteristics, (and standard deviation within parenthesis), of model 3 are; post merger market share, 38.13 (25.23) percent, entry barriers 0-6, 0.68 (1.30), structural change, 0.25 (0.43), increasing demand, 0.11 (0.32), excess capacity 0.21 (0.41), and failing firm 0.10 (0.30). Given that a merger possesses all the mean sample characteristics, the probability of a merger being subject to a phase-2 investigation, and hence not cleared after phase-1, is 63.34 percent, ceteris paribus. Any change of the characteristics of the merger affects the probability.

A 1-unit increase of the post merger market share in model specification 3, from mean sample characteristic 38.13 to 39.13 percent, gives a marginal effect of 0.0229 (see table 5) which implies that the probability of the merger being subject to a phase-2 investigation increases by 2.29 percent, ceteris paribus. The marginal effect and the centred discrete change of post merger market share in model specification 3 are equal. This is due to the fact that the variable is continuous and not binary.

A 1-unit increase of entry barriers 0-6 in model specification 3, from mean sample characteristics 0.68 to 1.68 entry barriers, gives a marginal effect of 0.164, which implies that the probability of a merger being subject to a phase-2 investigation increases by 16.4 percent, ceteris paribus. The marginal effect and the centred discrete change are approximately equal.

A graphical depiction shows perhaps a more straightforward way of interpreting the results of the probability of the outcome as the value of an independent variable is altered. Figures 1a-1c below are based on the coefficient values in model specification 3, table 5, and show how the probability of a merger being subject to a phase-2 investigation varies with altered assumptions. All variables are held at their mean sample characteristics, except for the value of the altered variable.

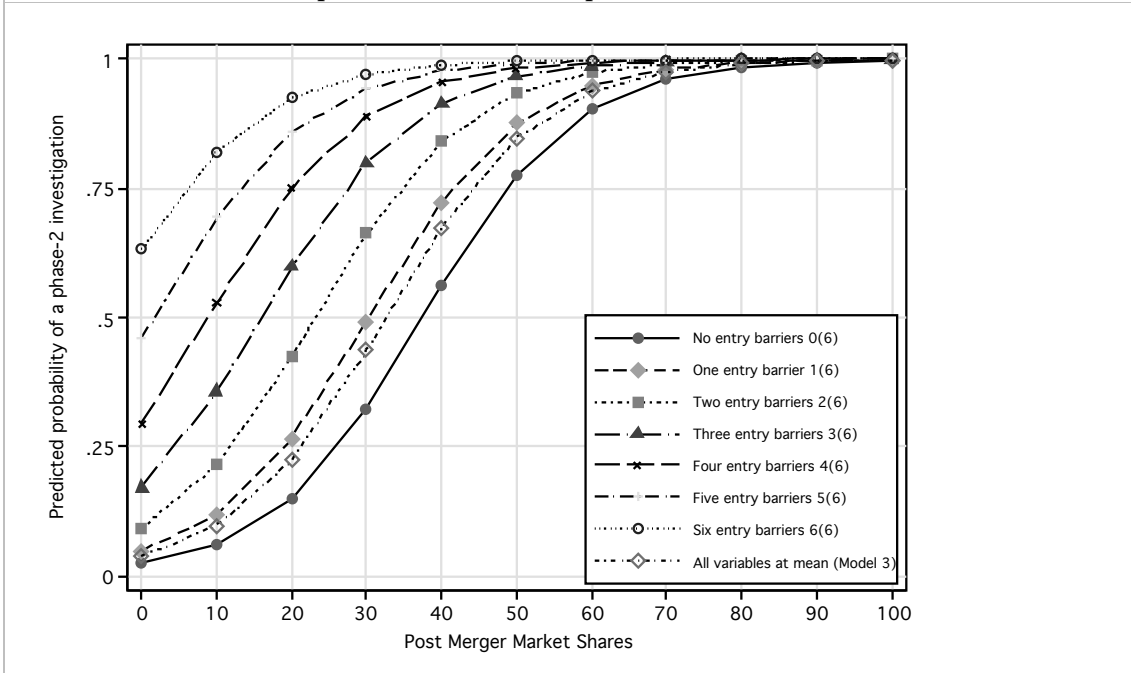


Figure 1a. An increased number of identified entry barriers, even at a low post merger market share, increase the probability of a phase-2 investigation.

The centred discrete change of structural change in model 3, is -0.4513, see table 5. A 1-unit increase should in this instance be viewed as the change from the merger being noti-

fied before year 2000, to the merger being notified after year 2000. Since the variable is binary, the centred discrete change is preferred. This implies that for a merger with sample mean characteristics, a 1-unit increase of structural change reduces the probability of the merger being subject to a phase-2 investigation by 45.1 percent, ceteris paribus.

The centred discrete change of failing firm in model specification 3 is -0.3830. A 1-unit increase should in this instance be viewed as the merging firms change their argumentation from not using a failing firm defence to using a failing firm defence. This implies that for a merger with sample mean characteristics, a 1-unit increase of failing firm reduces the probability of the merger being subject to a phase-2 investigation by 38.3 percent, ceteris paribus.

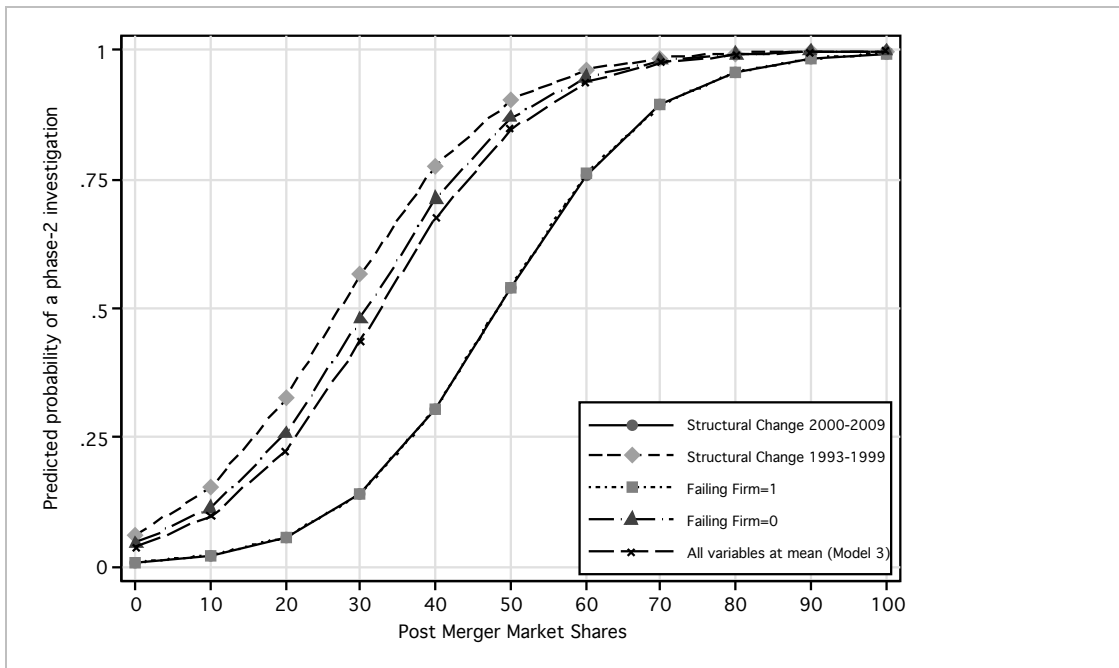


Figure 1b. The structural change affects the probability of a phase-2 investigation. Given that a merger was notified after year 2000, a higher post merger market share is required in order for a merger to be subject to a phase-2 investigation, than a merger notified before year 2000. The predicted probabilities for structural change 2000-2009 and failing firm=1 overlap.

Given a merger with the same post merger market share, a *sincere* failing firm defence reduces the probability of a phase-2 investigation, compared to no failing firm defence.

The centred discrete change of increasing demand in model specification 3 is -0.4986. A 1-unit increase should in this instance be viewed as the relevant market characteristics change from being characterised as not having an increasing demand, to having an increasing demand. This implies that a 1-unit increase in demand reduces the probability of phase-2 investigation by 49.9 percent, ceteris paribus.

The centred discrete change of excess capacity is 0.4364. A 1-unit increase should in this instance be viewed as the market characteristics change from being characterised as not having excess capacity to having excess capacity. This implies that a 1-unit increase in excess capacity increases the probability of phase-2 investigation by 43.6 percent, ceteris paribus.

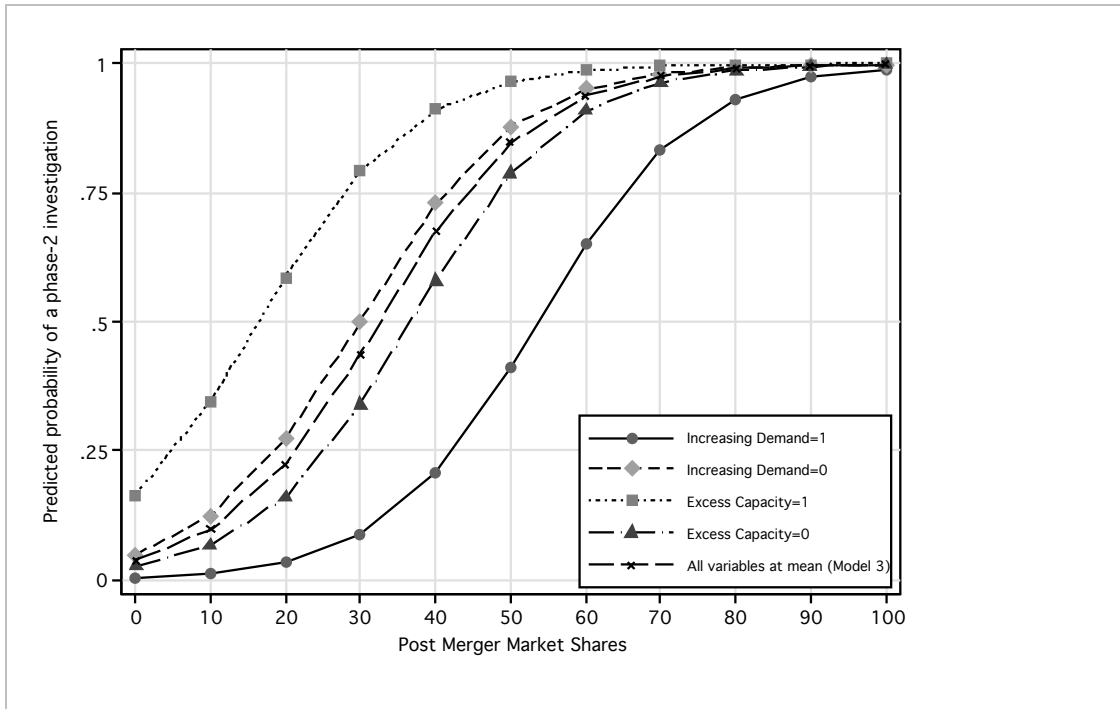


Figure 1c. Increasing demand and excess capacity affects the probability of a phase-2 investigation. Given a merger with the same post merger market share, a market with increasing demand reduces the probability of a phase-2 investigation, compared to a market with no increasing demand. The reverse is true to excess capacity; given the same post merger market share, excess capacity increases the probability of a phase-2 investigation.

The predicted probability of a phase-2 investigation for logistic, probit and OLS estimation methods, depending on the post merger market share is shown graphically in figure 1d.

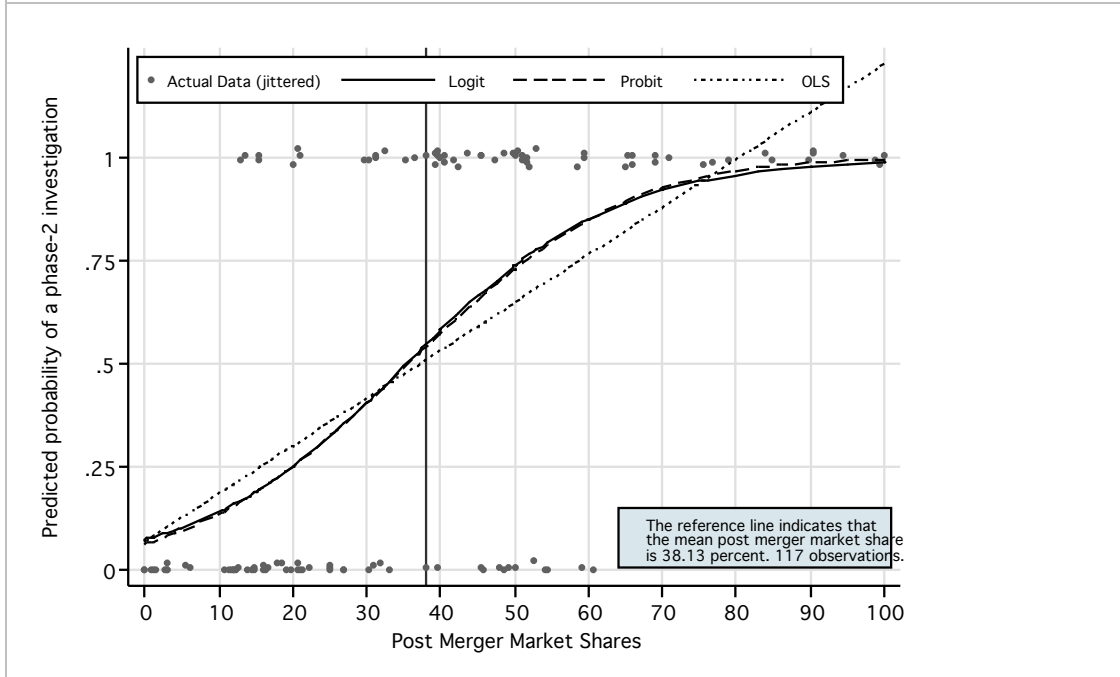


Figure 1d. The logistic and probit models give practically identical probabilities.

5.2 Whether case concerns are identified after a phase-2 investigation or a merger is cleared

Six logistic regression model specifications are presented in table 6 below. Model specifications 1-6 classifies correctly between 81.20 - 84.48 percent of all mergers. Model specifications 1-6 confirm the assumption that there are significant differences in the characteristics of mergers with identified case concerns and mergers cleared by the SCA.

Measurements of goodness-of-fit are presented for all models. The marginal effect is presented next to model specifications 1-6. The centred discrete change (mean value $-/+0.5$) is only presented for model specifications 3 and 5.

Graphical results from the preferred model, given altered assumptions, are presented in figures 2a-2b.

The results of the hypotheses

The hypotheses stated in section 4.1 are either accepted or not accepted. Some hypotheses are partially accepted. A partial acceptance to a hypothesis implies that it may be sensitive to either the inclusion of another independent variable or is only valid under certain circumstances.

H 1 B) Dominance: market share and concentration (HHI). The hypothesis is partially accepted. *Post merger market share* has a positive significant influence over the probability of the SCA indentifying case concerns after phase-2; see model specifications 1-3. It is significant at the 5 percent level. The hypothesis is not accepted for *post merger HHI*, the variable has no significant influence over the outcome; see model specifications 4-6.

H 2 B) Increase in dominance: market share increase and increase in concentration (HHI). The hypothesis is partially accepted. The hypothesis is not accepted for *market share increase*; see appendix 4. An increase in market share has no significant influence over the probability of the SCA indentifying case concerns after phase-2. Nevertheless, the hypothesis is accepted for *HHI increase*, which has a positive significant influence over the outcome at the 10 percent significance level; see model specification 5.

H 3 B) Entry barriers and excess capacity. The hypothesis is partially accepted. The hypothesis is accepted for the variable of *entry barriers* in model specifications 1-6. The existence of entry barriers has a positive significant effect over the probability of the SCA indentifying case concerns after phase-2. The hypothesis is not accepted for the existence of *excess capacity in the market*. See appendix 4. The variable has no significant influence over the outcome.

H 4 B) Increasing demand. The hypothesis is partially accepted. The existence of a market being characterised as having an *increasing demand* has a negative significant influence over the probability of the SCA indentifying case concerns after phase-2 in model specifications 2-3. It is significant at the 5 percent level. Nevertheless, the hypothesis is

not accepted for model specification 6. The variable increasing demand is not significant in model specification 6.

H 5 B) Failing firm. The hypothesis is accepted. The existence of *failing firm* defence increases the probability of the SCA identifying case concerns after phase-2. Failing firm is positive significant in model specifications 1 and 3-6 at the 10 percent significance level. Nevertheless the variable is not significant in model specification 2, with the inclusion of additional variables.

H 6 B) Structural change. The hypothesis is accepted. The variable *structural change* measures the impact of the changes in merger legislation that took place year 2000- 2009 compared to the period 1993-1999. The variable structural change has no significant influence over the probability of the SCA identifying case concerns after a phase-2 investigation in model specifications 1-6. The estimated models support the hypothesis that no structural shift has occurred during the period.

H 7 B) Close competitors, import competition, technological development, efficiency gains, and countervailing buyer power. The hypothesis is accepted. The variables have no significant influence over the probability of the SCA indentifying case concerns after phase-2; see model specifications 4-6 in table 6 and appendix 4.

The preferred model

The conclusion from the goodness-of-fit measurements is that model specifications 3 and 5, in table 6, are best suited to explain the determinants of the SCA identifying case concerns after phase-2.

Model specification 3 includes; post merger market share, entry barriers 0-6, structural change, failing firm, and increasing demand. All independent variables except for structural change are significant. 81.90 percent of the 116 mergers analysed in model 3 are correctly classified based on the model specification. The pseudo R^2 is 0.20, and the adjusted pseudo R^2 is 0.10. Model specification 5 includes; HHI increase, post merger HHI, entry barriers 0-6, structural change, failing firm, and import competition. Three of the variables are however not significant; post merger HHI, structural change and import competition.

The two models 3 and 5 are not directly comparable since the independent variables diverge except for the variables failing firm and structural change. Despite model 5 having slightly higher percent of correctly classified mergers; 82.05 percent, and marginally higher goodness-of-fit than model 3, it is not chosen as the preferred model, since fewer variables are significant in model 5 than in model 3. The preferred model according to the lowest estimated values of the information criteria (AIC) is model 3. The following analysis concerns model 3.

Table 6 Whether case concerns are identified after a phase-2 investigation or a merger is cleared.

Model specifications 1-6

	Model 1 Phase-2 Concerns			Model 2 Phase-2 Concerns			Model 3 Phase-2 Concerns			Model 4 Phase-2 Concerns			Model 5 Phase-2 Concerns			Model 6 Phase-2 Concerns		
	Coefficient Value	Marginal Effect	Centred Discrete Change (mean+/-0.5)	Coefficient Value	Marginal Effect	Centred Discrete Change (mean+/-0.5)	Coefficient Value	Marginal Effect	Centred Discrete Change (mean+/-0.5)	Coefficient Value	Marginal Effect	Centred Discrete Change (mean+/-0.5)	Coefficient Value	Marginal Effect	Centred Discrete Change (mean+/-0.5)	Coefficient Value	Marginal Effect	Centred Discrete Change (mean+/-0.5)
Independent variables:																		
HHI Increase	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Post Merger Market Share	0.0206** (0.00947)	0.00289** (0.00134)	0.0198** (0.00966)	0.00262** (0.00129)	0.0203** (0.00958)	0.0275** (0.00132)	0.0203** (0.00958)	0.0275** (0.00132)	0.0027	0.0203** (0.00958)	0.0275** (0.00132)	0.0027	0.0203** (0.00958)	0.0275** (0.00132)	0.0002	0.00113* (0.000598)	0.000164* (9.35e-05)	0.0002
Post Merger HHI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Entry Barriers 0-6	0.465*** (0.158)	0.0654*** (0.0239)	0.508*** (0.157)	0.0672*** (0.0227)	0.504*** (0.160)	0.0683*** (0.0238)	0.504*** (0.160)	0.0683*** (0.0238)	0.0684	0.504*** (0.160)	0.0683*** (0.0238)	0.0684	0.504*** (0.160)	0.0683*** (0.0238)	0.000145 (0.000105)	0.460** (0.179)	0.0668** (0.0269)	0.0668
Structural Change 2000-2009 compared to 1993-1999	0.108 (0.502)	0.0154 (0.0722)	0.258 (0.527)	0.0357 (0.0740)	0.197 (0.499)	0.0276 (0.0704)	0.197 (0.499)	0.0276 (0.0704)	0.0267	0.197 (0.499)	0.0276 (0.0704)	0.0267	0.197 (0.499)	0.0276 (0.0704)	0.269 (0.515)	-0.210 (0.606)	-0.0295 (0.0840)	-0.0305
Failing Firm	1.225* (0.720)	0.228 (0.160)	1.241 (0.759)	0.222 (0.165)	1.200* (0.704)	0.217 (0.153)	1.200* (0.704)	0.217 (0.153)	0.1644	1.200* (0.704)	0.217 (0.153)	0.1644	1.200* (0.704)	0.217 (0.153)	1.358* (0.818)	1.303* (0.784)	0.252 (0.181)	0.1908
Increasing Demand	-	-	-1.233** (0.615)	-0.117** (0.0486)	-1.274** (0.612)	-0.123** (0.0496)	-1.274** (0.612)	-0.123** (0.0496)	-0.1747	-1.274** (0.612)	-0.123** (0.0496)	-0.1747	-1.274** (0.612)	-0.123** (0.0496)	-	-	-	-
Import Competition	-	-	0.788 (0.737)	0.124 (0.136)	-	-	-	-	-	-	-	-	-	-	1.019 (0.690)	0.996 (0.679)	0.175 (0.140)	0.1454
Close Competitors	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Constant	-2.833*** (0.536)	-	-2.954*** (0.550)	-	-2.779*** (0.540)	-	-2.779*** (0.540)	-	-	-2.638*** (0.481)	-	-	-2.638*** (0.481)	-	-2.596*** (0.488)	-	-	-
Observations	116	116	116	116	116	116	116	116	116	116	116	116	116	116	117	117	117	117
Correctly classified	82,76%	84,48%	81,90%	81,20%	81,90%	81,20%	81,90%	81,20%	81,20%	81,90%	81,20%	81,20%	81,90%	81,20%	82,05%	82,05%	82,91%	82,91%
Pseudo R ²	0,19	0,21	0,20	0,19	0,20	0,19	0,20	0,19	0,19	0,20	0,19	0,19	0,20	0,25	0,25	0,19	0,19	0,19
Pseudo R2 Adjusted	0,10	0,09	0,10	0,10	0,10	0,10	0,10	0,10	0,10	0,10	0,10	0,10	0,10	0,13	0,13	0,07	0,07	0,07
AIC	106,38	107,36	106,88	106,88	106,88	106,88	106,88	106,88	112,14	106,88	112,14	112,14	106,88	107,41	107,41	114,76	114,76	114,76
BIC	120,14	126,64	123,40	123,40	123,40	123,40	123,40	123,40	128,72	123,40	128,72	128,72	123,40	126,75	126,75	134,10	134,10	134,10

Robust standard errors in parentheses. *** Indicates significance at the 1 percent level (p<0.01), ** indicates significance at the 5 percent level (p<0.05) and * indicates significance at the 10 percent level (p<0.1)

The mean sample characteristics (and standard deviation) of model 3 are; post merger market share, 38.02 (25.31), entry barriers 0-6, 0.68 (1.30) structural change, 0.25 (0.43), failing firm defence, 0.09 (0.29) and increasing demand 0.11 (0.32). Given that a merger possesses all the mean sample characteristics, the probability of the merger being subject to the SCA identifying case concerns after phase-2, and hence not cleared, is 16.18 percent, *ceteris paribus*. Any change of the characteristics of the merger affects the probability.⁷²

A 1-unit increase of the post merger market share in model specification 3, from mean sample characteristics 38.02 to 39.02 percent, gives a marginal effect of 0.0027, (see table 6), which implies that the probability of the SCA identifying case concerns after phase-2 increases by 0.27 percent, *ceteris paribus*. The marginal effect and the centred discrete change of post merger market share in model specification 3 are approximately equal. This is due to the fact that the variable is continuous and not binary.

A 1-unit increase of entry barriers 0-6 in model specification 3, from mean sample characteristics 0.68 to 1.68 entry barriers, gives a marginal effect of 0.0683, which implies that the probability of the SCA identifying case concerns after a phase-2 investigation increases by 6.83 percent, *ceteris paribus*. In this instance the marginal effect and the centred discrete change are approximately equal.

Figures 2a-2b are based on the coefficient values in model specification 3, table 6, and show how the probability of identified case concerns of a merger varies with altered assumptions. All variables are held at their mean sample characteristics except for the value of the altered variable.

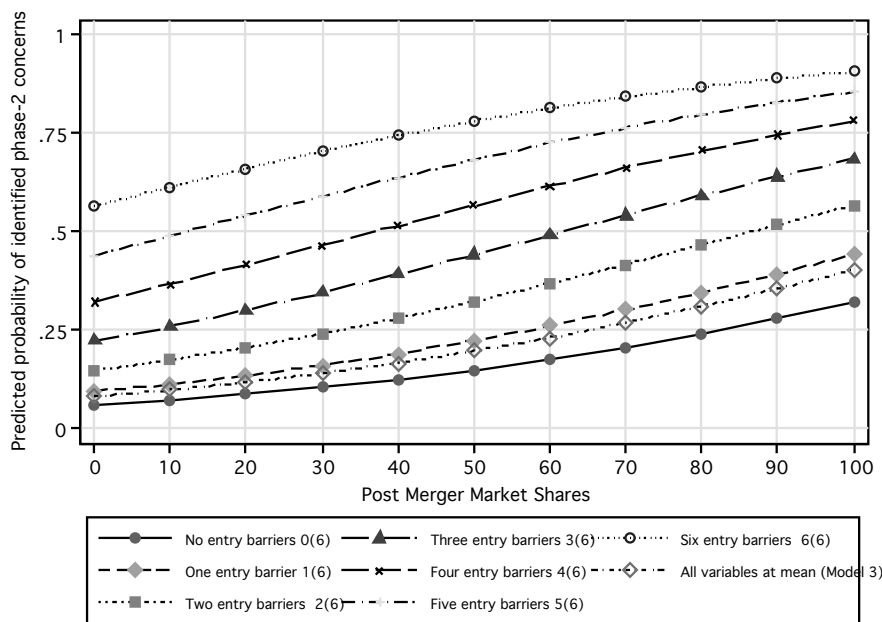


Figure 2a. An increased number of identified entry barriers, even at a low post merger market share, increases the probability of identified case concerns.

⁷² A Graphical ROC curve analysis of model specification 3 in table 6, is shown in appendix 6.

The centred discrete change of increasing demand in model specification 3 is -0.1747, this implies that a 1-unit increase in demand reduces the probability of the SCA identifying case concerns after phase-2 by 17.47 percent, ceteris paribus. A 1-unit increase should in this instance be viewed as the relevant market characteristics change from being characterised as not having an increasing demand, to having an increasing demand.

The centred discrete change of failing firm in model specification 3 is 0.1644. A 1-unit increase should in this instance be viewed as the merging firms change their argumentation from not using a failing firm defence to using a failing firm defence. This implies that for a merger with sample mean characteristics, a 1-unit increase of failing firm increases the probability of the SCA identifying case concerns after phase-2 by 16.44 percent, ceteris paribus.

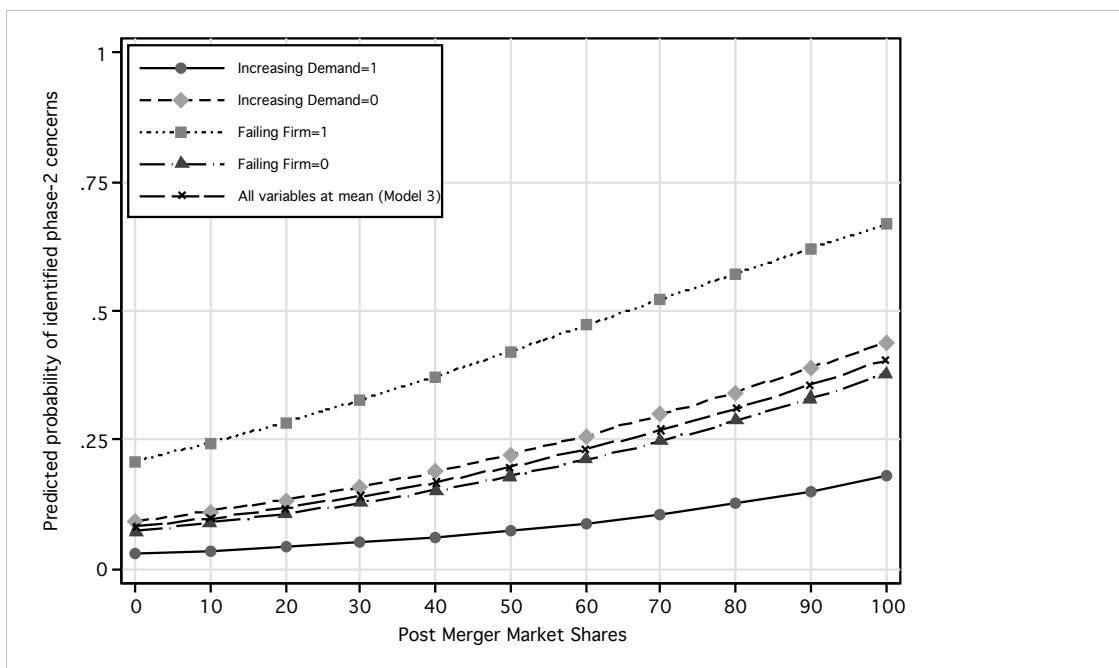


Figure 2b. Increasing demand reduces the probability of identified case concerns, even at a high market share. Failing firm defence increases the probability of identified case concerns after phase-2.

The predicted probability of identified phase-2 concerns for logistic, probit, and OLS estimation methods, depending on the post merger market share, is graphically shown in figure 2d in appendix 2.

There are a few additional variables that are described in appendix. The estimated results of technological development, efficiency gains, countervailing buyer power, et cetera are found not to be significant in this thesis. This does not necessary imply that these variables are of no importance in merger control decisions. The descriptive statistics reveal that these variables have few observations.

5.3 Summary of the results

This master's thesis is, to my knowledge, the first econometric analysis of merger enforcement in Sweden. The results contribute to the understanding of the application of Swedish merger control enforcement. Knowledge concerning the previous merger decisions of the SCA may increase predictability, and affect whether future mergers will take place.

The purpose is to analyse the determinants of merger control decisions of the SCA and to what extent economic factors are important. Neither in the new Competition Act, nor in the legislative history are the conditions described under which the SCA may initiate an in-depth phase-2 investigation. The results of the thesis show the determinants that are found to be important during the period 1993-2009.

When comparing the preferred model in table 5, for the dependent variable whether a merger is subject to a phase-2 investigation or cleared by the SCA, to the preferred model in table 6, for the dependent variable whether case concerns are identified after a phase-2 investigation or a merger is cleared by the SCA, it is clear that three determinants; post merger market share, entry barriers 0-6 and increasing demand have a significant influence in the same direction over the outcome for both analysed decision stages. Hence, these variables are consistently important determinants of merger control decisions.

A fourth determinant failing firm is significant for both dependent variables, however the direction of the significance is not the same. This supports the assumption behind the hypotheses H5. It appears reasonable to assume the existence of two types of failing firm defences; a merger in which a *sincere*, verifiable failing firm defence is used, is likely to be cleared after a phase-1 investigation and not subject to a phase-2 investigation, hence the sign of the estimated coefficient is negative for the first decision stage. Given that the merger was not cleared after a phase-1 investigation and subject to a phase-2 investigation by the SCA, an *insincere*, unverifiable failing firm defence is likely to be revealed in the in-depth investigation, and subsequently, case concerns may be identified. Hence the sign of the estimated coefficient is positive for the second decision stage.

A fifth determinant excess capacity has a positive significant influence over the outcome whether a merger is subject to a phase-2 investigation and not cleared after a phase-1 investigation by the SCA, (the first decision stage). Nevertheless the variable is not significant whether case concerns are identified by the SCA. A reason for this result may depend on whether excess capacity in a market is the outcome of natural reasons, the outcome of allocated quotas, or the outcome of potentially collusive practice. Subsequently an in-depth investigation is required to determine the nature of the excess capacity in the market.

The variable structural change before and after year 2000 has a negative significant influence over the outcome whether a merger is subject to a phase-2 investigation and not

cleared after a phase-1 investigation by the SCA, (the first decision stage). A merger notified after year 2000 has a significantly lower probability of being subject to a phase-2 investigation, than a merger notified before year 2000. Nevertheless the variable is not significant whether case concerns are identified by the SCA, (the second decision stage). A reason for this result may be that the precision in merger control has increased as a result of the structural change. There is no apparent difference of identified *case concerns* for mergers notified before and after year 2000. It is possible that *unproblematic* mergers were subject to a phase-2 investigation before year 2000 to a larger degree, than after year 2000. An in-depth analysis is required before any decisive conclusion may be drawn concerning whether the precision in merger control has increased as a result of a structural change.

6 Discussion and conclusions

Previous studies have found significant effects of a high post merger market share and high entry barriers over the outcome of merger decisions. This thesis gives credence to the fact that high post merger market share and high entry barriers appear to be of universal importance in merger decisions, regardless of legislative differences. The determinants have significantly affected the outcome of the merger decisions of the 1) European Commission, 2) Canadian Bureau of Competition Policy, and 3) the SCA according to this thesis. Import competition was found not to have significantly influenced the merger decisions of the SCA, contrary to the result of the Canadian study by Kehemani and Shapiro (1993). The three determinants increasing demand, failing firm, excess capacity, were all found to have a significant influence over the outcome in this thesis, but they are not comparable to estimated variables in previous studies. Hence, more studies are needed before any conclusion concerning universal importance may be made concerning these determinants.

The author has solely quantified all relevant case documents. No double codification procedure was applied. While some variables were unproblematic to quantify into a data set; market share, turnover, et cetera, others required interpretation of text. In order to limit inconsistency of text interpretations, a structure of how to interpret certain passages was created. A potential source of inconsistency relies with the case documents and the different authors of the texts, including both texts from the notifying parties and from the SCA. The potential source of inconsistency relies mainly with variables that require descriptions of relevant markets, import competition, excess capacity, entry barriers, failing firm, et cetera.

A potential problem is the fact that the notification rules and the legislation have changed over the period. Due to the fact that the sample size is fairly small, it is unwise to draw any conclusion of other structural changes, than the structural change before and after year 2000.

Due to confidentiality, no information concerning market shares was given in 32 out of 149 cases. Since market concentration (HHI) is rarely mentioned in the decisions by the SCA, the HHI variables were calculated, based on available information concerning competitors in the relevant market. The fact that information about market shares of competitors occasionally was not provided, or regarded as classified, may have affected the precision of the HHI variables.

Given that notifications and decisions vary in terms of the level of detailed descriptions of relevant markets, it is unclear whether notifications and decisions, of limited length and low level of detail, have undergone the same level of scrutiny as notifications and decisions of considerable length and high level of detail. Mergers cleared after a phase-1 investigation, and hence not subject to a phase-2 investigation are generally of more limited length and lower level of detail. A potential problem is that certain issues may have wrongfully been codified as unimportant or unproblematic due to the fact that the information concerning the issue was not included in the documentation. This is mainly a potential problem for mergers cleared after a phase-1 investigation. This may cause an upward biasness; since variables may demonstrate a higher correlation than otherwise should be the case.

A possible way to circumvent the potential problem of upward biasness and improve the overall merger control process would be if the SCA would implement a uniform decision structure and improve the argumentation in the decisions. A uniform decision structure in which all cases are treated consistently, regardless of being cleared after a phase-1 investigation, cleared after a phase-2 investigation, or where case concerns are identified, will increase the predictability and transparency. The grounds for all merger decisions ought to be included in the decisions otherwise transparency is inadequate. With the inclusion of the SNI industry classification code of relevant markets corresponding to NACE Rev. 2 classifications, an industry comparison to mergers notified to the European Commission also would be made possible.

A previous study, Simonsson (2005), evaluated the court processes of the SCA, and concluded that the SCA should improve its court process success frequency. The proposed improvement in this thesis may affect the success frequency of the court processes of the SCA.

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Appendices

Appendix 1 Phase-1 and phase-2 cases by SNI 2007 Industry Sector

Table 7 Number of cases by SNI 2007 Industry Sector		Phase-1 cases		Phase-2 cases	
SNI Letter code	Industry Sector	Freq.	%	Freq.	%
B	Mines and quarries	1	1,25%	2	2,90%
C	Manufacturing industry	26	32,50%	21	30,43%
D	Electricity, gas, steam and hot water plants	4	5,00%	3	4,35%
F	Construction industry	1	1,25%	3	4,35%
G	Trade, et cetera.	17	21,25%	22	31,88%
H	Transport and storage companies	3	3,75%	3	4,35%
I	Hotels and restaurants	-	-	1	1,45%
J	Information and communication companies	9	11,25%	4	5,80%
K	Financial institutions and insurance companies	3	3,75%	2	2,90%
L	Real estate companies	7	8,75%	-	-
M	Professional, scientific and technical companies	2	2,50%	-	-
N	Administrative and support service companies	5	6,25%	3	4,35%
Q	Human health and social work establishments	1	1,25%	2	2,90%
R	Establishments for arts, entertainment, et cetera.	1	1,25%	-	-
S	Other service companies	-	-	3	4,35%
	Total	80	100%	69	100%

Many of the notified mergers in the sample relate to sector C, the manufacturing industry sector and to sector G, the trade industry sector, or to sector J, information and communication companies. Comparing the industry sector distribution of the randomly stratified phase-1 cases and phase-2 cases shows that the distribution is fairly equal. No mergers involving sector L, real estate companies, sector M, professional, scientific and technical companies or sector R, establishments for arts, and entertainment, were subject to a phase-2 investigation. The two most aggregated level of the SNI 2007, one letter code and two-digit code correspond to the NACE Rev. 2 and ISIC classifications. Industry classification code is neither supplied in the notification nor in the SCA's decision. Classification of notified merger by the SCA would permit an industry comparison to mergers notified to e.g. the European Commission.

Appendix 2 Variable definitions, descriptive statistics II, and graphical depictions

Countervailing buyer power. This variable is codified as 1 if countervailing buyer power is mentioned and regarded as high and 0 if it is not mentioned in the documentation. The ability of buyers to switch to alternative sources of supply in response to a change in relative prices affects the potential for a merger to create or enhance a position of a single firm, or collective dominance. The possibility of a firm to charge high prices depends on the degree of concentration of the buyers in the relevant market. A firm may exercise market power if it faces a large number of weak buyers, rather than one or a few strong buyers. A strong buyer may counteract a firm's market power by threat of switching to another producer or even begin an own production. This is defined as countervailing buyer power.

Technological development. This variable is codified as 1 if technological development is mentioned and regarded as high and 0 if it is not mentioned in the documentation.

In absence of **efficiency gains**, a merger is expected to lower both consumer surplus and welfare. The effect may be offset if there are efficiency gains from the merger. The firms may be more efficient together, and reduce costs. If cost reductions are large enough, they may benefit consumers.

Based on the SNI 2007 Industry Sector classification, three binary industry variables were created based on the most common industries of merging firms; 1) **manufacturing**, 2) **trade**, and 3) **information and communication companies**.

Table 8 Descriptive statistics II

Independent variables	# obs	Mean	Std. dev.	# obs=1	% obs=1
DG, Director General, 1992-1999	149	0,6040	0,4907	90	60%
DG, Director General, 1999-2002	149	0,1678	0,3749	25	17%
DG, Director General, 2003-2008	149	0,2013	0,4024	30	20%
DG, Director General, 2009-	149	0,0268	0,1322	4	3%
Post Merger Market Share [0-30]%	128	0,4531	0,4998	58	45%
Post Merger Market Share [31-50]%	128	0,2813	0,4513	36	28%
Post Merger Market Share [51-75]%	128	0,1719	0,3788	22	17%
Post Merger Market Share [75-100]%	128	0,0938	0,2926	12	9%
Decreasing Demand	149	0,0671	0,2511	10	7%
Technological Development	149	0,1007	0,3019	15	10%
Transparency in Input Prices	149	0,0470	0,2123	7	5%
Symmetric market shares post merger	149	0,0470	0,2123	4	3%
Buyer Power	149	0,0872	0,2832	13	9%
Countervailing Buyer Power	149	0,1074	0,3106	16	11%
Efficiency Gains	149	0,0604	0,2390	9	6%
Entry barriers 0-6 (Scale: 0=no or low barriers,1, 2, 3, 4, 5, and 6=high barriers to entry)	149	0,5772	1,2202		
High Entry Barriers	149	0,1342	0,3420	20	13%
Timeliness (new competitor cannot enter within two years)	149	0,0872	0,3420	13	9%
Sufficiency (new entry cannot defeat competitive concerns)	149	0,0268	0,1622	4	3%
Scale	149	0,1275	0,3347	19	13%
Essential Facilities	149	0,1074	0,3106	16	11%
Intellectual Property Rights Prevent Entry	149	0,0940	0,3106	14	9%
SNI C: Manufacturing Industry	149	0,3154	0,4663	47	32%
SNI G: Trade, et cetera	149	0,2617	0,4411	39	26%
SNI J: Information and Communication Companies	149	0,0872	0,2832	13	9%

Figure 2c, based on the model specification 3, in table 6, demonstrates how the probability of identified case concerns after a merger varies with altered assumptions. All variables are held at their means except for the altered variable.

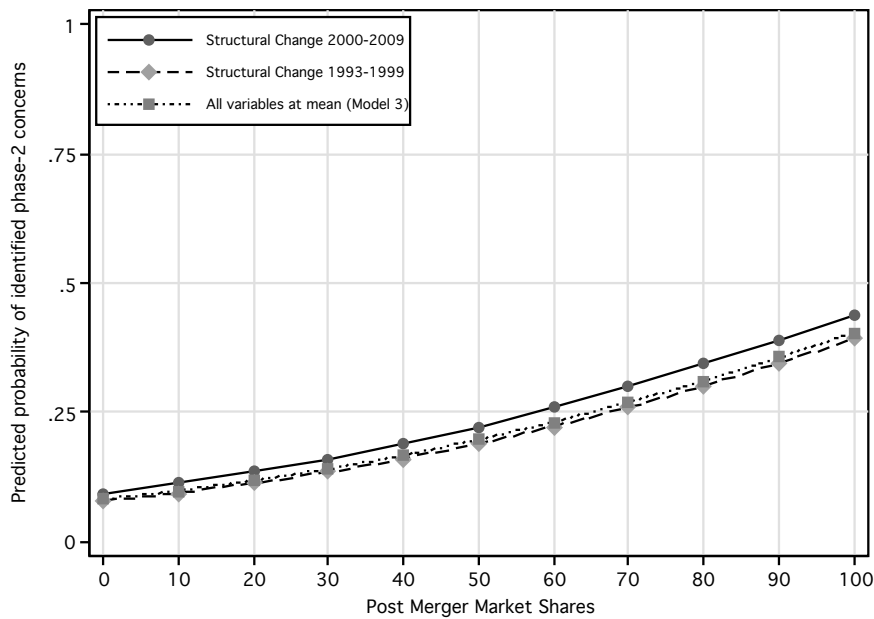


Figure 2c. There is no apparent effect of the structural change. The graphical depiction is consistent with the insignificant result in model specifications 1-6 in table 6. Given that it would have been a structural change of whether case concerns have been identified to a higher or lower degree before and after year 2000, then the lines in figure 2c would not have been approximately equal. The probability of the SCA identifying case concerns has not changed during 1993-2009. Nevertheless the probability of a merger being subject to a phase-2 investigation has changed as was shown previously in figure 1b, in section 5.1.

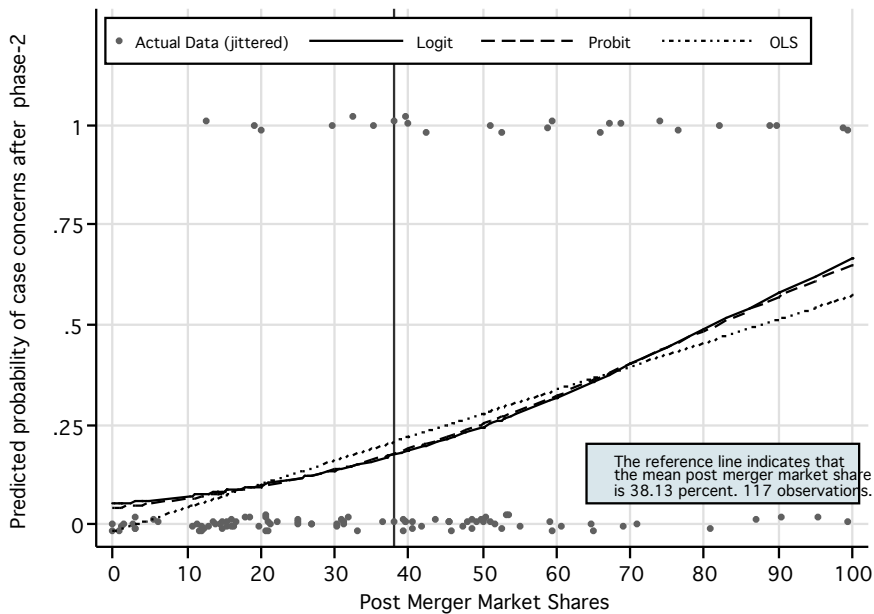


Figure 2d. The predicted probability of identified phase-2 concerns for logistic, probit and OLS estimation methods, depending on the post merger market share is shown graphically. The logistic and probit models give practically identical probabilities.

Figures 3a-3b show the relation between the level of post merger HHI and the level of HHI increase of a merger for the two decision stages.

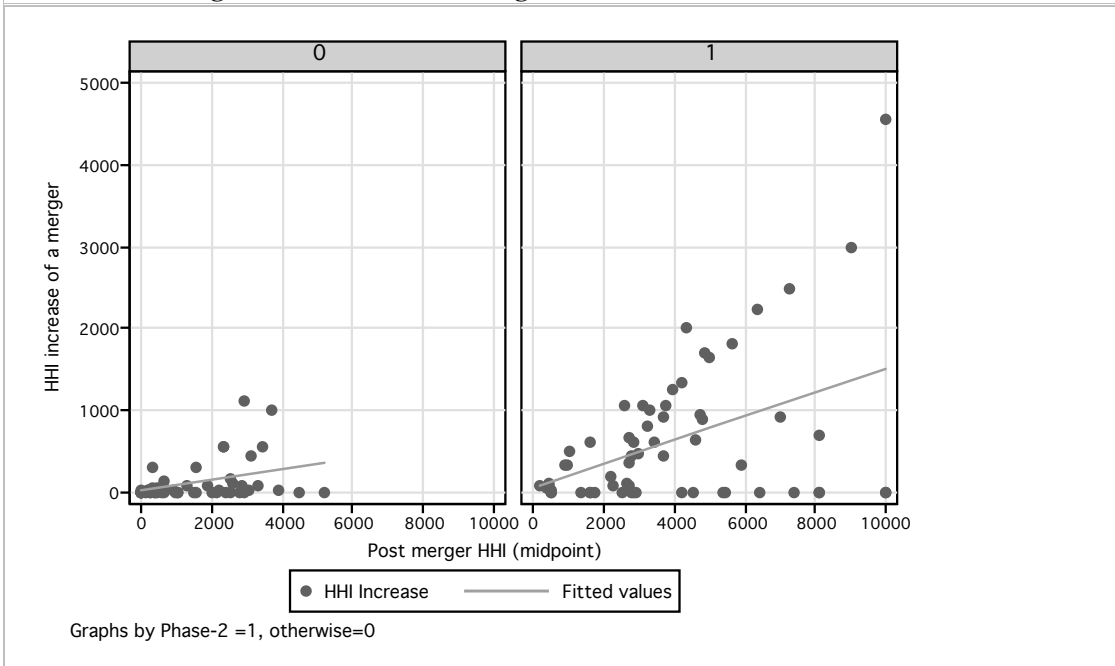


Figure 3a. Post merger HHI and HHI increase of a merger, depending on whether the merger is subject to a phase-2 investigation or cleared. Scatter is concentrated in the bottom left corner for mergers cleared, and the scattered pattern is spread out for mergers subject to a phase-2 investigation. Given that the HHI increase exceeds 1000, and the post merger HHI exceeds 4000, the merger is likely not to be cleared before a phase-2 investigation.

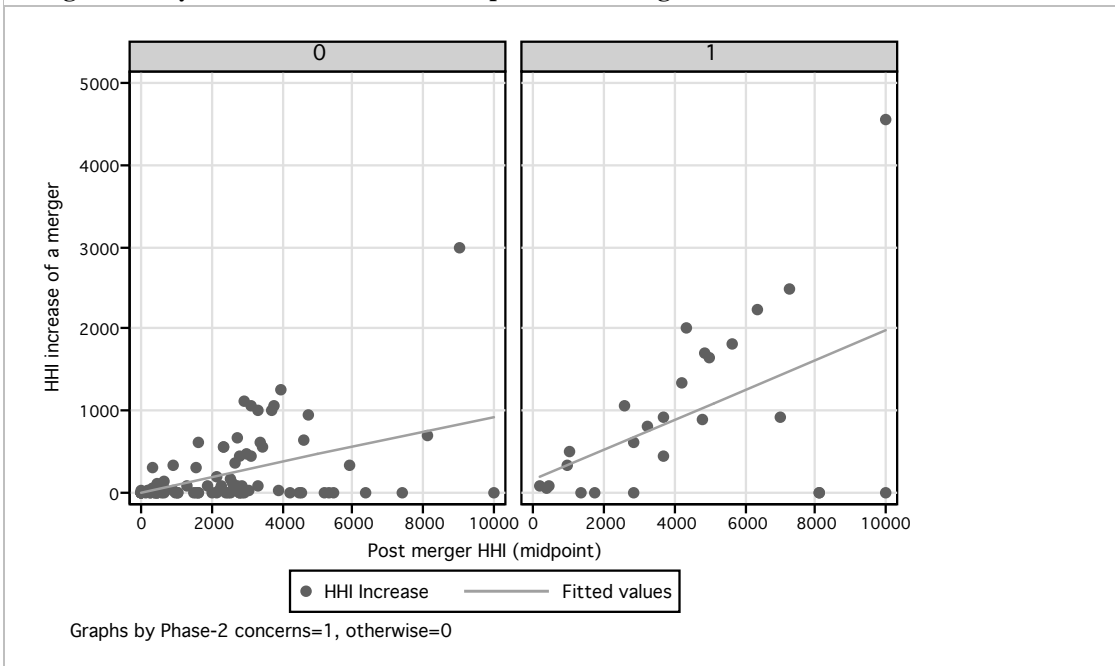


Figure 3b. Post merger HHI and HHI increase of a merger depending on whether *case concerns* are identified after a phase-2 investigation or a merger is cleared. The scatter is less concentrated for mergers cleared in figure 3b, than in figure 3a.

Appendix 3 Robustness check whether a merger is subject to a phase-2 investigation or a merger is cleared after a phase-1 investigation.

Independent variables:	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	Phase-2 Coefficient Value	Phase-2 Coefficient Value	Phase-2 Coefficient Value	Phase-2 Coefficient Value	Phase-2 Coefficient Value	Phase-2 Coefficient Value	Phase-2 Coefficient Value	Phase-2 Coefficient Value	Phase-2 Coefficient Value	Phase-2 Coefficient Value	Phase-2 Coefficient Value	Phase-2 Coefficient Value
Market Share Increase	0,0131 (0,0228)	0,0102 (0,0245)	-	-	-	-	-	-	-	-	-	-
Post Merger Market Share	0,0655*** (0,0169)	0,0863*** (0,0230)	-	0,0932*** (0,0179)	0,0983*** (0,0181)	0,0985*** (0,0181)	0,0991*** (0,0189)	0,0990*** (0,0184)	0,104*** (0,0189)	0,0932*** (0,0178)	0,0860*** (0,0180)	0,0884*** (0,0185)
Entry Barriers 0-6	0,791*** (0,306)	0,715** (0,351)	0,804*** (0,311)	0,561 (0,413)	0,697* (0,378)	0,665** (0,301)	0,706* (0,381)	0,685** (0,339)	0,702* (0,370)	0,593* (0,343)	0,584* (0,314)	0,528* (0,302)
Increasing Demand	-	-2,261** (1,032)	-2,686*** (0,944)	-2,428** (1,000)	-2,291** (1,002)	-2,307** (0,994)	-2,322** (0,984)	-2,424*** (0,914)	-2,586** (1,059)	-2,739*** (0,995)	-1,899** (0,921)	-2,333*** (0,832)
Excess Capacity in Market	-	1,610* (0,830)	1,804** (0,810)	2,128*** (0,776)	2,009** (0,822)	2,004** (0,812)	2,059** (0,975)	1,883** (0,827)	1,949** (0,848)	2,018** (0,906)	1,924*** (0,654)	1,769*** (0,707)
Structural Change 2000-2009 compared to 1993-1999	-1,862** (0,783)	-1,988** (0,792)	-1,754** (0,714)	-1,989*** (0,723)	-2,119*** (0,769)	-2,068*** (0,740)	-2,092*** (0,763)	-2,227*** (0,782)	-1,971** (0,996)	-1,959* (1,105)	-1,218 (0,925)	-1,803* (1,067)
Failing Firm	-1,619 (1,086)	-	-0,881 (0,890)	-1,925* (1,054)	-1,775* (0,997)	-1,710* (0,973)	-1,750* (1,034)	-2,029** (1,005)	-	-	-	-
Close Competitors	-	-	-	1,635 (1,917)	-	-	-	-	-	-	-	-
Technological Development	-	-	-	-	-0,403 (0,683)	-	-	-	-	-	-	-
Efficiency Gains	-	-	-	-	-	0,280 (1,395)	-	-	-	-	-	-
Import Competition	-	-	-	-	-	-	-0,131 (0,976)	-	-	-	-	-
Post Merger MS [0-30]%	-	-	-2,591*** (0,748)	-	-	-	-	-	-	-	-	-
Post Merger MS [31-50]%	-	-	0,437 (0,672)	-	-	-	-	-	-	-	-	-
Countervailing Buyer Power	-	-	-	-	-	-	-	0,974 (0,901)	-	-	-	-
DG 1992-1999	-	-	-	-	-	-	-	-	2,473*** (0,767)	-	-	-
DG 1999-2002	-	-	-	-	-	-	-	-	-	-1,840* (0,947)	-	-
DG 2003-2008	-	-	-	-	-	-	-	-	-	-	-1,562* (0,882)	-
Structural Change 1993-1997 compared to 1998-2009	-2,441*** (0,608)	-2,846*** (0,658)	0,859 (0,692)	-3,040*** (0,600)	-3,074*** (0,617)	-3,153*** (0,597)	-3,150*** (0,601)	-3,165*** (0,606)	-5,548*** (1,006)	-3,058*** (0,596)	-3,069*** (0,596)	-3,761*** (0,756)
Constant	92	92	116	117	117	117	117	117	117	117	117	117
Observations	78,26%	80,43%	82,80%	82,90%	82,29%	83,80%	82,90%	82,10%	85,50%	85,50%	84,60%	82,10%
Pseudo R2	0,33	0,43	0,41	0,50	0,49	0,49	0,49	0,50	0,52	0,49	0,46	0,46
Pseudo R2 Adjusted	0,25	0,31	0,31	0,41	0,40	0,40	0,39	0,40	0,43	0,40	0,37	0,37

Robust standard errors in parentheses. *** Indicates significance at the 1 percent level (p<0.01), ** indicates significance at the 5 percent level (p<0.05) and * indicates significance at the 10 percent level (p<0.1).

The main results of the thesis are robust to the inclusion of additional independent variables. Note in models 1 and 2 that a market share increase is not significant, given that a merger has a post merger market share ranging between 0-30 percent, it has a negative significant influence over the outcome, see model 3. The variables close competitors, technological development, efficiency gains, import competition and countervailing buyer power have no significant influence over the outcome, see models 4-8. The Director General (DG) of the SCA can either be viewed as a leadership variable or as a test of time. Mergers notified during DG 1992-1999, have a positive significant influence over the outcome. The variable is significant at the 1 percent level, see model 9. Mergers notified during DG 1999-2002, and during DG 2003-2008, have a negative significant influence over the outcome. The variables are significant at the 10 percent level. See models 10-11. Comparing an alternative structural change, mergers notified during 1993-1997, to mergers notified during 1998-2009, note that the positive significant influence over the outcome is inline with the results of the variable structural change 2000-2009, compared to 1993-1999.

Appendix 4 Robustness check whether case concerns are identified after a phase-2 investigation or a merger is cleared.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Independent variables:	Phase-2 Concerns	Phase-2 Concerns	Phase-2 Concerns	Phase-2 Concerns	Phase-2 Concerns	Phase-2 Concerns	Phase-2 Concerns	Phase-2 Concerns	Phase-2 Concerns	Phase-2 Concerns	Phase-2 Concerns
	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value
Market Share Increase	0.000229 (0.0145)	-	-	-	-	-	-	-	-	-	-
Post Merger Market Share	0.0191 (0.0131)	0.0156 (0.0103)	0.0202** (0.0101)	0.0202** (0.00965)	0.0195** (0.00986)	0.0198** (0.00966)	0.0204** (0.00973)	0.0209** (0.00976)	0.0204** (0.00958)	0.0207** (0.00977)	0.0214** (0.00946)
Entry Barriers 0-6	0.392** (0.178)	0.409** (0.168)	0.461*** (0.162)	0.492*** (0.158)	0.537*** (0.196)	0.508*** (0.157)	0.504*** (0.160)	0.514*** (0.162)	0.508*** (0.162)	0.516*** (0.164)	0.522*** (0.165)
Structural Change 2000-2009 compared to 1993-1999	0.612 (0.552)	0.235 (0.495)	0.285 (0.530)	0.186 (0.499)	0.168 (0.503)	0.258 (0.527)	0.205 (0.503)	-	-	-	-
Increasing Demand	-1.207** (0.610)	-1.347** (0.643)	-1.081 (0.660)	-1.234** (0.618)	-1.359** (0.656)	-1.233** (0.615)	-1.281** (0.604)	-1.183* (0.608)	-1.185* (0.629)	-1.091* (0.592)	-1.391** (0.649)
Failing Firm	0.661 (0.758)	1.226* (0.710)	1.215 (0.755)	1.162* (0.705)	1.181* (0.709)	1.241 (0.759)	1.210* (0.696)	1.184* (0.694)	1.226* (0.717)	1.238* (0.680)	1.364* (0.761)
Close competitors	-	0.888 (0.670)	-	-	-	-	-	-	-	-	-
Excess Capacity in Market	-	-	0.894 (0.648)	-	-	-	-	-	-	-	-
Technological Development	-	-	-	-0.378 (1.122)	-	-	-	-	-	-	-
Efficiency Gains	-	-	-	-	-0.537 (1.212)	-	-	-	-	-	-
Import Competition	-	-	-	-	-	0.788 (0.757)	-	-	-	-	-
Countervailing Buyer Power	-	-	-	-	-	-	-0.0689 (0.752)	-	-	-	-
DG 1992-1999	-	-	-	-	-	-	-	0.148 (0.505)	-	-	-
DG 1999-2002	-	-	-	-	-	-	-	-	0.153 (0.642)	-	-
DG 2003-2008	-	-	-	-	-	-	-	-	-	-0.286 (0.554)	-
Structural Change 1993-1997 compared to 1998-2009	-	-	-	-	-	-	-	-	-	-	-0.718 (0.570)
Constant	-2.633*** (0.585)	-2.727*** (0.545)	-3.018*** (0.590)	-2.730*** (0.560)	-2.718*** (0.539)	-2.954*** (0.550)	-2.776*** (0.540)	-2.864*** (0.547)	-2.768*** (0.539)	-2.731*** (0.513)	-2.478*** (0.526)
Observations	91	116	116	116	116	116	116	116	116	116	116
Correctly classified	82,40%	84,50%	83,60%	81,90%	81,00%	84,50%	81,90%	81,00%	81,90%	81,00%	81,90%
Pseudo R2	0,152	0,212	0,217	0,199	0,2	0,211	0,198	0,197	0,197	0,198	0,194
Pseudo R2 Adjusted	0,002	0,094	0,099	0,081	0,082	0,092	0,08	0,096	0,096	0,096	0,11

Robust standard errors in parentheses. *** Indicates significance at the 1 percent level (p<0.01), ** indicates significance at the 5 percent level (p<0.05) and * indicates significance at the 10 percent level (p<0.1)

The main results of the thesis are robust to the inclusion of additional independent variables. Market share increase is not significant, see model 1. The variables close competitors, excess capacity in market, technological development, efficiency gains, import competition and countervailing buyer power have no significant influence over the outcome, see models 2-7. The Director General (DG) of the SCA can either be viewed as a leadership variable or as a test of time. Mergers notified during DG 1992-1999, during DG 1999-2002, and during DG 2003-2008, have no significant influence over the outcome. See models 8-10. The results are inline with the results of the variable structural change 2000-2009, compared to 1993-1999.

Appendix 5 Robustness check SNI 2007 Industry Sector 2007

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Phase-2	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value	Coefficient Value
Independent variables:												
Post Merger Market Share	0.103*** (0.0199)	0.101*** (0.0187)	0.101*** (0.0185)	0.108*** (0.0210)	0.0211** (0.00985)	0.0208** (0.00970)	0.0206** (0.00979)	0.0212** (0.00994)	0.0215** (0.00995)	0.0210** (0.00983)	0.0209** (0.00990)	0.0215** (0.0100)
Entry Barriers 0-6	0.731 (0.450)	0.799* (0.421)	0.720** (0.337)	0.788* (0.470)	0.495*** (0.162)	0.516*** (0.160)	0.513*** (0.160)	0.521*** (0.161)	0.499*** (0.164)	0.521*** (0.161)	0.519*** (0.162)	0.526*** (0.162)
Increasing Demand	-2.169** (0.871)	-2.217** (0.981)	-2.311** (1.063)	-2.075** (0.993)	-1.315** (0.619)	-1.371** (0.567)	-1.125** (0.566)	-1.242** (0.541)	-1.253** (0.620)	-1.313** (0.563)	-1.070* (0.572)	-1.187** (0.536)
Excess Capacity in Market	2.207** (0.877)	1.992** (0.831)	1.945** (0.785)	2.139** (0.873)	-	-	-	-	-	-	-	-
Structural Change 2000-2009 compared to 1993-1999	-2.117*** (0.750)	-2.066*** (0.711)	-2.003*** (0.752)	-2.022*** (0.721)	0.195 (0.501)	0.189 (0.499)	0.206 (0.499)	0.196 (0.498)	-	-	-	-
Failing Firm	-1.567* (0.911)	-1.603 (0.979)	-1.848* (0.968)	-1.670* (0.933)	1.269* (0.714)	1.274* (0.689)	1.192* (0.693)	1.281* (0.688)	1.261* (0.707)	1.270* (0.682)	1.188* (0.684)	1.278* (0.685)
SNI Manufacturing	-1.080 (0.697)	-	-	-1.188 (0.788)	-0.310 (0.619)	-	-	-0.105 (0.742)	-0.312 (0.624)	-	-	-0.102 (0.750)
SNI Trade	-	1.000 (0.626)	-	0.448 (0.709)	-	0.780 (0.532)	-	0.677 (0.652)	-	0.782 (0.531)	-	0.680 (0.654)
SNI IT	-	-	-1.482 (1.389)	-1.864 (1.584)	-	-	-0.762 (0.577)	-0.603 (0.704)	-	-	-0.758 (0.570)	-0.597 (0.703)
Constant	-3.045*** (0.606)	-3.502*** (0.761)	-3.120*** (0.609)	-3.176*** (0.766)	-2.714*** (0.543)	-3.023*** (0.632)	-2.759*** (0.547)	-2.953*** (0.709)	-2.681*** (0.507)	-2.991*** (0.596)	-2.724*** (0.513)	-2.921*** (0.673)
Observations	117	117	117	117	116	116	116	116	116	116	116	116
Correctly classified	86,30%	84,60%	84,60%	87,20%	81,90%	84,50%	81,00%	84,50%	83,60%	84,50%	81,00%	84,50%
Pseudo R2	0,51	0,505	0,504	0,53	0,2	0,212	0,202	0,215	0,199	0,212	0,201	0,214
Pseudo R2 Adjusted	0,411	0,406	0,405	0,407	0,082	0,094	0,084	0,063	0,098	0,11	0,1	0,079

Robust standard errors in parentheses. *** Indicates significance at the 1 percent level (p<0.01), ** indicates significance at the 5 percent level (p<0.05) and * indicates significance at the 10 percent level (p<0.1)

The main results of the thesis are robust to the inclusion of additional independent variables. Whether the merging firms reside in the manufacturing industry has an insignificant influence over the outcomes in model specifications 1, 4-5, 8-9 and 12. Whether the merging firms reside in the trade sector has an insignificant influence over the outcome in model specifications 2, 4, 6, 8, 10, and 12. Whether the merging firms reside in the IT sector has an insignificant influence over the outcome in model specifications 3-4, 7-8, and 11-12.

Appendix 6 ROC curve analysis

Figures 4a-4b Receiver Operating Characteristic (ROC) curve analysis for the preferred model specifications

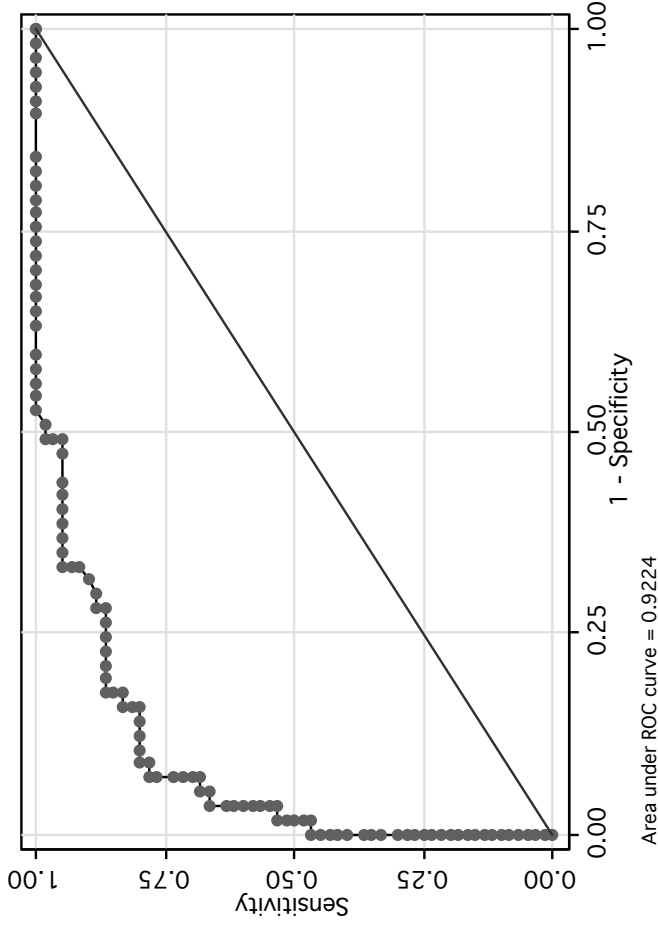


Figure 4a. ROC curve analysis for the preferred model specification 3 in table 5, whether a merger is subject to a phase-2 investigation or a merger is cleared after phase-1.

Another method to evaluate a logistic regression model is to use a Receiver Operating Characteristic (ROC) curve analysis. In a ROC curve the true positive rate (Sensitivity) is plotted as a function of the false positive rate (1-Specificity) for different cut-off points of a parameter. The area under the ROC curve is a measure of how well a parameter can distinguish between two outcomes. The area under the ROC curve is a value that varies from 0.5 (discriminating power not better than chance) to 1.0 (perfect discriminating power). It can be interpreted as the percent of all possible pairs of cases in which the model assigns a higher probability to a correctly classified case than to an incorrectly classified case. Any point of the ROC curve indicates how the probability of correctly predicting a 1 is traded against the probability of correctly predicting a zero. The further away the ROC curve is from the 45-degree line the better the model predicts both ones and zeros. The area under the ROC curve in figure 4a is 0.9224, a value that is generally described as excellent accuracy.

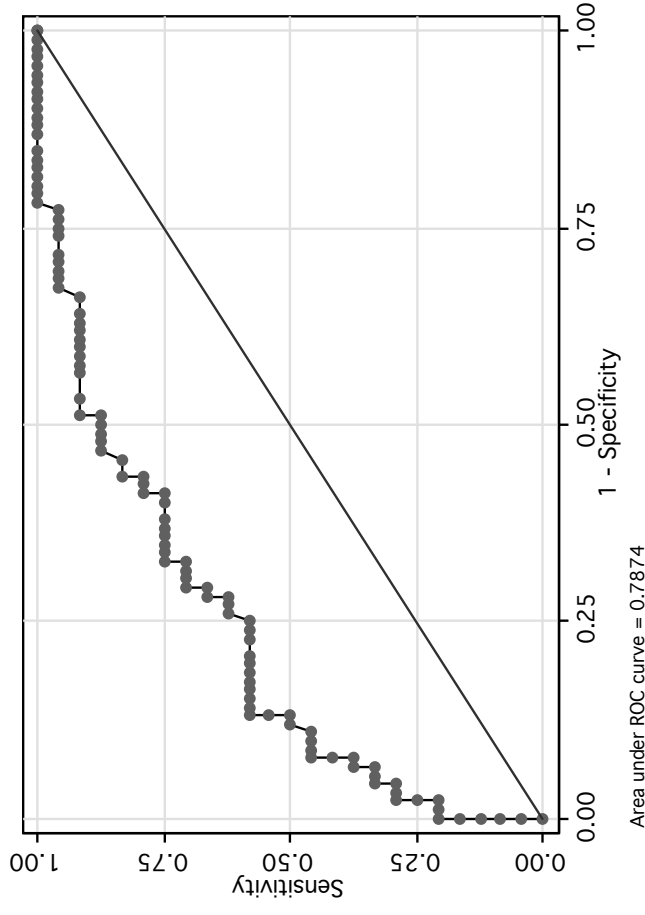


Figure 4b. ROC curve analysis for the preferred model specification 3 in table 6, whether case concerns are identified after a phase-2 investigation or a merger is cleared.

Another method to evaluate a logistic regression model is to use a Receiver Operating Characteristic (ROC) curve analysis. In a ROC curve the true positive rate (Sensitivity) is plotted as a function of the false positive rate (1-Specificity) for different cut-off points of a parameter. The area under the ROC curve is a measure of how well a parameter can distinguish between two outcomes. The area under the ROC curve is a value that varies from 0.5 (discriminating power not better than chance) to 1.0 (perfect discriminating power). It can be interpreted as the percent of all possible pairs of cases in which the model assigns a higher probability to a correctly classified case than to an incorrectly classified case. Any point of the ROC curve indicates how the probability of correctly predicting a 1 is traded against the probability of correctly predicting a zero. The further away the ROC curve is from the 45-degree line the better the model predicts both ones and zeros. The area under the ROC curve in figure 4b is 0.7874, a value that is generally described as fair adequacy.