DG Enterprise

The internal market and the relevant geographical market

The impact of the completion of the Single Market Programme on the definition of the geographical market

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Preface

This report from Copenhagen Economics has been prepared by a team consisting of Mr. Thorben Velling, Mr. Tobias Koebke, Ms. Catharina Dreyer, Ms. Nina Poulsen, Dr. H. Peter Mollgaard, Dr. Per Baltzer Overgaard, and Dr. Niels Haldrup, all affiliated to Copenhagen Economics. Ms. Katja Jin Kristensen and Ms. Gisin Ma have provided excellent research support. The team leader has been Dr. Claus Kastberg Nielsen, CEO and co-founder of Copenhagen Economics.

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Executive Summary: The Single Market Programme and the relevant geographical market

The European Commission represented by DG Enterprise has asked Copenhagen Economics to analyse the relationship between the completion of the Single Market Programme and the definition of the relevant geographical market for consumer products in EU merger cases.

The Single Market Programme refers to the completion of the internal market, the ambitious European initiative to reduce regulatory barriers to trade between member states launched in 1987 and still proceeding. The goal of the Single Market Programme is to create an integrated European-wide market with effective competition reaching across national borders.

The relevant market is a key concept in EU merger cases. The relevant market comprises all companies (and their products) within a specific geographical area, which are connected to each other in such a way that they constrain the competitive behaviour of each other. Among other things, the competition authorities use the relevant market to calculate market shares for merging companies in order to assess whether the merger threatens to create a dominant position.

If the Single Market Programme succeeds, it must be expected that the definition of the relevant geographical market in EU merger cases gradually becomes broader, although we do not expect that the relevant geographical market ends up being European in all merger cases. The reason is that there are other barriers to market integration than barriers being affected by the Single Market Programme.

If, on the one hand, the above expectations come true, we can count the widening geographical market in EU merger cases as yet another empirical documentation of the success of the Single Market Programme with great practical and economic value for European enterprises and for society as such.

If, on the other hand, the expectations do not come true, we have a paradox to explain. One immediate explanation could simply be that the Single Market Programme is not successful and, hence, widening geographical markets cannot be expected. A second explanation could be that the Single Market Programme is successful, but only in markets not well represented in the sample of cases. Another explanation could be that national regulators and businesses create new barriers at the same pace as other barriers are being torn down by the Single Market Programme, hence, nullifying the impact on market integration from an otherwise successful Single Market Programme. Yet another explanation could be that the Single Market definition

applied by the Commission is somehow biased in favour of narrow geographical markets. And there may be yet other explanations.

Our analysis proceeds in a number of stages.

First, in chapter 1 we review the most recent empirical evidence on the progress of the Single Market Programme. The aim is to get a thorough empirical foundation for the claim that the Single Market Programme works, that trade increasingly flows across EU borders, and that effective competition within the European area is on the rise.

Secondly, in chapter 2 we review the most recent theoretical evidence on barriers to market integration. The Single Market Programme aims to reduce a particular kind of barriers to economic integration, regulatory barriers, and we need to understand how these regulatory barriers relate to other barriers, be it natural, other regulatory barriers or even barriers created by businesses. Furthermore, we need some understanding of the origins of these barriers, especially those barriers that may be under the control of the businesses themselves.

Thirdly, in chapter 3 we analyse the actual definition of the relevant geographical market in a large sample of EU merger cases in the period from 1990 until 2001. We evaluate whether the size of the relevant geographical market defined in these merger cases has grown during the period. In addition, we review the methodology that the Commission has applied to define the relevant market, the barriers to integration identified during the investigation, and the empirical indicators chosen to document and verify the actual definition of the relevant market. We pay some attention to the question whether there is a significant difference between the methods applied for defining a relevant product market and a relevant geographical market. The database and merger cases are documented in appendices 1 and 2.

Fourthly, in chapters 4 and 5 we draw up a set of concrete step-by-step recommendations for how to define the relevant geographical market in EU merger cases. The recommendations build on the insights obtained in the first chapters and on concrete experiences from the definition of the relevant geographical market in five hypothetical merger cases involving consumer goods: salmon, beer, tobacco, electricity, and facial tissue. The hypothetical merger cases are reviewed in chapter 5 and, more thoroughly, in appendix 3.

Fifthly, in chapter 6 we investigate the criteria for referral of merger cases with a community dimension to the national authorities in EU member states. In the light of the review of EU merger regulation, we argue in favour of a set of alternative criteria for referral of merger cases and draw up a concrete proposal. We end by evaluating the extent to which it would have changed the distribution of merger cases between EU and the national authorities, if these criteria, hypothetically, had been applied to actual merger cases with a community dimension in the period 1990-2001.

This summary highlights the key findings and the main lessons and results derived from each of the five stages outlined above. We focus on lessons that may be of relevance to competition practitioners.

1. The progress of the Single Market Programme

We measure the progress of the Single Market Programme using two complementary methods. The first method measures the legislative impact by looking at the share of directives implemented in member states: the higher the share the larger the legislative success. The second method measures the economic impact by looking at the change in trade flows and price dispersion between member states: the larger the increase in trade and

the decrease in price dispersion, the larger the economic success. Clearly, it is the latter method that matters the most for the size of the relevant geographical market.

In terms of legislative impact, the Single Market Programme has been a clear-cut success. The share of directives implemented in national legislation is already large and still growing. As of 2002, no member state has a share of implemented directives less than 97 per cent.

In terms of economic impact, the Single Market Programme is still successful, but the success is not as clear-cut. Trade between member states relative to GDP has increased by 4 percentage points since 1993, trade border effects have decreased significantly in the same period, and price dispersion between tradables in member states has decreased. However, trade *within* member states is still at least 6 times larger than trade *between* member states, even when accounting for distances and other explanatory variables. Even though similar analyses based on US data show that trade tend to be larger within political borders than across political borders, also in well-integrated economies, it seems as though the Single Market Programme still has some distance to go.

2. Barriers to market integration

The evidence shows that the Single Market Programme has been a moderate, but non-trivial, success. We now ask the question why the Single Market Programme has not been an even larger success?

There can be several answers to this question. *First*, it could be that the Single Market Programme has been targeted at regulatory barriers that are less important or less binding than other barriers. The three pillars of the Single Market Programme have been the removal of border costs, the opening up of public procurement, and harmonisation of technical standards. However, even with a highly successful implementation of these provisions, market integration may still be limited if customers in EU member states systematically favour local goods to foreign goods. This is the argument of, among others, Geroski (1995).

Secondly, it may be that new barriers have been created at a pace that partly offsets the removal of barriers targeted by the Single Market Programme. Governments may have created new barriers to promote legitimate political goals but with the (presumably) unintended side effect of erecting new barriers to trade between member states. Private businesses may also have tried strategically to create new barriers with the (presumably) intended effect of perpetuating the protected status of their home markets even in the presence of the Single Market Programme. If this is the case, market integration may still be limited even with a formally successful Single Market Programme.

In order to investigate the latter question in more detail, we survey in chapter 2 the theoretical literature on barriers to integration with emphasis on the endogenous creation by businesses of strategic barriers to (market) entry. We pay special attention to barriers associated with contractual relations in distribution channels, also called *vertical agreements*, since they may be the key to understanding the prospects of European market integration for consumer goods in the light of the continued implementation of the Single Market Programme.

The theoretical survey identifies a large number of barriers to integration created by businesses, which may serve the goal of discouraging foreign competitors from entering a market within a member state. Some examples of vertical agreements are: Long-term contracts, exclusive dealing, selective distribution, and exclusive territories.

The survey shows that, in theory, there are ample possibilities for companies to strategically erect (new) barriers to entry that may hinder market integration in reality, even if the Single

Market Programme successfully removes other regulatory barriers to market integration. The identified barriers by far exceed the barriers mentioned in the Commission Notice on market definition (European Commission, 1997b), both in terms of scope and quantity. However, whether companies are able turn these theoretical possibilities into real world phenomena with significant economic impact is still unclear and awaits an empirical assessment.

In any concrete merger cases involving *vertical agreements*, an economic analysis is required to decide whether the vertical agreement enhances economic efficiency and stimulates entry, or reduces economic efficiency, dampens competition and discourages entry. However, most vertical agreements should be of limited concern to competition authorities, if horizontal competition is vibrant.

We conclude that while it is - in theory - true that businesses can strategically create new barriers to replace barriers torn down by the Single Market Programme thereby impeding trade and effective competition within the EU, it is not at all clear that vertical agreements *per se* have this effect. It depends on a concrete economic evaluation in each specific case. In any case, vertical agreements are likely to be less of a problem as the Single Market Programme advances, stimulating horizontal competition.

3. The relevant geographical market in EU merger cases

We now turn to an investigation into whether the moderate, but non-trivial success of the Single Market Programme and of European economic integration also has been translated into broader relevant geographical markets in EU merger cases.

To answer the question, we carefully go through a large sample of EU merger cases with a community dimension since 1990. For each merger case, we register not only the definition of the relevant geographical market(s), but also the method applied by the Commission to define the relevant market, the barriers to integration identified during the investigation and the empirical indicators chosen to document and verify the actual definition of the relevant market. This allows us to address the above question, but also to identify the most frequent barriers to integration applied, to see which empirical techniques have been used most frequently, and whether there has been a significant difference in the methods applied to define relevant geographical markets compared to relevant product markets.

Our sample, which is further documented in appendices 1 and 2, includes 67 Phase II merger cases from the period 1990-2001, about 70 per cent of all such cases. In these cases, the Commission has defined 208 relevant markets of which 30 per cent are from 1997 or earlier and the remaining 70 per cent from 1998 or later. We have not included any Phase I cases as the descriptions of the relevant markets in theses cases often are very rudimentary. We emphasize that the results of the analysis should be evaluated with caution due to the rather limited size of the sample.

First, we calculate a deceptively simple indicator of the size of a geographical market by attributing different weights to different geographical market definitions ranging from 100 for a market smaller than a member state to 500 for a market larger than the European Economic Area. We find no evidence that the size of the relevant geographical market has increased during the period. The result seems to be robust to changes in the industrial structure of merger cases throughout the period. Clearly, the limited number of observations calls for modesty when interpreting the result. But overall the result is rather surprising given that EU seems to have become slightly more integrated during the implementation of the Single Market Programme.

Secondly, we observe that the SSNIP-methodology is rarely applied, explicitly or implicitly, in the definition of the relevant geographical market and even that the European Commission makes explicit reference to demand and supply substitution in surprisingly few cases, cf. Table 1. It is of particular interest that the methodology applied in the definition of the relevant product market seems to be much better structured than in the definition of the geographical market.

Table 1: The methodology for geographical market definition compared to product market definition, 1990-01

	Geographical market	Product market				
	Per cent of markets defined					
SSNIP-method	4	11				
Demand substitution	5	61				
Supply substitution	6	22				
Potential supply	1	15				
Courses Own coloulations						

Source: Own calculations.

Thirdly, we observe that the two, by far, most frequent barriers to geographical integration identified by the Commission are transport costs (a natural barrier) and regulatory barriers, despite the existence of the Single Market Programme. These two types of barriers account for more than 70 per cent of all markets defined; cf. Table 2. Distribution systems are the third most frequent barrier, but are only identified as a barrier in 15 per cent of all markets defined. Also, note that the barriers identified on the product market are different. For comparison, the single most frequent barrier to the integration of product markets is, by far, product incompatibility (product characteristics) applied in more than 60 per cent of all markets defined.

Table 2: The four most frequent barriers to market integration, 1990-2001

	Geographical market	Product market
	Per cent of mar	rkets defined
Transportation cost and delivery time	24	3
Regulatory barriers	36	10
Distribution cost	24	6
National preferences	22	4
Source: Own calculations		

Source: Own calculations.

Finally, the Commission typically relies on very simple indicators such as trade flows and differences in price levels as empirical documentation for the chosen market definition. These indicators are used in 70 per cent of all cases, before as well as after 1997. More sophisticated indicators such as price correlation or price elasticities are used in only 2-3 per cent of all markets defined, much less than in the definition of the relevant product market.

4. A framework for geographical market definition

We now turn to the development of a set of guidelines on how to define the relevant geographical market in EU merger cases. Our aim is to develop a set of guidelines that can assure i) a more consistent and transparent geographical market definition; ii) a more sophisticated consideration of an extended list of barriers to market integration; iii) a more frequent use of empirical verification of relevant market hypotheses.

We have based the guidelines on the lessons learned from chapters 1-3; then we have applied the guidelines to five hypothetical merger cases involving consumer goods as salmon, beer, tobacco, electricity, and facial tissue. Finally, we have incorporated the practical lessons learned in the five cases in the guidelines presented in this chapter.

Our preferred analytical strategy has three key elements:

- 1. SSNIP-methodology
- 2. Scientific method
- 3. Price tests

First, we strongly recommend that market delineation is based on a well-structured guiding framework, and we, specifically, recommend using the SSNIP-methodology as the guiding framework. The recommendation is not inconsistent with the Commission Notice on market definition, but the analysis in chapter 3 showed that the SSNIP-methodology seems to be used explicitly in only a limited number of EU merger cases.

Secondly, we recommend mimicking the classical scientific method and sub-divide the process of market definition into two separate stages, where the competition analyst in the first stage formulates a hypothesis of the relevant (geographical) market, and in the second stage evaluates (or tests) the hypothesis against available data.

Thirdly, we recommend using price tests (tests of price co-movements) as the standard tool for empirically evaluating the extent of relevant markets. We acknowledge that a high degree of price co-movement is neither a necessary, nor a sufficient condition to determine whether two markets belong to the same relevant market, but we maintain that price tests seem to be the most relevant and feasible tool for a quantitative assessment of the relevant (geographical) market. We note, on the one hand, that there exist analytical methods that are superior to price tests, with closer affinity to the SSNIP-methodology, such as residual demand analysis. However, in most cases they remain hopelessly infeasible because of their huge data requirements. On the other hand, very feasible methods, such as price level comparisons and trade flows may be considered, but they are certainly analytically inferior to price tests. See appendix 4 for an analysis of the use of price tests in competition analysis.

We proceed by outlining some of the key issues of relevance for the formulation of a market hypothesis and set up a concrete step-by-step plan for developing a hypothesis of the relevant geographical market, cf. Table 3. We illustrate each step by providing concrete examples from the five case studies in chapter 5 and highlighting the features that seem to be at odds with the current practice of the European Commission. We further document our analysis of the five cases in appendices 3A–E.

Table 3: Formulating the relevant market hypothesis

1a. Define all candidate markets
Set up a gross list of all candidate markets, that is, all markets that are candidates for being or being part of the relevant market(s) in the merger case under review. In some cases the candidate markets may have a temporal dimension in addition to the traditional product and geographical dimension.
1b. Calculate market shares for candidate markets
Calculate market shares for the merging companies on all candidate markets.
The goal is to sort out trivial from non-trivial cases with large marginal returns of
rigorous analysis.
1c. Determine relevant product markets
Determine the relevant product markets by considering demand and supply
substitution in the product dimension.
1d. Demand substitution on the candidate geographical market
First, use the SSNIP-methodology to determine to which degree customers are
likely to switch their demand <i>from</i> the candidate geographical area <i>to</i> other
geographical areas.
The task is to identify demand side barriers that may prevent or deter customer
substitution.
1e. Supply substitution on the candidate geographical markets
Second, use the SSNIP-methodology to determine to which degree potential

competitors are likely to switch their supply *to* the candidate geographical area *from* other geographical areas.

The task is to identify supply side barriers that may prevent or deter potential competitors from competing in the short-run.

1f. Formulate relevant market hypothesis(es)

Combine the results of the analyses on (geographical) demand and supply side substitution to formulate a hypothesis about the size of the relevant geographical market.

Source: Table 4.1 in chapter 4

We emphasise the need for equal consideration of demand and supply side substitution, as well as the need in specific markets to introduce a temporal dimension in addition to the traditional product and geographical dimension of the relevant market.

Finally, we outline the key issues for an evaluation of the market hypothesis advanced in the previous stage and set up a concrete step-by-step plan for hypothesis evaluation using price tests, cf. Table 4. Some of the key issues we consider are tests of stationarity, purging of common factors, static versus dynamic price tests, bivariate versus multivariate tests, and we include a detailed discussion of criticisms of price tests. The plan is heavily inspired by the concrete application of a large number of price tests in the five case studies described in both chapter 5 and in the appendices.

Table 4: Evaluating the relevant market hypothesis

2a. Collect relevant price series

The first step is to search for and collect price series that are representative for the relevant market(s) in the relevant market hypothesis.

2b. Exploratory data analysis of the price series

Explore thoroughly the properties of price series with standard statistical tools: Calculate e.g. mean, median, variation, skewness, kurtosis, and standard deviation.

2c. Test for stationarity

Test whether price series are either stationary (integrated of zero order) or nonstationary (integrated of 1st order).

2d. Test for static price correlation

Test whether prices on two (geographical) candidate markets move together simultaneously. A large degree of co-movement between price series may indicate that the two candidate markets belong to the same relevant market.

For **stationary time series**, the proper measure for co-movement of prices is the *partial correlation coefficient*, not the ordinary correlation coefficient. For **non-stationary series**, co-movement of prices is measured by a test for con-integration. A number of test methods are available, in all cases involving auxiliary regressions.

2e. Test for dynamic price correlation

Test whether prices on two candidate markets move together with a lag.

For **stationary series**, Granger causality test must be used for testing dynamic price correlation. For **non-stationary series**

the Johansen method can be used to consider dynamic correlation. The Johansen method implies setting up a simultaneous equation system (an error correction model) of the price series including potential common factor variables and lagged values of all price series.

2f. Test for multivariate price correlation

Test whether prices on several candidate markets move together simultaneously.

For **stationary series**, an error correction model can be set up. The set-up is in principle similar to the Johansen method, although adapted to stationary series. For **non-stationary series**, the Johansen method for co-integrated time series can be used. The Johansen method implies setting up a simultaneous equation system (an error correction model) of the price series including potential common factor variables and lagged values of all price series.

Source: Table 4.2 in chapter 4

We emphasize that the traditional method of hypothesis testing may, at times, be flawed when the candidate markets have a temporal dimension. An example is electricity that cannot be stored between periods. Products supplied at different points in time can either be treated as different products or as having a separate temporal dimension in line with the product and geographical dimension.

We argue and demonstrate empirically that multivariate price tests, testing price correlations between several pairs of candidate markets simultaneously, may yield different results than the traditional univariate tests, where pairs of candidate markets are tested in a sequential manner. We expect that using univariate price tests lead to more narrow market definitions than multivariate price tests.

We furthermore argue that benchmarking price correlations between candidate markets on correlations between markets that are known to be either integrated or non-integrated may limit the inherent arbitrariness often involved, when deciding whether a specific test result is an indicator of market integration or not.

Finally, we emphasize the importance of having access to relevant price data for competition analysis. We strongly recommend that Eurostat assign higher priority to collecting and organising such data. It is our practical experience that surprisingly many data are available, but that they may be extremely scattered, only possible to locate with a lot of imaginative thinking and – in some cases – luck, and in some cases only available at prohibitively high costs.

5. Referral to national authorities

We proceed by analysing the procedures for referring merger cases from the European Commission to the national competition authorities. *First*, we describe the current referral rules and the proposal for facilitation of referral put forward by the Commission. *Secondly*, we put forward a proposal for new referral criteria that are based on sound economic theory and evaluate the *hypothetical* consequences if these referral criteria were used in a selection of European merger cases.

The main reason for increasing the number of referrals to member states must be that the national competition authorities in some cases are better positioned to handle the cases. We take for granted that such an advantage exists and that referring more cases to member states – everything else equal - increases *efficiency*.

But it is material that mergers in the EU are treated in the same objective manner independently of which authority will determine the case. However, this is complicated because member states and the Commission may have different goals and interests. Thus, we design the proposal such that under a specific set of assumptions, merger cases may be referred to member states if the interests of the member state and the Commission are aligned, but cannot be referred if it is likely that member states reach a materially different conclusion than the Commission.

Accordingly, we propose the following set of criteria for referral of merger cases to national competition authorities.

A merger case with a Community dimension can be referred in full to a national competition authority on the request of the Commission or a member state if...

- ...the merger affects competition ...
- ...on a distinct market within a member state...

• ...where trade with other member states is not significant, viz. smaller than, say, 10 per cent of total output.

We, hypothetically, apply these criteria on 32 actual merger cases from the period 1990-2001, with distinct markets within a member state and with the required information about trade flows. The 32 cases were split equally between Phase I and II cases: 16 Phase I merger cases handled by member states and 16 Phase II merger cases handled by the Commission.

If the proposed criteria had hypothetically been applied, we estimate that the number of merger cases handled by the Commission would drop, while the number of cases handled by member states would increase. With respect to the 32 cases, the Commission would have handled 9 merger cases, while national competition authorities would have handled the remaining 23 merger cases.

Chapter 1 : The progress of the Single Market Programme

If the Single Market Programme succeeds in creating a truly integrated market within the European Union, we would intuitively expect that it would gradually lead to a broader definition of the relevant geographical market in EU competition cases, including merger cases.

The purpose of this chapter is to survey the empirical literature on the status of the Single Market Programme and try to answer the first implicit question in the above statement: Is the Single Market Programme a success? If the answer is affirmative, we can proceed to the next implicit question: Has the relevant geographical market increased in size in EU merger cases as a response to the success of the Single Market Programme? On the other hand, if the answer is negative, we would not (for this reason) expect to see a larger size of the relevant geographical market in EU merger cases.

The Single Market Programme has its origin in the Treaty of Rome calling for the creation of a common market based on the free movement of goods, individuals, services and capital. In 1968 the customs union was established eliminating customs duties and quotas in intracommunity trade. Recognising the insufficiency of the customs union as a mean to provide an integrated market, the Commission in 1985 published a White Paper on the completion of the internal market. The paper identified legislative measures needed to remove remaining obstacles to trade within the Community and proposed a time schedule for the creation of a Single European Market on 31 December 1992. The goal was formally enshrined in the Single European Act, which was adopted in 1986 and came into force in 1987.

The aim of the Single Market Programme is to eliminate non-tariff barriers (particularly, technical and administrative barriers) to trade and investment and the free movement of individuals. Non-tariff barriers may, for example, incorporate technical barriers, public procurement rules, customs and fiscal formalities, capital controls and industrial property protection.

The formal procedure for the implementation of the Single Market Programme can be described in four stages. *First*, a specific regulatory barrier is identified. *Secondly*, an EU directive is adopted defining how regulations must be changed to eliminate the regulatory barrier. *Thirdly*, member states incorporate the directive into national legislation. *Finally*, companies (and individuals) react by increasing trade (and investment) between member states and prices start to co-move across borders, provided the regulatory barrier has been correctly defined and legislation adequately implemented; cf. Figure 1.1.

To answer the question posed initially, we need a measure of the progress of the Single Market Programme. We measure progress at two levels. First, we measure to what extent the adopted directives have been implemented in the national legislation in member states.

Presumably a high share of directives implemented in national legislation is a necessary condition for the completion of the Single Market Programme. However, it is clearly not a sufficient condition. Secondly, we try to measure directly the effects, the extent to which trade has increased and prices have become more aligned between member states since the start of the Single Market Programme. Larger trade flows and closer price alignment between member states are presumably necessary consequences and thus more direct measures of the progress of the Single Market Programme.





We make the following conclusions. *First*, a very significant part of the adopted EU directives has now been implemented in national legislation in member states. In April 2002 all member states have implemented at least 97 per cent of all EU directives into national legislation, while the same share was only 90 per cent at the end of 1997. From this formal perspective, we must consider European markets to be almost fully integrated.

Secondly, trade flows between EU member states measured relative to GDP have increased by more than 4 percentage points since the early 90es, and price dispersion for tradable goods measured as the standard deviation of the consumer price indices in member states has been reduced by almost 50 per cent in the same period. Both observations can be interpreted as signs of a successful move towards an integrated market.

Thirdly, borders still matter, as trade between member states is very limited relative to trade within member states. The so-called trade border effect within the European Union is in the range 6-12, indicating that trade *within* member states is 6-12 times larger than trade *between* member states, even correcting for differences in transport costs and other explanatory variables. The trade border effect seems to be declining in the 80es and the 90es, but is still surprisingly large. Based on these observations, we realize that even though Europe has become more integrated, there is still some way to go. However, trade border effects between the US and Canada and within US states indicate that trade border effects may be significant even in well-integrated economies. Thus, there are probably limits as to how small border effects can be.

Fourthly, although most of the empirical results mentioned above do not explicitly distinguish between consumer and other goods, we expect that the results apply equally for both types of goods. As concerns the implementation of the Single Market Programme in national legislation, it is a Herculean task to identify directives that are more relevant for consumer goods than for other goods. And the very high average implementation ratio does not really leave room for a low implementation ratio for any subgroup of goods. As concerns the effects of the Single Market Programme on trade and prices, the empirical research on price

alignment is limited, but the research that is available indicates that consumer goods behave like other goods.

The rest of the chapter is structured as follows. First, we briefly summarise the status of the implementation of EU directives into national legislation in section 2.1. Secondly, we review the empirical research on European integration, focusing on changes in trade flows in section 2.2 and on price dispersion in section 2.3.

1.1 Implementation of the Single Market Programme

We start of by measuring to what extent the EU directives, which are part of the Single Market Programme, have been implemented in the national legislation in member states. Presumably, a high share of directives implemented in national legislation is a necessary condition for the completion of the Single Market Programme.

It turns out that by this measure the Single Market Programme seems to be rather successful; cf. Table 1.1. Five years ago, in 1997, member states had implemented between 90 and 97 per cent of the directives. This year member states have implemented between 97 and 99 per cent of the directives. Thus, implementation has increased by 2-8 percentage points in the period from 1997 to 2002. In the story above, we implicitly assume that each directive has an equal weight in the Single Market Programme. This is not likely to be true. Thus, we cannot reject the hypothesis that among the directives yet waiting to be implemented are directives with a more than proportional importance for the Single Market Programme. If this is true, the "success" is clearly overestimated.

Member state	Percentage	of implemented dire	ectives
Member state	November 1997	April 2002	Change
Sweden	93.8	99.3	5.5
Denmark	96.2	99.3	3.1
Finland	92.6	99.1	6.5
Netherlands	96.5	98.7	2.2
United Kingdom	95.4	98.5	3.1
Spain	95.3	98.5	3.2
Belgium	91.5	98.5	7.0
Italy	92.4	98.3	5.9
Portugal	94.1	97.9	3.8
Austria	89.9	97.9	8.0
Luxembourg	93.5	97.7	4.2
Ireland	94.6	97.6	3.0
Germany	91.5	97.6	6.1
Greece	92.5	97.3	4.8
France	92.6	96.9	4.3

Table 1.	1: Status	for the im	plementation	of EU	directives
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Source: European Commission, Internal Market Scoreboard, November 1997 and May 2002. <u>Http://europa.eu.int/comm/internal market/en/</u>

A high implementation ratio is a measure of political success for European integration. But it is not necessarily a good measure of actual economic integration. Actual economic integration is the result, not only of policy, but also of other factors. But actual economic integration - due to the Single Market Programme or to other factors - must be reflected in the volume of trade of goods and services within Europe as well as in the movement of prices in different European regions.

In the extreme, a complete integration of national economies would imply that one could not observe any effect of political borders on trade and prices. In this case trade between two member states would be as large as trade within a member state and the price dispersion

between two member states would be the same as the price dispersion within a member state.

In the next two sections, we measure the progress of actual economic integration using a number of different indicators of trade and price alignment to get an indication of whether the national economies have become more integrated over time; cf. Table 1.2. We realize that the chosen indicators are quite rude, and we cannot completely reject the idea that changes in the chosen indicators may have been caused by other factors than the Single Market Programme.

Table 1.2: Indicators of market integration

	Over time	Relative to within
Trade	Trade flow	Trade border effect
Prices	Price dispersion	Price border effect

First, we measure how trade flows between EU member states have developed during 80es and 90es. We expect that trade flows have increased significantly in the period¹. We also measure trade between member states relative to trade within member states. If two member states are truly integrated, we would expect that trade between member states is not significantly different from trade within any of the member states. For this purpose we use the trade border effect measuring whether international trade deviates from intra-national trade after controlling for distance and other relevant factors.

Mergers may serve as an alternative to exports in the presence of barriers to trade. A firm prevented from exporting to another country may penetrate a market by investing in production facilities in that country. Foreign direct investment might therefore be more frequent in the presence of barriers to trade and thus serve as an (inverse) indicator of market integration. However, foreign direct investment may also increase when regulatory barriers are abolished as markets grow and the size of firm may adjust upwards to reap economies-of-scale. In sum, the net effect of the Single Market Programme on foreign direct investment is uncertain.

Secondly, we also measure how closely related price formation has become in member states. We expect price formation to be more closely aligned when trade flows between member states are high. We use price dispersion, either the variance or the coefficient of variation of comparable price indices, and expect price dispersion to decrease during the 90es. However, prices also differ within member states, so the development of price dispersion does not really tell how integrated two member states are. For this purpose, we employ the price border effect measuring whether *between* price dispersion deviates from *within* price dispersion after controlling for distance and other relevant factors.

Although we take price convergence as an indicator of the success of the Single Market Programme, in theory this cannot be taken for granted if prices converge to the highest level instead of the lowest level. For example, firms formerly being able to earn above normal profits because they are protected from competition from abroad may respond to deregulation by forming cartels. Cartelisation of firms across borders may allow the firms to preserve a dominant position and maintain above normal profits.

¹ In chapter 2 we argue that businesses may respond to deregulation by creating their own barriers to market integration. To the extent that the latter barriers are more severe then the former, trade may theoretically decrease following the Single Market Programme.

1.2 Impact of the Single Market Programme on trade flows

Trade of goods between the EU member states was relative constant in the period 1981-93, where intra-EU exports and imports both made up 12-15 per cent of GDP; cf. Figure 1.2. During the 90es, trade of goods increased to 16-17 per cent of GDP. Thus, if we take trade as an indicator of market integration, EU member states seem to have become more integrated after the launch of the Single Market Programme.

One may wonder why trade of goods fell in the period from 1988 to 1993 where most of the directives of the Single Market Programme were adopted. It may be due to the European recession 1991-1993, generally reducing the level of trade, or the introduction of the new system for trade statistics, Intrastat, in 1993, that may have caused a (fictional) shift in the level of trade.



Figure 1.2: Intra-EU exports and imports of goods

Note: EU-15.

Source: European Commission, Statistical Annex of European Economy (spring 2002).

Trade border effects

Trade border effects measure whether international trade deviates from intra-national trade after controlling for distance and other factors. The most common framework for the measurement of trade border effects is a modified gravity model. The gravity model explains trade between two regions primarily as a function of their relative sizes and the distance between the regions. The gravity model is a parsimonious and rather robust empirical model providing rough explanations of the determinants of trade flows between countries.

To measure trade border effects, the gravity model is slightly modified. The model is modified to take data on trade flows within countries as well as trade between countries into account. It also has to incorporate data on trade distances within countries as well as trade distances between countries. Finally, the model has to include a dummy variable to distinguish trade flows between countries from trade flows within countries. The dummy measures the trade border effect; and if trade between countries is different from trade within countries, the dummy will be statistically significant. If the dummy has the value of 2, trade within countries is twice as large as trade between countries.

The trade border effect within the European Union has been estimated in a number of studies. Most of the studies estimate a trade border effect within the range of 6-12, with a slight tendency for the largest border effects to be recorded in studies using data from the 80es and the smallest border effects using data from the 90es². The results imply that the *within* trade of a member state on average is at least 6 times larger than *between* trade with other member states; cf. Table 1.3. It seems fair to conclude that the border effects are remarkably high, indicating that the European economies are not fully integrated.

Study	Time period	Explanatory variables	Border effect
Chen (2002)	1996	A. Country size and distance	6.5
		B. A plus transportability	6.0
		C. B plus country fixed effects	4.3
Nitsch (2000)	1979-90	A. GDP and distance	6.8
		B. A plus adjacency	10.8
		C. A plus language	8.8
		D. A plus language + adjacency	11.4
		E. D plus remoteness	11.4
Head and Mayer (2000)	1984-86	GDP, distance, price, language	11.9-19.5
Helliwell (1998)	1992	A. GDP, distance, language, remoteness	6.6
		B. A plus per capita income and population	6.5
Wie (1996)	1982-94	GDP, distance, remoteness, language, adjacency	1.7

Table 1.3: Average border effect, European Union

Note: The estimates by Nitsch exclude Portugal and Spain. Head and Mayer have used different estimates of distance implying different estimates of the border effect.

There can be several reasons for the large variation from study to study. First, the time period differs, which matters to the extent that border effects change over time. This, however, does not seem to be the sole explanation. For example, the studies by Nitsch and Wei cover the same time period 1982-90, but the estimated border effects are nevertheless different by a factor of 4-7. Secondly, the studies use different sets of explanatory variables. Neither does this seem to be the only explanation. For example, model E by Nitsch and the study by Wei include the same explanatory variables, but the estimated border effect by Nitsch is almost 7 times larger than the one estimated by Wei. Finally, the variables may be measured differently from study to study. In particular, there are generally no data available for distance and intra-national trade. Both variables can be proxied in several ways, and this may lead to non-trivial differences in the estimated border effects. This is illustrated by the study of Head and Mayer, where the estimated trade border effect varies between 12 and 20 when different distance indicators are used.

Trade border effects have been proposed as an alternative empirical measure of barriers to market integration in the delineation of a relevant geographical market (Sleuwagen et al, 2001). While not rejecting the possibility that trade border effects convey useful information about cross border competition effects, we have doubts about their applicability in a specific merger case. The main reason is that trade border effects typically are measured on a very aggregate level without clear relevance for a merger case with specific relevant markets. Trade border effects may also be difficult to evaluate. For example, geographical markets may still not be integrated even though trade border effects are not significantly different from zero. The reason is that the trade border effect corrects for some trade-reducing factors, as distance, that in a competition sense may be a highly relevant natural barrier between two geographical markets.

² We prefer to interpret the result by Wei (1996) as an outlier until other studies have corroborated his results.

Some of the studies also analysed the change of the border effect over time. The trade border effect seems to have decreased substantially from the late 80es to mid 90es, cf. Figure 1.3, and reached in 1994 a level at about 50 per cent of the level in the late 70es. Most of the reduction seems to have taken place in the latter part the 80es and the beginning of the 90es, which is consistent with the timing of the Single Market Programme.



Figure 1.3: Border effect on trade in Europe

Source: Wei (1996), Head & Mayer (2000.

Why are trade border effects large?

In this section we ask ourselves: Why do we still observe such large border effects? We consider the question from two perspectives. We describe the explanatory variables that have been used in the estimation of the border effects. Then, we compare estimates of EU trade border effects with similar trade border estimations from North America.

The estimated trade border effect measures the effect beyond what can be accounted for by the explanatory variables. Thus, a high trade border effect is not, for example, due to large trade distances between countries. If the border effect had been estimated without distance as an explanatory variable, it would have been even larger. But distance is not the only explanatory variable included in the estimations. The explanatory variables may also include among others, remoteness, transportability, adjacency and language; all indicators of the extra costs of trade between countries compared to trade within a country.

Remoteness takes into account the geographical position of two countries relative to all other countries. Two remote countries like Australia and New Zealand tend to trade more with each other than Spain and Sweden, even though the distance between the first pair is the same as the distance between the latter pair. This is due to the fact that Australia and New Zealand are further away from other trading partners than Sweden and Spain. Transportability measures how easy it is to transport a good, for example measured by value relative to weight or volume. Adjacency indicates whether two trading partners share a common border, and language indicates whether two countries share the same language. In addition, the studies often include GDP, country size and per capita income. The larger GDP or size of a country, the larger the trade will be, which is probably not surprising. Increasing per capita income is expected to increase demand for product variety, and therefore trade.

Some of the studies have included additional explanatory variables in analyses of specific industries; cf. Table 1.4.

Study			Explar	nation		
	Technical	Non-tariff	Information	Spatial	National	Exchange
	barriers	barriers	costs	clustering	preferences	rate volatility
Chen (2002)	Yes	No	Yes	Yes		
Head and Mayer (2000)		No			Yes	

Table 1.4: Causes of industry-specific differences in border effects

Chen finds evidence of technical barriers capable of explaining different industry-specific border effects. But she does not find evidence of non-tariff barriers as an explanation of border effects. This is consistent with the result by Head and Mayer. Chen finds some support that information costs and spatial clustering can explain differences in border effects. With respect to information costs, larger firms are assumed to enjoy some information advantages over smaller firms when they pursue cross-border trade. The idea of spatial clustering is that intermediate and final goods producers tend to agglomerate within political boundaries in order to avoid trade costs. Head and Mayer also investigate national preferences as an explanation of border effects and find supporting evidence.

Overall, the empirical studies only partially explain why EU member states are still surprisingly non-integrated. Costs of trade between member states, including relatively long distances and language barriers, seem to be the best explanations of the absence of market integration.

We may also gain some insight, if we compare the EU trade border effect with border effects in other areas. The seminal paper by McCallum (1995) showed that the internal trade in the US and Canada was 22 times as large as the trade between the two countries. While the very large US-Canada trade border effect has been questioned by Anderson and Wincoop (2001), a border effect of substantial size seems to remain. The US-Canada case is interesting, because the two countries are very similar in terms of culture, language and institutions. Despite these similarities, the border still matters for trade. Clearly, there are limits to how small border effects can be even for seemingly well-integrated countries.

There even seems to be significant border effects between states within the US, despite the absence of obvious trading frictions. According to Wolf (2000), the *within* state trade is more than 4 times larger than *between* trade. Hillberry and Hummels (2002) also find that border effects are significant, but lower. They estimate a border effect of 1.5. They suggest that political boundaries influence trade, because manufacturers are legally allowed to segment markets by designating boundaries that their wholesalers are not allowed to cross.

1.3 Impact of the Single Market Programme on price dispersion

We now turn to investigate the impact of the Single Market Programme on price dispersion. In a fully integrated economy, the price dispersion, measured as the standard deviation, between similar goods in two different areas would be statistically insignificant. But the more segmented markets, the more independent are prices and the larger price dispersion is possible. According to a study by Rogers (2001), the price dispersion for tradable goods in selected European cities fell by about 30 per cent from 1990 to 1995 and almost similarly from 1995 to 1999. Thus, on this measure, EU member states have become more integrated; cf. Figure 1.4.



Figure 1.4: Price dispersion of tradables and non-tradables in Europe

Note: Price dispersion is measured by the standard deviation. Source: Rogers (2001).

In contrast, the price dispersion for non-tradables has been almost constant. This is not surprising, since non-tradables are by definition not exposed to arbitrage across borders by consumers or producers. This is also reflected in the relative size of price dispersion within a year. Price dispersion of non-tradables is 2-3 times as large as the price dispersion of tradables, cf. also Table 1.5.

Area	Price index	. 1990	1995	1999
Europe	Overall	0.12	0.12	0.11
	Tradables	0.12	0.08	0.06
	Non-tradables	0.27	0.33	0.31
United States	Overall	0.16	0.15	0.17
	Tradables	0.05	0.04	0.04
	Non-tradables	0.51	0.52	0.57

 Table 1.5: Price dispersion of consumer prices in European and US cities

Note: The price dispersion is measured by the standard deviation of prices in selected European and US cities. Source: Rogers (2001).

The price dispersion for tradables in European cities is larger than the corresponding dispersion in US cities. However, while in 1990 the European price dispersion was twice the price dispersion in the US, they were very similar in 1999. Taking the price dispersion in the US as a benchmark for what is possible, the EU seems to have come close to its potential.

The price dispersion for non-tradables is much larger in the US than in Europe, which is also reflected in a larger overall price dispersion in US than in Europe. This may partly be due to a more unequal income distribution in the US than in Europe. The relatively large dispersion for non-tradables is thus mostly due to a relatively large price dispersion of housing prices.

In a similar study the European Commission finds that the price dispersion for private final consumption goods fell in the period 1995-98, cf. Table 1.6. The price dispersion fell for both goods and services, whereas the price dispersion for fuel and power did not change. These conclusions are not far from the conclusions in the analysis by Rogers (2001), if goods are taken as a rough measure of tradables and services as a rough measure of non-tradables.

·	1995	1996	1997	1998
Private final consumption	0.18	0.16	0.15	0.14
Non-durable goods	0.15	0.14	0.13	0.12
Durable goods	0.16	0.13	0.12	0.12
Gross rents	0.34	0.31	0.30	0.29
Fuel and power	0.18	0.17	0.16	0.18
Services	0.17	0.16	0.16	0.13

Table 1.6: Price dispersion in EU for goods and services

Note: The price dispersion is measured by the coefficient of variation.

Source: European Commission,

http://europa.eu.int/comm/internal_market/en/update/economicreform/cardiff01enpress.htm

The sectoral price dispersion also went down in most industries in the period 1993-97, except for electricity, gas and water; cf. Table 1.7.

Table 1.7: Price dispersion in EU by industry

Sector	1993	1997
Aggregate price level	0.16	0.15
Manufacturing	0.15	0.09
Electricity, gas and water	0.24	0.26
Construction	0.26	0.23
Services	0.26	0.19

Note: The price dispersion is measured by the coefficient of variation.

Source: European Commission

http://europa.eu.int/comm/regional_policy/sources/docoffic/official/reports/pdf/taba.pdf

Overall, we conclude that prices have become more aligned across Europe in the 90es, which indicates that national economies have become more integrated in the period.

Border effect on prices

If trade border effects are significant, one should also expect price border effects. Price border effects are similar to trade border effects, as they measure how price dispersion *between* countries differ from price dispersion *within* countries. However, the empirical research of price border effects is much more sparse than on trade border effects. To our knowledge, only two studies exist using EU data. Both of them conclude that price border effects are significant, but their size is more moderate.

Engel and Rogers (2001) estimate border effects on prices for Europe 1981-97. The price variable to be explained is the variance of relative consumer price indexes between European cities measured in the same currency. The variance of relative price indexes is larger *between* countries than *within* countries and the border significantly explains price variability after controlling for distance. However, the border effect is reduced from 2.89 to about 0.2, if exchange rate variability is included as an explanatory variable. Serres, Hoeller and Maisonneuve (2001) estimate price border effects for 1998 using price level data for specific categories of manufactured goods. They find that the dispersion of prices in the European Union was 20-25 per cent higher *between* countries than *within* countries after controlling for distance.

Chapter 2 : Barriers to market integration

In the previous chapter, it was argued that the Single Market Programme has been a success if measured by the progress of the actual implementation of EU directives into national legislation, but only a moderate – though non-trivial – success if measured by cross-border trade and price convergence. Trade between EU member states has increased, and the price variability within the EU area has been reduced. But trade between EU member states is still modest compared to trade within member states. There is no doubt that the Single Market Programme has been a relative success, but a question remains: Why has it not been an even larger success?

There could be several answers to this question. *First*, it may be that the Single Market Programme has been targeted at regulatory barriers to market integration that are less important or less binding than other (natural?) barriers. The three pillars of the Single Market Programme have been the removal of border costs, the opening up of public procurement and harmonisation of technical standards. However, even with a highly successful implementation of Single Market Programme provisions, market integration may still be limited if customers in the EU member states systematically favour local goods to foreign goods. This is the argument of, among others, Geroski (1995).

Secondly, it may be that new barriers have been created at a pace that partly outweighs the removal of barriers targeted by the Single Market Programme. Governments may have created these new barriers to promote legitimate political goals but with the (presumably) unintended side effect of erecting new barriers to trade between member states. Private businesses may also strategically have created new barriers with the (presumably) intended effect of perpetuating the protected status of their home markets even in the presence of the Single Market Programme. In any case, even with a nominally successful Single Market Programme, market integration may still be limited.

In this chapter we provide a theoretical overview of barriers to market integration and their origins. The point of departure is that successful market integration requires smooth arbitrage on the demand-side and smooth mobility on the supply-side of markets. With this in mind, the chapter focuses on the origins of barriers to mobility, while making a distinction between natural barriers, regulatory barriers, and strategic barriers created by businesses. From the perspective of the Single Market Programme, the key question is whether barriers of the third type will replace barriers of the first two types. Hence, the focus of the chapter is on the last type, strategic barriers created by businesses (on the supply side).

The approach of this chapter borrows substantially from *modern industrial organisation*, in the sense that it makes a distinction between barriers that are largely *exogenous* and barriers that are *endogenous*. Very roughly, exogenous barriers are those outside the control of

market participants (consumers and businesses), while endogenous barriers are those erected or, at least, affected by the behaviour of the market participants, in particular businesses.

We make several conclusions. *First*, we conclude that the academic literature within the New Industrial Organisation tradition is replete with examples of barriers to entry that may be created strategically by companies to prevent or deter entry from competitors. Some may be created by unilateral action by a single company though brand proliferation, sleeping patents, bundling, versioning and tying. Others may be created in cooperation between companies, either as horizontal agreements between companies at the same level of the supply chain, or as vertical agreements between companies at different levels of the supply chain, e.g. between a producer and a number of distributors. Even though most of the barriers have been exemplified, we do not know much about their prevalence.

Secondly, while the theoretical literature agrees that most horizontal agreements are not desirable from the point of economic efficiency, the same conclusion does not necessarily hold for vertical agreements, as for example exclusive dealing and exclusive territories. First of all, if competition between brands is vibrant, then vertical agreements should be of limited concern to competition authorities. One implication is that the larger the success of the Single Market Programme, the less to worry about with respect to vertical agreements. And if this condition does not hold, then any of the vertical agreements may be either benign (*induce entry*) or malign (*prevent entry*) from the perspective of economic efficiency, depending on the particular sets of circumstances surrounding a given case. And whether a particular vertical agreement belongs to the one or the other type must be decided in a concrete economic analysis.

To summarise this chapter, we provide the following checklist of signs, which might be associated with one or more incumbent firms attempting to establish strategic or endogenous barriers to entry; cf. Box 2.1. In the context of the Single Market Programme such barriers also constitute barriers to market integration. The checklist is a gross list of *possible* strategic barriers to market integration mainly derived from a buoyant theoretical literature. The relevance of the identified strategic barrier still remains to be documented empirically and probably varies significantly from market to market.

On average the strategic barriers to entry are probably more important to consumer goods than to other goods. In particular, the barriers created by vertical agreements are to a large extent linked to distribution systems that are only relevant for consumer goods. For example, a company producing intermediate products for the food industry often sell their goods directly to (a limited number of) companies in the food industry, B-to-B, and does not need a sophisticated distribution network. But the companies in the food industry must direct their products to a large number of small and dispersed customers, B-to-C, such that access to an efficient and wide ranging distribution network becomes a key competitive asset.

Box 2.1: Checklist of possible signs of barriers created by businesses

Barriers created by unilateral action

- Introductory discounts
- Rebates and bonuses
- Loyalty programmes
- Proprietary and incompatible standards
- Patenting
- Sleeping patents
- Capacity expansion
- Excess capacity
- Brand proliferation
- Product pre-announcements
- Versioning
- Bundling
- Tying
- Forward and backward integration
- Increased advertising intensity

Barriers created by horizontal agreements

- Joint bonus and loyalty schemes
- Closed bonus systems
- Closed standardisation agreements
- Closed cross-licensing agreements

Barriers created by vertical agreements

- Long-term contracts
- Exclusive dealing
- Selective distribution
- Exclusive territories
- Restrictions on parallel imports

2.1 New Industrial Organisation

Modern industrial organisation (IO) offers a detailed account of strategic barriers to mobility, entry and exit (cf. e.g. Gilbert (1989) and Tirole (1988, ch. 4 and 8) for surveys). The focus of this literature is on understanding the value of incumbency, which largely turns on entry barriers and their origins. A distinction is made between technological (i.e., natural), legal (i.e., regulatory) and strategic barriers.³ The emphasis in the new IO literature is on the strategic barriers are largely suppressed. However, the distinction between strategic and technological barriers is often unclear since the current strategic choices of firms affect the technologies available tomorrow. Similarly, the distinction between strategic barriers and legal barriers is sometimes blurred since the investments today in R&D may affect tomorrow's (legal) property rights (through patents and copyrights etc.).

Despite the problems in drawing up the various distinctions, the approach of modern IO makes it a useful point of departure for our purposes. One limitation of the modern IO approach to entry barriers from the perspective of the present overview is that the focus is almost exclusively on the strategic interaction between firms, that is, on supply-side interactions between rival firms. In formal modelling, the demand-side interactions and, hence, consumer arbitrage is largely neglected, at least in the sense that a demand system is simply assumed.

³ At this point it should be added that there is also a vast literature on the proper definition of an entry barrier. Gilbert (1989) gives an overview, and key contributions include Bain (1956), Stigler (1968), von Weizsäcker (1980) and Demsetz (1982).

Presumably, the Single Market Programme implies or should imply that certain legal barriers to consumer and firm mobility are brought down in a systematic and publicised manner. From an analytical perspective, this implies that the situation looks somewhat like the temporal structure of many IO-models where some protected situation comes to an end. Those (i.e. firms) who were previously protected know this and have time to prepare their response. Consequently, we should try to understand how they could optimally prepare. A key question is whether and how incumbent firms can turn their first-mover position (which they have by virtue of their past protection) into a permanent competitive advantage. The situation from the perspective of firms vying for the market is inherently dynamic, with some kind of break in the strategies available to (actual and potential) market participants. Hence, from a modelling perspective, a natural point of departure would be the simple models of dynamic oligopoly competition suggested by Fudenberg and Tirole (1984) and Bulow, Geanakoplos and Klemperer (1985) (for comprehensive introductions to these and related models cf. e.g. Tirole (1988, ch. 8) and Shapiro (1989)).

Let us briefly outline how these IO-models can be related to the progress of Single Market Programme. In their most stylised version, a two-stage dynamic model is considered. Initially, one or several incumbent firms enjoy a protected position. Assume that at some preannounced date this protection comes to an end due to the progress of the Single Market Programme. Incumbents know this in advance, as do customers and potential entrants. The incumbent(s) can move first in visible fashion. In particular, he (they) can make an *investment*. The point of the investment (the signal) is to influence the subsequent choices of potential newcomers (typically foreign in the context of the Single Market Programme).^{4 5} Depending on the specifics of the situation under scrutiny, incumbents may e.g. attempt to limit the scale of entry or deter entry altogether. Models with these features will form the basis for much of the discussion below in Section 3.5.

In this context, investment should be understood rather broadly. The most obvious example is that an incumbent firm can invest in productive capacity, which is more or less accurately observed by potential entrants. Substantial capacity expansion by incumbent firms may (correctly) be interpreted by a potential entrant as a sign that post-entry competition will be very intensive, should he decide to enter. Hence, the potential entrant may decide that entry is not worthwhile, and the initial investment in capacity expansion has served its purpose as a strategic entry barrier. In related fashion, incumbent firms may visibly increase their investments in R&D to attempt to convert their first-mover position into a sustainable competitive advantage.⁶ Similarly, the investment by incumbent firms may be in increasing customer loyalty (through marketing, bonus schemes or otherwise). If the customers of incumbents are highly loyal, then potential entrants may conclude that entry is not worthwhile, and the incumbent swill have paid off. Finally, the investment may be an investment in dealer-relations, which makes entry seem unprofitable from the point of view

⁴ Of course, this simple two-stage framework is an abstraction. However, it captures the distinction between a preentry and a post-entry period. The important feature is that, in the pre-entry period, incumbents have the opportunity to visibly prepare for the onslaught of competition.

⁵ In some cases, incumbent firms may have found the protection afforded by the natural and regulatory barriers to entry too weak already before the implementation of the Single Market Programme. In that case they may already have taken strategic steps to prepare for potential entry, and the additional effects of the Single Market Programme might only be marginal. In any case, the focus of this chapter is on additional business responses potentially brought about by the implementation of the Single Market Programme.

⁶ If the outcome of R&D is largely in terms of process innovations, then the investment is basically an investment in lowering production costs. The point to be made is that incumbents may have an incentive to invest over and above what they would have done had there been no threat of potential entry. In a different interpretation, these models also explain why incumbents may pre-emptively take out more patents than they would have had there been no threat of entry.

of potential entrants. The set of entry deterring strategies available to incumbents is much larger,⁷ but these stylised examples should suffice as an introduction.

In light of these examples key notions for understanding the role of incumbent investments in creating strategic barriers to entry and market integration include the following: *strategic posturing or signalling* (in particular, aggressiveness in the face of potential entry), *irreversibility*⁸, *sunkness* of investment outlays⁹, *asset specificity*¹⁰ and *commitment value* of past investments.

2.2 A taxonomy of barriers to market integration

In this section we shall try to categorise barriers to market integration according to their *origins*. The point of this exercise is to draw up a comprehensive list of barriers and their origins assessing them against the general progress of the Single Market Programme. Then, in specific cases that come under antitrust scrutiny, the items on the list should play an integral part in the definition of scope of the relevant geographical market.

A useful distinction can be made between three types of barriers:

- Natural barriers
- Regulatory barriers
- Barriers created by businesses

First, the archetypical example of a natural barrier is *language*. A consumer who has habitually shopped in a monopolized shop in country A might be prevented from turning to a lower priced shop in country B for the simple reason that he is unable to obtain information on the offerings of shops in country B due to a language barrier. We shall refer to this barrier as *exogenous* to the extent that the consumer would have to incur prohibitively large costs to removing the barrier (e.g., learning the language of country B to save a few Euros on an electronic widget). Of course, in some cases the barrier might be overcome at a low cost, if the firms in country B could make their offerings available in the language of country A (this may be illustrated by web sites which make information on offerings available in several languages). In addition, provided that it is feasible, the firms in country B should also have an economic incentive to make their offerings available in this fashion.

Secondly, a key example of a regulatory barrier might be *national standards* related to e.g. health, safety or the environment. A consumer in country A might be prevented from shopping around for bargain prices in country B for the simple reason that the offerings available in country B are incompatible with product requirements and standards in country A. Again, whether this constitutes a barrier to the effective integration of markets depends on whether the national standards allow firms in country A to maintain higher prices or whether firms in country B could (and would) quickly adapt their products to the standards in country A were the firms in country A to maintain high prices.

Regulatory barriers are *semi-exogenous* and could in principle be removed quickly by policy makers. In terms of the example, a national standard is something that could be changed by

⁷ Cf. Shapiro (1989) and Tirole (1988, ch. 8) as well as the discussion below.

⁸ An investment, which cannot easily be reversed or undone, should be discarded by potential entrants as a credible signal of the future intentions of the incumbents.

⁹ An investment outlay or cost is sunk, if it cannot be recovered subsequently, should the investment project fail.

¹⁰ A specific asset is an asset which has a significantly lower value in alternative use. Therefore, it will typically have a low resale value, and a large fraction of the investment costs associated with building the asset will be sunk.

act of parliament. Hence, there is nothing inherently natural in such a barrier. A further reason for alternatively referring to such a barrier as only semi-exogenous is that market participants (consumers and firms) can try to influence legislation by lobbying. However, we shall maintain that such activities are outside the market as such and therefore not truly endogenous.

Thirdly and finally, the archetypical example of barrier created by businesses is *foreclosed access* to distributors. A producer in country A may have tied up all the most efficient retail distributors in the country, and as a result a potential competitor currently active in country B may be at a significant competitive disadvantage vis-à-vis the consumers in country A. This type of barrier will also be referred to as *endogenous*, since it is the result of the conscious strategic choice of the firm in country A, that is, a market participant. For consistency with the industrial organisation literature, endogenous barriers will interchangeably be referred to as *strategic* barriers to integration.

It should be noted that effective market integration could be the result of either demand-side responses to price differences, supply-side responses, or both. Suppose, initially, that the price of some good or service differs significantly between country A and country B. Market integration can then be the result of consumers quickly turning their demand to outlets in the low-price country. Alternatively, integration can be accomplished by firms switching more supply to the high-price country. Either way, price differences over and above transport cost will be removed through arbitrage and/or competition in a fully integrated market.

Based on these observations, it should be clear that mobility on one side of the market is generally sufficient for successful market integration. If demand is fully mobile across borders, then whether or not supply is mobile is less important. Similarly, if supply is fully mobile across borders, then whether or not demand is also mobile is less important. In practice, neither demand nor supply is perfectly mobile, and therefore it is important to assess mobility on both sides of a given market. Yet, the distinction made above between various types of barriers remains useful: on both sides of any market, there may be natural barriers, legal and regulatory barriers as well as barriers created by businesses.

Let *consumer arbitrage* refer to the action of consumers of buying a good or service at the geographical location where the price is lowest. The ability of consumers to arbitrage may be hindered by natural barriers or due to barriers created by public regulation or by businesses. A key example of an impediment to consumer arbitrage is dealer restrictions, such as territorial exclusivity combined with contractual barriers to parallel importing.

Similarly, let *firm mobility* refer to the ability of firms initially in one geographical location to direct or redirect supplies to another location. This may either require relocation of production facilities or gaining access to distribution channels. Barriers to firm mobility may prevent firms from a certain geographical location from supplying their products in other geographical areas, including areas where prices are high, and thus segment markets. Again, barriers to firm mobility may be natural, created by public regulation or created by businesses.

This suggests the following schematic representation of the barriers, where a few examples have been filled in.

	Natural	Regulatory	Created by businesses
Consumer	Transportation costs	Import restrictions	Dealer restrictions
arbitrage	Search costs	Product standards	Bundling of goods and
	Language	Exchange costs	services
			Switching costs
Firm	Transportation costs	Environmental standards	Long-term contracts
mobility	Language	Licenses and patents	Foreclosed access to
	Scale economies	Subsidies	distribution
			Excess capacity

Table 2.1. Ochematic representation of potential barriers	Tab)le 2	2.1:	Schematic	representation	of	potential	barriers
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Sometimes, competition from other firms (actual or potential) is seen as inferior to consumer arbitrage in putting competitive constraints on firm pricing, cf. for example Commission Notice on Market Definition (European Commission (1997b). This point of view may have some merit in relation to the definition of the relevant product market, if it is the case that consumers can easily switch to substitute products, while firms can only reposition their product portfolios at significant costs. However, it is far from clear that this should also apply generally with respect to the definition of the relevant geographical market. Of course, firms typically have to make an agreement with a foreign distributor in order to serve that market, but that may not necessarily be a serious obstacle. On the other hand, transportation costs, search costs, language barriers, etc., may present a severe obstacle to individual consumer arbitrage, particularly when parallel importing is effectively limited. So, in the absence of other barriers to firm mobility, it seems generally unwarranted to primarily focus on the demand-side in the definition of the relevant geographical market. One pragmatic exception from this statement may be in the situation, where it is not possible to assess the quantitative relevance of supply substitution, for example because of lack of evidence on excess capacity possessed by foreign producers. Cf. Padilla (2001) on the role of supply substitution in the definition on the relevant market.

In most jurisdictions (including the EU), market definition for purposes of antitrust analysis distinguishes between supply substitution and potential competition, which is largely motivated by the time horizon where the competitive constraints are assumed to be at work. We do not make this distinction in this overview, partly because it is not easy to categorise the impediments to competition in terms of whether they restrict firms in the short run or in the long run. Specifically, in the relation to mergers during various stages of the Single Market Programme, it is conceptually problematic to relegate potential competition to a minor role. After all, if the Single Market Programme opens a market which was previously protected, the merger activities of incumbents in the previously closed geographical market might in large part be motivated by the prospect of potential competition from abroad. Hence, there may be cases where *all* the relevant competitive pressures may be of a potential nature at the time of a proposed merger. Although we do not make a distinction between supply substitution and potential supply in this theoretical overview, it is highly relevant to do so in actual competition cases. Supply substitution should be technologically feasible and economically viable within a short time period (say 12 months) to enter the market definition stage; cf. Padilla (2001).

2.3 Natural barriers

As defined above, natural barriers are exogenous barriers, which are irremovable in the short to medium run even in principle. To identify such barriers, an economist would likely start by looking at the micro-primitives, that is, *technologies*, *preferences* and *information* (broadly defined), and try to relate barriers to these.

Technology

Significant *scale and scope economies* can constitute a barrier to firm mobility and, therefore, potentially to market integration. The simplest example is where production of a single good

involves significant fixed cost and constant variable unit costs. In the jargon of economics, non-convexities in available technologies are likely to give rise to concentrated markets. In other words, barriers to entry (firm mobility) are closely related to some generalised notion of decreasing average cost.¹¹

Transportation costs may in one interpretation constitute an entry barrier and, thus, a barrier to market integration. An obvious example would be ready-mixed concrete, which is unlikely to be transported from Spain to Finland, even if production facilities in Spain are more efficient. Thus, the scope for buyer arbitrage between sources of supply may be limited in spite of price differences. However, whether this constitutes a significant barrier to integration depends in large part on whether or not the efficient Spanish producer can set up shops in Finland.

Preferences

From the perspective of firms, consumer preferences are *given* at least in the short run.¹² Thus, at a given point in time, the preferences of consumers in one country may reflect *historical traditions, national habits* or *biases*. In any case, from the point of view of a foreign potential entrant, the consumer preferences may constitute a barrier, which has to be overcome in order to develop a sound business case.

Examples abound, but two should suffice to make the case. Eating and drinking habits of different nations constitute a classic example, which may make entry by foreign firms difficult. In a European perspective, casual observation also suggests that the buying habits of automobile drivers have a strong national flavour. If anything, these examples make it seem likely that foreign competitors often have to overcome substantial *switching costs* and *consumer inertia*.

Another aspect of consumer valuations and preferences is that some markets display *network externalities or demand-side scale economies*. This may make a market hard to break into from the perspective of a potential entrant. To illustrate, markets for various types of computer software may display network externalities. The value to a potential buyer of acquiring a piece of software (thus, his willingness-to-pay) depends on how many others have already acquired or is expected to acquire the software. More users make it easier to exchange files and/or more applications are likely to be marketed. Thus, if these network effects are strong, individual users of existing software are less inclined to buy from an entrant supplying a substitute product.

Information

Clearly, consumer arbitrage and firm mobility is predicated on market participants being able to spot market opportunities as they arise. There are two sides to this. Firms have to make their offerings known to potential buyers, in order to enter and gain market share. Similarly, consumers must be able to spot various offers, in order to potentially switch sources of supply. This suggests that natural informational barriers to market integration are related to *language* and *search*.

Thus, natural barriers to consumer arbitrage largely consist of transportation costs, search costs and language. While still remaining important, these barriers may be on the decline. Electronic commerce and the various search facilities (including shop-bots) available on the Internet may eventually reduce arbitrage costs substantially. On the Internet, search costs are

¹¹ The notion of natural monopoly in economics is related to the sub-additivity of the cost function. Heuristically, (strict) sub-additivity means that one firm can produce a good more cheaply than several firms combined can.

¹² In the longer run, preferences can, of course, be influenced by the marketing activities of businesses, cf. below.

essentially independent of geographical distance, and the consumer need not leave his home in order to purchase goods and services. Even language may be considered a vanishing obstacle to foreign purchase partly because the consumer does not have to speak but primarily to read the foreign language, and partly because shopping outlets on the Internet may choose to make information available in different languages and can do so at relatively modest costs.

2.4 Regulatory barriers

There is a whole array of possible barriers to integration created by legislatures, governments and government agencies (wittingly or unwittingly). As far as firm mobility is concerned, barriers created by public regulation include trade barriers, technical standards, packaging regulations, subsidies, public procurement policies, licenses and patents, etc. Trade barriers, technical standards and exchange costs, affect consumer arbitrage. Also, the legislative and regulatory process is subject to lobbying, influence activities and, ultimately, capture by various interest groups. An in-depth discussion of the multiple ways in which regulation, broadly defined, interfere with the functioning of the market place is well beyond the scope of this chapter. Therefore, we restrict ourselves to listing some issues that are of particular relevance in light of the Single Market Programme.

National standards

National standard setting relates for example to health, safety, technical requirements, packaging requirements, the environment and ethical requirements (e.g., animal treatment, genetic manipulation, and child labour). We shall not attempt to give a survey, but merely give an example, cf. Box 2.2, which illustrates the issues involved, and how they are related to market integration.

Box 2.2: The case of canned beer in Denmark

Until recently Denmark had a ban on the sale of canned beer. Instead, beer was sold solely in glass or plastic bottles. These bottles were collected at the retail outlets, cleaned and used again by the bottlers. This recycling system was open to entrants, but there is little doubt that the system created a significant fixed (and sunk) entry cost, which meant that profitable entry required significant scale. As a result, foreign brands held a very small share of private retail consumption.

Following a European Commission ruling, the Danish ban on cans has been rescinded. However, a recycling system for cans had to be designed. The initial proposal in the Spring of 2002 showed signs of regulatory capture by the national Danish incumbents. In particular, the metering system allowed incumbents to monitor market activities by new entrants very carefully. In addition, the collection system and inter-firm transfer payment schemes were squarely controlled by incumbents rather than by some independent entity. As a result, market commentators have questioned the scope for foreign entrants making inroads into the market, even absent the ban on canned beer.

Protection of national heritage

The national heritage is obviously of interest to European policy makers, and little imagination is required to realise that this may sometimes be at odds with the aims of the Single Market Programme. The example in Box 2.3 should illustrate the point.

Box 2.3: The case of exclusive trademarks

The general wave to make proprietary what used to be generic trademarks (e.g., camembert and feta) looks like an example of regulatory capture by national industries, which may ultimately lead to increased protection and market segmentation. This might conceivably be interpreted as a response by some industries to the Single Market Programme, in the sense that trade barriers, which have previously protected domestic producers of certain goods, are sought replaced by exclusive trade mark provisions.

Public sector procurement and selling

First of all, it should be noticed that the public sector is the largest single buyer of many goods and services, and as a result this buyer may affect markets well beyond its own share. Similarly, the public sector (society as a whole) ultimately controls many rights essential for doing business. This raises a series of potential problems from the perspective of the Single Market Programme. A key question is whether there is a national bias in public sector buying and allocation of rights. Such a bias might manifest itself in both the observed buying patterns of public sector agencies as well as in trading institutions designed by public sector agencies.¹³ The following Box 2.4 contains a few examples of the issues raised.

Box 2.4: The case of fleet cars, auctions and airport slots

The public sector is buying *fleet cars* for various purposes (police, military, postal services, etc.). Casual empiricism suggests that governments have a strong preference for their own national manufacturers. This may constitute a barrier to foreign manufacturers. There are, at least, two dimensions to this problem. First, a preference for national makes in procurement contests, if there are indeed contests, obviously makes it more difficult for foreign manufacturers to win. Secondly, the public sector preference for national makes accords the manufacturers of these makes an advantage (or head start) in establishing a network of service facilities. Such a network is clearly a necessary condition for the foreign makes to make inroads into the private market. Thus, a small (or not so small) incumbency advantage derived from public sector fleet-car buying may spill over into the private market. This may ultimately constitute an entry barrier and, thus, a barrier to effective market integration.

Despite EU initiatives in relation to public procurement by *auction*-like mechanisms, the share of foreign-based winners in procurement contests remains low. Clearly, domestic firms may often have some cost advantages due to proximity of existing production and service facilities, but it remains unclear whether the specific procurement formats and information channels chosen contribute to a levelling of the playing field or whether they tend to increase initially small incumbency advantages.

There is ample evidence that incumbent national airlines still dominate in main home country airports. This obviously raises the question whether allocation procedures for *airport slots* are biased, and whether they contravene the purpose of the Single Market Programme. Quite naturally, national carriers have initially inherited certain rights and slots from the pre-liberalisation era. However, as time passes occasion arises for certain slots to be allocated anew. The procedures whereby this is done clearly affect the extent to which potential entrants can develop a sound business case. Attempts at developing fluid markets for airport slots have so far been modest, and there is little doubt that barriers to entry and further market integration in the airline industry remain significant.

Trade barriers, taxes and subsidies

As discussed in the previous chapter, trade barriers, taxes, and subsidies affect market integration in numerous ways. Here we shall only comment briefly on the relation between trade liberalisation and oligopoly competition.

In relation to trade barriers, it has been argued that trade liberalisation may conceivably increase the stability of cartels that divide geographical markets between them, cf. Lommerud and Sørgard (2001). Starting with the empirical observation that some firms only sell in their home markets even though trade costs appear not to be prohibitively high, they show that with price competition, collusion may become easier to sustain after a reduction in trade costs. With quantity competition, on the contrary, the scope for collusion is reduced. Thus, the full details of the relationship between trade barriers and cartel stability remains to be worked out for some specific cases, but the above study suggests that some concern is warranted

¹³ Note that public sector agencies may act as the designer of trading institutions both when they are in the market to buy (e.g., hospital equipment, highways, and airlines seats) and to sell (e.g., buildings, land, drilling rights, TV, and phone licenses).

that legal and regulatory barriers might be replaced by tacit collusion at least in some industries.¹⁴

Advertising regulation

Advertising is often crucial to gain access to new markets (that is, to reach potential customers). This suggests that there may be cases where restrictive regulation of advertising mainly benefits old incumbents at the expense of potential newcomers; cf. Box 2.5.

Box 2.5: The case of children's television and cigarettes

Various countries have rather restrictive regulation of commercial slots during and adjacent to *children's programmes on TV*. Ostensibly, this is to protect children and/or help parents. The raised concerns are many, and they may be well founded. However, from the perspective of competition and market integration, the question remains: Who benefits (in relative terms) from these advertising restrictions? Incumbents or potential entrants? To illustrate, breaking into the market for children's toys requires that a potential entrant is able to reach the potential customers, that is, the children and their parents. Without access to commercial slots during children's programmes, the task of the potential entrant may be very hard indeed. Thus, incumbents may be relatively more happy with advertising restrictions than are potential entrants.

This *cigarette* example combines taxation and restrictive regulation of tobacco advertising. An interesting question is: who are the main benefactors from a combination of very high taxes and advertising bans? As an entry strategy, aggressive price competition seems largely futile if more than 90% of the retail price is made up of taxes and if, in addition, cross-price elasticities are modest. So, which dimensions are left to compete in when advertising is banned or severely restricted? Our conjecture would be that national incumbents are considerably more satisfied with the current regime than are potential (foreign) entrants.

National patents

A patent gives its holder a legal monopoly for a limited period to exploit commercially the patented invention. At present there is no supranational patent, but the European Commission has now launched a proposal for Council regulation of the Community Patent. In 1994 the most far-reaching multilateral agreement on Intellectual Property Rights was made within GATT/WTO. The so-called TRIPS agreement defines higher international standards of protection and dictates a harmonisation of global IP-systems.

A community patent may lead to more integrated economies as national patents serve to segment national economies. Though a firm may achieve patents in other countries within the existing system, costs may prevent the firm from applying. A firm having a national patent only risks imitation if it exports the product to another country, and that risk may be reinforced by parallel imports eroding profits on the national market, cf. below. A common patent system may serve to increase incentives to export. Theoretically though, the effect of a common patent system on trade is ambiguous. The displacement of pirates tends to increase exports, while the greater market power to the exporter tends to reduce exports (Braga and Fink, 1999). Empirical studies indicate that higher levels of patent protection have a positive impact on international trade flows.

2.5 Barriers created by businesses

We now turn to the core of the chapter: *barriers created by businesses*. To help structure the discussion, we start by making a few observations.

¹⁴ Lommerud and Sørgaard (2001) mention the European cement industry and the synthetic fibre industry as examples.

First, individual firms may take unilateral action to limit competition from other firms, or groups of firms may create various barriers that dampen or eliminate competition from rival (groups of) firms by collective agreements. Actions of either type are by nature covered by EU or national competition law. However, they need not be established with the primary purpose of limiting competition and may have redeeming efficiency effects that ensure their legality.

Whether a barrier to integration, entry or mobility created unilaterally (that is, by a single firm) constitutes a problem from the perspective of antitrust must be tied to notions of abuse of dominant position (EC Treaty, Article 82). Similarly, whether a barrier to integration/entry/mobility resulting from the agreements between or the concerted practices of several firms constitutes a problem from the perspective of antitrust must be tied to illegality of agreements and concerted practices (EC Treaty, Article 81).

The distinction between unilateral actions and collective agreements is sometimes unclear, and will have to be assessed by competition agencies on a case-by-case basis. For example, in a vertical relationship the distinction may be vague between a dominant upstream firm taking unilateral actions in its business strategies towards downstream firms and an upstream firm requiring those same downstream firms to enter into particular contractual arrangements (and, thus, become party to an agreement).

Secondly, collective agreements may be of a horizontal or vertical nature, that is, agreements between firms at the same or successive stages of the supply chain.

From a general perspective of market efficiency, the distinction between horizontal and vertical agreements can easily be motivated. Horizontal agreements between firms at the same level of the supply chain typically involve parties who are potential competitors at that level. This means that from the perspective of buyers (other firms or final consumers) they provide *substitutable* goods or services. Therefore, they typically have a collective incentive to coordinate their behaviour in order to raise prices above the uncoordinated oligopolistic level.

In contrast, firms who are vertically related provide *complementary* inputs to enhance the value of goods or services to be shipped further down the supply chain. Therefore, their collective incentive is generally very different. Typically, one party to a vertical agreement has an interest in the other parties providing their inputs as cheaply and efficiently as possible. Quite often, this will imply that the collective interest of the parties to a vertical agreement is closely aligned to the interest of potential buyers (and society in general). Based on this general observation, there is good reason to have somewhat different prior attitudes to horizontal and vertical coordination and, therefore, we shall treat them under separate headings.¹⁵

Barriers created unilaterally

Barriers created unilaterally can be linked directly to the IO models discussed above.¹⁶ Recall that in those models, an incumbent faced by the threat of entry had the opportunity to "invest" strategically in the pre-entry period in order to influence the behaviour of potential entrants. Similarly, during the progress of the Single Market Programme, an incumbent firm in one country has the opportunity to prepare for the market situation subsequent to the removal of some exogenous barrier to geographical firm mobility. This can be done in a variety of ways,

¹⁵ This perspective is further developed in Seabright (1998) and Martin, Møllgaard, Overgaard and Schultz (2000). It is also very evident in OECD (1994) and Rey and Caballero-Sanz (1996). A more general discussion of coordination emphasising the distinction between complementary and substitutable activities, assets and inputs can be found in Seabright and Halliday (2000).

¹⁶ Cf. Fudenberg and Tirole (1984), Bulow, Geanakoplos and Klemperer (1985), Tirole (1988, ch. 8) and Shapiro (1989).

and below we discuss some examples of business strategies that can be seen in this light.¹⁷ When the effect of the incumbent pre-entry choices is to deter entry, we refer to them as *pre-emptive*. When the effect is "merely" to influence the entrant's behaviour in the case of certain entry, we refer to them as *accommodating*.

Strategic patenting

Patenting by an incumbent firm may limit or undermine the business case of a potential entrant. The most straightforward case is when an incumbent successfully takes out a patent on a product innovation and then puts it to rest. This may prevent the potential entrant from entering with a substitute to the product of the incumbent. Similarly, the incumbent may take out a patent on a process innovation and then put it to rest. This may prevent the potential entrant from entering with a competing technology. This is particularly relevant in cases where the same product can be produced efficiently by two rather different technologies. By this is meant that minimum average costs can be attained by different technologies and possibly at different scales.

Product proliferation

An incumbent who initially produces one or a few substitutable products may choose to meet the challenge from potential entrants by crowding the product space prior to entry. This may either limit the optimal scale of entry or it may prevent entry altogether. The argument has been developed in the context of automobiles (*GM*) by Scherer (1980, ch. 8) and breakfast cereals (*Kellogg's*) by Schmalensee (1978). In a different context, an incumbent might choose to crowd the geographical space to limit the entry opportunities of potential competitors. The proliferation of fast food chains (e.g., *McDonald's*) or discount grocery stores (e.g., *Netto*) might be interpreted in this light.

Advertising

Incumbent investments in marketing (e.g. advertising) to increase brand-recognition and brand-loyalty may sometimes serve to create an entry barrier. A key feature of much marketing and advertising activities is that they are associated with substantial sunk costs: e.g., the advertising outlays associated with a marketing campaign that ultimately fails are irreversible. The market for soft drinks immediately spring to mind. For decades branded soft drinks have been associated with very substantial advertising outlays. Any potential entrant contemplating entry into the market for soft drinks should foresee a huge investment in advertising to gain any market share. These outlays will be entirely lost should the campaign fail.

Excess capacity

As already noted above, incumbents may strategically expand capacity in the pre-entry period in order to pre-empt or limit the scale of entry. Irreversible investments in capacity expansion convert variable costs to sunk costs and, therefore, serve as a signal that future competition will be aggressive in case of entry. This may prevent entry altogether or limit the scale of entry.

Attracting customers

If the market in question displays strong network effects, then an incumbent has an incentive to invest heavily in attracting customers to its network in the pre-entry period. If the incumbent is able to attract customers sufficiently quickly to its network, then the market may

¹⁷ In the remainder of the text, some references are given to key papers in the industrial organisation literature. Many more references to the pre-1990 literature can be found in Tirole (1988, ch. 4 and 8), Shapiro (1989) and Katz (1989). Most of those included in the text are dated after 1990.
permanently tip his way.¹⁸ To attract customers quickly, introductory discounts may be offered.

Product incompatibility

If the incumbent has the option of choosing his product standard in the pre-entry period, then it may be optimal for him to choose to make his standard proprietary and to make his product incompatible with that of the potential entrant. In the context of a market with network externalities, this has been referred to as a performance play.¹⁹ By this is meant that the incumbent aims to become the single supplier of the product or service under consideration, that is, he aims to win the battle for the market. If this choice of standard is interpreted as intended by the potential entry, then he may decide that entry is not profitable. The incumbent has to weigh the expected returns from this strategy against a more open standard and product compatibility, which makes entry easier but also may imply that critical mass and market take-off may be reached more quickly to the benefit of both the incumbent and an entrant.

Bundling

That bundling potentially has the capacity to deter entry or limit competition under certain circumstances has long been recognised in the economics literature. Consider the case where some firm (an incumbent) initially has substantial market power in a market for some good or service. Then, the argument has been made that this incumbent may try to extend his market power to other goods or services through bundling these products (the tied products) with the first product (the tying product). Whinston (1990) shows how this may increase incumbent profitability when the tied market exhibits scale economies and imperfect competition.²⁰ More recently, Carlton and Waldman (2002) have made the point that an incumbent may choose bundling in order to increase profitability in his primary (tying) market by foreclosing efficient entry to this market as well as emerging new markets for complements. Notable antitrust cases involving *IBM* (bundling mainframes and peripheral equipment) and *Microsoft* (bundling the operating system with applications software) may be interpreted in light of these models.²¹

From the perspective of European market integration, an interesting case may be related to bundling of goods and services. For example, the purchase of a computer may include supporting services, or the purchase of a pair of contact lenses may include a periodical eye check. In both cases, it is unlikely that a consumer in Dublin will have the durable good (computer/contact lenses) regularly serviced in Palermo. Generally, the effect of bundling traded goods with non-traded services is to impose arbitrage costs on the consumers since the product bought serviced in one country cannot be re-serviced in another country unless the consumer pays the full servicing cost. This may ultimately enable the manufacturer to price discriminate (geographically), even in the absence of natural or regulatory barriers to arbitrage, cf. e.g. Horn and Shy (1996).

Systems lock-in

More generally, bundling of products into a system may serve to increase consumer switching costs and create systems lock-in.²² This, in turn, may present a significant entry barriers for entrants with stand-alone products. An obvious example is that of software suites and

¹⁸ Markets with strong demand-side scale economies are sometimes referred to as tippy, cf. e.g. Shapiro and Varian (1999).

¹⁹ Cf. Shapiro and Varian (1999).

²⁰ Cf. also Whinston (2001).

²¹ Cf. also Carlton (2001a,b) and Whinston (2001).

²² For more on switching costs and lock-in, cf. Klemperer (1987a,b,c, 1995), Farrell and Shapiro (1988) and Shapiro and Varian (1999, ch. 5-6).

audio/video systems. However, since bundling is optional from the point of view of the initial incumbent, it remains to be determined when a pure bundling strategy with foreclosing effects is optimal.²³

Technological staggering of complements

On a related note, when the incumbent offers a bundle of products (a system), then he may design the bundle in such a way the elements of the bundle have different lifetimes (economic or physical). This means that initial buyers will have to make decisions on renewals or upgrades in a sequential manner. This may create lock-in to the system, in the sense that the switching costs of individual consumers remain high throughout. Whenever a consumer has to renew an element, he faces the choice of writing off the whole system in order to buy one from a competitor or to simply stay with the incumbent and buy a new version of a single element. If the strategy of the incumbent is cleverly designed, he can make sure that it is always optimal for the individual consumer to stay. This may obviously constitute an entry barrier for new firms with competing systems. This type of reasoning seems particularly relevant for the IT industry, where a system consists of pieces of hardware and software. Other examples may be found relating to audio and video systems.

Bonus and rebate schemes

Progressive or cumulative bonus or rebate schemes may sometimes have as purpose or effect to increase consumer switching costs. Frequent-flyer programmes immediately spring to mind as an example.²⁴

Product pre-announcements

Finally, incumbents may pre-emptively pre-announce new versions of their products to limit the business case of actual or potential competitors. Potential examples include video game systems, computer hardware and software, automobiles, etc. When coupled with network externalities and proprietary standards, this may present a formidable entry barrier even to firms with superior products.

A notable general feature of many of the above examples is that seemingly small first-mover advantages can be turned into a large, sustainable competitive advantage.²⁵ In the context of the Single Market Programme, it would often seem that national incumbents have such first-mover advantages in "their" markets. Consequently, it should be a major concern to make sure that they are not converted into lasting entry barriers to the detriment of competition and market efficiency.

Barriers created through horizontal agreements

While most horizontal agreements are considered as textbook violations of antitrust statutes, there are a few in this category worth mentioning and which might survive antitrust scrutiny.

²³ That is, optimal in comparison to e.g. a mixed bundling strategy where elements of the bundle (the system) can also be bought individually.

²⁴ See, in particular, the references to Klemperer above.

²⁵ This general phenomenon has been a focus of attention in recent contributions to the literature on auctions. In the context of UK Premier League football, the interaction between club-ownership stakes and bidding for television rights has been analysed by Bulow, Huang and Klemperer (1999) and Klemperer (2002a). In the context of the recent European 3G mobile phone license allocation procedures, the relationship between the 2G incumbency and entry barriers to the 3G license contests has been studied by Binmore and Klemperer (2002) and Klemperer (2002b). Similar properties have been suggested in markets for goods or services with scale economies on either the technology or demand side, cf. e.g. Arthur (1989). Here, the early positions of firms are affected by chance events. These (small) chance events have lasting effects, so that market outcomes are non-ergodic or path-dependent.

Bonus systems with a horizontal scope

There are numerous examples of bonus systems, which are part of a wider agreement and therefore have a horizontal scope. The most immediate examples include airline frequent-flyer programmes and insurance. From the perspective of entry and market integration, an interesting feature of such agreements relate to whether the "systems" are *open* or *closed*. In relation to airlines, parties to various alliances have joint bonus systems (in addition to agreements on code-sharing, baggage handling, catering, ground maintenance, etc.). These bonus systems are typically closed in the sense that the customers of the competitors of the alliance *cannot* use their bonus points on alliance flights. In contrast, in the insurance industry an individual typically retains his insurance risk status²⁶ when moving his business to a competitor. Thus, whatever agreements exist between horizontal competitors in the insurance industry mainly relates to information sharing and joint databases. While the airline bonus systems may arguably create consumer switching costs, the portability of risk status in the insurance industry would seem to decrease switching costs, if anything.²⁷

Standardisation agreements between incumbents

Incumbent firms may enter into various kinds of standardisation agreements. In markets with strong network externalities (demand-side scale economies), switching cost and ex post consumer lock-in to the standard, such agreements may have a clear efficiency motivation. However, the effects on entry, dynamic competition and efficiency depend on the specifics of the market and the agreement under consideration. If the standard is proprietary and exclusive to the incumbents, then it may constitute a significant entry barrier and hence, potentially constitute a barrier to market integration. On the other hand, if the standard is open, it may actually facilitate entry, in the sense that a potential newcomer to the industry will not have to individually attain critical mass and "tip" the market its way.

R&D related horizontal agreements between incumbents

An R&D agreement between horizontally related incumbents is another type of agreement, which may be motivated by efficiency considerations. This includes scale economies in R&D and the useful pooling of human and physical assets. Essentially, scale economies in R&D is an example of the complementarities alluded to above, and as such R&D cooperation may line up nicely with the interests of society as a whole. However, if the agreement stipulates a cross licensing of know-how between the parties to the agreement only, then the agreement may constitute a barrier to entry.²⁸

Barriers created through vertical agreements (organisation of distribution)

As noted above, vertical agreements and coordination in distribution systems serve to solve problems that distinguish them from most horizontal agreements. Although the economics literature on vertical agreements is very rich and heterogeneous, there are some features that stand out.²⁹

First, vertical agreements may be beneficial for society by solving various *externality problems* within a given supply chain – most notably those related to successive mark-ups

²⁶ The bonus or rebate schemes involve the insuree moving between risk classes as time passes without activating the policy. This is most well known from comprehensive auto insurance.

²⁷ From an antitrust perspective, the liberal information sharing between insurance companies may present other problems (mainly related to the possibility of tacit collusion).

²⁸ Of course, we should add to this concerns that the R&D cooperation may spill over into subsequent coordination of business strategies vis-á-vis buyers (other firms or final consumers).

²⁹ There are many surveys available in the literature, cf. e.g. Tirole (1988, ch. 4) and Katz (1989). More recent contributions, which emphasise the relationship between the economic theory of vertical relations and the practical concerns of antitrust, include OECD (1994), Dobson and Waterson (1996a), Rey and Caballero-Sanz (1996) and Seabright (1998).

and to free riding on marketing and service efforts.³⁰ This essentially relates to the notion of complementarity introduced above. If the supply of complementary inputs is left uncoordinated, there is a strong possibility that the outcome will be sub-optimal from the perspective of the vertical structure (distribution channel) as a whole.

Secondly, vertical agreements may be harmful for society as they may serve to dampen the competition with other vertical structures (*reduce inter-brand competition*) or serve to prevent entry (*foreclosure*). From the perspective of this chapter, the latter two, and particularly the third, are the most interesting. So, the question is whether and when vertical agreements may serve to (endogenously) dampen competition or create a barrier to entry. In particular, it will be of interest (in light of the Single Market Programme) to consider whether vertical agreements in a vertical structure in one country may serve to prevent entry by a competitor from another country at some level of the supply chain.

Thirdly, the competition-reducing and foreclosing effects of vertical agreements require that horizontal competition is severely limited to begin with. In that case, vertical agreements may aggravate competition problems. If inter-brand competition is vibrant, then - whatever their purpose or effects with respect to firm profits might be - vertical agreements should be of limited concern to antitrust agencies (cf. also Rey and Caballero-Sanz (1996), Dobson and Waterson (1996a) and Seabright (1998)). Thus, although the Single Market Programme will not lead to fully integrated markets overnight, the tendency for improved integration and the associated increase in horizontal competition or broader market definitions should allow more vertical agreements to escape antitrust scrutiny.

Fourthly and finally, the legal form of a vertical agreement is a poor criterion on which to base the antitrust regime. This is largely due to a combination of two things. First, various vertical agreements may serve as substitutes from the perspective of firms. This calls for a symmetric treatment under the law. Otherwise the choice of vertical contractual relations will be guided by regulatory expediency rather than by cost minimisation and economic efficiency. Secondly, depending on the particular sets of circumstances surrounding a given case, any of the vertical agreements may be either benign or malign from the perspective of economic efficiency.

Types of vertical agreements

The most prominent examples of vertical agreements are *exclusive territories* and *exclusive dealing* arrangements. Vertical agreements in terms of exclusive dealing or exclusive territories may - through coordination or competition - increase economic efficiency and are for that reason not prohibited *per se*. Even arrangements that potentially reduce competition may thus be accepted (through individual or group exemption) provided compensating efficiency gains exist. This is contrary to most horizontal arrangements, including most notably the division of geographical markets.

Exclusive territories limit the territory or group of customers that a particular distributor or dealer may serve and exclude other distributors from serving the customers in the territory or group, cf. Rey and Caballero-Sanz (1996). The contractual provisions may impose more or less sharp restrictions and more or less closed territories. Absolute territorial exclusivity (in geographical space) is a strict provision, which prevents the distributor from selling to customers that are not part of its territory and gives the distributor a monopoly to sell the products in the territory. Territorial restrictions may be combined with provisions not to resell to other distributors, which hinders parallel import.

³⁰ These problems may usefully be referred to as intra-brand problems.

Exclusive territories directly reduce intra-brand competition between dealers by limiting the number of sellers of a particular product. The effect on inter-brand competition between vertical structures – which is most relevant in relation to market definition – is uncertain, as there might be positive as well as negative effects on competition as we shall see below. Suffice it to note here that an increase in the intensity of inter-brand competition could, for example, result from improved efficiency in the distribution of a given product, which in turn encourages retailers to make investments that allow them to compete more aggressively with distributors of other brands. In contrast, a dampening of inter-brand competition might result from granting dealers more freedom when setting their prices and, thus, making the demand perceived by the manufacturer less sensitive to changes in the wholesale price.

Exclusive dealing is an agreement in which a seller agrees to sell a given product to one purchaser only (exclusive selling) or a purchaser agrees to buy a given product from only one seller (exclusive buying). Exclusive buying arrangements foreclose buyers from purchasing goods from suppliers of their choice and, thereby, foreclose other suppliers' access to outlets for their products, which may reduce inter-brand competition. While there is a tendency towards internationalisation of distribution, retailing is still essentially national, cf. European Commission (1997a). The national scope of distribution systems makes it likely that exclusive dealing arrangements between national producers and distributors are more common than arrangements between players with different nationality, indicating that sophisticated exclusive dealing arrangements might serve to perpetuate market segmentation by replacing legal and regulatory barriers.

Vertical agreements may increase profitability and make entry more attractive

Vertical agreements that solve a coordination problem will help increase the profits of the vertical structure. Then in all probability they will also make entry seem more attractive. This serves to illustrate a point, which is sometimes overlooked by antitrust practice: vertical agreements can serve to *eliminate or overcome* entry barriers.³¹ In this sense, vertical agreements, which solve intra-brand externality problems, may often be the natural ally of the Single Market Programme.

To give an example, consider a firm in country B who is considering entry into country A. Successful entry may require substantial investment by a local distributor in marketing. Many of these investments are likely to be relationship-specific and sunk, in the sense that investment outlays will be lost should the launch of the product in country A prove to be a failure. For this reason it is important that the investment by the distributor is protected from free riding by other distributors (in country A or elsewhere) and from appropriation by the manufacturer. For this reason, it is often necessary for the entrant (the manufacturer from country B) to sign an elaborate contract with the distributor. Such a contract may involve granting *territorial exclusivity*, possibly even completely preventing subsequent "boot-legging" or parallel imports from country B or some other country in which the manufacturer from country B has an established distribution network.

Similarly, even if the manufacturer takes on most of the marketing efforts himself and, therefore, eliminates the scope for free riding by other dealers, he will still need distributors. The manufacturer may either choose to use existing retail outlets in country A and conduct his business with the distributors on a simple arm's length basis. However, if the retail outlets carry substitutable products, then the manufacturer is subjected to the risk that retailers might divert their sales efforts (in-store promotion) from the particular manufacturer to the brands of competing manufacturers. Therefore, even in this case the entering manufacturer may opt for some kind of *exclusive dealing* arrangements with his dealer(s) in country A.

³¹ This point is not new and has been made by e.g. Rey and Caballero-Sanz (1996).

Vertical agreements may dampen inter-brand competition

The possible adverse effects of vertical agreements relate to their potential for dampening inter-brand competition and to their potential market foreclosing effects. This is already reflected in the report by Rey and Caballero-Sanz (1996). Therefore, this overview will be brief, primarily adding the insights of more recent contributions from the theory of industrial organisation.

As far as the inter-brand competition is concerned, it has been argued that vertical agreements may either serve to sustain horizontal collision or to dampen price competition between vertical structures.

First, retailer-induced horizontal collusion might conceivably be disguised as a vertical agreement ("mock vertical agreements"). A retailer cartel may jointly "force" a manufacturer to stipulate a fixed retail price (resale price maintenance) or territorial exclusivity to eliminate downstream competition. The fixed retail price may also be backed by a threat of refusal to deal with retailers who undercut the agreed price. These types of retailer-induced agreements have to be accepted by the upstream firm, and a commercial rationale for this will have to be provided. Similarly, it is sometimes argued that horizontal collusion at the upstream level can be supported by various vertical agreements. Resale price maintenance has been suggested as a useful instrument in policing upstream collusion. However, these hypotheses presently lack a robust modelling foundation.³²

Secondly, there is a more established set of models, which have been suggested to explain how vertical agreements may help dampen inter-brand competition. The basic point is that delegation (vertical separation) of decision-making power from the upstream level to the downstream level may often present itself as a less aggressive strategic posture to upstream competitors. These upstream competitors may then reciprocate this either directly by softening price competition or by instituting similar vertical agreements, which ultimately lead to softer downstream and upstream competition. The central point is that head-to-head competition between two vertically integrated structures supplying close substitutes for final consumption may lead to very aggressive price competition. In that case it may be optimal for manufacturers to delegate the retail pricing decision to independent distributors.³³

Thirdly, a related example is the suggestion by Rey and Stiglitz (1988) that exclusive territories may ultimately dampen inter-brand price competition. Exclusive territories directly dampen intra-brand competition. This, in turn, makes the retail prices in a given vertical structure less sensitive to changes in the wholesale price. Thus, the incentive for the upstream firm to decrease its price to steal business from the competing vertical structures will be diminished, and the ultimate result will be that inter-brand price competition has become less intensive. In the terminology of the IO models referred to earlier,³⁴ entering into vertical agreements (in this case exclusive territories) serves as a friendly and non-aggressive posture vis-á-vis upstream competitors.

Fourthly, exclusive dealing arrangements may be a way to increase consumer-switching costs (in the sense of e.g. Klemperer (1995)). If only one brand is available in each store, then the consumer search costs are increased, which will imply that the inter-brand competition downstream is less intensive than it would have been had there been several

³² Some progress has been made, cf., e.g., Jullien and Rey (2000), Rey and Vergé (2002) and Dobson and Waterson (1997) for a variety of modelling attempts.

³³ The scope for dampening inter-brand competition through vertical separation has been studied by Bonanno and Vickers (1988), McGuire and Staelin (1983) and Gal-Or (1991).

³⁴ In particular Fudenberg and Tirole (1984).

brands available in each store. This, in turn, implies that less aggressive pricing at the upstream level is optimal. Again, vertical agreements have served to dampen inter-brand price competition.

Fifthly, a different segment of the literature has studied the incentives of competing manufacturers to choose common or exclusive distributors. Lin (1991) has suggested that with a common distributor, the inter-brand competition at the retail level would be very intensive. As a result, manufacturers have an incentive to choose exclusive distributors to dampen inter-brand competition. However, O'Brien and Shaffer (1993) and (more generally) Bernheim and Whinston (1998) have shown that a richer contract structure might reverse this conclusion, in the sense that exclusive distribution may not dampen inter-brand competition compared to a common distributor. However, manufacturers may still opt for exclusivity to increase their profits since less rent is appropriated by the downstream level under exclusive dealing. From a practical perspective, the conclusions of these contributions may be questioned for failing to fully account for the possibility of competition at the retail level whether manufacturers choose common agencies or exclusive dealing. If entry into retailing is more "liberal" or if manufacturers choose several retailers for efficiency reasons, analyses by Besanko and Perry (1993,1994) and Dobson and Waterson (1996b) indicate that exclusive dealing and the associated absence of in-store inter-brand competition allows for less intensive upstream competition. Hence, exclusive dealing may dampen inter-brand competition.

From the perspective of entry and market integration, it is not immediately clear which conclusions and policy inferences can be drawn from these analyses of the role of vertical agreement in the inter-brand competition between *given* vertical structures or distribution channels. However, in general the market-opening effects of the Single Market Programme seem likely to undermine the collusive or competition-dampening potential of incumbent vertical agreements. If anything, vertical agreements put in place by an established set of vertical structures to keep final prices and profitability high should induce entry by new (foreign) firms. In the face of the Single Market Programme, such agreements would likely spell the demise of the incumbents, and one would expect to see them gradually dismantled during the progress of the Single Market Programme. However, some vertical agreements and contractual arrangements may have a market foreclosing potential to which we now turn.

Vertical agreements may create entry barriers

The IO literature is replete with theoretical examples of how vertical agreements may create entry barriers and foreclose access to markets, even vis-à-vis a more efficient entrant. To generally motivate many of these contributions, it should be noted that due to the asymmetries of their initial positions, it will often be the case that an incumbent is willing to pay or sacrifice more to prevent entry than a potential entrant would be to gain access to the market.³⁵ The focus of attention in this literature has been how exclusive dealing and exclusive territories may serve to foreclose entry.

The foremost example of the role of exclusive dealing is the case where an incumbent firm ties up the most efficient retail outlets through long-term exclusive dealing contracts with the retailers. This may be seen as an attempt to raise the costs of potential entrants, since they

³⁵ In the abstract, this can easily be motivated as follows. An incumbent monopolist stands to lose the monopoly profit in return for a lower duopoly profit. In contrast, a potential entrant stands to gain a duopoly profit instead of a zero profit. If the sum of the duopoly profits is smaller than the monopoly profit (which is often a reasonable conjecture), then the incumbent would be willing to sacrifice more to maintain the monopoly than the potential entrant would be to attain a duopoly position. This, of course, rests on various underlying modelling assumptions (mainly symmetry assumptions), but a robust case can certainly be made.

may have to resort to less efficient (higher cost) distribution outlets. ³⁶ Similarly, an incumbent may sign a long-term contract with an input supplier to ensure that his competitors (actual or potential) will have to resort to less efficient sources of supply. A recent authoritative treatment of exclusive dealing that recognises the role of complex payment schemes can be found in Bernheim and Whinston (1998).

An obvious question that has to be answered is whether the party who is receiving an exclusivity proposal will have an incentive to accept the suggested exclusivity obligation. An affirmative answer to this relates intimately to whether there is enough rent to go around to allow the proposer to make it worth the receiver's while to accept the proposal – essentially, there must be enough rents to allow the proposer to "bribe" the receiver into accepting exclusivity obligations. Aghion and Bolton (1987) have suggested a model to explain how the added rent generated by the foreclosing effects of dealer exclusivity may be sufficient to allow the upstream firm to suggest an acceptable (long-term) exclusive dealing contract to the chosen dealer. A different question is whether, in actual markets, such schemes might work. For example, what if there are several potential dealers available?

As far as exclusive dealing is concerned, it has been argued that they even foreclose entry by more efficient potential entrants. Rasmusen, Ramseyer and Wiley (1991) relate this to scale economies and the ability of the incumbent to bribe a sufficient number of dealers to make entry unprofitable³⁷, while Comanor and Rey (2000) build on an assumption that entry and post-entry competition will carve enough out of total industry profits to allow the incumbent to spread around the excess profits in case entry is prevented by the exclusive dealing provisions.

A second example is provided by Rey and Stiglitz (1995) who suggest that exclusive territories may (under certain circumstances) serve as a commitment device to ensure an aggressive response to entry. Therefore, exclusive territories may be used to either deter or limit the scale of entry. In its simplest form, the analysis of Rey and Stiglitz (1995) shows that exclusive territories enable an aggressive posture vis-à-vis potential entrants who might be considering a gradual entry strategy. A dealer with an exclusive territory will fight hard to retain his local monopoly. In contrast a nationwide dealer might think twice before meeting localised entry with a very aggressive response, due to fears that a "price war" in one locality might spread to adjacent areas. A nationwide or integrated dealer may thus see local monopolies fall like domino bricks. To prevent this, the manufacturer could choose to disintegrate dealership relations and define exclusive territories.³⁸ In an EU context the example can easily be adapted to provide a rationale for limiting exclusive distributor territories along national borders to pre-emptively convey an aggressive posture in the face of potential entry.

In summary, vertical agreements that serve to solve the vertical coordination problem do not present much of a problem from the perspective of either competition policy or market integration. In contrast, coordinating vertical agreements that increase the potential profits of a given vertical structure will tend to make entry look more attractive to potential newcomers. On the other hand, if vertical agreements mainly serve to dampen short-term competition between vertical structures (inter-brand competition) or, especially, to adversely deter entry through foreclosure, then they should be of concern to public agencies.

³⁶ Formal analyses along these lines include Comanor and Frech (1985), Mathewson and Winter (1987) and Schwartz (1987).

³⁷ However, cf. the comment on Rasmusen, Ramseyer and Wiley (1991) by Segal and Whinston (2000).

³⁸ In the terminology of Fudenberg and Tirole (1984), an "investment" in a local dealer system with exclusive territories might be interpreted as a "lean and hungry" posture.

In the context of the Single Market Programme, it is particularly interesting to observe that economic theory suggests that vertical agreements may cut both ways: they may deter entry, or they may stimulate entry depending on the circumstances. Thus, from the perspective of market integration (and efficiency) regulators should often reign in vertical agreements as a powerful ally. In any case, careful economic analysis will be useful in deciding, in specific cases under scrutiny, whether observed or suggested agreements or distribution systems will deter or stimulate cross-border consumer arbitrage or firm mobility.

Chapter 3 : Defining the relevant geographical market in EU merger cases, 1990-2001

The aim of the Single Market Programme is to create an integrated European market. We saw in chapter 1 that the Single Market Programme has been a clear success measured on the input-side. The degree of implementation of the Single Market Programme in national legislation has been impressive. However, the success of the Single Market Programme seems to be more modest if measured on the output-side. We showed, in particular, that the trade border effects within Europe have decreased during the 90es implying that member states have become more integrated, but that trade border effects still remain at rather high levels within the European Union. There is still much more trade within EU member states than trade between member states.

In order to understand this apparent paradox, we surveyed in chapter 2 the theoretical literature on barriers to market integration with special emphasis on the recent contributions from modern industrial organisation. We divided barriers to market integration into three different types: natural, regulatory and those created by businesses. Further, we learned that the new literature on industrial organisation has identified a multitude of barriers to integration that may have been created by businesses in an endogenous move to keep markets disintegrated despite the attempt to eliminate regulatory barriers through the Single Market Programme.³⁹ Presently, we do not know much about the empirical importance of these endogenous or strategic barriers to integration created by businesses. However, it may be hypothesised (at least in principle) that one explanation for the limited success of the Single Market Programme – as measured by the border effects – be that regulatory barriers removed by the Single Market Programme are replaced by barriers to market integration created by businesses.

In this chapter we investigate how the European Commission has defined the relevant geographical market in all significant merger cases handled by the Commission since the Council regulation on merger control came into force in 1990. The purpose is two-fold.

First, we investigate whether the progress of the Single Market Programme on average has resulted in a larger size of the relevant geographical market. We clearly expect such a positive link between the progress of the Single Market Programme and the size of the geographical market definition, especially in merger cases. This is also reflected in the Commissions Notice on definition of the relevant product market (European Commission, 1997b) as stated in the following quote:

³⁹ Also a new understanding that natural barriers not necessarily are as natural as previously believed.

"Finally, the Commission also takes into account the continuing process of market integration in particular in the European Union when defining geographical markets, especially in the area of concentrations and structural joint ventures.... A process of market integration that would, in the short term, lead to wider geographical markets may therefore be taken into consideration when defining the geographical market for the purposes of assessing concentrations and joint ventures."⁴⁰

Secondly, we investigate in more detail how the Commission delineates the relevant geographical market. This allows us to analyse, not only the above question, but also the methodology applied by the Commission, the most frequent barriers to integration identified and the most frequent empirical techniques applied. Furthermore, we will be able to see whether the particular barriers to integration created by businesses that we identified in chapter 2 have started to play a significant role when the Commission defines the relevant market. If this is indeed the case, we may be able to explain the limited success of the Single Market Programme: Regulatory barriers removed by the Single Market Programme have been replaced by strategic barriers endogenously created by businesses.

To address the issues raised above, we have compiled a database of all significant merger cases with a community dimension and handled by the Commission since 1990. In the database we have included all electronically available Phase II merger cases, as well as Phase I merger cases that have been referred to national authorities. A total of 90 merger cases are included in the database, about 70 per cent of all possible cases.

For each case we register the exact definition of the relevant geographical market and characterise the size of the market, the methodology applied, the types of substitution considered, the types of barriers to integration identified and the types of empirical indicators employed to verify and substantiate the chosen market definition. We also compare the methodology applied for the definition of the relevant geographical market with the definition of the relevant product market.

First, we conclude that the average size of the relevant geographical market in the merger cases included in the database is stable throughout the period 1990-2001. It is rather surprising that the implementation of the Single Market Programme does not seem to have had any impact on the size of the relevant geographical market. Given the results in chapter 2 and the stated intentions of the Commission, we would certainly have expected a tendency towards a larger geographical market. Simple sensitivity analysis indicates that the result does not rely on changes in the industry structure among the merger cases handled by the Commission. However, we emphasize that the test of market size is relatively weak due to the limited number of market definitions.

Secondly, we conclude that the methodology applied in the definition of the *geographical* market is much less systematic and consistent than the methodology applied in the definition of the *product* market. For geographical markets, the SSNIP-methodology is rarely applied, and less than 10 per cent of the market definitions have references to demand and supply substitution. For product markets, the SSNIP-methodology is applied three times more often, and references to demand and supply substitution appear ten times more often than for the relevant geographical market.

Thirdly, we find a surprising lack of empirical and quantitative indicators in EU merger cases. There is only very limited use of price tests. The two most important empirical indicators of

⁴⁰ European Commission, Notice on the definition of the relevant market for the purpose of competition, 1997b

market integration (or segregation) applied the Commission are very simple and crude: Trade flows and comparisons of price levels. The relationship between these variables and market integration is highly questionable. And overall, there seems to have been a significant decline in the use of empirical indicators to verify and substantiate the definition of the relevant geographical market.

Fourthly and finally, we find no sign of a surge in the importance of barriers created by businesses in EU merger cases. The two predominant barriers to geographical integration on the markets in EU merger cases are in all years transport costs (a natural barrier) and regulatory barriers, applied in more than 75 per cent of the market definitions.

All in all, it can be argued that the delineation of the relevant geographical market in EU merger cases can be more systematic, consistent and empirically based.

The rest of the chapter is organised as follows. Section 3.1 describes the database, which has been build to organise the merger cases. The database is structured to reflect the recommendations in the Commission Notice on market definition (European Commission, 1997b). In section 3.2 we briefly introduce the concept of the relevant geographical market, and in section 3.3 we investigate the development of the size of the geographical market in the majority of EU merger cases over time. In the last section 3.4, we survey the methodology applied by the Commission in order to reach a conclusion with respect to the definition of the relevant geographical market in the same merger cases.

3.1 EU merger cases

The database is constructed to organise merger cases handled by the Commission since the Council regulation on merger control came into force at 21 September 1990. Merger cases with a community dimension have to be notified to the Commission according to the EU Merger regulation. Whether a merger cases has a community dimension depends on the size of the merging parties according to a set of rather complicated thresholds, cf. Box 3.1.

Box 3.1: Merger cases with a community dimension

1.	Without prejudice to Article 22, this Regulation shall apply to all concentrations with a Community dimension as defined in paragraphs 2 and 3.
2.	For the purposes of this Regulation, a concentration has a Community dimension where:
	 the combined aggregate worldwide turnover of all the undertakings concerned is more than ECU 5,000 million; and
	b. the aggregate Community-wide turnover of each of at least two of the undertakings
	concerned is more than ECU 250 million, unless each of the undertakings concerned
	achieves more than two-thirds of its aggregate Community-wide turnover within one
	and the same Member State.
3.	For the purposes of this Regulation, a concentration that does not meet the thresholds laid
	down in paragraph 2 has a Community dimension where:
	 a. the combined aggregate worldwide turnover of all the undertakings concerned is more than ECU 2,500 million;
	b. in each of at least three Member States, the combined aggregate turnover of all the undertakings concerned is more than ECU 100 million;
	c. in each of at least three Member States included for the purpose of point (b), the
	aggregate turnover of each of at least two of the undertakings concerned is more
	than ECU 25 million; and
	 the aggregate Community-wide turnover of each of at least two of the undertakings concerned is more than ECU 100 million, unless each of the undertakings concerned achieves more than two-thirds of its aggregate Community wide turnover within one and the same Member State.

Source: Article 1 in the EU Merger Regulation 4086/89.

The database includes all electronically available Phase II merger cases as well as Phase I merger cases that have been referred to national authorities. When the Commission receives a merger notification, it initiates a Phase I investigation to consider whether the merger raises

doubts as to the compatibility with the common market by impeding effective competition, cf. Box 3.2. If the answer is no, the merger is approved and the case is closed. These cases are called Phase I cases and are generally not included in the database. Most Phase I cases do not contain sufficient information to characterize the methodology applied for the definition of the relevant market.

If the answer is yes, a more thorough Phase II investigation is initiated. These latter cases are referred to as Phase II cases and are included in the database if the decisions have been electronically available. However, during Phase I a member state can request the Commission to turn over the merger case to its national competition authority. If specific conditions are satisfied, the Commission may decide to accommodate the request, fully or partially. Those cases are referred to as Phase I cases referred to national authorities and are also included in the database if the decisions have been electronically available.

Box 3.2: Merger cases in Phase I and Phase II

After receiving a notification the Commission initiates a Phase I investigation. The Commission evaluates whether the concentration will create or strengthen a dominant position as a result of which effective competition would be significantly impeded in the common market or in a substantial part of it. Mergers that do not raise such concerns are approved.

The merging parties can submit structural modifications of the concentration or commitments as to future behaviour under the Phase I procedure – hereby eliminating the competition concerns. In adopting a decision the Commission may approve the concentration subject to such structural modifications or commitments.

Under Phase I investigation, a member state may request the Commission to refer consideration of a merger with a Community dimension back to its national authority. To do so it is required that the merger threatens to create or strengthen a dominant position on a distinct market within that member state or the merger affects competition on a distinct market within that member state which does not constitute a substantial part of the common market. The Commission may refuse such a requestor only refer a part of the concentration to national investigation.

If the concentration raises competition concerns, a Phase II investigation is required. A Phase II investigation will result in greater scrutiny of the deal by the Commission. The scope of the investigation is the same as in Phase I but more thorough. At the end the Commission can either approve the concentration or prohibit it as being incompatible with the common market. The Commission can, as in Phase I, make the approval subject to certain commitments.

In the period 1990-2001 the Commission handled 1,747 Phase I referral merger cases, of which 34 were referred to national authorities, and 97 Phase II merger cases, cf. table 1.1. We have included 23 Phase I cases referred to member states and 67 Phase II cases that all have been electronically available. These cases constitute about 70 per cent of all possible merger cases. In the remainder of this chapter we analyse in detail all Phase II cases, while the analysis of all Phase I referral merger cases is postponed to chapter 6 dealing with criteria for the referral of Phase I merger cases to member states.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Total
Phase II													
Total number*	0	5	4	3	5	7	7	11	9	9	17	20	97
In database	0	0	3	1	3	4	2	9	7	9	13	16	67
Phase I referred to member states													
Total number*	0	0	1	1	1	0	3	7	4	4	6	9	34
In database	0	0	0	0	1	0	2	5	2	4	1	8	23

Table 3.1: Merger cases, total and included in the database

Note: Referred Phase I cases in 2001 include 3 cases that have been notified in 2001, but where the decision has not been taken until 2002.

Source: http://europa.eu.int/comm/competition/mergers/cases/stats.html and database.

3.2 The relevant geographical market

The database organises all information in a merger case concerning the definition of the relevant product and geographical market and the methodology applied to reach the conclusion with respect to the definition of the relevant market. Cf. the appendix for a detailed documentation of the structure of the database.

The database is constructed to reflect the recommendations in the 1997 Commission Notice on the definition of the relevant market (European Commission, 1997b). The purpose of the guideline is "to provide guidance as to how the Commission applies the concept of relevant product and geographical market in its ongoing enforcement of Community competition law". The Notice is the first guideline for market definition published by the Commission⁴¹.

The Commission Notice defines the relevant geographical market as follows:

"The relevant geographical market comprises the area in which the undertakings concerned are involved in the supply and demand of products or services, in which the conditions of competition are sufficiently homogeneous and which can be distinguished from neighbouring areas because the conditions of competition are appreciably different in those areas".

The guidelines in the Commission Notice can be interpreted as representing a four-level approach to the definition of the relevant (geographical) market, cf. Figure 3.1

⁴¹ The US and UK competition authorities have published similar guidelines for many years.



Figure 3.1: Market definition according to the Commission Notice

The first level concerns the choice of the overall methodological approach to market definition. The Commission emphasises the use of a systematic method to define the relevant market and mention - without calling it by name - the SSNIP-methodology⁴² as one example of a systematic methodology. We are not aware of other systematic methodologies applicable for market definition. In the database we identify all cases where the SSNIP-methodology has been applied, either directly or indirectly.

SSNIP is an acronym for a Small, but Significant Non-transitory Increase in Prices and is a framework for thinking systematically about relevant markets. The SSNIP-methodology takes the following thought experiment as its point of departure: You want to investigate whether some candidate goods produced within a specific geographical area constitute their own relevant geographical market. Assume now that the goods are produced by a hypothetical monopolist and ask your self whether it is likely that the hypothetical monopolist can earn a profit by Increasing Prices by 5-10 per cent (Small, but Significant) for a period of not less than 12 months (Non-transitory)⁴³.

If the answer is yes, then the candidate goods form their own relevant market. If on the other hand, the answer is no, because consumers substitute away from the candidate market as a result of the price increase and purchase the same good in neighbouring regions or because producers from other regions enter the profitable market, then the relevant geographical market is larger than the goods in the candidate market. The thought experiment is now repeated with a larger geographical area as a starting point and continued until the answer to the question posed is yes.

On the three lower levels of the market definition process the somewhat abstract SSNIPmethodology is made (more) operational.

On the second level we have to incorporate the different types of substitution that may constitute competitive constraints on the hypothetical monopolist in case prices are

⁴² Often the SSNIP-methodology is referred to as an SSNIP-test. Using the word test is a highly misleading description of what is rather a general framework for thinking about markets rather than a directly applicable test.
⁴³ Defining Non-transitory as a period not less than 12 months is a rule of thumb due to, among others, Office of Fair Trading (1999).

increased: Demand substitution, supply substitution or potential competition. Demand substitution in the geographical dimension takes place if consumers start buying substitutes outside the geographical area under consideration. Similarly, supply substitution and potential competition take place if producers located outside the geographical area start supplying goods to the geographical area under consideration. The difference between supply substitution and potential competition is a matter of time horizon. Supply substitution takes place in the short run defined as within one year, while potential competition takes place in the longer run.

The Commission Notice emphasises demand substitution as the most important type of substitution, although they also find supply substitution relevant in some situations:

"Supply-side substitutability may also be taken into account when defining markets in those situations in which its effects are equivalent to those of demand substitution in terms of effectiveness and immediacy"

The Notice does not require potential competition to be taken into account in the market definition stage of a merger case:

"The third source of competitive constraint, potential competition, is not taken into account when defining markets, since the conditions under which potential competition will actually represent an effective competitive constraint depend on the analysis of specific factors and circumstances related to the conditions of entry. If required, this analysis is only carried out at a subsequent stage, in general once the position of the companies involved in the relevant market has already been ascertained, and such position is indicative of concerns from a competition point of view."

For each merger case in the database we identify whether demand substitution, supply substitution or potential competition has been analysed to determine potential barriers to market integration.

On the third level we identify barriers to market integration. Barriers to market integration are the potential causes of market segmentation that can explain why demand or supply substitution in the specific case may be limited. For example, transport costs may be a potential cause of market segmentation that in a specific case may explain the presence of limited demand and supply substitution.

The barriers to market integration that are included in the database are selected on the basis of barriers to market integration mentioned in The Commission Notice. The overview of barriers to market integration in Table 3.2 shows that the Notice primarily focuses on natural and regulatory barriers, whereas the Notice only pays minor attention to barriers created by businesses. Only few of the barriers created by businesses described in Chapter 2 in this report also make up an explicit part of the Commission Notice.

Types of barriers	Commission Notice	Chapter 3
Natural barriers	National or local preferences	Transport costs
	Language	Search costs
	Culture and life style	Language
	Transport costs	Scale economies
Regulatory barriers	Public procurement	Import restrictions
	Price regulation	Product standards
	Quotas	Exchange costs
	Tariffs	Environmental standards
	Technical standards	Licenses and patents
	Monopolies	Subsidies
	Freedom of establishment	
	Administrative authorisations	
	Packaging regulations	
Barriers created by	Access to distribution channels	Unilateral action
businesses	Costs of setting up distribution networks	Introductory discounts
		Rebates and bonuses
		Loyalty programmes
		Proprietary standards
		Patenting
		Sleeping patents
		Capacity expansion
		Excess capacity
		Brand proliferation
		Product pre-announcements
		Versioning
		Bundling
		Tying
		Forward and backward integration
		Increased advertising intensity.
		Horizontal agreements
		loint honus and lovalty schemes
		Bonus systems
		Standardisation agreements
		Cross licensing agreements
		oroso noonaing agreementa.
		Vertical agreements
		Long-term contracts
		Exclusive dealing
		Selective distribution
		Exclusive territories
		Restrictions on parallel imports

Table 3.2: Barriers to g	eographical market	integration
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Note: In chapter 2 we focus on barriers created by businesses whereas we only provide a limited number of examples of natural and regulatory barriers.

Source: European Commission, 1997b and chapter 2.

Fourthly and finally, we identify empirical indicators that can measure the importance of one or several barriers to market integration. Indicators of barriers to market integration are an array of empirical measures that may document and render probable that geographical areas are indeed segmented and not part of a larger unified market. For example, diverging price patterns in two adjacent areas may indicate that two areas do not belong to the same relevant market.

3.3 The size of the relevant geographical market

In this section we investigate the size of the relevant geographical markets in a sample of 67 Phase II merger cases handled by the Commission in the period from 1990 to 2001. The selection of cases represents almost 70 per cent of all Phase II cases in the period. Most of the missing cases are concentrated in the beginning of the period.

In some cases the Commission has not explicitly defined *any* relevant market. In 9 merger cases all geographical markets are either defined as "*not necessary*", "*Other*" or the definition has been "*left open*". We have excluded these 9 cases from the sample.

A single merger case may involve several relevant markets, if the merging parties operate in several different product markets. For example, merging parties in the chemical industry may produce several different chemical products. As a consequence the number of markets significantly exceeds the number of merger cases. The remaining 58 Phase II cases in the database include in all 258 markets, cf. Table 3.3.

The number of geographical market definitions is smaller than the number of markets, because the Commission in some cases leaves the definition of the geographical market open. This can happen if the precise definition of the relevant geographical market is irrelevant, for example because competition concerns arise for all relevant definitions of the relevant market. The database thus includes 208 market definitions, which gives an average of 3.6 market definitions per case. Roughly 75 per cent of the cases have less than 6 markets per case.

	Cases	Cases	Cases	Markets	Markets	Market definitions		
		excluded	included		excluded		Average per	Standard
_						Number	case	deviation
	67	9	58	258	50	208	3.6	28

Table 3.3: Cases, markets and market definitions in the database

Source: Database

In the analysis we attribute the same weight to all markets. This can to a certain extent bias our conclusions concerning the market definition practice of the Commission. If the attention (and resources devoted) to the analysis of a market depends on the importance of the case, it is likely that our conclusions give to much credit to the market definition practice in the less important cases and to little credit to the market definition practice in the more important cases. We have tried to attribute different weights to different markets, e.g. by aggregate turn over, but the information in the merger cases concerning turnover is not sufficiently detailed and consistent to allow such a correction.

Only four industries defined at the one-digit NACE-level are represented in the database with more than one merger case, cf. Table 3.4. Most of the cases are within manufacturing (64 per cent). Transport, storage and communication also make up a relatively large share of all cases (14 per cent). There is no major difference between the distribution of cases and the distribution of defined markets.

Industry	Ca	ses	Market definitions		
	Number	Percent	Number	Percent	
A. Agriculture, hunting, forestry	1	1.7	8	3.8	
C. Mining and quarrying	1	1.7	6	2.9	
D. Manufacturing	37	63.8	133	63.9	
E. Electricity and water supply	2	3.4	4	1.9	
F. Construction	1	1.7	3	1.4	
G. Wholesale & retail trade etc.	4	6.9	7	3.4	
H. Hotels and restaurants	1	1.7	1	0.5	
I. Transp., storage, comm.	8	13.8	31	14.9	
J. Financial intermediation	1	1.7	4	1.9	
M. Education	1	1.7	10	4.8	
J. Other community etc.	1	1.7	1	0.5	
Total	58	100	208	100	

Table 3.4: Phase II merger cases by industry

Source: Database

Geographical scope of the relevant market

We first consider the size of the relevant geographical market. The geographical market was defined to be equal to or less than the national market in 38 per cent of the cases, cf. Table 3.5. Almost 50 per cent of the markets were defined to be equal to or larger than EEA whereas 12 per cent of the markets were in between: Less than EEA, but larger than national markets.

Table 3.5: Size of the relevant geographical market

Size of geographic market	Number of market def	Per cent
< National	4	1.9
= National	75	36.1
Nat < Market < EEA*	26	12.5
= EEA*	48	23.1
> EEA*	55	26.4
l alt	208	100. 0

Note: EEA is European Economic Area

Source: Database

To give a more detailed impression of the change in the size of the relevant geographical market over time we have constructed a market size index for all merger cases as well as for the five industries with the largest number of merger cases in the database. The index is calculated as a deceptively simple annual average of the size of the individual markets, where we have attributed markets less than national markets a value of 100, markets equal to national markets a value of 200, markets larger than national but smaller than the EU area a value of 300, markets equal to the EU area a value of 400 and, finally, markets larger than EU having a value of 500.

The average size of a geographical market turns out to have an index value slightly above 300, which corresponds to a geographical market larger than national market but smaller than the EU area. A visual inspection of the index confirms, that the relevant geographical market has been surprisingly constant over time, cf. Figure 3.2. The index is more volatile in the first five years of the period than in the last five years. This is probably due to the limited number of observations in the former period.



Figure 3.2: The size of the relevant geographical market, 1992-2001





Note: Number in column indicates the number of markets. The index value is calculated as an arithmetic average of the size of individual markets with market size < national: 100, = national: 200, national < size < EU: 300, = EU: 400, > EU: 500. The dashed line indicates the average index value for market in the figure. Source: Own calculations.

If we look at the five largest industries, it is more difficult to get a coherent picture because the number of observations is limited. One exception may be DJ. Manufacturing of basic metals, which also seems to have the same market size in the second half of the period as in the first half. None of the remaining industries show any significant tendency to a larger or smaller

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geographical market in the time periods they cover. However, the results are clearly fragile due to the limited number of markets and cases included.

The figures indicate that the average size of the geographical market may change from industry to industry. If this is the case one should be cautious to conclude about market size over time for all merger cases. It may, for example, be possible that the seemingly constant market size is the result of the combined effect of increasing market size within industries and industries with small markets making up a larger share of the merger cases over time. In order to investigate this issue we have tested whether the individual industries have the same distribution of market size as the overall distribution for the period 1990-01, cf. Table 3.6. The test does not depend on the scale of the index.

Table 3.6: Test for market size distribution for individual industries compared to total distribution

	No.	Market d	efinitions	Average market	Std. dev.	Test value
	Case	Number	Percent	index	OFINDEX	
Total unweighted index	58	208	100.0	326.0	126.6	
A Agriculture, hunting, forestry	1	8	3.8	2125	64.1	0.92
C. Mining and quarrying	1	6	29	500.0	0.0	0.73
D. Manufacturing of	2	10	4.8	450.0	97.2	0.96
DE pupl and paper etc.	5	17	8.2	351.3	98.5	0.99
DG chemicals, fibers etc.	6	34	16.3	381.9	74.1	0.93
DI non-metallic mineral products	2	7	3.4	350,0	160.4	0.99
DJ metal products	7	22	10.6	418.7	116.7	0.100
DM transport equipment etc.	7	31	14.9	348.9	147.6	0.101
G Wholesale, retail trade	1	7	3.4	250.0	139.7	0.95
I. Transp., storage, comm	8	31	14.9	247.4	106.0	0.99
M Education	1	10	4.8	260.0	96.6	0.98
Other	17	25	120	106.0	106.0	0.99

Notes: The test is a chi squared– test. The test value is the probability of not rejecting the hypothesis of same size distribution for the industry as for the total distribution for the period 1990-01 as a whole. D. Manufacturing excluding market definitions within DE, DG etc. The average index is calculated as an arithmetic average of the size of individual markets with market size < national: 100, = national: 200, national < size < EU: 300, = EU: 400, > EU: 500.

Source: Database.

For all industries, except one, it cannot statistically be ruled out that the industry has the same distribution of market size as the total distribution for all industries. For example, it cannot be ruled out with a probability of 99 per cent that the sector, *Transport*, has the same size distribution as the total distribution. It is only for sector C, *Mining and quarrying*, that the probability of not rejecting the hypothesis of same size distribution is smaller than 90 per cent.

Overall, it seems fair to conclude that it is warranted to look at the total distribution of market size when we look at the development of market size over time. However, we emphasize that the test is relatively weak due to the limited number of market definitions in many industries. This probably implies a relatively high probability of not rejecting the hypothesis of equal size distribution. Moreover, the test is conducted for broadly defined industries. Thus, we cannot

exclude the possibility that an industry actually consists of several heterogeneous industries, each of which has a size distribution that is different from the total distribution⁴⁴.

Subject to these weaknesses, we can test the total distribution for constancy of market size over time. Because the number of observations is very limited in some years, we have added years together before making the test. We have applied two different groupings. In the first we add two years together making five sub-periods. In the second, we add five years together making two sub-periods. The test indicates, that the size distribution is constant over time, cf. Table 3.7.

	Two year period	ls		Five year period	S
Period	Markets	Test value	Period	Markets	Test value
1992-93	8	0.84			
1994-95	22	0.95	1992-96	32	0.96
1996-97	29	0.97			
1998-99	63	0.99	1997-01	176	0.99
2000-01	86	0.99			

Table 3.7: Test for constancy of market size over time

Notes: The test is a chi squared-test. The value is the probability of not rejecting the hypothesis of same size distribution for the sub period as for the period 1990-01 as a whole.

Starting with the two-year periods, we cannot reject the hypothesis that all sub-periods, except one, have the same size distribution as the size distribution for the entire period with a probability of more than 90 per cent. The exception is the period 1992-93 having relatively few observations. Turning to the five-year periods, the test also confirms that the market size distribution is the same in the first period as in the last period.

One may wonder whether the result is biased due to the exclusion of Phase I cases from the analysis. Phase I cases probably have wider market definitions on average than Phase II cases. This is due to the fact that the wider the geographic market, the less likely it is that competition concern arises, and the more likely it is that the case becomes a Phase II case. There are two situations where the exclusion of Phase I cases could bias our conclusion.

First, if the number of Phase I cases (with larger markets) increase relative to the number of Phase II cases, the average market size of all merger cases would increase, even though the average market size for Phase II cases remain constant. However, the share of Phase I cases has been rather stable at about 98 per cent throughout the entire period.

Secondly, if the size of the average Phase I market increases over time, the average market size of all merger cases would increase. It is a possibility that the average market size of industries most likely to appear in Phase I cases has increased due to the Single Market programme, whereas Single Market Programme has not had any impact on the average market size in industries most likely to appear in Phase II cases. We do not know whether this has been the case, but it does not severely undermine our argument. In this case the Single Market Programme would have succeeded in the industries that from the beginning were more integrated (and presumably with limited marginal returns of additional integration) and would not have succeeded in the industries that from the beginning were less integrated (and presumably with higher marginal returns of additional integration).

⁴⁴ It could have been interesting to study at the evolution of the market definition within the same market across time by using cases involving the same industry/market(s) and being sufficiently separated in time. However, this has not been possible because there are too few cases and markets to allow for such an exercise.

3.4 The methodology applied for definition of the relevant geographical market

We now turn to an investigation of the methodology applied by the Commission to define the relevant geographical market in Phase II merger cases. In particular, we compare the methodology applied with the methodology prescribed in the Commission Notice (European Commission, 1997b).

We emphasize that such an analysis of the market definition methodology involves translating words into numbers and categories. Accordingly there is a risk of a measurement error. However, we have put considerable effort into minimizing the risk of errors. In particular, we have counted the use of the different kinds of arguments by a careful manual reading of the cases and not mechanically using electronic tools. For example, we have decided that the Commission uses the SSNIP-methodology in a case, whenever the word SSNIP appears or whenever there is a direct or indirect reference to the SSNIP-experiment: Letting a hypothetical monopolist increase prices by 5-10 per cent. Clearly, we are forced to leave out of account the case where the Commission uses an argument without referring to it, neither directly, nor indirectly. If this is often the case, our result may be biased in the direction of underestimating the methodology applied by the Commission.

It turns out that the Commission in only a very limited number of markets, directly or indirectly, refers to the SSNIP-methodology. The Commission referred to SSNIP in about 4 per cent of all markets in the period 1990-2001, cf. Table 3.8. It is unclear whether the Commission uses an alternative methodology in the remaining 96 per cent of the markets. It is not possible to determine whether the limited use of the SSNIP-methodology implies too narrow or too wide a definition of the relevant geographical market.

Table 3.8: Using the	SSNIP-methodology,	1990 - 2001

Method	Number of market def	Per cent	
SSNIP	8	3.8	
Other	200	96.2	
Total	208	100.0	

Source: Database.

We do not know whether the Commission has made use of the SSNIP-methodology without referring to it, directly or indirectly. If this is the case, we underestimate the actual use of the method.

When the Commission defines the relevant *product* market, it uses the SSNIP-methodology more frequently. The Commission refers to the SSNIP-methodology in almost 11 per cent of the markets, three times as often as in the definition of the geographic market. One reason could be that the examples in the Commission Notice much more frequently are phrased in terms of product markets rather than geographical markets.

Types of substitution

We have counted the number of market definitions in which the Commission explicitly takes into consideration demand and supply substitution. It turns out that the Commission in rather few cases makes explicit reference to the two types of substitution. The Commission refers to demand substitution in about five per cent of all market definitions and to supply substitution slightly more often cf. Table 3.9.

Method	Number of market def	Per cent	
Demand sub.	11	5,3	
Supply sub.	13	6,3	
Potential sup.	2	1	
None	187	89.9	
One or more	21	10.1	

Table 3.9: Types of substitution	and	geog	raphic	al n	narket	definition,	1990	- 2001
						_		

Source: Database.

It is interesting that the Commission referred to supply substitution as frequently as demand substitution. The Commission Notice clearly focuses on demand rather than supply substitution, but as argued in Chapter 2 the heavy focus on demand substitution seems less warranted for the definition of geographical markets than for the definition of product markets.

In general the Commission refers much more frequently to demand and supply side substitution when defining product markets than geographical markets. In these cases the Commission refers to demand substitution in almost 61 per cent of all markets and to supply side substitution in 21 per cent of all markets

Barriers to market integration

We have for each market definition identified the type of barriers that have been applied for the definition of the relevant geographical market. It is very clear that natural and regulatory barriers are by far the most frequent barriers identified, preventing a broader geographical market definition. Regulatory barriers are decisive in about one third of all markets. Transport costs, a natural barrier, are decisive in one third of the markets, cf. Table 3.10. Distribution costs and national preferences are also considered relatively frequently.

Table 3.10: Barriers to market integration

	Number of barriers	Per cent of market def.
National preferences	32	15.4
Brand preferences	10	4.8
Product characteristics	20	9.6
Transport costs	72	34.6
Demand side switching costs	1	0.5
Supply side switching cost	11	5.3
Regulatory barriers	76	36.5
Chains of substitution	5	2.4
Distribution costs	33	15.9
Other barriers	18	8.7
Total	278	133.7
	No. of market def.	Perc. of market def.
None	10	4.8
One or more	198	95.2

Source: Database

When the Commission defines the product market, product characteristics are the single most important barrier identified. Product characteristics as a barrier implies that the physical characteristics - weight, functionality, size - of the goods in question are so different that, in the eyes of the Commission, they cannot be considered relevant substitutes in the product dimension.

Indicators of market integration

Finally, for each market definition we have also counted the types of empirical indicators that the Commission has used to empirically verify the absence of integration. Empirical indicators

are important because they constitute the only way to document the impact of a hypothesised barrier and to judge whether the barrier is quantitatively relevant in real life.

The simple answer is that the Commission uses two simple and crude types of empirical indicators, price level comparisons and trade flows. These two indicators are used in more than 70 per cent of all markets; cf. Table 3.11. The story goes like this. If price levels are very different or if trade flows are limited between two regions, then these two regions constitute separate relevant geographical markets.

In very few cases have the Commission applied more advanced indicators such as price correlations and price elasticities.

lumber of indicators	Per cent of market def
62	29.8
2	1.0
1	0.5
86	41.3
21	10.1
9	4.3
4	1.9
185	88.9
No. of market def.	Perc. of market def.
67	32.2
141	67.8
	lumber of indicators 62 2 1 86 21 9 4 185 No. of market def. 67 141

Table 3.11: Indicators of barriers to market integration

Source: Database

When the Commission defines the relevant *product* market, the most frequent indicator is simple comparisons of price levels that are used in about one third of markets. However, more advanced indicators such as price correlations and price elasticities are used much more frequently than in geographical market definitions. These more advanced indicators are used for 15-20 per cent of all markets. Thus, the practice so far has been to use very simple indicators of market integration. It is unclear whether this implies a broader or a more narrow definition of the relevant market compared to situation where more sophisticated techniques had been used.

Chapter 4 : A framework for geographical market definition

The goal of chapter 4 is to set up a framework for definition of the relevant (geographical) market in EU merger cases. Our aim is to develop a set of guidelines that can assure i) a more consistent and transparent geographical market definition; ii) a more sophisticated consideration of barriers to market integration; iii) a more frequent use of empirical verification of relevant market hypotheses, especially price tests.

The framework is developed on the insights obtained from the analysis of the current practice of defining the relevant geographical market in EU merger cases in chapters 1-3 of this report. We have applied the framework to five hypothetical merger cases in order to illustrate the practical use and applicability of the framework. We stress that the five merger cases are *toy* cases, in the sense that they are mainly featured to illustrate the use of certain methodologies and techniques rather than to reach a definite conclusion with respect to the relevant geographical market in specific cases. The five case stories are described in chapter 5 and in the appendices, but we have – for the sake of simplicity – allowed ourselves to incorporate the practical lessons learned during the five cases into the framework presented in this chapter.

The focus in this report is on the definition of the relevant geographical market, although we realize that in the real world it is neither desirable, nor feasible to maintain sharp dividing lines between the two dimensions of the relevant market. But to maintain tractability we will nevertheless in this context concentrate on the geographical dimension, unless the omission of the product dimension makes the presentation too narrow or otherwise excessively flawed.

The chapter is structured as follows. In section 4.1 we describe the overall analytical strategy of our proposed framework for (geographical) market definition in EU merger cases. Our preferred analytical strategy has three key elements:

- 1. SSNIP-methodology
- 2. Scientific method
- 3. Price tests

We describe and argue in some detail for the inclusion of each of the three key elements in our proposed analytical strategy for (geographical) market definition with reference to the current practice in EU merger cases. Finally, we propose to structure the analysis of the relevant market in two distinct stages (mimicking the scientific method), using the SSNIP-methodology as the overriding guiding principle:

- 1. Formulating the market hypothesis
- 2. Evaluating the market hypothesis (using price tests)

Next, in section 4.2 we discuss the first stage of the definition of the relevant (geographical) market: Formulating the market hypothesis. We outline some of the key issues for the formulation of a market hypothesis and set up a concrete step-by-step plan for developing a hypothesis of the relevant geographical market. In addition, we illustrate each of steps by providing concrete examples from some of the five case studies in chapter 5 and highlight the features that seem to be at odds with the current practice of the European Commission.

Finally, in section 4.3 we discuss the second stage of the definition of the relevant (geographical) market: Evaluating the market hypothesis (using price tests). We outline the key issues for an evaluation of the market hypothesis advanced in the previous stage and set up a concrete step-by-step plan for hypothesis evaluation using price tests. The plan is heavily inspired by the concrete application of a large number of price tests from some of the five case studies described in chapter 5 and the appendices and we highlight the features that seem to be at odds with the current practice of the European Commission.

4.1 Analytical strategy

The three key elements of the proposed analytical strategy are: 1) SSNIP-methodology; 2) Scientific method and 3) Price tests, cf. Figure 4.1.

First, we strongly recommend that market delineation be based on a well-structured guiding framework, and we, specifically, recommend using the SSNIP-methodology as the guiding framework. The recommendation is not inconsistent with the Commission Notice on market definition, but the analysis in chapter 3 showed that the SSNIP-methodology seems to be used explicitly in only a limited number of EU merger cases.

Secondly, we recommend mimicking the classical scientific method and sub-divide the process of market definition into two separate stages, where the competition analyst in the first stage formulates a hypothesis of the relevant (geographical) market, and in the second stage evaluates (or tests) the hypothesis against available data. The proposal is motivated by the very limited use of empirical evidence in EU merger cases, cf. chapter 3. We expect that the introduction of a separate stage dedicated to empirical documentation will expand the utilization of empirical analysis.

Thirdly, we recommend using price tests, tests of price co-movements, as the standard tool for empirically evaluating the extent of relevant markets. We acknowledge that a high degree of price co-movement is neither a necessary, nor a sufficient condition for two candidate markets belonging to the same relevant market, but we maintain that price tests seems the most relevant and feasible tool for a quantitative assessment of the relevant market, especially for competition analysts facing tight deadlines.

In the remainder of this section we will describe each of the three key elements of the proposed strategy.





The SSNIP-methodology

SSNIP is an acronym for **S**mall, but **S**ignificant **N**on-transitory Increase in **P**rices. Sometimes it is referred to as an SSNIP-test, which is a highly misleading use of the word '*test*'. SSNIP is not a test, but a convenient and attractive framework for thinking systematically about relevant markets.

Using the SSNIP-methodology implies going through the following thought experiment. You want to investigate whether some candidate goods produced within a specific area constitute their own relevant geographical market. Assume now that the goods are produced by a hypothetical monopolist and ask yourself whether it is likely that the hypothetical monopolist can earn a profit by Increasing Prices by 5-10 per cent (Small, but Significant) for a period of not less than 12 months (Non-transitory).⁴⁵

⁴⁵ When discussing the SSNIP-experiment, the Commission Notice on market definition refers mostly to a permanent price increase. This is at odds with the application of the SSNIP-experiment in US and UK merger cases, where a non-transitory price increase normally is referred to as a price increase of limited duration, normally not longer than 12 months.

If the answer is yes, then the candidate goods form their own relevant geographical market. If on the other hand, the answer is no, because consumers substitute away from the price increase or because other producers enter the profitable market, then the relevant geographical market is larger than the candidate market. The thought experiment is now repeated with a larger geographical area as a starting point and continues until the answer to the question posed becomes yes. In this case the relevant geographical market embraces all geographical areas included in the last thought experiment.

Our prime motivation for recommending a systematic adherence to the SSNIP-methodology is the seemingly disturbing absence of an explicit common guiding framework for the definition of the relevant geographical market in EU merger cases, cf. Chapter 3. The SSNIP-methodology has apparently been applied in less than five per cent of all geographical market definitions, while the SSNIP-methodology has been used more than three times as often for product markets. We are – like others⁴⁶ - not aware of any serious alternative to applying the SSNIP-methodology. In our view, the only alternative to the SSNIP-methodology is lack of consistency and transparency.

One of our cases has revealed a specific problem concerning the use of the SSNIPmethodology. In the electricity case, we strongly suggest that the relevant geographical market for wholesale electricity trade is time-dependent and can shift from hour to hour. Our empirical analysis shows, for example, that Eastern Denmark in some hours is part of the same relevant geographical market as the other Nordic areas, but in other hours constitutes its own relevant market. The reason is that in the latter hours, the transmission line between Sweden and East Denmark is congested, essentially leaving the East Danish market to a single dominant East Danish producer. In all other hours, the East Danish market is supplied by all Nordic producers. The congested hours, however, made up only about 5 per cent of all hours in 2001, and they were irregularly intermittent.

It is clear that this market set-up is a serious challenge to the notion of non-transitority in the SSNIP-methodology. In the electricity market, a hypothetical monopolist in East Denmark can clearly raise prices profitably in congested hours, but equally clearly not in non-congested hours. But as the two types of hours are intermingled, the hypothetical monopolist will never be able to raise prices profitably in any non-transitory and uninterrupted period of 12 months.

The case illuminates the need in some cases to adjust the SSNIP-methodology to a particular market. The UK regulator of the electricity market, OFGEM, has for example proposed that the ability to raise prices is described in two dimensions: the size of the price increase and the number of hours where the price increase is feasible, cf. Box 4.1. It remains to be seen whether the Commission and the European Court of Justice is going to accept that relevant markets may have a temporal dimension.

Box 4.1: OFGEMs proposal to define price increase by size and duration

- 4.13. By way of examples, the guidelines state that a license-holder has the ability to bring about a substantial change in wholesale electricity prices if it has the ability to bring about a change of:
 - 5 per cent or more for a cumulative duration of more than 30 days (1,440 halfhours) in a one-year period;
 - (ii) 15 per cent over 480 half-hours in a one-year period (ten days in total); or
 - (iii) 45 per cent over 160 half-hours in a one-year period (ie a little less than 1 per cent of the time).

Source: AES and British Energy: A report on references made under section 12 of the Electricity Act 1989 at http://www.competition-commission.org.uk/fulltext/453c4.pdf.

⁴⁶ E.g. OFT and NERA.

Scientific method

We recommend mimicking the classical scientific method and sub-divide the process of market definition into two separate stages. In the first stage, the competition analyst on the basis of the SSNIP-methodology, analyses the markets, the market participants, the competitive conditions, the barriers to demand and supply side market integration, and assembles readily available descriptive information about trade flows, price differences, market shares and the like. Finally, the competition analyst advances a hypothesis of the most likely definition of the relevant (geographical) market.

In the second stage, the competition analyst uses the hypothesis of the relevant geographical market to predict the behaviour of prices on the basis of the SSNIP-methodology. The typical prediction is that prices on similar products within the same relevant geographical market should not be able to depart significantly from each other. The predictions are tested using a number of tests for co-movement of prices that are developed. If a careful reading of the results of the price tests supports the proposed hypothesis, we conclude that the hypothesis has been empirically supported. If it does not support the advanced hypothesis, we recommend that the competition analyst carefully reconsider the proposed hypothesis or the empirical tests.

It is evident that the proposed analytical strategy mimics the classical scientific method of observing the world (observing the candidate markets), inventing a theory (hypothesising relevant market(s)), using the theory to make predictions about observable parameters (prices with a relevant market move together) and test the predictions (using tests of price correlation and co-movement).

We have two main reasons for mimicking the scientific method. First, the current practice of defining the relevant geographical market in EU merger cases clearly shows that rigorous empirical analysis is in limited use, cf. Chapter 3. We are strongly arguing in favour of advancing the use of rigorous empirical analysis in EU merger cases. However, in order to make full use of rigorous empirical analysis it is important to structure the process of market definition to facilitate the use of empirical methods. It is our practical experience that it is of great importance for good empirical analysis to develop a clear and concise testable hypothesis before engaging in data work.

Secondly, one explanation for the scant use of empirical evidence in EU merger cases may be that the competition analyst treats all types of evidence – be it qualitative or quantitative – as substitutes. If qualitative evidence is easier (less costly) to obtain than empirical evidence, there will be a tendency for more qualitative and less quantitative evidence. By dividing the analysis into two phases, it becomes more visible that qualitative and empirical evidence should not be treated as substitutes, but as complements.

However, some words of caution are also required here. While we do propose to *structure* the analysis in a manner that resembles the scientific method, we are *not* advocating the use of pure scientific decision criteria, nor in general the use of the falsification principle. We are fully aware of the fact that in most merger cases – if not all – the empirical evidence will not be of such quality that you can rely purely on scientific decision criteria. In all cases there is some scope for interpretation. The task of the empirical analysis is exactly to minimize this uncertainty, not to eliminate it. Even in the case where the empirical results may be conflicting, the competition analysts still have to make the best possible decision, based on a careful interpretation of the results from **both** stages of the process of market delineation.

Price tests

We strongly recommend using tests of price correlation or co-integration (price tests) as standard tools for evaluating the (geographical) extent of relevant markets. By price tests we understand tests that measure the (static or dynamic) degree of correlation between two or several price series. If, for example, two products belong to the same market, we expect - on the basis of the SSNIP-methodology - that there will be limits to how much the prices of the two products can drift from each other. In other words, the prices of the two products will be highly correlated. This feature of market integration can be tested in a rather straightforward fashion using tests of partial correlation or co-integration. We consider a high correlation between prices in two regions as a strong indication of the absence of significant barriers to market integration, although we acknowledge that it is neither a necessary nor a sufficient condition. Price tests require data that are often available and most price tests can be performed using standard econometric software, such as Eviews and PC-Give. In short, price test are the most relevant and feasible tool for a quantitative assessment of the relevant market. But until now, price tests have played only a marginal role in EU merger analysis being used only for 3 per cent of all geographical and 15 per cent of all product markets in EU merger cases.

There are two main lines of criticism of using price tests for delineating geographical markets.

On the one hand, we realize that price tests are not perfect and that advanced indicators based on residual demand analysis in principle are superior to price tests. But data requirements are often prohibitively large. Both price and volume data are required for a longer period and often on a detailed company level. As such it is no surprise, that we did not encounter any example of residual demand analysis in our review of EU merger cases, cf. Chapter 3. We will provide a more complete review of this strand of criticism against price tests in section 4.3.

On the other hand, we also acknowledge that, in some cases, data may not be available and that the assessment of the hypothesis in many cases will need to be less formal than normally implied by using statistical price tests. We nevertheless maintain that data are available in some cases as witnessed, especially, by the salmon and electricity case in Chapter 5; that data increasingly will become available in sufficient quantity and quality; that the Commission can ask Eurostat to put more effort into organizing proper data for competition analysis; and that, in any case, maintaining a sharp dividing line between the hypothesis and the empirical assessment of the hypothesis is basic scientific practice, which by itself cannot but improve the transparency of the process of defining the relevant geographical market.

4.2 The first stage: Formulating the relevant market hypothesis

In the first stage the competition analyst formulates a hypothesis of the extent of the relevant geographical market. We propose to follow a sequential step-by-step approach along the following line.

First, define all the relevant candidate markets, that is, all markets that are candidates for being or being part of a relevant market. The starting point is the product portfolio of the merging companies under scrutiny. Define the candidate markets in each of the two dimensions, product and geography. The most common approach is to define the dimensions of the market in a sequential manner, first the product dimension, then the geographical dimension. In some cases, notably non-storable products as electricity, a temporal dimension may be added, either as a separate dimension or as a separate product characteristic.

Secondly, calculate market shares for all candidate markets in order to decide whether the process of market definition is trivial or non-trivial. Market definition may be trivial if the market share on all candidate markets is either well below 25 per cent or well above 40 per cent. In the former case it is likely that competitive concern *does not arise* irrespectively of the chosen market definition. In the latter case it is likely that competitive concern *arise* irrespectively of the chosen market definition. This step is a screening device such that the competition analyst can devote the major part of his limited resources on non-trivial cases.

Thirdly, define the product markets. Select the candidate markets to analyse and apply the SSNIP-methodology to identify barriers to (product) substitution on the demand and supply side.

Fourthly, define the geographical markets Apply the SSNIP-methodology to identify barriers to (geographical) substitution on the demand and supply side. Applying the SSNIP-methodology means setting up the following thought experiment on the candidate market(s): Assume that the goods on the candidate market are produced by a hypothetical monopolist and ask your self whether it is likely that the hypothetical monopolist can earn a profit by Increasing Prices by 5-10 per cent (Small, but Significant) for a period of not less than 12 months (Non-transitory). Seek an answer to the question posed by identifying barriers to market integration that prevent customers from switching to goods outside the candidate market. If these barriers are of such nature that a profit can be earned by SSNIP-increasing prices, then the candidate market may constitute its own relevant market.

Finally, formulate a hypothesis of the extent of the relevant market(s). Cf. Figure 4.2 for an illustration of the path to follow.





We will emphasize two particular features of the proposed approach, that we will discuss in more detail below: i) Equal consideration of demand and supply substitution and ii) Identification of supply side barriers using an extended checklist of barriers. In the end of the section we set up a proposal for a concrete step-by-step method that can be followed even by the less experienced economist.

Demand and supply substitution

The analysis of EU merger cases in chapter 3 gave rise to one major observation concerning the role of demand and supply substitution in the definition of the relevant *geographical*

market. Only very few cases have explicit references to the role of demand and supply substitution. The two types of substitution are referred to in less than 6 per cent of all markets defined. In contrast, when defining the relevant product market explicit references to demand and supply substitution are much more frequent and occurs in more than 60 and 20 per cent, respectively, of all product markets defined. We interpret this observation as a sign (out of several) that the practice of defining the relevant product market is more sophisticated and formal than defining the relevant geographical market. For this reason, we particularly recommend that the competition analyst explicitly considers demand and supply substitution for the definition of the relevant geographical market.

We also recommend that the definition of the relevant geographical market take into consideration substitution on the demand side and supply side *on equal terms*. In the Commission Notice on market definition (European Commission, 1997b) the Commission explicitly makes supply side substitution secondary and inferior to demand side substitution by stating:

"Supply-side substitutability may also be taken into account when defining markets in those situations in which its effects are equivalent to those of demand substitution in terms of effectiveness and immediacy".

First, we generally see no reason to apply specific reservations to the supply side vis-à-vis the demand side. In any case, they both have to be assessed by the same measuring rod. The SSNIP-methodology requires demand and supply substitution to be technologically and economically feasible within a non-transitory period (that is often interpreted as twelve months) such that the initial prise increase becomes unprofitable. Clearly, if supply side substitution requires larger investments in production and distribution technology than what is needed for demand substitution, then supply side substitution may *ex post* play a minor role than demand side substitution. But it seems unwarranted to delegate supply side substitution to a secondary role *ex ante*.

Secondly, it seems especially unwarranted to give more emphasis to demand side substitution for the definition of the relevant *geographical* market for *consumer products*. In the product dimension a stronger emphasis on demand side substitution may be warranted because the investment (in time and money) needed for the consumer to dump the high price good and switch to the low price good on the same shelf seems to me much more limited than the investment needed for a potential competitor to manufacture and introduce a new product on the candidate market under scrutiny. However, in the geographical dimension, the investment needed for a customer to switch his demand to another geographic area, maybe even crossing a border, seems in relative terms to be larger than the investment needed for a potential competitor) borders of the candidate market under scrutiny.

We admit that the point of view of the Commission *may* have some merit in relation to the definition of the relevant *product* market, where consumers in many cases can easily switch to substitute products on the same shelf, while firms can only reposition their product portfolios at significant costs. However, it is far from clear that this should also apply generally with respect to the definition of the relevant *geographical* market. We prefer to see the argument as yet another sign that the Commission Notice primarily was written with the product dimension in mind.

Identification of supply side barriers using an extended checklist

The key exercise in formulating a relevant market hypothesis is the identification of barriers to market integration that can prevent cross-border substitution from taking place either on the

demand or on the supply side. When barriers are numerous or strong, they can prevent substitution from taking place and severely limit the size of the geographical market.

The analysis in chapter 2 revealed that the most frequent barriers to integrated markets recorded in EU merger cases throughout the entire period from 1990 to 2000 have been natural (transport costs) and regulatory (several) barriers. Each of these barriers has been recorded in about one third of all EU merger cases. In addition the prevalence of transport costs as a barrier has increased from 25 per cent in the beginning of the nineties to almost 40 per cent in the end of the nineties. If this correct, it raises doubts about the effectiveness of the Single Market Programme to integrate European markets and effectively create larger relevant markets within the European Economic Area.

One problem is that the Single Market Programme is not targeted at, and has no direct impact on, a natural barrier as transport costs (except cross-border costs). A second problem is that regulatory barriers seem to be as important in the last part of the period as in the first part, even though the Single Market Programme is explicitly targeted at regulatory barriers, cf. chapter 1. The identified regulatory barriers may not make part of the Single Market Programme; or they may be national regulatory barriers erected (presumably unintentionally) as a bi-product of policies serving other legitimate national goals, such as a cleaner environment or improved public health. In the cases of tobacco and beer in chapter 5, taxation of both products are exempt from the Single Market Programme, and there is little doubt that a ban on tobacco advertisements makes it more difficult for competitors to challenge strong national incumbents. And in the case of beer, the new Danish recycling system for cans seem to continue putting imported beer on cans on a competitive disadvantage vis-à-vis national beer on bottles.

Given the surprising prevalence of natural and regulatory barriers, we again stress the importance of empirically evaluating the hypothesized size of the relevant geographical market to demonstrate the empirical and practical relevance of the postulated barriers. This is particularly true in a situation where we observe a remarkable reduction in the application of quantitative indicators in EU merger cases. In the period until 1997, at least one empirical indicator was used in 85 per cent of all markets defined, after 1997 in only 60 per cent of all markets defined. In addition, in most cases the empirical indicators employed were simple indicators as price level comparisons and trade flows with questionable relevance for delineating geographical markets.

Strategic barriers created by businesses do not seem to play any major role. There may be several explanations for this observation. In the one end of the spectrum, it may be that strategic barriers in reality are not important in real life merger cases despite the existence of dozens of theoretical contributions in the area, cf. chapter 2. In the other end of the spectrum, it may also be that the competition analysts have not been sufficiently aware of barriers to market integration created endogenously by firms. One piece of supporting evidence for this theory is that strategic barriers do not seems to exist in the Commission notice on market definition from 1997.

While there does not seem to be a systematic tendency in EU merger cases that businesses increasingly create strategic barriers to integration to replace other barriers being torn down by the Single Market Programme, we still recommend that the identification of barriers be performed using an expanded check list of barriers, including many or all of the barriers created by businesses listed in chapter 2.

However, it is important to be aware that vertical agreements, typically agreements relating to distribution systems, may have both positive and negative consequences for competition and

economic efficiency. Vertical agreements may increase efficiency and stimulate entry, or it may reduce competition and deter entry. There are no clear-cut rules for whether one or the other effect prevails, requiring the competition analysts in each specific case to perform a concrete economic analysis. However, if horizontal competition is working, then vertical agreements generally should be of no major concern to the competition analyst.

Step-by-step guidelines for the formulation of a relevant market hypothesis

We now proceed to set up a step-by-step approach to the formulation of a relevant market hypothesis, cf. Table 4.1. The table describes in the left column the most important factors to take into consideration for each step in the proposed approach. In the right column the table provides concrete examples from the five toy cases, primarily the Salmon and the Electricity cases.

#	Activity	Examples and illustrations		
1a	Define all candidate markets			
	Set up a gross list of all candidate markets, that is, all markets that are candidates for being or being part of the relevant market(s) in the merger case under review.	The Salmon case: The <i>products</i> are: Scottish and Norwegian farmed salmon.		
	The standard approach is to describe candidate markets sequentially: The product dimension(s) first, then the geographical	The geographical areas are France, Belgium, The Netherlands, Germany, Spain, Italy and the UK.		
	dimension(s). The product portfolio of the companies under review determines the product dimension. The geographical markets	The Electricity case: The <i>product</i> is wholesale electricity.		
	served by the companies determine the geographical dimension.	The geographical areas are price areas in the Nordic countries linked by transmission lines with limited capacity		
	In some cases candidate markets may have a temporal dimension. An example is electricity that cannot be stored between periods.	And Germany, Spain and the Netherlands.		
	either be treated as different products or as having a separate temporal dimension in line with the product and geographical dimension.	The time periods are periods with or without congestion constraints on transmission lines connecting the geographical areas giving rise to radically different compatitive		
	The Commission Notice on market definition does not take into consideration a potential temporal dimension of a relevant market	conditions.		
1b	Calculate market shares for candidate market	ts		
	Calculate market shares for the merging companies on all candidate markets.	We have not calculated market shares in the hypothetical cases in chapter 5 because all cases are toy cases where		
	The goal is to sort out non-trivial cases, where the marginal returns to rigorous market definition are large, from trivial cases.	the merging companies are not identified.		
	 The screening rules may be as follows: If all market shares are significantly <i>below</i> 25 percent, competition concerns may be trivial and there is no need for a rigorous market definition. If all market shares are significantly <i>above</i> 40 percent, competition concerns arise in any case and there may be limited need for rigorous market definition. 			
	 If some market shares are significantly above 40 percent, competition concerns may arise and it can be important to 			

Table 4.1: Formulating the relevant market hypothesis
achieve a rigorous definition of the relevant

	market.	
1c	Determine relevant product markets Determine the relevant product markets by considering demand and supply substitution in the product dimension. A detailed description of this activity does not make part of this report.	The Salmon case: The relevant product markets are: Norwegian farmed salmon Scottish farmed salmon The Electricity case: The relevant product market is: Production and cale of wholesale
		electricity
1d	 Demand substitution on the candidate geogr. First, use the SSNIP-methodology to determine to which degree customers are likely to switch their demand <i>from</i> the candidate geographical area <i>to</i> other geographical areas. The SSNIP-methodology implies going through the following thought experiment: Assume that a hypothetical monopolist controls the candidate market. Let prices on the candidate market increase by 5-10 per cent for a non- transitory period of, say, 12 months. Evaluate <i>on the demand side</i> whether consumers are likely to switch their purchases from the candidate geographical market to other geographical areas to such a degree that the initial price increase becomes unprofitable. <i>If yes</i>, the relevant market is larger than the candidate market. If no, the relevant market. 	 aphical market The Salmon case: There are only limited possibilities for (geographical) demand substitution. Salmon is a perishable product and cannot easily be handled except by specialised Internet- and mail order shops that specialise in high end products. The Electricity Case: There are no possibilities for (geographical) demand substitution, as customers are obliged to purchase electricity from authorised dealers within a price area.
	The task is to identify demand side barriers that may prevent or deter customer substitution. Demand side barriers may be natural (language, transport costs or search costs); regulatory (product standards) or strategic created by businesses.	
1e	Supply substitution on the candidate geographics Second, use the SSNIP-methodology to determine to which degree potential competitors are likely to switch their supply to the candidate geographical area <i>from</i> other geographical areas.	phical markets The Salmon case: There are good possibilities for (geographical) supply substitution. Farmed salmon is a product with limited product differentiation with
	 The SSNIP-methodology implies going through the following thought experiment: Assume that a hypothetical monopolist controls the candidate market. Let prices on the candidate market increase by 5-10 per cent for a non-transitory period of, say, 12 months. Evaluate <i>on the supply side</i> whether potential competitors are likely to switch their supply either by trade or FDI to the candidate geographical market from other geographical areas to such a degree that the initial price increase becomes unprofitable. 	Scottish salmon occupying the high end. Transport is complicated but with moderate costs at about 4 per cent of the wholesale price. Contracting is informal and seldom long term. The Electricity Case: There are moderate to good

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- If yes, the relevant market is larger than the candidate market. If no, the relevant market corresponds to the candidate market.
- · Repeat the procedure until the answer is no!

The task is to identify supply side barriers that may prevent or deter entry of potential competitors. Supply side barriers may be natural (language, transport costs or search costs); regulatory (product standards, trade tariffs, NTB) or strategic created by businesses (monopolization of distribution channels, long term contracts).

Collect information on trade flows, price differences and market shares to support but note that active supply side substitution may be consistent with

Small and large trade flows

1f

Small or large price differentials

Formulate relevant market hypothesis(es) Combine the results of the analyses on

Note that markets may be integrated if either supply substitution or demand substitution is

(geographical) demand and supply side

size of the relevant geographical market.

sufficiently strong.

possibilities for (geographical) supply substitution.

Wholesale electricity is a very homogeneous product with no product differentiation.

Transport costs are negligible as long as the transmission capacity is large, but becomes infinite once the maximum capacity is reached. Transmission capacity is strong between Nordic price areas, but very limited between the Nordic area and Germany.

Long-term contracts may bind suppliers for a (longer) period, while spot markets allow for immediate substitution.

In Nordic liberalised markets vertically integrated companies are disallowed separating out production from distribution and minimizing problems with bundling.

The Salmon case:

Market hypothesis 1: The relevant substitution to formulate a hypothesis about the geographical market for Norwegian Salmon embraces (at least) all European countries.

> Market hypothesis 2: The relevant geographical market for Scottish Salmon embraces (at least) all European countries.

The Electricity case:

Market hypothesis 1: The relevant geographical market for wholesale electricity embraces all Nordic countries (except Iceland), but not Germany, in hours without transmission constraints on intra-Nordic transmission lines

Market hypothesis 2: The relevant geographical market for wholesale electricity embraces subsets of Nordic price areas, but not Germany, in hours with one or several transmission constraints on intra-Nordic transmission lines.

4.3 The second stage: Evaluating the relevant market hypothesis

In the second stage, the competition analyst must confront his hypothesis about the size of the relevant geographical market with available data to verify the existence and importance of the barriers to market integration identified in the previous step. This is an extremely important step because the mere existence of a barrier to market integration is not a sufficient argument to split the market in two distinct relevant markets. It could be that the barrier

existed, but that it was not sufficiently strong to qualify for market separation. For this reason, we consider it to be tremendously important to supplement the identification of barriers with a quantitative evaluation or verification of their importance and impact. For this purpose we propose to use tests of price correlation or co-integration, in short price tests.

We propose to follow a sequential step-by-step approach along the following line.

First, the analyst has to obtain price series for the relevant candidate markets. Data can be obtained from a number of public and private sources and it may in some cases be a tedious exercise to locate the relevant data. Especially given the low priority given by statistical offices bureaus as Eurostat to the collection and organisation of data relevant for competition analysis. However, it is our experience that surprisingly many data are available, but they may be extremely scattered and only possible to locate with a lot of imaginative thinking and – in some cases – luck.

Secondly, when data series have been obtained, the competition analyst must describe and transform the price series as needed. The objective is to learn about the properties of the price series by calculating key statistics and visualizing the price series in various types of plots. In some cases it may also be relevant to transform the original series to first differences or to a logarithmic representation. The latter representation reduces the impact of outliers.

Thirdly, price series must be tested for stationarity. This is a very important preparatory step needed to select the proper analytical tools for the price tests. Stationary and non-stationary series are created by fundamentally different processes such that a comparison of two such series within the same statistical framework becomes fundamentally flawed. If price series are stationary, or integrated of zero order, classical statistical methods as correlation coefficients can be used. On the other hand, if price series are non-stationary, or integrated of 1st order, new statistical methods as co-integration must be used.

Test for stationarity may also be seen as a first test of co-movement of prices. The fundamentally different characters of stationary and non-stationary series implies that a *necessary* requirement for two candidate markets belonging to the same relevant market integration is that price series must be of the same order.

Fourthly, the co-movement between price series must be tested using tests of price correlation or co-integration. A key issue in price tests are *common factors*. Common factors are factors that may cause prices to co-move even though they are completely unrelated to the competitive forces between two candidate markets. One typical example is variations in the costs of raw materials that are common for the products on the two candidate markets. Common factors must be purged from the price series before implementing price tests. If this is not done properly, price tests may (typically) indicate spuriously high correlation between two candidate markets even though the two candidate markets properly measured would be completely separate.

Once common factors have been purged a large number of price tests are available from very simple test that can be executed in standard software and with no expert skills to very sophisticated tests requiring specialized software and expert support.

Finally, on the basis of the price test evaluate the validity of the formulated hypothesis about the size of the relevant market(s). Cf. Figure 4.3 for an illustration of the path to follow.





We will emphasize two particular features of the proposed approach that we will discuss in more detail below. First, we will discuss the relationship between the different type of price tests: stationary versus non-stationary price tests, static versus dynamic tests as well as bivariate versus multi-variate tests. Secondly, we will discuss a broad range of general and specific criticisms that has been put forward against the use of price tests. In the end of the section we set up a proposal for a concrete step-by-step method for the evaluation of relevant market hypotheses using price tests that to some degree can be followed even by the less experienced economist.

Types of price tests

Using the SSNIP-methodology implies performing a thought experiment of the likely reactions of customers and potential competitors in response to a non-transitory price increase of 5-10 per cent on the chosen candidate market. If the customers decide to drop the higher priced good, they may instead choose to buy a range of other products or to buy the same product in a range of other markets. Likewise if potential competitors decide to enter the candidate market with higher priced goods, they can do so from a range of different positions, either in the product dimension (from other sectors) or in the geographical dimension (from other countries).

The important thing is to notice the potential multi-dimensionality of the substitution pattern on both the demand and supply side, cf. Figure 4.4. The key candidate market is in the centre encircled by six other candidate markets. If prices increase in the centre market, customers may flee from the high priced market to several other low priced market (red arrows), while competitors are attracted from several low priced market to the high priced market (blue arrows).

Our basic price test is the bi-variate price test measuring co-movements in prices between pairs of markets. One such pair is encircled with a dotted black line. Clearly, the pair-wise price test ignores a substantial volume of information about substitution behaviour between other pairs of markets and there is a clear risk of underestimating the true extent of comovement between prices by deliberately ignoring these price interactions.

Instead the competition analyst can use multi-variate price tests that can handle price relations between many pairs of markets simultaneously. The price is that multi-variate price tests are more sophisticated and difficult to use by average competition analysts who are not trained econometricians. Multi-variate price tests also typically requires better and more numerous data.

A special issue is the question of using sequential or simultaneous estimation strategies. The typical estimation strategy in market delineation is sequential. First, testing in the product dimension, then in the geographical dimension. The key reason is simplicity and tractability as all price tests can be implemented with rather simple statistical techniques. However, Bergh (1996) and Neven et al. (1993) suggest that market delineation will be biased towards narrow markets if product markets and geographic markets are defined sequentially, rather than simultaneously. Overall demand substitution toward both other products and other locations will normally be stronger than substitution in either dimension at a time. Ignoring this one might decide first to define products narrowly and then to define geographic extent narrowly ignoring the possibility of a diagonal substitution.

Clearly the most appropriate strategy seems to be a simultaneous strategy measuring the joint co-movement of prices in a number of product and geographic markets. The Salmon case provides an example. The sequential strategy made us conclude that Scottish and Norwegian Salmon belong to different relevant (product) markets. The simultaneous strategy instead taught us that Scottish and Norwegian Salmon indeed belong to the same relevant product and geographical market.



Figure 4.4: Bi-variate and multi-variate correlation

Another issue is the time dimension. Our basic price test is the static price test measuring the *simultaneous* co-movement between prices on two markets, thus completely ignoring that the price relation may be lagged or dynamic, cf. Figure 4.5. Clearly, there is again a risk of underestimating the true extent of co-movement between prices by deliberately ignoring the dynamic price interactions.





Instead the competition analysts can use dynamic price tests as the Granger causality test or Error Correction Models. These tests measure whether past values of prices on one market are statistically significant for the prediction of current prices on another market. The dynamic price test is a valuable supplement to the basic static price test, but it is also more sophisticated and difficult to use by competition analysts who are not trained econometricians.

Ideally, the multivariate price test incorporating i) the product and the geographical dimension, ii) multiple markets and iii) dynamic lags is *the* price test. However, the multi-variate price test is also sophisticated and cannot be used except by trained econometricians and, even if this is indeed the case, only if good data are available. In reality, the competition analyst is again faced with the eternal dilemma between relevance and feasibility. The pragmatic solution might be to first to use bi-variate static price tests. If the results are uncertain and/or the choice of market makes a difference, proceed to bi-variate dynamic price tests. If these results also are uncertain and/or the choice of market still makes a difference, proceed to multi-variate dynamic price tests. Provided good data are available...!

Criticism of price tests

A number of general criticisms have been put forward against the use of price tests for market definition. We accept that the concept of an antitrust market as defined by the SSNIP-method is different from the concept of an economic market as defined, for example, by Stigler and Sherwin (1985): "A market for a good is the area within which the price of a good tends to uniformity, allowance being made for transportation costs".

On the basis of this observation, Werden and Froeb (1993) as well as Sleuwagen (1999) argue that a high price correlation between two market areas is neither a necessary nor a sufficient condition for the two market areas being integrated in the sense of an antitrust market. Indeed, Werden and Froeb (1993) develop a small theoretical model and prove that under specific circumstances it is possible to have high correlation between prices only under circumstances where the two markets are not integrated in the SSNIP-sense and vice versa. We will not question this (theoretical) line of argument, and we acknowledge that using price tests – as with all other empirical tests - implies a risk of making type I-errors (accepting a wrong conclusion) and type II-errors (rejecting a right conclusion).

However, we tend to disagree with the rather bombastic conclusion of Sleuwagen et al (2001), that "... the delineation of an economic market is completely different from the delineation of an antitrust market". Even though we realise that the market concepts are different, we will maintain that much useful information can be extracted from analyses based on the economic market concept, that is relevant for the antitrust market and that cannot be extracted in any other way. Although the concepts are not identical, they are related. Generally, the more arbitrage and, thus, economic market integration, the less possible it is to exert market power for a hypothetical monopolist.

We are also aware of a large number of specific criticisms raised against price tests. We disagree with most of them, and the rest are irrelevant, in the sense that they are so general that they are valid for any kind of empirical analysis, be it residual demand analysis or price tests.

Werden and Froeb (1993) argue that price correlation tests cannot be applied when prices are non-stationary. This is correct, but it does not invalidate the idea of comparing price trends, but just requires the use other econometric techniques, namely co-integration techniques.

In the same spirit, Sleuwagen et al (2001) argue that co-integration methods cannot be used if price series are stationary and are without unit roots. This is correct, but it is not a problem. Co-integration methods are the appropriate tools whenever series are non-stationary, correlation methods the appropriate tools whenever series are stationary. We demonstrate in Chapter 5 in the cases of Electricity and Salmon how to apply a large number of price tests on stationary price series, and in the cases of Beer, Tobacco, and Salmon how to apply a large number of price tests on non-stationary price series.

Werden and Froeb (1993) also argue that typically pair-wise comparison of prices is applied, leaving out the possibility that a set of goods may be substitutes with the candidate good even though each single good is not sufficiently substitutable. It is correct that pair-wise comparisons are widely used, but we show that there are several techniques available for multiple comparisons. The case of Salmon in Chapter 5 demonstrates that multivariate analysis of price series - as argued correctly by Werden and Froeb – gives rise to larger relevant markets than pair-wise comparisons. However, we realize that multi-variate price tests require a higher level of econometric sophistication than typically available with an average competition analyst.

Finally, Werden and Froeb (1993) argue that price tests often have to rely on data extrapolated outside their original range and on historical data that in some cases may not adequately reflect the markets under scrutiny. While these criticisms are correct, they are hardly relevant only for price tests. We prefer to interpret these warnings as an urge to be cautious and modest when interpreting the results from any kind of empirical analysis. It is also true that price correlation tests can reach erroneous conclusions if there is spurious

correlation in the data originating from common factors unrelated to the competitive forces. However, in many cases spurious correlation can be purged from the data using standard tools such as partial correlation instead of ordinary correlation. We demonstrate in Chapter 5 in the cases of Salmon, Beer, Electricity and Tobacco the feasibility and importance of purging price series for common factors.

Werden and Froeb (1993) argue that there only are arbitrary guidelines for determining whether a high price correlation is sufficient to declare that two markets are integrated or not. This is correct, but we believe – and show in Chapter 5 in the case of Electricity - that in some cases it is possible to obtain non-arbitrary guidance by benchmarking correlations between candidate markets on correlations between markets for which we are convinced that they are not integrated. In other cases it may be possible to corroborate the results from correlation analysis with supplementary analyses, e.g. Granger causality and correlation analysis of multi-variate price series.

Bishop and Walker (1999) argue that price correlation methods are less applicable for comparing prices between countries whenever exchange rates are volatile. This is probably correct, but seems only modestly relevant in a Europe with little exchange rate volatility for most of the nineties (for most of the countries) and is certainly of no relevance in Euro-land. Again, it is also plausible that the same reservations may apply to any analysis that involves prices from different countries, be it residual demand analysis or price correlation tests.

To summarise, we generally disagree with criticism regarding the use of price tests to delineate geographical markets, although we recognize that price tests may have their shortcomings. However, in the latter case we need two ask the following two questions: 1) Is there any other analytical method that is superior and equally feasible? and 2) Do price tests work in practice, even though we realise that they may fail in theory?

The answer to the first question is probably no. There exist superior analytical methods with closer affinity to the SSNIP-methodology, such as residual demand analysis, but they remain in most cases hopelessly infeasible because of their huge data requirements. And there exist very feasible methods, such as price level comparisons and trade flows, but they are certainly analytically inferior to price tests.

The answer to the second question is unknown, even though it is highly relevant. It may be that price correlation tests in theory are not a reliable predictor of the delineation of the relevant market, but it may be also that for the majority of parameter outcomes that can be observed in real life, this observation is just a theoretical oddity that can be dismissed for any practical application. We don't know the answer, but here is certainly room for innovative research of high practical relevance.

Step-by-step guidelines for the evaluation of a relevant market hypothesis

We now proceed to set up a step-by-step approach to the evaluation of a relevant market hypothesis, cf. Table 4.2. The table lists describe in the left column the most important factors to take into consideration for each step in the proposed approach. In the right column we provide concrete examples from the five toy cases, primarily the Salmon and the Electricity cases.

 Table 4.2: Evaluating the relevant market hypothesis

#	Activity	Examples and illustrations
2a	Collect relevant price series	
	The first step is to search for and collect price	All cases:
	series that are representative for the relevant	In our cases, data has been obtained
	market(s) in the relevant market hypothesis.	at the proper level of detail and

- It is important to consider the following issues:
- Data sources can be public statistical material, commercial data or eventually data from the merging companies themselves.
- Relevant data will not always be immediately available and we strongly recommend that the provision of relevant data for competition analysis become a prioritised task of Eurostat.
- Price series must have a minimum number of observations if price tests are to be used. In general, we recommend that price series must have at least 25 observations.
- Extending the period (e.g. 1 year to 2 years) or increasing the frequency (e.g. annual to monthly data) increase the number of observations. Extending the period is better than increasing frequency, because a higher frequency also adds seasonal variation that may have to be purged.
- Relative prices (indices) are as valuable as absolute prices. Measuring co-movement between prices does not require information about price levels.
- In some cases wholesale prices are available, but consumer prices are ideally needed. If competitive concerns relate to the production rather than the distribution sector, it may not matter a lot. If in doubt, analyse both.
- Prices should, as a rule, include taxes. If taxes make up a high proportion of the total price and change frequently, it can cause spurious correlation. If in doubt, analyse price series with and without taxes.
- 2b Exploratory data analysis of the price series Explore thoroughly the properties of price series with standard statistical tools: Calculate e.g. mean, median, variation, skewness, kurtosis, and standard deviation.

Make graphical representations of the price series using e.g. line plots, scatter plots, histograms, probability plots, and autocorrelation plots.

In some cases it may be preferable to work on the log-transformed series, because they reduce the influence of outliers. This is a standard feature of many econometric analyses.

Convert price series to a common currency, if needed.

2c Test for stationarity Test whether price series are either stationary (integrated of zero order) or non-stationary (integrated of 1st order).

Stationarity tests are needed to select the appropriate analytical technique and as a first specificity for salmon and electricity, while data for beer, tobacco and facial tissue are less adequate. The latter data are obtained on a very aggregated level or in one case with a severely limited number of observations.

Twelve annual observations in the case of facial tissue are clearly too few.

96 monthly observations in the cases of salmon, beer and tobacco are sufficient to make most of the price tests.

8,760 hourly observations in the case of electricity are pure luxury, but the high data frequency also gives rise to numerous problems with seasonal variation.

Salmon data are from a commercial database and Eurostat. Electricity data from the web sites of the Nordic, German, Dutch and Spanish power exchanges. Beer and tobacco data from Eurostat. Facial tissue data are from a commercial database.

Taxes make up a large share of the total price of tobacco and beer. Frequent tax changes imply that the price often changes in step-wise manner. Unless consumers react immediately to tax changes, it may make correlation spuriously low.

The Salmon case:

All prices for Scottish salmon seem to be stationary, while all prices for Norwegian salmon seem to be nonstationary. indication whether candidate markets belong to the same relevant market.

Stationary time series have a well-defined mean over time, while the mean of nonstationary time series may fluctuate over time. A well-defined mean, independent of time, is a key requirement for using classical statistical methods. For this reason stationary time series can be analysed with classical statistical methods, while non-stationary time series can *only* be analysed with co-integration methods.

The statistical properties of stationary and nonstationary series are such that their comovement (measured e.g. by the ordinary correlation coefficient) is limited. For this reason, tests of stationarity can also be considered as the first test of market integration. A *necessary, but not sufficient,* condition for two candidate markets to belong to the same relevant market is that the price series are integrated of the same order.

Stationarity is tested by the ADF-test or the KPSS-test. Tests of stationarity are by now standard elements of any advanced econometrical software package as Eviews, PcGive, and others.

2d Test for static price correlation Test whether prices on two (geographical) candidate markets move together (simultaneously). A large degree of comovement between price series may indicate that the two candidate markets belong to the same relevant market.

Stationary price series with a large degree of simultaneous co-movements are correlated. Simultaneous correlation is measured by the correlation coefficient.

Non-stationary price series with a large degree of co-movements share a common stochastic trend and are said to be co-integrated. Cointegration is measured by a test for cointegration.

A key concern prior to any test of co-movement is to purge price series for all correlation that is caused by *common factors* unrelated to competition, e.g. inflation, exogenous temporal variation or prices on key inputs common for the two candidate markets.

If common factors are not purged, correlation may be spuriously high with a serious risk of drawing erroneous conclusions about the size of the relevant market.

Stationary price series

For stationary time series, the proper measure for co-movement of prices is the *partial correlation coefficient*, not the ordinary correlation coefficient. Thus, stationarity tests indicate preliminarily that Scottish and Norwegian salmon belong to different product markets, and that all represented countries may belong to the same relevant geographical market.

The Electricity case:

All wholesale prices for electricity seem to be stationary.

Stationarity has been tested for subsamples of hours with and without congestion constraints. This is challenging because price series become non-continuous with a large number of "missing" observations.

Stationarity has also been tested for higher data frequencies, daily and weekly average prices, to improve robustness.

Thus, stationarity tests indicate preliminarily that all represented countries may belong to the same relevant geographical market.

The Salmon case:

Tests of static price correlation indicate that:

- Prices of Scottish salmon (stationary) in Spain, France, Holland and Belgium are more correlated than other markets with a partial correlation coefficient in the range [0.5;0.7]
- Prices of Norwegian salmon are generally pairwise co-integrated
- Prices are purged for seasonal variation and inflation
- It has not been possible to benchmark results on results from integrated or non-integrated markets.
- We conclude preliminary that the relevant geographical market for Norwegian salmon seems to be all countries included in the analysis, while for Scottish salmon at most Spain, France, Holland and Belgium.

The Electricity case:

Tests of static price correlation indicate that:

- Nordic prices are perfectly correlated in hours without congestion constraints [PAC=1];
- Nordic prices are poorly correlated in hours with congestion constraints [PAC<0.4]

The partial correlation coefficient differs from the ordinary correlation coefficients, as the former, but not the latter, has been purged from the influence of *common factors*.

A high and significant correlation coefficient close to unity may indicate that the two candidate markets belong to the same relevant market. A low or insignificant correlation coefficient may indicate that the two candidate markets *do not* belong to the same relevant market.

The partial correlation coefficient (PAC) is calculated by regressing all price series on time series of common factors using OLS. The residuals from this regression are considered as a measure of prices purged for common factors and the partial correlation coefficient is the ordinary correlation coefficient between the residuals from two such regressions.

Purging price series for common factors must be done separately for any relevant subsample of the price series in the analysis. This assures that the series are purged only for information about common factors inside the relevant sub-sample, not from outside.

Calculating PAC is possible in any statistical software package that can perform standard statistical tests and OLS-regressions.

There is no straightforward way of telling when a PAC is sufficiently high to conclude that markets are integrated. In practice, a widely used criterion for market integration is when the PAC cannot be tested different from zero.

When the number of observations is large, any PAC may be significant and the statistical significance criterion becomes void. Instead the estimated PACs can be compared to benchmark PACs, that is PACs calculated for pairs of markets that are *known to be integrated* or *known not no be integrated*.

Suppose that the PAC between integrated markets is 0.8 and between non-integrated markets 0.4. If the PAC between two candidate markets is tested lower than 0.4, the pragmatic conclusion may be that markets are not integrated. If the PAC between two candidate markets can be tested higher than 0.8, the pragmatic conclusion may be that markets are integrated. In between there is no clear answer, but the range of indefiniteness has been reduced from [0;1] to [0.4; 0.8].

Non-stationary time series For non-stationary price series, co-movement of prices is measured by a test for conintegration. A number of test methods are available, in all cases involving auxiliary

- Nordic and German prices are poorly correlated in all hours [PAC<0.3].
- Price series are purged for exogenous variation in consumption pattern: Daily, weekly and seasonal cycles
- Partial correlation coefficients are benchmarked on markets that are **not** integrated with Nordic markets, that is,, the Spanish and Dutch market. Generally, PAC are low in the range below 0.4.
- We conclude preliminarily that Nordic price areas belong to the same geographical market in hours without congestion constraints; that Nordic price areas belong to different geographical markets in hours with congestion constraints (the exact configuration depending on the location of congestion constraints; that Germany and the Nordic price areas are never part of the same relevant geographical market.

regressions.

Common factors are typically purged by including the time series of the common factors in the auxiliary regressions.

The simplest method exploits the fact the price difference of two co-integrated non-stationary price series must be stationary. Accordingly, we can test for co-movements by testing whether the (simultaneous) price difference between the prices on two candidate markets are stationary using similar tests as in step 2c, either an ADF-test or a KPSS-test. Common factors are purged by regressing the price series on the common factors and testing the price difference of the residuals rather than the price series themselves.

A widely used, but more complicated, method is the Engle-Granger two-step procedure. First the two price series are regressed against each other using OLS, including common factors as explanatory variables in the regression. Second, the residuals from this regression are tested for stationarity using either an ADF-test or a KPSS-test.

Finally, the Johansen method can be used. The Johansen method implies setting up a simultaneous equation system (an error correction model) of the price series including potential common factor variables. A strong advantage of this method is that multiple price series can be analysed simultaneously, cf. step 2f, and also that dynamic correlation amongst the series are explicitly being accounted for, cf. step 2e. The Johansen method requires better data with more observations than the two previous methods and the method is (still) technically challenging and should not be used except with expert guidance.

2e Test for dynamic price correlation Test whether prices on two candidate markets move together, eventually with a lag.

> Compared to the static tests, the dynamic tests take into consideration that prices on two markets can impact each other with a lag. If tests of dynamic price correlation confirm the presence of lagged correlation, then measures of simultaneous correlation, cf. step 2d, underestimate the true extent of co-movement between prices.

Again, different methods must be employed for stationary and non-stationary price series.

Stationary price series

For stationary series, Granger causality test must be used for testing dynamic price correlation.

The Granger causality test implies regressing the current price on a candidate market on

The Salmon case:

Tests of Granger-causality indicate that:

- that prices of Scottish salmon in Spain, France, Holland and Belgium seem to be dynamically, as well as static, correlated
- that prices of Scottish salmon in Germany, Austria and Belgium seem to be dynamically, although not static, correlated

lagged values of its own price and of prices on the other candidate market. As previously, price series must be purged from common factors and the resulting residuals used in the regression instead of the ordinary prices.

Granger causality (or dynamic correlation) is present, whenever the estimated coefficients on the lagged prices from the other candidate market are tested different from zero. Note, that Granger causality can be present in one direction or in both directions.

The strength of dynamic correlation may be estimated through a series of auxiliary regressions aiming to measure the share of variation in the first price that can be explained solely by lagged values of the second price. An R^2 -index can be calculated on the basis of the auxiliary regressions. The larger is the index, the larger is the dynamic correlation.

Non-stationary price series

The Johansen method can be used to consider dynamic correlation. The Johansen method implies setting up a simultaneous equation system (an error correction model) of the price series including potential common factor variables and lagged values of all price series.

Dynamic correlation can be tested by LM-tests of weak exogeneity in the error correction model.

The Johansen method requires better data with more observations than other methods and the method is (still) technically challenging and should not be used except with expert guidance.

2f

Test for multivariate price correlation Test whether prices on several candidate markets move together simultaneously.

Compared to the bi-variate test, the multivariate tests take into consideration that prices on several markets can interact at the same time. It can be argued that a sequential analytical strategy using bi-variate test to analyse multiple price series may lead the competition analysts in some cases to reject co-movement between prices even though a "full" multi-variate analysis could confirm the presence of joint movement of multiple price series.

A large degree of co-movement between several price series may indicate that the candidate markets in question belong to the same relevant market.

The Salmon case:

A principal components analysis of Scottish salmon prices indicate:

 that there is some evidence that the total price variability can be described by a limited number of factors. The analysis especially confirms that prices in Spain, France, Holland and Belgium can be explained (almost entirely) by a single factor.

A Johansen type analysis of Norwegian salmon prices indicate:

 that a single strong common stochastic trend drives all the price series simultaneously. The evidence strongly favours a conclusion, where all the countries

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⁴⁷ Roger Van den Bergh, 1996, Modern Industrial Organisation versus Old-fashioned European Competition Law, European Competition Law Review 17(2) 75-87. D. Neven, R. Nuttall and P. Seabright, 1993, Merger in Daylight: The Economics and Politics of European Merger Control, CEPR, p. 54.

Again, different methods must be employed for stationary and non-stationary price series.

Stationary price series

For stationary series, an error correction model can be set up. The set-up is in principle similar to the Johansen method, although adapted to stationary series.

The error correction model, as the Johansen method, requires better data with more observations than other methods and the method is (still) technically challenging and should not be used except with expert guidance.

Alternatively, principal components and factor analysis can be used. The aim of principal components and factor analysis is to identify the number of underlying basic factors that may be able to generate the price series. If the number of factors (principal components) is limited to one, it indicates that the markets represented by the price series may belong to the same relevant market.

If, on the other side, the number of factors is two, it might indicate that the markets represented by the price series may belong to at least two separate relevant markets.

It is beyond the scope of this survey to go into further detail on the error correction model and the principal components and factor analysis.

Non-stationary price series

For non-stationary time series, the Johansen method for co-integrated time series can be used. The Johansen method implies setting up a simultaneous equation system (an error correction model) of the price series including potential common factor variables and lagged values of all price series.

The Johansen method requires better data with more observations than other methods and the method is (still) technically challenging and should not be used except with expert guidance.

It is beyond the scope of this survey to go into further detail on the error correction model and the principal components and factor analysis.

Simultaneous versus sequential analysis: Modern industrial economics⁴⁷ suggests that market delineation will be biased towards narrow markets if product markets and geographic markets are defined sequentially, rather than simultaneously. Overall demand substitution toward both other products and other locations will normally be stronger than substitution in either dimension at a time. belong to a common geographical relevant market.

On the basis of a sequential analysis, we conclude that the relevant geographical market for Norwegian salmon seems to be all countries included in the analysis, while for Scottish salmon at most Spain, France, Holland and Belgium. These results confirm our previous results.

A simultaneous Johansen type analysis of Scottish and Norwegian salmon prices in Spain, France and Holland indicate:

 that a model of a common product and geographical market is strongly preferred to a model with a common geographical market for two separate products.

On the basis of a sequential analysis, we conclude that the relevant market for Scottish and Norwegian salmon in Spain, France and Holland seem to be a common product and geographical market, thus reversing the conclusion from the sequential analysis.

The Electricity case:

A principal component analysis of prices in the Nordic price areas and in European regions indicate that:

• it is not possible to find a limited number of principal factors that can explain prices in all the included areas. It confirms the previous results that congestion constraints within the Nordic countries and lack of transmission capacity between the Nordic countries and Germany prevents the creation of a truly integrated geographical market in all hours. Ignoring this one might decide first to define products narrowly and then to define geographic extent narrowly ignoring the possibility of a diagonal substitution.

Simultaneous delineation of relevant markets is possible using the Johansen method. Se the Salmon case for a concrete example where the conclusion is reversed as predicted when using simultaneous rather than sequential estimation.

Chapter 5 : Case studies

In chapter 4 we proposed to define the relevant geographical market applying a two-stage approach. First, the competition analyst sets up a hypothesis of the relevant market, and in the second stage assesses (or tests) the hypothesis against available data. In this chapter 5 we apply the proposed framework to five selected consumer goods: Salmon, beer, tobacco, electricity, and facial tissue. We first set up a hypothesis of the relevant market based on sound economic reasoning. Then we assess the hypothesis by use of price tests. We put most of the effort into showing how empirical analysis of price data can be used to define the relevant market. In setting up the market hypothesis we particularly pay attention to the distribution system. However, this part of the study is more rudimentary than the price analysis.

We emphasise that our case studies are merely illustrative toy-cases and do not correspond to actual process of market definition in a concrete merger cases, one reason being that in an actual competition case the point of departure is always a specific company and its products. It follows that the reader in no way should expect that our general conclusions are reflected in the conclusions of the competition authorities in a specific competition case.

Our conclusions with respect to the relevant geographical market can be summarized as follows:

- The relevant geographical market for Scottish and Norwegian salmon is European.
- The relevant geographical markets for beer and tobacco are national.
- The relevant geographical markets for wholesale electricity are time-dependent, depending on the state of congestion in the European transmission lines. In some hours the Nordic area constitute a single geographical market, in other hours the Nordic area is split into several national or sub-national markets. None of the other European countries appear to have geographical markets larger than national.
- We did not make any conclusion concerning facial tissue due to severe data limitations.

We identify several different barriers to market integration. The distribution system, broadly defined, seems to be a severe barrier to integration on the beer market. Thus, strict regulations of advertising, high costs of transportation and economies to scale in distribution tend to segment the national geographical markets. The distribution system may also be of some importance on the tobacco market, primarily because of advertising regulation. On the

electricity market the physical capacity of the transmission systems was the primary barrier to market integration. We also identify barriers to market integration besides the distribution system, in particular on the markets for beer and tobacco, including brand preferences, restrictions on cross border trade and the tax system.

We make a number of methodological conclusions.

First, the SSNIP-method has to be adapted to the characteristics of the industry to which the firms under scrutiny belong. As an example the Nordic electricity market turned out to be characterised by short-term periods of market segmentation followed by periods of market integration and thus not fitting into the normal one-year period of the hypothetical monopolist experiment used for market delineation.

Secondly, a simultaneous delineation of product and geographical markets should always be carried out where data allows it. We show that a simultaneous delineation of the salmon product and geographical markets implied another product market definition than the traditional sequential method did.

Thirdly, market delineation should be based on partial correlation coefficients rather than simple correlation coefficients as the latter to a large extent were influenced by spurious correlation.

Fourthly, we show that benchmark correlations could be used to delineate the geographical electricity market, thereby solving the problem of ad hoc threshold correlations to determine whether markets are integrated or segmented.

Fifthly, we show in the salmon case that the results obtained from correlation coefficients could be provided with more solid foundation using other tests as causality and exogeniety.

Sixthly, more generally, market delineation can advantageously be based on the use of a wide range of tests reflecting different aspects of price behaviour.

The rest of the chapter is structured as follows: In section 5.1 we introduce the case studies, and in section 5.2 to 5.6 we summarise the results of the case studies. We follow this order: Salmon (section 5.2), tobacco (section 5.3), beer (section 5.4), electricity (section 5.5) and facial tissue (section 5.6).

5.1 Introduction to the case studies

We have selected salmon, beer, tobacco, electricity, and facial tissue as our case studies, cf. Table 5.1. The consumer goods are selected to obtain cases that differ with respect to the price data used and with respect to the characteristics of the distribution system. Furthermore the price data differ with respect to their price concept, time period, whether they are measured as level or index, and finally as regards the frequency of the data. We have obtained data from Eurostat as well as from commercial databases. We note that the data applied are not necessarily the most adequate for market definition. In particular, it may be possible to obtain data from commercial databases at a price, which was not within the budget of this study. However, with the purpose of illustrating empirical methods to market delineation, the available data are generally adequate.

	Salmon	Beer	Tobacco	Electricity	Facial tissue
Source	Kontali, Eurostat (Comext)	Eurostat (New Cronos)	Eurostat (New Cronos)	Nordpol.com, apx.nl, lpx.de, eex.de, omel.es	Economist Intelligence Unit
Price concept	Export unit values	Consumer, producer	Consumer, producer	Wholesale	Consumer
Time period	1995-02	1995-02	1995-02	2000-01	1990-01
Level/index	Level	Index	Index	Level	Level
Frequency	Monthly	Monthly	Monthly	Hourly	Annual
Observations	96	96	96	8760	12

Table 5.1:	Characteristics	of price of	data used in	5 case studies
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Note: All data are obtained from non-commercial sources, except Salmon-data from Kontali and facial tissue-data from Economist Intelligence Unit.

We put most of the effort into showing how empirical analysis of price data can be used to define the relevant market. We also make a hypothesis of the relevant market by economic reasoning and in this respect pay particular attention to the distribution system. However, this part of the analysis is much more rudimentary than the price analysis.

We emphasise that the case studies do not correspond completely to market definition in actual merger cases. In an actual competition case the point of departure is always a specific company and the specific products and services that are produced by the company. In the cases at hand the point of departure is the "average" relevant market as defined in a number of similar EU cases. It should be clear that our analysis will be more generic and general than a standard competition case and that it cannot incorporate the same level of specific details as in a competition case. In particular, many of the potential barriers created by businesses can only be investigated by getting quantitative and qualitative information from the market participants. It follows that the reader should in no way expect that the definition of the relevant market by the competition authorities in a new competition case necessarily would not necessarily duplicate our results and conclusions.

We go through the cases by firstly giving a short introduction to the product and the industry including a summary of a recent merger case. Then we approach market definition, first through economic argumentation and subsequently through price tests.

Market hypothesis by economic reasoning

We consider whether it is possible for a hypothetical monopolist on a national market to increase the price of the good in question by 5-10 per cent and earn an extra profit. If the answer is yes, we tend to argue that the relevant geographical market cannot be larger than the national one. If the answer is no, we tend to argue that the relevant geographical market is larger than national.

We consider both demand and supply substitution when we carry out the hypothetical monopolist experiment. We pay attention to the role of the distribution system in segmenting geographical markets. More precisely, we consider the potential barriers faced by a producer bringing the good from the place of production to the place of consumption in a foreign country. The potential barriers include natural and regulatory barriers as well as barriers created by businesses, cf. Box 5.1.

Box 5.1: Potential barriers related to the distribution system

- Transportation costs
- Language
- Export restrictions
- Product standards
- Costs of repackaging
- Administrative including reporting to public authorities,...
- Access to distribution channels
- Advertising

A potential entrant thus has to consider the costs of transporting the good, possible legal restrictions on exporting, how easy it is to get access to retail outlets and how costly it is to bring the product into the mind of the consumers.

Our focus on the distribution system also implies that we largely ignore entry barriers that are not related to the distribution system. These include a number of barriers such as bonus systems, cross-licensing, excess capacity, cf. chapter 2, that can only be identified by getting information from market participants, which is far beyond the scope of our analysis.

More generally, our approach to market delineation through economic reasoning should only be taken as a sketch of the analysis that should be undertaken in actual merger cases. Market definition in actual merger cases should generally consider all potential barriers to market integration, and these should to the extent possible be documented quantitatively.⁴⁸

Market assessment by price tests

Contrary to the market definition by economic reasoning, we make a full-fledged empirical analysis of prices using a variety of different approaches that each has strengths and weaknesses. In this chapter we summarise the main findings of the empirical studies whereas a full documentation is provided in appendix 3. Also, a comprehensive survey and discussion of empirical analyses of price data in the delineation of the relevant geographical market is provided in appendix 4.

In each case, the analysis has the following structure:

- 1. Description of the data and descriptive statistics
- 2. Test for stationarity
- 3. Pair-wise comparisons of the price series
- 4. Multiple comparisons of the price series

5.2 Salmon

We define the relevant markets for Scottish and Norwegian salmon. Based on our economic reasoning we tend to conclude that national markets are integrated and thus constitute a single antitrust market because we do not find any severe obstacles to arbitrage. The conclusion seems to be confirmed by the empirical analysis of prices. In particular, the geographical market for Norwegian salmon consists of nearly all the countries included in the analysis, whereas the geographical market for Scottish salmon consists of a subset of the countries. We also find that simultaneous delineation of product and geographical markets yields a different delineation of the product market from what we find if we follow the conventional sequential method (products first, geography second). In other words, the

⁴⁸ Of course it is not necessary to consider all types of barriers if for example one can identify one (or more) barrier that by itself segment markets, for example prohibitively large transport costs.

sequential approach can lead to wrong conclusions when compared to a more proper simultaneous approach to market definition. Finally, we show that using a wide range of price tests provides the market delineation with a more solid foundation than relying on a single test. As one example, causality and exogeneity tests can make the interpretation of the results obtained from correlation coefficients more clear.

The salmon product and the industry

Salmon may be caught in the wild or farmed. Salmon farming is a relatively recent phenomenon, dating back about a quarter of a century. This means that the markets for farmed salmon have matured with the completion of the Single Market Programme. Before 1975, fresh salmon was caught from wild stocks and considered a luxury product. Today, wild salmon accounts for a negligible fraction of EU consumption⁴⁹ and will be ignored in the following exposition: Focus will be on the market for farmed salmon in the EU.

The major producers of Atlantic salmon are Norway (54% of production volume), Scotland (17%), Chile (13%), Canada (8%), Faeroe Islands (5%), and Ireland (3%). During the decade from 1990 to 2000, Atlantic salmon production more than tripled; Norway lost "market share" while Scotland, Chile and Canada gained; however, in absolute numbers all countries increased production.

In recent years the farmed salmon industry has shown signs of concentration: major producers have taken advantage of economies of scale and increased capacity utilisation. The salmon industry includes several vertical elements of a supply chain:

- 1. Breeding of the salmon
- 2. Primary processing (slaughtering and gutting)
- 3. Secondary processing (filleting, smoking, ...)
- 4. Retailing or exporting

The main battlefields of Norwegian and Scottish producers of farmed salmon are England, France, Germany, and Spain. Norway exports a lot to Denmark as well: Denmark serves as a hub for further distribution and processing of Norwegian salmon, in the same way as England serves as a hub for Irish and Scottish farmed salmon.

A merger case in the salmon industry

The UK Competition Commission has recently (2000) investigated and reported on the proposed acquisition by Nutreco Holding NV of Hydro Seafood GSP Ltd from Norsk Hydro. Nutreco has substantial interest in fish feed and in salmon production in Scotland, Chile, and Canada but not in Norway or Ireland. Norsk Hydro is Norway's largest industrial group originating in oil and energy production. Norsk Hydro did not regard its salmon farming businesses, Hydro Seafood, as belonging to its core competencies.

The Competition Commission found that the relevant product market for salmon was that for gutted farmed Atlantic salmon extending across all of the EEA: Farmed salmon, imported from other European countries, mainly Norway, competes with Scottish farmed salmon and is considered a substitute for Scottish salmon by many secondary processors, wholesalers and retailers. The European Commission based its assessment on investigations of the physical characteristics of the product as well as on analysis of price series. It was, however, noted

⁴⁹ Wild salmon accounts for less than one per cent of volume and around three per cent of the value of production in the UK. Globally, wild salmon accounts for almost fifty per cent of production. These wild supplies mainly originate from Alaska and are canned before they are marketed. Canned salmon and fresh salmon are commonly regarded belonging to different product markets, cf. UK Competition Commission (2000).

that the Scottish salmon was a somewhat differentiated product in a small market segment; this was based on quality certifications such as the "Label Rouge" in France as well as on the modest price premium commanded by the product.

In the geographical market definition the market for salmon was broadly defined as EEA wide. However, a potentially narrower market was indicated in which the Scottish salmon was somewhat differentiated. The European Commission considered the import restrictions (minimum price) on Norwegian salmon to have little impact on the market definition as the sales price in the EU had generally exceeded the minimum import prices. Econometric analysis of price series was used to evaluate the competitive interactions of the markets in order to evaluate their level of integration. Also, the distribution costs were found to be relatively low for both Scottish and Norwegian salmon just as distribution was found not to significantly favour Scottish salmon producers over Norwegian producers.⁵⁰

Nutreco's post-merger share would be above 15 per cent of the broadly defined EEA market and around 46 per cent⁵¹ in the narrowly defined, differentiated market.

The Competition Commission recommended prohibition of the merger because of the expected direct effects on the *feed* market and its indirect effect on the *salmon* market: Nutreco's share of the UK market for salmon feed would increase substantially. The supply of salmon feed is concentrated with a three-firm concentration ratio above 90 per cent. Nutreco's Trouw is one of the three large suppliers of feed. Since the merged company was stipulated to buy mainly from Trouw, the Competition Commission expected the other two big feed suppliers to face increased unit costs following reduced capacity utilisations. This would lead to an even further increase of Trouw's position and make it the only competitive feed producer. Other salmon farmers would thus face increased costs and "[as] the costs of independent salmon farmers and smolt producers increase, some will either become more dependent on Nutreco or go out of business, thereby further consolidating Nutreco's position." (Competition Commission, 2000, p. 4).

Lexecon analysed the market definition for gutted salmon in this merger case. Based on data from July 1997 through June 2000 relative prices were analysed using stationarity tests, cf. Wills (2002). Lexecon relied on a sequential procedure according to which they first decided that Scottish salmon was part of the same product market as Norwegian salmon (in the UK) and then decided that Scottish salmon sold in the UK was part of a market including France and the rest of Europe. Apparently, the analysis was accepted by the Competition Commission. Below we will argue that this sequential procedure may lead to wrong conclusions.

Market hypothesis by economic reasoning: Scottish and Norwegian salmon

In the markets for farmed salmon, entry barriers and barriers to market integration include advertising, contracts with retailers and regulatory barriers in the form of antidumping duties.

On the *demand* side, the barriers to integration include a slight consumer preference for Scottish salmon even though processors, wholesalers and retailers (who are relatively large) purportedly are willing to buy salmon from both countries.

⁵⁰ It was argued that the increased transport time would reduce the quality of the Norwegian salmon, however, due to rigor mortis, the salmon cannot be processed for 24-36 hours, wherefore transport can take place without relative loss of competitiveness.

⁵¹ The markets for smolts and feed and trouw were also delineated. UK regulation prohibits imports of smolts, except from Eire, which led to a narrow definition of this market. Feed also was defined narrowly in spite of imports (around 5 per cent) from Denmark, Norway, and the Faeroes. The argument was security of supply and technical advice from feed suppliers that apparently requires proximity.

On the *supply* side, several barriers have been identified. Advertising is used by producers: Norwegian salmon is advertised as a healthy product while Scottish salmon generally is marketed as a superior quality product e.g. it has been awarded the Label Rouge in France. Thus, an attempt at vertical product differentiation is made with Scottish salmon occupying the up-scale position. Retailers sell some salmon products as own brands. Contracts are not widely used; most trade is handled informally. However, retailers seem to drive a movement towards increased use of longer-term contracts, but at present the market seems very flexible for all players. Transportation is complicated but not overly expensive. Salmon requires specialised treatment throughout the distribution chain, involving iced containers and refrigerated storage facilities. Transportation costs amount to about four per cent of total costs to farmers and six per cent to processors. Overall, the distribution does not seem to constitute a barrier to market integration.

In terms of regulatory barriers, the European Commission found Norwegian producers guilty of dumping in 1996. Price floors and export volume caps were consequently established for Norwegian producers. A punitive anti-dumping tax of three per cent was applied to all Norwegian exports. However, this tax may be used to finance marketing projects relating to the Norwegian salmon industry. Although Norwegian salmon is restricted by these regulations, their impacts have been minimal due to the overall market development with increased volumes and prices. Prices have generally remained over the floor.

To summarise, neither demand nor supply substitution are severely limited by any barriers to market integration. We thus tend to conclude that a hypothetical monopolist on a national market would not be able to profitably raise prices by 5-10 per cent for sustained period, that is, antitrust markets are wider than national markets.

Market delineation by price tests: Scottish and Norwegian salmon⁵²

The price data used for the analysis of the salmon case are export prices (FOB) for Norwegian and Scottish Salmon (Source: Norwegian Kontali, and Eurostat's Comext). All prices have been converted to the same currency and unit of account (Euros per kilo). The sampling period and countries of the separate samples are:

Norwegian Salmon:	January 1992 – March 2002 Denmark, France, Germany, UK, Spain, Italy, the Netherlands, Sweden, Portugal, Belgium, Finland, and Austria
Scottish Salmon:	January 1995 – March 2002 France, Belgium+Luxembourg, the Netherlands, Germany, Italy, Ireland, Spain, and Austria

Although the geographical data set is richer than this we have chosen to operate mainly with France, Germany, UK, Spain, Italy, the Netherlands and Belgium (+Luxembourg). Some of the excluded importing countries are small in terms of volume; others appear more volatile.

Figure 5.1 (left) illustrates the Norwegian data. The pre-1995 data have the erratic features often found in a market before it matures. After 1995, Norwegian export prices move more or less in unison (according to a visual inspection that may be imprecise). Figure 5.1 (right) illustrates the Scottish prices. A visual inspection reveals that Scottish prices in Italy seem to behave differently than the other prices. The impression is "less orderly" than for Norwegian prices.

⁵² For a detailed account, cf. appendix 3A.





We have also illustrated the price data by looking at the autocorrelation functions with up to twelve lags. These show how strongly the prices are affected by their own past and are commonly used to display time series properties. The main impression from this is that the pattern is rather different across Norwegian and Scottish salmon. Norwegian salmon exhibits fairly high persistence in prices: high prices tend to be followed by high prices, low prices by another low price. This feature is much less pronounced for the Scottish prices. In addition, Scottish salmon appear to have a slight seasonal variation, which one must take into account in subsequent analysis.

Testing the order of integration

To better understand the processes that have generated the various price series for salmon, we conducted tests of the integration order of the single price series. The aim of this is first to determine whether the (log) price series are stationary, i.e. integrated of order 0, I(0), or whether first differences are stationary in which case the price series is said to be integrated of order 1, I(1). Stationarity means that a time series follows the same stochastic distribution independent of time. The reason why we want to test for stationarity and non-stationarity is because it has implications for the way the price series should subsequently be analysed. Dealing incorrectly with non-stationarity can result in invalid inference.

Testing for integration is now standard tools of time series econometrics. We carried out the Augmented Dickey Fuller (ADF) test which is entirely standard and the less standard Kwiatkowski, Phillips, Shin and Smith (KPSS) test. The latter test reverses the hypotheses and tests the null hypothesis of stationarity against the non-stationary I(1) alternative. We tested both the time series themselves and, for each of the two exporting countries, also the differences in prices between the various markets.

We found that Scottish salmon prices were stationary (after taking logs) and that this applied to price differences between different markets as well. The latter is consistent with Lexecon's finding of stationary relative prices for Scottish salmon in the case mentioned above. On the contrary, Norwegian log prices seemed to be I(1), stationary only after taking first differences. This seems to suggest that Norwegian and Scottish prices follow different processes and that they thus belong to different product markets. To see whether this is so, further analysis is needed.

Pair-wise comparisons of the price series

Correlation analysis is frequently used in market delineation analyses to measure how close co-movements of prices are. A positive correlation close to 1 indicates a high degree of co-movement; a correlation coefficient close to 0 indicates low or no co-movement while a

negative correlation coefficient indicates that on average, when one price goes up, the other goes down. Most of the correlation coefficients we found were positive. Calculation of correlation coefficients is standard in econometrics software.

Standard correlation coefficients just measure co-movements and tend to ignore the possibility that two prices go up (or down) for some common underlying reason. For example, in a strongly inflationary setting, all prices tend to go up, and it would be surprising not to find correlation coefficients close to unity. This, however, is a spurious correlation. The question is: If the prices are corrected for external factors, what co-movement remains? The answer to this question is measured by the *partial correlation coefficient*.

We calculated partial⁵³ and standard correlation coefficients of prices for both Scottish and Norwegian salmon. To illustrate the above point: For Norwegian salmon, the standard correlation coefficient between the price in Austria and the price in The Netherlands was 0.73, while the partial correlation coefficient was only 0.34. Had we relied only on the former, we would have concluded that the two prices move closely together and that the markets were integrated. However, the partial correlation coefficient reveals that this is a spurious phenomenon: In reality, the two markets are probably not integrated.

From the pair-wise comparisons, we found that for Scottish salmon, Austria, Germany, and Ireland seemed not to be integrated with the other countries, while Spain, France, and The Netherlands seemed to be integrated. For Norwegian salmon a similar analysis indicated that the UK (and to some extent, Austria and Portugal) does *not* belong to the same market as that of the other countries. This seems to contradict the finding by Lexecon that salmon sold in the UK belongs to the same market as the rest of Europe. However, their analysis was based on prices of *Scottish* salmon in the UK relative to France and other European countries; to our knowledge they did not test the relative prices of Norwegian salmon.

A general difficulty with correlation analysis is that the threshold value of partial correlations is ad hoc and that we rely on contemporary co-movements thus ignoring possible market dynamics. Tests of *Granger causality* or, equivalently, non-causality may overcome these weaknesses by testing for existence or non-existence of causal relations between the markets. This may be done using standard econometric packages. For Scottish salmon, we find that French prices Granger cause prices in the Netherlands and Spain; Dutch prices weakly Granger cause French prices; and Spanish prices weakly Granger cause French prices. Thus, there seems to be a general pattern pointing to France, Spain, and the Netherlands being linked relatively tightly together as a group. This provides the conclusions drawn in the correlation analysis with a more solid foundation.

For the Norwegian prices a Granger causality exercise would not be appropriate due to the non-stationarity of the prices. Instead we test *weak exogeneity* of prices in different markets conditional upon the finding of cointegration. Cointegration occurs when the price trends of the single export markets are shared. It appears that a lot of interdependency exists across the individual countries. Short-term dynamics as modelled by an error correction model does not always point in both directions of pair-wise country comparisons. However there is adjustment in at least one direction for all country pairs (although Italy/France and Italy/Spain seem not to conform totally to this picture). There is no indication of a block structure that would suggest the existence of multiple market segments.

⁵³ The external factors that were used to calculate partial correlation coefficients were fairly limited: we used seasonal dummy variables and log consumer price changes in each of the countries. In a real merger case, more care should be taken in identifying relevant external factors.

Multiple comparisons of the price series

So far our methods have exploited pair-wise comparisons of prices. This would tend to ignore the more complicated interactions between markets that could originate from arbitrage between more than two sub-markets (countries). *Principal components analysis* provides such a multivariable approach to correlation analysis. Strictly speaking, this procedure is not valid for non-stationary data, but it can give an impression of the number of common market segments even for non-stationary data. In the technical appendix the comparisons of the price series are discussed in detail. However, it should be noted that just as the correlation coefficients the principal component analysis does not provide definite answers. It may however be particularly useful when one (1) principal component exists in the data as this indicates a segmented market. One should however, exercise caution when the data is non-stationary.

Our principal components analysis of Scottish salmon prices seems to support that some groups of countries tend to co-vary more than others. In particular this analysis provides further underpinning of the conclusion of the pair-wise correlation analysis that France, The Netherlands and Spain seem to constitute one market while the remaining countries do not. Causality tests further re-enforce this conclusion.

For Norwegian salmon, a *multivariate cointegration analysis* is needed, given the nature of the prices. A *Vector Auto-Regressive* (VAR) model of the prices for seven countries was specified. The results were indeed very impressive and the tests again confirmed that the individual countries are closely linked into one integrated market.

Simultaneous market delineation

Modern industrial economics⁵⁴ suggests that market delineation will be biased towards narrow markets if product markets and geographical markets are defined sequentially, rather than simultaneously. Overall demand substitution toward both other products and other locations will normally be stronger than substitution in either dimension taken one at a time. Ignoring this one might decide first to define products narrowly and then to define the geographical extent narrowly ignoring the possibility of a diagonal substitution.

We now suggest a procedure for simultaneous or joint determination of the relevant market. This procedure requires high quality data and to maintain tractability we have decided to limit the number of variables under scrutiny: We have two products and decided only to analyse their prices in France, The Netherlands, and Spain. These countries were chosen because our previous analysis suggested that these countries form a market for Scottish salmon. Norwegian salmon was also found to constitute a market for this group of countries, but the sequential analysis indicated that Scottish and Norwegian salmon did not belong to the same product market.

The analysis of joint market delineation employed the Johansen ML procedure for cointegrated systems, which in the present setting jointly models Scottish and Norwegian salmon for the three countries under scrutiny. The simultaneous analysis suggested that Norwegian and Scottish salmon are to be considered as belonging to the same product market as well as the same geographical market. Absent this analysis we would have concluded that Scottish and Norwegian salmon are two different products, resulting in the

⁵⁴ Roger Van den Bergh, 1996, Modern Industrial Organisation versus Old-fashioned European Competition Law, European Competition Law Review 17(2) 75-87. D. Neven, R. Nuttall and P. Seabright, 1993, Merger in Daylight: The Economics and Politics of European Merger Control, CEPR, p. 54.

complete analysis being false. Thus a complete simultaneous delineation should always be carried out when data allows it.

5.3 Beer

We delineate relevant geographical markets for retail sale of beer (off trade sale). Based on economic reasoning our market hypothesis is that antitrust markets are national markets. Strong preferences for local brands combined with strict regulation of advertising seem to be a significant barrier to market integration. Also high costs of transportation, regulation of cross border trade, different tax systems and difficult access to distribution channels which exhibit large scale economies restrict demand and supply substitution. When we define relevant markets by price tests, we also tend to conclude that markets are national. The pair-wise price comparisons indicated that UK, France, and Sweden could possibly constitute an integrated market, but this result was not supported by the multivariate analysis. However, frequent changes in excise taxes on beer combined with the use of consumer prices and producer prices in our analysis imply that our market definition by price tests may be too narrow. Thus, the correlation of prices including excise taxes, on which the producers base their entry decision.

The beer product and the industry

Beer as an industry dates far back with the beer industry still retaining many national characteristics. EU markets for beer are radically different on dimensions such as lifecycle, concentration and regulation. Beer has till now been granted exemptions from the Single Market Programme with respect to tax harmonisation and cross-border trade. Beer generally enters the market in two ways, on-trade (hotels, restaurants and catering) and off-trade (typically retailers). The heterogeneity of the EU markets means that no typical ratio exists between the on-trade and the off-trade. We focus our analysis on off-trade beer.

The supply side of the beer market in the EU is made up of a number of large multinational players as well as smaller regional and local players. On an international scale, only the largest producers play a significant role with companies such as Danone, Heineken, and Interbrew clearly in the lead. The northern European markets are generally mature with countries such as The UK, France, and Germany all facing declining demand. Southern European countries on the other hand typically experience demand growth.

From the end of the 90es consolidation has taken place in the beer industry, with producers both taking advantage of economies of scale as well as seeking to expand their market base in the maturing markets.

The main geographical markets for the international and regional brands are not very overlapping. In 1999 the main players in France were Danone, Heineken, and Interbrew; in Germany⁵⁵ Binding Group, Brau und Brunnen and Holsten, and in the UK Scottish & Newcastle, Bass, and Whitbread are the dominant players. Danone and Heineken dominate in Spain and Interbrew and Birra Peroni in Italy.

⁵⁵ Note that the German beer industry is highly fragmented with more than 1,000 breweries nationwide, and the actual shares of the "key" players are all less than 10%.

A recent merger case in the beer industry (case M.2044)

In 2000 the European Commission investigated and reported on the proposed acquisition by Interbrew of Bass Machine Holdings Limited and its shares in Bass Holdings Limited and Prazske.⁵⁶

The European Commission concluded that beer was a separate product market from other beverages on the grounds of its alcoholic properties and taste as well as, amongst other reasons, the price differences. It furthermore based the decision on previous investigations (the Orkla/Volvo decision)⁵⁷. Additionally, the Commission differentiated between on-trade and off-trade when defining the relevant product market, but did not find it necessary to investigate the existence of sub-markets within each channel as competition concerns arose under the widest definition.

The main argument presented in favour of two separate product markets for beer was the different sales mix in the two channels. However, the routes to the market were also considered but left open as competition concerns would arise regardless of the definition. It was found that the relevant market for beer was the supply of beer to the on-trade segment and the supply of beer to the off-trade segment.

This review will focus on the supply of beer to the off-trade market. The European Commission concluded that the relevant geographical markets for the supply to the off-trade were no wider than the UK and therefore that the UK presented all the characteristics of a distinct market. The Commission evaluated whether premium and standard lager constituted separate product markets and considered indicators such as drinking occasion, price differences, and price elasticity. Supply side substitution was also considered, looking at issues such as production and route to the market (in particular secondary distribution); however, the final definition was left open as competition concerns arose under the widest definition.

Several barriers were identified in regards to the geographical delineation of the relevant market for off-trade beer. One such barrier was national preferences for beer; it was argued that the fact that few brands had established a significant presence in more than one member state indicated that national preferences limited the scope of the market. Distribution and marketing was identified to take place on a national level by the large brewers, indicating that the relevant market was national. The Commission also relied on the facts that no significant differences existed in wholesale prices across the UK and the level of discounts generally was negotiated at a national level.

The Commission noted that after the merger, Interbrew would hold four of the top ten lager brands, and together S&N and Interbrew would hold eight out of ten. When looking at the top 40 brands, the parties would hold 75% post merger. This was considered to diminish the countervailing bargaining power of the buyers as lager sales constituted 82.2% of off-trade beer sales. It was furthermore stipulated by the Commission that the increased concentration of brands would make it more difficult for regional brewers to compete effectively.

The commission further noted that the concentration could facilitate discrimination against independent wholesalers.

⁵⁶ European Commission (2000): Case No. Comp/M.2044 - INTERBREW / BASS.

⁵⁷ Commission Decision of 20.9.1995 in Case IV/M.582 . Orkla/Volvo (OJ L66, 16.3.1996, p.17).

The Commission concluded that the merger threatened to create a collectively dominant position in the market for the off-trade sectors in the UK. It furthermore noted that the case fulfilled the criteria for referral to the competent UK authorities and referred it to the UK authorities.

Market hypothesis by economic reasoning: Beer

The EU beer markets face numerous barriers to market integration including advertising regulation, high costs of transportation and local brand preferences.

On the *demand* side, consumers to a large extent seem to prefer national brands. This reduces their willingness to substitute their demand for beer supplied in the home country to beer on foreign markets, if their preferred brand is not available abroad. At the same time costs of transportation are relatively high. Thus, compared to most other goods, beer is rather heavy relative to its price. Beer is estimated to weigh 2 kg per Euro it costs, which is well above the figure for most goods that generally weigh less than 1 kg per Euro they cost, cf. Chen (2002). Furthermore, there are varying restrictions on cross-border trade. For example, if a UK consumer decides to purchase beer in a foreign country, he is required to bring back the goods himself. A consumer from the Nordic countries is furthermore restricted in terms of the quantities he can bring back.

On the supply side there are several barriers related to the distribution system. Firstly, there are strict regulations of advertising of alcoholic beverages in several (particularly northern European) countries. These regulations are justified by a desire to counter the effects of alcoholic beverages such as drunk driving. Measures, ranging from legislative bans of adverts in television and printed media to more lenient voluntary self-regulatory agreements by the brewers, make the branding and entry of new products very difficult by itself and even more in combination with the consumer preference for local brands. Secondly, costs of transportation are high as noted above. Thirdly, there are significant economies of scale in distribution, and brewers are known to enter into joint distribution agreements. This trend may leave new players at a disadvantage as they may find access to competitive distribution channels difficult. Fourthly, there are examples of local distribution requirements. In Denmark, for instance, suppliers of bottled beer are required to ensure that the bottles are returned (for recycling) in crates. In practice this means that the "standard" Danish bottles must be used; however, the introduction of cans in Denmark is likely to decrease the importance of this requirement⁵⁸. Overall, the distribution system seems to be a severe barrier to entry on a foreign market.

In addition to the barriers to distribution, supply substitution may also be hindered by the different tax systems, which de facto may result in two practically identical beers, sold on the same geographical market, are taxed differently. This is due to the fact that the methods used in applying excise duties are based on the national brewing traditions. In Denmark, for instance, excise duties are applied according to the degree of nutrients using a technical term called Plato and not relative to the alcohol content as is common in many other EU countries.⁵⁹ Furthermore, the Danish tax is applied stepwise, which results in fairly identical beers (according to alcohol %) being taxed significantly different.

To summarise, demand substitution as well as supply substitution seem to be severely limited. We therefore tend to conclude that a *hypothetical monopolist* on a national market would be able to raise prices 5-10 per cent for a sustainable period of time without facing eroding profitability. Thus, the relevant geographical markets for beer are probably national.

⁵⁸ Cf. the remarks in chapter 2.

⁵⁹ Danish Competition Authorities (2000): "Carlsbergs eventuelle overtagelse af Albani".

Market delineation by price tests: Beer⁶⁰

The data sources of the beer study are Eurostat (New Cronos) where a number of monthly beer price series are collected for the period January 1995 to March 2002. The following price indexes have been used for the study:

- Harmonised consumer prices of beer, HICPM, for UK, Sweden, the Netherlands, Italy, France, and Germany.
- Domestic producer prices of beer, DPPI, for UK, Sweden, the Netherlands, Italy, France, and Germany. The domestic producer prices measure the producer prices for the domestic market for the single countries and will be used to delineate the market at producer level.

We note, that frequent changes in excise taxes on beer combined with the use of consumer prices and producer prices in our analysis may imply that market definition become too narrow. Thus, the correlation of prices including excise taxes will probably be lower than the correlation of prices excluding excise taxes, on which the producers base their entry decision.

Figure 5.2 illustrates the time path of nominal and real consumer price indexes (after logtransformation). Most nominal series appear to be trending over the sample period, but the price increases deviate from country to country. However, this observation does not preclude that the series correlate sufficiently for geographical market delineation to apply. The time path of the real consumer prices exhibits a somewhat clearer indication of possible common price trends even though there is a tendency towards increased price divergence for some of the countries. The different properties revealed by focusing on nominal and real prices respectively suggest that adjusting for the general price trend should be considered.



Figure 5.2: Nominal (left) and real (right) log consumer price indexes of beer

Testing the order of integration

The empirical evidence is very much in favour of concluding that both nominal and real prices are non-stationary. The only exception is Swedish prices, which generally tend to be stationary.

These findings imply that the class of appropriate analytical tools for the further analysis should be integration and co-integration techniques designed to analyze non-stationary time processes. In the following we concentrate on the analysis of consumer prices and refer to the appendix as concerns the analysis of producer prices.

⁶⁰ For a detailed account, cf. appendix 3B.

Pair-wise comparisons of price series

We have estimated simple and partial *correlation* coefficients. We cannot make strong conclusions from this analysis because the time series are non-stationary. Nevertheless, the correlation coefficients may give a first indication of possible market delineations. Particularly the prices in UK and France seem to be dependent. The standard correlation coefficient is 0.9 for nominal consumer prices whereas the partial coefficient is close to 1. For real consumer prices the standard correlation coefficient is close to zero whereas the partial coefficient is 0.5.

We have also conducted a *bivariate cointegration analysis*, which is the appropriate method given the non-stationarity of the time series. The analysis of nominal consumer prices points to cointegrating relations between several of the countries. However, the cointegration results are not generally consistent. If all the relations were valid, only a single common trend would drive all price series. But this would mean, for internal consistency of the various cointegration possibilities, that all pairs should cointegrate and this is not what we find. There does seem to be one particular group where some internal consistency seems to exist. UK, Sweden, and France all cointegrate in pairs. We undertook a similar analysis for real consumer prices. Cointegration exists for some of the same combinations of countries as for nominal consumer prices.

Multiple comparisons of price series

We have conducted a *multivariate cointegration analysis* in order to search for more structure amongst the beer consumer price series. The analysis of nominal consumer prices suggests that any conclusion concerning UK-Sweden-France constituting a single market segment should be made with care. Also, the analysis of real consumer prices did not point to a robust market delineation of a group of countries.

5.4 Tobacco

Based on economic reasoning we make the hypothesis that the geographical markets for tobacco are national. Brand loyalty, advertising regulation, high taxes and customs regulations on cross border trade probably severely limit demand and supply substitution. The hypothesis is largely confirmed by the empirical analysis of prices. The pair-wise price comparisons indicated that Austria, Germany, the Netherlands, and Denmark could possibly constitute an integrated market, but this result was not supported by the multivariate analysis. However, frequent changes in excise taxes on tobacco combined with the use of consumer prices and producer prices in our analysis imply that market definition may be too narrow. Thus, the correlation of prices including excise taxes, on which the producers base their entry decision.

The tobacco product and the industry

Tobacco is a controversial product, which has increasingly become subject to regulatory intervention and regulation. Duties on tobacco products are still to be harmonised as part of the Single Market Program. Tobacco is sold in different forms primarily Factory-Manufactured-Cigarettes (FMC), Roll-Your-Own (RYO), pipe tobacco, and cigars. In the EU, FMC constitute more than 91% of tobacco consumption.

The markets for cigarettes are highly concentrated in most European countries with the largest three firms holding between 80% and 90% market shares in countries such as Germany, France and the UK. Three overall groupings can be observed: 1) International companies (Philip Morris & BAT), 2) Regionally-based companies (Imperial & Gallaher) and 3) National companies. Except for Marlboro (Philip Morris), which holds 21.3% market share in EEA, different firms tend to dominate in different markets.

The tobacco manufacturing industry is becoming increasingly concentrated; most cigarettes are manufactured in one or two European countries and then shipped to their final destination. The tobacco industry includes the following supply chain elements:

- 1. Farming of tobacco
- 2. Manufacturing of tobacco products
- 3. Distribution of tobacco products

There is very little evidence of manufacturers integrating into the distribution function.

A merger case in the Tobacco industry (case M.2779)

In 2002, the European Commission investigated and reported on the proposed acquisition by the British Imperial Tobacco Group plc (Imperial Tobacco) of the German company Reemtsma Cigarettenfabriken GmbH (Reemtsma). Imperial Tobacco was a leading British tobacco company, with significant international operations. Reemtsma was a privately owned manufacturer of cigarettes based in Germany. Reemtsma's principal business was the manufacture of cigarettes. The two companies both sold cigarettes in Germany, Italy, and the UK.

The Commission considered whether the relevant product market was for "white sticks", that is, including both Factory Manufactured Cigarettes (FMC) and Roll Your Own (RYO) tobacco. It noted that a separation of the two was not necessary as it would not alter the competitive assessment. The European Commission found however, that the two products were not directly substitutable for most smokers. The indicators primarily used to delineate the product market were price differences between FMC and RYO cigarettes as well as market enquiries. The Commission also noted that some companies segmented the FMC market on taste and price. However, based on conclusions in previous cases, such segmentation was considered not to be meaningful.

The Commission found that the geographical market for tobacco products (cigarettes, RYO tobacco and cigars/cigarillos) at producers and distributors levels were national. These findings were based on decisions in previous cases and related to the strong national characteristics concerning tax, public health protection, advertising and distribution.

In Germany, the new entity would have a market share of around 25% making it the second largest in the market. At the same time the distributors had high degrees of bargaining power, and as a result no competitive concerns were raised for the German market.

In Italy, each of the players held less than 1% of the market for FMC but Imperial Tobacco held 40% - 50% of the market for RYO tobacco. The ease of entry to the market (distribution is a de facto monopoly) as well as the volatility in the market however persuaded the Commission that competitive concerns where unlikely to arise.

The UK posed a more complicated case as the Imperial Tobacco Company held 35% - 45% of the market for FMC and Reemtsma 0% - 10%. At the same time Imperial Tobacco had exclusive distribution rights of Phillip Morris' brands. This gave Imperial Tobacco a strong bargaining position vis a vis distributors. Also, Reemtsma was very dominating in the Own Label segment – an area that normally would not give rise to concerns given the ease of

switching suppliers. However, Reemtsma had acquired 50%-70% of the Own Label trademarks, and distributors were de-facto captive as they could not easily switch suppliers.⁶¹

The Commission found that the concentration would put Imperial Tobacco in a position to increase prices of own-label cigarettes, which would probably have the effect of increasing the prices of all the brands, as own-label cigarettes act as a benchmark price for the market. Imperial Tobacco would also be in a position to restrict supply volumes or delivery conditions of own-label products in the UK. This would force the supermarkets and cash-and-carry chains to seek the introduction of new own-label trademarks in the market, which cannot be achieved within reasonable time periods and during which the UK cigarette market could undergo significant change.

The acquisition was however allowed to go ahead with certain remedial obligations placed on the parties. These remedies freed the distributors from Imperial Tobacco/Reemtsma and enabled them to compete independently (e.g. the distributors of cigarettes for which the trademark was owned by Reemtsma were given the possibility to freely reassign the trademark when switching suppliers).

Market hypothesis by economic reasoning: Tobacco

In the tobacco industry the barriers to entry and to further market integration are to a large extent regulatory, including areas such as advertising, taxation, and distribution. In general, the barriers are relatively high in relation to the stagnating markets for tobacco products. This is particularly the case for branded products.

On the *demand* side potential barriers count a strong brand loyalty amongst smokers and restrictions on cross-border trade. These restrictions take the form of customs regulations of the quantities allowed to purchase for own consumption from other EU countries.

On the *supply* side, a primary barrier to integration is the advertising of tobacco products, which is currently in the process of being banned in the EU as a whole. However, a full ban will not take effect until 2006. Most countries already have legislation in place to ban or restrict certain types of advertising. Advertising restrictions complicate communication with the consumers, and thereby make it difficult for new brands to establish themselves in the market, in particular because consumers are loyal to their preferred brands. Distribution of tobacco products tends to take place in one of two forms: 1) De facto monopolies (former state monopolies), which control the licensing of sales outlets and 2) more liberalised and diverse outlets such as supermarkets and convenience stores. The monopoly-like structures are typically observed in southern European countries while countries like the UK operate in more liberalised and open markets. It is not apparent whether the distribution infrastructure in itself constitutes barriers to market integration. Overall, as concerns the distribution system, we have identified advertising as a primary barrier to supply substitution.

In addition to this barrier, high taxes on tobacco products may be a barrier to supply substitution. The tobacco taxes currently constitute around 70-80 per cent of the retail price in most EU countries. Consequently, tobacco manufacturers are forced to lower their profit to counter the taxes. As a result the companies have lower margins to recover the costs of entry into new markets; this may discourage them from challenging the incumbent players in new markets⁶².

⁶¹ The distributors of Own Label cigarettes typically sold the trademark rights to protect themselves against potential lawsuits by disgruntled smokers.

⁶² Cf. the remarks in chapter 2.

To summarise, demand substitution as well as supply substitution seem to be severely limited. We therefore tend to conclude that a *hypothetical monopolist* on a national market would be able to raise prices 5-10 per cent for a sustainable period of time without facing eroding profitability. Thus the relevant geographical markets for tobacco are probably national.

Market delineation by price tests: Tobacco⁶³

The data sources of the *tobacco study* are Eurostat (New Cronos) where a number of monthly tobacco price series are collected for the period January 1995 to March 2002. The following price index series have been used in the study:

- Harmonised consumer prices of tobacco, CPI, for UK, Sweden (SW), Austria (AUT), the Netherlands (NL), Spain (ESP), Germany (DE), and Denmark (DK).
- Domestic total producer prices of tobacco, DPPI, for Sweden, Austria, the Netherlands, and Germany. The total producer prices encompass domestic producer prices, i.e. the producer prices for tobacco to the domestic market, and foreign producer prices, i.e. producer prices for exported tobacco, of the respective countries.

In addition to the series just mentioned general producer and consumer price levels have been included in some of the studies in order to adjust for the general consumer and producer price inflation in the respective countries.

We note that frequent changes in excise taxes on tobacco combined with the use of consumer prices and producer prices in our analysis may imply that market definitions become too narrow. Thus, the correlation of prices including excise taxes will probably be lower than the correlation of prices excluding excise taxes, on which the producers base their entry decision.

In Figure 5.3 we illustrate the time path of nominal and real consumer price indexes. Most nominal series appear to be trending over the sample period, and the series exhibit a tendency towards increased discrepancies during the period. A particular feature is the stepwise nature of many of the price indexes. Also the real consumer prices tend to grow during the sample period.





⁶³ For a detailed account, cf. appendix 3C.

Testing the order of integration

We conclude that the *single price indexes* are non-stationary at both the consumer and producer level. In general, these findings imply that the class of appropriate analytical tools for the further analysis should be integration and cointegration techniques designed to analyse non-stationary time processes.

Many of the *pair-wise differences* in the nominal consumer price indexes were also found to be non-stationary. However, there appear to be a group consisting of the Netherlands, Austria, Germany, and Denmark where the price-pairs are stationary and hence co-integrate one-to-one. The German and Danish consumer prices do however not co-integrate. A similar grouping is suggested when the real consumer prices are addressed.

Pair-wise comparisons of the price series

We have estimated the *correlation* coefficients in order to get an indication of possible market delineations. Of the course, the usual warning against using correlations of non-stationary data applies. The present data set is an ideal example of the important difference between simple and partial correlations. Generally, real and in particular nominal consumer price series appear to be strongly correlated when measured in terms of the simple (or standard) correlations. Thus, several of the simple correlation coefficients of nominal consumer prices are close to one. However, the partial correlation coefficients are much lower. For nominal consumer prices, many of the correlation coefficients are close to zero or even negative. This suggests that a common trend (general price inflation) causes a spuriously high correlation amongst the price series. Only in the case of Spanish – Swedish prices the partial correlation coefficient is sufficiently high to indicate a common market. Given the geographical distance between these markets this is likely caused by the non-stationarity of the series.

We have also conducted a *bivariate cointegration* analysis, which is the appropriate technique given the non-stationarity of the data. Only for the nominal consumer prices we got results that appeared meaningful and consistent with the results of the previous analyses. For nominal consumer prices there are some indications that the Austria- the Netherlands-Germany-Denmark group may constitute an integrated market, not least because the same group of countries was highlighted in stationarity-tests.

Multiple comparisons of the price series

We conducted a multivariate cointegration analysis. We did not find a grouping of countries, which was consistent with an appropriate delineation of the relevant geographical market. In particular, the analysis did not confirm the market delineation consisting of Austria, the Netherlands, Germany, and Denmark, which the stationarity and bivariate cointegration analysis pointed to.

5.5 Electricity

Electricity is a special case for several reasons. *First*, it is a sector with an abundance of data, as the wholesale price is determined *hourly* on the new European power exchanges. The waste amount of data is ideal to demonstrate the potential of price tests. *Secondly*, wholesale electricity is a prime example of a successful implementation of the Single Market Programme. We show, that today the Nordic countries in many situations constitute a truly integrated geographical market, even though markets have been strongly nationally segmented for decades. It is surprising and somewhat disappointing that the Commission as late as in 2001 still hold the view that Sweden constitutes its own national markets. *Thirdly*, the electricity sector is a good example of a sector where a strict application of the SSNIP-methodology is very likely to lead to erroneous conclusions with respect to geographical market delineation. The reason is that the geographical market for wholesale electricity is time-dependent due to congestion in transmission lines, and may change from hour to hour.

Under these circumstances, maintaining that the hypothetical monopolist should be able to raise prices in a non-transitory period of 12 months is illusionary.

In particular, we argue that the Nordic countries in hours without congestion in transmission lines are a prime example of an integrated geographical market. However, in hours with congestion in transmission lines, the Nordic countries may be split into a number of separate geographical markets, mostly national in scope. It seems as though the liberalisation of the electricity sector still has some distance to go in other European countries as Germany, the Netherlands and Spain, where markets are still not beyond national in scope. Our results are strongly confirmed by using price tests. We also show how partial correlation coefficients can be benchmarked on distant markets providing a minimum threshold for market integration, and reducing the problem of using ad hoc threshold correlations to determine whether markets are integrated.

The product and the industry

Electricity is produced in an array of different ways ranging from traditional power plants over windmills to hydro generation. Once produced, the electricity needs to be consumed instantaneously since it is a non-storable commodity.⁶⁴ There are several steps involved in bringing electricity to the end users; the electricity must pass via a series of transmission and distribution networks with different capacities all of which are operated by an appointed systems operator who ensures that the system is in balance. In the several EU countries electricity is traded on an hourly basis in an organised wholesale spot market. We focus our analysis on these prices.

The structure of the electricity supply industry has undergone significant changes in many European countries as a result of liberalisation and directives such as the Electricity Directive EC 96/92 currently in place. This directive dictates the pace of market opening over the next years. The EU electricity markets have greatly reduced their barriers in recent years. However, some technical and structural issues remain unsolved, notably the limited transmission capacity of the international linkages between the countries. It should be noted that within the EU, the degree of liberalisation and integration of electricity markets differ across member states. The Nordic countries and the UK have e.g. achieved very integrated cross-border electricity markets, while others have still to comply with the minimum requirements of the EU directive.

The primary elements in the electricity supply chain are diagrammed below:

⁶⁴ Electricity can be stored, but so far no economically feasible way has been developed.


Figure 5.4: Typical structure of the Electricity Supply Industry

A recent merger case in the electricity industry - case M.2684

In 2002 the European Commission examined the acquisition of Hidroelectrica del Cantabrico S.A. by Electricidade de Portugal S.A. (EDP), Energie Baden-Württemberg A.G. (EnBW) and Caja de Ahorros de Asturias (Cajastur).

Before defining the relevant product market, the European Commission took into account the degree of liberalisation as well as market openings expected in the near future; it also considered the definitions in previous cases. The relevant product market was defined on two dimensions: a) the wholesale market – e.g. the pool and bilateral contracts between eligible customers and generators; and b) the retail market – e.g. the electricity offered subsequently by retailers to eligible customers. The Commission considered both the demand-side and the supply-side (including imports) of the market.

The relevant geographical market for wholesale and retail electricity was defined as national in accordance with recent Commission decisions. In other recent decisions the Commission has also defined the Swedish and Finnish wholesale markets as national in scope⁶⁵. It was particularly noted that the capacity of international links only amounted to 6.6% of demand in peak periods. It was also stressed that organisation of the electricity market was different from the systems in neighbouring countries on several dimensions.

The Commission found that the proposed operation would result in relatively limited horizontal overlaps in the Spanish wholesale and retail electricity markets. The acquisition would however strengthen the duopolistic dominant position on the Spanish market by reducing EDF's incentive to promote stronger exports to Spain. EDF was considered to be the main source of potential competition on the concentrated and isolated Spanish electricity market.

The Commission however approved the merger subject to commitments by EDF; notably to expand the capacity on the link between Spain and France to a certain level.

⁶⁵ Cf. IV/931 Neste/IVO notified on 14. April 1998.

Market hypothesis by economic reasoning: Electricity

The product market we consider is wholesale and retail physical electricity trading. The main barrier to complete integration of electricity trading is limited capacity on international transmission lines.

On the *demand side*, there are by and large no possibilities for cross-border demand substitution as an end user in a country must purchase electricity from a supplier that is registered at the national system operator; that has a country-specific agreement with a balance provider and that follows the national rules for switching suppliers. The barriers are by nature technical (natural) and (in the long run) regulatory, as a (national) system operator for technical reasons must balance electricity markets continuously. In contrast, wholesale traders and a limited number of large end users can trade electricity directly on the international power exchange and are not subject to the above limitations.

On the *supply side* in a liberalized electricity market trading on the same power exchange, the primary barrier is the limited capacity of transmission lines unable to cope with the electricity demand in peak load hours. This can split the market into several smaller geographical markets with different prices. This technical problem can only be reduced by adding transmission capacity that is very expensive. In the short run bottlenecks are handled by the transmission system operators who engage in various activities to ensure that available capacity is allocated competitively.

The capacity issue becomes particularly pertinent when dealing with the international transmission lines. As long as the transmission lines between EU countries have insufficient transmission capacity, international competition is unlikely to develop. This problem is further exacerbated as the scarce capacity in the international links is often allocated inefficiently, or kept away from the market in long-term private contracts.

To summarise, when there are sufficient capacity and no bottlenecks, physical wholesale and retail electricity trade traded on the same power exchange is likely to constitute an integrated market. The prime example is the Nordic electricity market. When bottlenecks are present neither demand nor supply substitution is possible and a hypothetical monopolist on a national market is thus able to raise prices profitable by 5-10 per cent for a sustained period. In these hours, relevant geographical markets tend to be national or even sub-national.

Market delineation by price tests: Electricity⁶⁶

The electricity spot prices of the exchanges to be analysed cover the whole of 2001 and the sampling frequency is hour-by-hour data. The entire sample consists of 8,760 observations. In much of the subsequent analysis we will consider sub samples of the full sample reflecting the possibility of certain bilateral markets to be subject to congestion or non-congestion. For the Nordic area we have information available on congestion hours.

The Nordic region for the supply of electricity is of primary interest in this study of market delineation whereas electricity exchanges in the rest of Europe play a secondary role. As we shall argue, these latter exchanges will play the role of benchmarks for market delineation in the Nordic region. The following regional markets are examined:

⁶⁶ For a detailed account, cf. appendix 3D.

Nordic region (Nord Pool)	Europe	
West Denmark (VDK)	Frankfurt (EEX)	
East Denmark (ODK)	Leipzig (LPX)	
Sweden (SE)	Amsterdam (APX)	
South Norway (SNO)	Madrid (OMEL)	
Mid Norway (MNO)		
North Norway (NNO)		
Finland (FI)		

As can be seen by visual inspection the price pattern of the Nordic regions has a rather similar pattern, cf. Figure 5.5. In particular, a number of extreme observations seem to be present for all of the Nordic regions. The pattern of the rest of Europe exchanges seems to be somewhat different: The group of other European regions has price variability that appears markedly bigger than for the Nordic region. This alone suggests that the Nordic and rest-of-Europe Regions belong to separate relevant geographical regions. Yet another feature characterising the series is the extremely strong seasonal pattern. An analysis of the autocorrelation pattern in the series confirms that the series have strong hour-of-day, day-of-week, and month-of-year effects. *It is very important to correct for the seasonal cyclical variation* in the data because otherwise a spuriously high correlation can be identified due to the seasonal pattern being similar across the different exchanges.







Testing the order of integration

All hourly series, except for Leipzig, are found to be stationary. The tests were also conducted for other frequencies of data observations. Daily and weekly observations were constructed from the original sample and the ADF tests of these series all turned out to be in strong favour of stationarity. Hence the result for Leipzig for hourly data is not robust to alterations of the sampling frequency. Generally, we merely favour the stationarity hypothesis given the strong evidence found for daily and weekly observations. Our maintained assumption in the following is thus that all series are stationary even when divided into congestion and non-congestion hours.

Pair-wise comparisons of the price series

As late as in 2001, the Commission defined the geographical dimension of a Nordic wholesale market as national. We argue here that the introduction of effective competition on the Nordic markets has made this definition inadequate and that much less simplistic market definitions are required.

We argue that the geographical dimension of the wholesale market depends on the state of congestion in the Nordic transmission network in any specific hour. In hours where there are no congestion constraints in the Nordic transmission network, the entire Nordic area constitutes the relevant geographical market. In hours with one or several congestion constraints the Nordic area may be split in two or more isolated regions with different prices, where each region constitutes its own geographical market.

Further, we argue that if we consider whether Germany and the Nordic area are part of the same geographical market, the answer is clearly no: the Nordic area is not part of the same geographical market as Germany. We build our argument on the very limited openness of the combined Nordic area vis-à-vis the rest of Europe measured relative to the total generating capacity and on the limited price correlation between the Nordic and European spot prices.

However, in some cases the Nordic area is split into several separate geographical areas due to the frequent occurrence of congestion constraints in the Nordic transmission networks. West and East Denmark are very frequently cut off from the rest of the Nordic area, in many cases leaving East and West Denmark with strong links to the German power market due to a very large transmission capacity relative to the total generation capacity in the area. The natural question to ask is whether West and East Denmark can be considered a part of the same geographical market as Germany in these hours.

Finally, we argue that even though there are obvious and strong links between Denmark and Germany, the commercial links between these regions are not sufficiently developed to enable them to be part of the same relevant market. We build this argument on the limited price correlation between East Denmark and Germany and between West Denmark and Germany even in the case where transmission lines to the rest of the Nordic area are congested.

Congestion management

It is very likely, that the Nordic area constitutes a single relevant geographical wholesale market in periods without congestion constraints in the Nordic transmission network. When the transmission capacity within the Nordic area is sufficient to accommodate all desired exchanges on the Nordic wholesale market, a single price of electricity prevail in the entire Nordic area equal to the system price. For example, if a hypothetical monopolist raised prices by 10 per cent in Eastern Denmark, generators in Norway, Finland and Sweden could easily win market shares in Eastern Denmark and make the initial price rise unprofitable.

However, transmission capacity is limited, and congestion arises regularly in the Nordic transmission network in the sense that the level of transmission desired by the market exceeds the available capacity in one or more Nordic transmission lines.

As an example, imagine a situation with excess supply of electricity in one region and excess demand of electricity in another region. The market will balance if it is possible to transport sufficient electricity from the region with excess supply to the region with excess demand. However, the transmission line between the two regions has limited capacity, and when the available capacity has been fully exploited, there is still excess supply and demand in the two regions. The limited transmission capacity prevents the market from achieving balance.

Transmission capacity within the Nordic area

When and where transmission capacity becomes a binding constraint on the price formation depends crucially on the supply of physical and effective transmission capacity within the Nordic area. It appears that all Nordic countries are well connected to the other Nordic countries, but that the volume of trade relative to total consumption is just about 5 per cent in Finland. The Commission has recently used this observation to argue that Finland constituted its own relevant geographical market.

We can obtain a relevant measure of transmission capacity by comparing - within each Nordic country - the total transmission capacity *within* the Nordic area to the total generation capacity. The larger the share, the more open is the country towards the other Nordic countries.

Generally, the Nordic countries are well connected to each other. The openness of the Nordic countries is high, especially for Denmark, Sweden, and Norway with above 20 per cent openness, but somewhat more limited for Finland⁶⁷ with about 10 per cent openness, cf. Table 5.2.

⁶⁷ The European Commission has in an earlier case used the limited openness of the Finnish electricity sector as an argument against a broad geographic market extending beyond the Finnish borders.

	Denmark	Finland	Iceland	Norway	Sweden	Nordel
Generation capacity, GW	12.5	16.8	1.4	27.9	31.7	90.3
Export capacity, GW	3.7	1.9	-	5.9	9.0	na
Import capacity, GW	3.7	2.3	-	5.2	9.2	na
Export openness	0.29	0.11	-	0.21	0.28	na
Import openness	0.29	0.13	-	0.19	0.29	na

Table 5.2: Trade openness within the Nordic area, 2001

Notes: Export (import) openness is calculated as the export (import) capacity divided by the total generation capacity.

Source: Nordel annual report 2001.

The realised net trade between Nordic countries measured relative to the total production is more modest than the openness. Denmark is the only Nordic country with net trade above 10 per cent of production; clearly revealing the importance of Denmark being the connecting link between the hydro-based system in the North and the thermal-based system in South and as a transit country between the Nordic area and Continental Europe, cf. Table 5.3.

1000000000000000000000000000000000000	Ta	ble	5.3:	Rea	lised	trade	within	the	Nordic	area.	, 2001
---------------------------------------	----	-----	------	-----	-------	-------	--------	-----	--------	-------	--------

	Denmark	Finland	Iceland	Norway	Sweden	Nordel
Total production, GWh	36,009	71,645	8,028	121,872	157,803	395,357
Net export, GWh	5,028	2,831	-	7,161	15,744	0
Net import, GWh	5,087	5,105	-	10,546	10,026	0
Realised net export	0.14	0.04	-	0.06	0.10	0
Realised net import	0.14	0.07	-	0.09	0.06	0

Notes: Realised net export (import) is calculated as net export (import) divided by total production. Source: Nordel annual report 2001.

Congestion constraints and price areas

We now turn to the empirical evidence on the occurrence of congestion. We say that a transmission line between two Elspot price areas is congested in a specific hour, whenever the prices⁶⁸ in the two price areas linked by the transmission line are different.

Congestion occurs most frequently on transmission lines between Sweden and Norway, especially from Sweden to Norway, and within Norway (up to 20 per cent of all hours in 2001), and on transmission lines between West Denmark on the one hand and Norway and Sweden on the other hand (above 10 per cent); cf. Table 5.4. The occurrence of congestion constraints is more modest from Sweden to East Denmark and insignificant between Sweden and Finland as well as from East Denmark to Sweden.

Table 5.4: Occurrence of cong	estion constraints	s between Nord	Pool price	areas, share
of total hours in 2001				

•••••••••••••••••••••••••••••••••••••••						
From/to	EDK	WDK	SE	SNO	M+NNO	FI
EDK			0.0			
WDK	-		11.6	14.2		
SE	5.3	13.9		10.9	21.1	0.1
SNO		8.9	4.3		20.9	
C+NNO			5.7	12.6		
FI			0.8			

Source: Nord Pool and own calculations.

⁶⁸ In principle, the best price to use is the price on the regulating power market. However, the regulating power price reported on Nord Pool is somewhat difficult to interpret. For this reason we have chosen to use the spot price. We do not expect significantly different results. However, we will slightly underestimate the occurrence of congestion constraints.

The frequent occurrence of congestion constraints implies that the Nordic area is often split into two or more price areas. The Nordic area was split into two or more separate price areas in almost 52 per cent of the hours in 2001. In the remaining 48 per cent, the Nordic area constituted a single price area.

However, it is rare to have more than three separate price areas at any same hour. In 2,670 hours or almost one third of all hours, the Nordic area was split into only two separate price areas. It was very rare to have more than three groups of price areas, cf. Table 5.5.

Number of price areas	Hours	Percent	Cumulated
1	4,539	51.8	51.8
2	2,670	30.5	82.3
3	1,071	12.2	94.5
4	371	4.2	98.7
5	108	1.2	99.9

Table 5.5: Frequency of price area combinations

Source: Nord Pool and own calculations.

We will now look at, which price areas that most often combine to form separate price areas. The most frequent combination turns out to be Mid- and North Norway as one price area, and the rest of the Nordic area as a second price area. This combination occurred in 978 hours, or just above 11 per cent of all hours in 2001. The second most frequent combination has West Denmark as one price area, and the rest of the Nordic area as a second area. This specific combination occurred in 889 hours or about 10 per cent of all hours in 2001. All other combinations occurred with a frequency below 3 per cent. Cf. Table 5.6 and Figure 5.6 for an illustration of the four most frequent price area combinations accounting for more than 75 per cent of all hours in 2001. For a complete list, cf. appendix 3D.

our most m	equent price			001
Rank	1	2	3	4
Count	4,539	978	889	236
Share	51.8%	11.2%	10.1%	2.7%
FI				
SE			196.4 (2.9)	187.7 (3.8)
ODK		148.17 (1.3)		
VDK	192.1 (1.0)		214.8 (4.2)	184.3
SNO				(2.0)
MNO		407.4	196.4	407.7
NNO		(0.7)	(2.9)	(3.8)

Table 5.6: The four most frequent price area combinations, 2001

Notes: Each cell indicates the average hourly price with the standard deviation of the mean in brackets. Source: Nord Pool and own calculations.



Figure 5.6: The four most frequent price area combinations, 2001

Notes: The number corresponds to the rank order in Table 5.5.

Price correlation between price areas

We now proceed by investigating the correlation structure between the spot prices depending upon whether congestion or non-congestion of particular types exist within the Nordic region. For the sake of simplicity, we focus on two of the most frequent price area combinations identified in Table 5.6.

First, some intuition on the expected price behaviour and a few remarks on the different congestion situations are in order. In hours where there is no congestion constraint between two adjacent price areas, the area prices are identical. It follows that the correlation coefficient between prices in the two price areas by definition is identical and equal to unity. However, in hours with congestion constraints between two adjacent price areas, the area prices will diverge and the correlation coefficient most likely become smaller than unity. If the congestion constraint is severe, we expect the correlation coefficient to decline significantly below unity. If the congestion constraint is less severe, we expect the correlation coefficient to decline less significantly below unity.

Although a higher partial correlation always implies a higher tendency for markets to be integrated, we have no exact information regarding when high is "high enough" to argue that markets are integrated. However, it is possible to obtain some guidance by using price correlations with distant spot markets in the rest of Europe such as Madrid (OMEL) and Amsterdam (APX), as a benchmark. We have strong *ex ante* reasons to believe that these markets are *not* integrated with the Nordic area and suggest that intra-Nordic price correlations comparable to or lower than price correlation with these markets are strongly suggestive of markets not being integrated.

First, consider price correlations for the situation where the *Nordic area is one price area*, i.e. all spot prices within the Nordic region are identical. This characterizes 4,539 hours, or 51.8 per cent of all hours in 2001. In this case, all partial correlation coefficients between Nordic spot prices are by definition unitary; cf. Table 5.7. Notice, that the partial correlations are lower than the ordinary correlation coefficients for all prices and that the partial correlation coefficient between Nordic and rest-of-Europe prices does not exceed 0.25. This is a very low figure, suggesting by itself that the Nordic area and rest-of-Europe constitute separate relevant geographical markets.

Table 5.7: Part	ial and	simple	correlation	coefficients	of spot	prices	in	hours	with	no
bottlenecks in	Nordic a	irea			-	-				

	Nordic area	EEX	LPX	APX	OMEL
Nordic area	1	0.33	0.36	0.28	0.14
Frankfurt	0.24	1	0.88	0.50	0.34
Leipzig	0.24	0.72	1	0.54	0.32
Amsterdam	0.15	0.33	0.37	1	0.26
Madrid	0.18	0.20	0.21	0.12	1

Note: EEX is the European Electricity Exchange in Frankfurt, LPX the Leipzig Power Exchange, APX the Amsterdam Power Exchange, and OMEL the Spanish Power Exchange. Above the diagonal, the simple correlation coefficients are reported where no correction has been made for common factors. Below the diagonal, the partial correlation coefficients are reported. These are corrected for the following variables: Hourly, daily, and monthly dummy variables. No bottlenecks occur in 4,539 hours corresponding to 51.8% of the total observations. We use logarithmic transformations of the price series to reduce the impact of outliers.

Source: Nord Pool, www.eex.de, www.lpx.de, www.apx.nl and www.omel.es, and own calculations.

Now, we consider the third most frequent constellation of price areas, where West Denmark is one price area and the rest of the Nordic area constitute a second price area. This amounts to 889 hours, or 10.1 per cent of all hours in 2001. In this case the partial correlation between the two Nordic price areas drops from unity to 0.37, cf. Table 5.8. Indeed this is a very low correlation, comparable to the correlations with the rest-of-Europe⁶⁹. The significant drop in correlation as a result of congestion strongly suggests, that the two price areas do not belong to the same relevant geographical market.

 Table 5.8: Partial and simple correlation coefficients of spot prices in hours with

 bottlenecks between West Denmark and the rest of the Nordic area, 2001

	WDK	S SNO MNO NNO F	EEX	LPX	APX	OMEL
West Denmark	\neq	0.46	0.68	0.64	0.44	0.39
East Denmark Sweden Norway Finland	0.37	t	0.35	0.35	0.27	0.12
Frankfurt	0.46	0.27	Ţ	0.92	0.63	0.43
Leipzig	0.42	0.26	0.83	ł	0.64	0.38
Amsterdam	0.24	0.16	0.52	0.52	ł	0.30
Madrid	0.29	0.27	0.29	0.33	0.21	4

Notes: EEX is the European Electricity Exchange in Frankfurt, LPX the Leipzig Power Exchange, APX the Amsterdam Power Exchange, and OMEL the Spanish Power Exchange. Above the diagonal, the simple correlation coefficients are reported where no correction has been made for common factors. Below the diagonal, the partial correlation coefficients are reported. These are corrected for the following variables: Hourly, daily, and monthly dummy variables. No bottlenecks occur in 889 hours corresponding to 10.1 per cent of the total observations. We use logarithmic transformations of the price series to reduce the impact of outliers. Source: Nord Pool, <u>www.eex.de</u>, <u>www.lpx.de</u>, <u>www.apx.nl</u> and <u>www.omel.es</u>, and own calculations.

⁶⁹ Note, however, that the correlation between prices in West Denmark and Germany is rather high, almost 0.5, in hours where the transmission lines to the rest of Nordic area are congested. It suggests that in these hours there is a tendency for West Denmark to move closer to the German market. We return to this issue in the next section.

Transmission capacity outside the Nordic area

We now calculate the total transmission capacity outside the Nordic area relative to the total generation capacity. The larger the share, the more open the country is towards the rest of Europe.

Generally, the Nordic countries are not well connected to the rest of the European power market. The transmission capacity only constitutes 3-4 per cent of the total generation capacity in the Nordic area, making it unlikely that import and export will be significant parameters of price determination on the entire Nordic market, cf. Table 5.9. However, openness varies significantly between the Nordic countries. Only Denmark has significant transmission capacity to the rest of Europe, while the transmission capacity of all other Nordic countries is virtually non-existing⁷⁰.

Table 5.9: Trade openness outside the Nordic area

	Danmark	Finland	Island	Norge	Sverige	Nordel
Generation capacity, GW	12.5	16.8	1.4	27.9	31.7	90.3
Export capacity, GW	2.0	0.06	-	0.05	1.2	3.3
Import capacity, GW	2.0	1.2	-	0.05	1.2	4.4
Export openness, capacity	0.16	0.00	-	0.00	0.03	0.03
Import openness, capacity	0.16	0.07	-	0.00	0.03	0.04

Notes: Export (import) openness is calculated as the export (import) capacity divided by the total generation capacity.

Source: Nordel and own calculations.

When we consider the realised trade, the general picture is the same. Trade between the Nordic countries and the rest of Europe is insignificant relative to the total production and Denmark is the only Nordic country with a significant trade volume; cf. Table 5.10.

	Danmark	Finland	Island	Norge	Sverige	Nordel
Total production, GWh,	36,009	71,645	8,028	121,872	157,803	395,357
Net export, 2001, GWh	4,152	0	0	0	2,714	6,866
Net import, 2001 GWh	3,516	7,685	0	0	1,141	12,342
Export openness, realised	0.12	0	0	0	0.02	0.02
Import openness, realised	0.10	0.11	0	0	0.01	0.03

Table 5.10: Realised trade outside the Nordic area

Notes: Realised net export (import) is calculated as net export (import) divided by total production. Source: Nordel and own calculations.

Price correlation between the Nordic area and Germany

We now turn to an investigation of the (partial) price correlation between prices in the Nordic area and with the rest of Europe. We first repeat a previous result. Whenever the Nordic area constitutes a single price area, the price correlation between the Nordic spot price and the spot price on the two German power exchanges are 0.24. This is very low and rather similar to the price correlation with very distant power exchanges as Amsterdam and Madrid, cf. Table 5.11. There does not seem to be strong links between the Nordic market and the German market as such, supporting the argument that the Nordic area and Germany are not part of the same relevant market.

⁷⁰ Finland has a large import capacity from Russia. However, the electricity is purchased on long-term contracts and it is not likely to respond to price differentials within the Nordic area.

	Nordic area	EEX	LPX	APX	OMEL
Nordic area	1	0.33	0.36	0.28	0.14
Frankfurt	0.24	1	0.88	0.50	0.34
Leipzig	0.24	0.72	1	0.54	0.32
Amsterdam	0.15	0.33	0.37	1	0.26
Madrid	0.18	0.20	0.21	0.12	1

Table 5.11: Partial and simple correlation coefficients of spot prices in hours with no bottlenecks in Nordic area.

Note: EEX is the European Electricity Exchange in Frankfurt, LPX the Leipzig Power Exchange, APX the Amsterdam Power Exchange, and OMEL the Spanish Power Exchange. Above the diagonal, the simple correlation coefficients are reported where no correction has been made for common factors. Below the diagonal, the partial correlation coefficients are reported. These are corrected for the following variables: Hourly, daily, and monthly dummy variables. No bottlenecks occur in 4,539 hours corresponding to 51.8% of the total observations. We use logarithmic transformations of the price series to reduce the impact of outliers.

Source: Nord Pool, <u>www.eex.de</u>, <u>www.lpx.de</u>, <u>www.apx.nl</u> and <u>www.omel.es</u>, and own calculations.

We now investigate the relationship between prices in West Denmark and Germany in the periods where West Denmark and the rest of Nordic area constitute two separate price areas. It turns out that West Denmark is a separate price area from the rest of the Nordic area in 889 hours or about 10 per cent of all hours in 2001, cf. Table 5.12. In most of these hours there are no congestion constraints between West Denmark and Germany. Only during 68 of the hours are there congestion constraints on both the Nordic and German transmission lines.

Table 5.12: The state of transmission lines to and from West Denmark, number of hours in 2001

	Closed from	Closed from	German line	Total
	WDK to	Germany to	open	
	Germany	WDK		
Closed from WDK to Nordel	1 (0%)	1 (0%)	344 (4%)	346 (4%)
Closed from Nordel to WDK	65 (1%)	1 (0%)	478 (5%)	543 (6%)
Nordel lines open	726 (8%)	66 (1%)	7,100 (81%)	7,871 (90%)
Total	799 (9%)	68 (1%)	7,922 (90%)	8,759 (100%)
Occurrent Namel David Elfer and sum	1 1 2			

Source: Nord Pool, Eltra and own calculations.

We now calculate the partial correlation coefficients between prices in West Denmark, Sweden and the four European markets for all significant combinations of congestion constraints to and from West Denmark. We first consider the situation where West Denmark is neither cut off from the rest of the Nordic area, nor from Germany. In this case, the correlation coefficient between West Denmark and Sweden is 0.66, while the correlation coefficient between West Denmark and the German power exchange is lower at 0.41; cf. Table 5.13.

Table 5.13: Partial	price correlation	coefficients	between	West	Denmark	and	selected
markets contingent	t on the state of t	he transmiss	ion lines,	2001			

German line				Closed from	Closed from	Closed from
	Open	Open	Open	WDK to	Germany to	WDK to
		-		Germany	WDK	Germany
Nordel lines		Closed from	Closed from			Closed from
	Open	WDK to	Nordel to	Open	Open	WDK to
		Nordel	WDK			Nordel
Sweden	0.66	0.24	0.55	0.75	0.90	0.75
Frankfurt	0.41	0.41	0.33	0.20	0.32	0.44
Amsterdam	0.27	0.17	0.12	0.14	0.14	0.50
Madrid	0.18	0.12	0.34	0.08	-0.05	0.12
Observations	7,100	344	478	726	66	65

Notes: We have left out three combinations of states with each only a single observation.

Source: Nord Pool, www.eex.de, www.lpx.de, www.apx.nl and www.omel.es and own calculations.

A complementary study to the partial correlation analysis can be conducted by estimating *impact impulse elasticities* across the various pairs of regions. We consider the three most important price area combinations within the Nordic region and want to measure the immediate impact on price elasticities subject to the existence of a particular price area state and a possible switch in this state. We want to measure the percentage change in prices in one region in response to a one percentage change in prices in another bidding region given that at particular price area state exists. This is the *state dependent impact response elasticity*. State dependent impact elasticity analysis can be a useful tool in any situation where delineation of the relevant geographical market can potentially depend upon particular states of the economic and physical environment. The case of the Nordic electricity market with congestion and non-congestion states is a good example.

The general impression is that price changes in the Nordic area imply significantly smaller relative price changes in the rest-of-Europe region for the various configurations. This supports the previous finding that the rest-of-Europe can be considered a separate price region to the Nordic region and hence do not belong to the same relevant geographical market. This is further supported by the fact that the impact multiplier on prices in the Nordic region by relative price changes in the rest-of-Europe are generally very small.

We have also considered market definition by using *error correction models*. Most frequently error correction models are used as a way of representing integrated and co-integrated time series with a nice and intuitive interpretation. However, error correction models are equally valid for stationary processes and the interpretations are equally attractive.

For the electricity case we have demonstrated how error correction models for stationary price processes can be made operational as a tool for delineating the relevant geographical market. For the electricity case the price changes are modelled with the price gap to other bidding regions (lagged one period) as an important explanatory variable with a nice interpretation in relation to the market delineation problem under scrutiny. It occurs for this particular case that the error correction model effectively accounts for the congestion/non-congestion feature in an integrated way, and the results turn out to be meaningful. We have found that within the Nordic area, the following bidding regions can be considered belonging to separate relevant geographical markets in hours of congestion: South Norway-Sweden, Mid Norway-Sweden, Mid Norway, and North Norway-Sweden.

Multiple comparisons of price series

We have used *principal components analysis* to extract the number of factors or components that are likely to explain the main price variability. It occurs that for the four scenarios at hand, covering within the Nordic area price variability as well as within "rest-of-Europe" price variability, it was not possible to identify a grouping consisting of the entire set of regions included in the study. In fact, several factors appeared to characterise price variability. These results support the findings of the bivariate analyses undertaken in this report.

5.6 Facial tissue

When we define the relevant markets for tissue by economic reasoning, we tend to conclude that the geographical markets are national, primarily due to high costs of transportation. It was not possible to define markets by price tests due to severe data limitations.

The tissue product and the industry

The production of tissue products is a three-stage process where wood paper (pulp) is treated and run on a paper machine. It is then turned into base paper (parent reel). Finally the parent reel is converted into various paper products and packaged. Large players in the tissue sector generally manufacture a range of tissue paper products ranging from toilet tissue, kitchen towels, over handkerchiefs & facial tissue to napkins. Furthermore, the large manufacturers tend to be vertically integrated across the different stages of production, in contrast to smaller players who tend to be active only in the latter stages. The focus of this analysis will be the market for facial tissues.

The supply side of the EU tissue market is made up of three to four first-tier manufacturers while a number of smaller manufacturers have gained significant market shares in limited geographical areas. The first-tier manufacturers consist of SCA Mölnycke Holding, Kimberly-Clark, fort James and Proctor & Gamble. The largest second-tier manufacturers are made up of a wider range of firms such as Metsä Tissue Corp. and a number of Italian producers (Annunziata, Cartiera Lucchese etc.). These manufacturers have also succeeded in attaining some limited sales outside their home market. Overall, manufacturers tend to develop high market shares only in the countries where they operate local production plants (and to some extend in the neighbouring countries).

The processed products primarily enter one of two channels; they are either supplied to retailers (for consumer products) or Away-From-Home⁷¹ (AFH) distributors (national wholesalers).

A merger case in the tissue industry (case M.2097)

In 2000 the European Commission investigated and reported on a proposed acquisition by SCA Mölnlycke Holding BV (SCA) of the whole of Metsä Tissue Corporation (MT). SCA manufactures and distributes a variety of tissue-based hygiene products throughout the EEA. MT is active in the production of tissue products, baking, and cooking papers. MT has production sites in Sweden, Germany, Finland, Poland, and the Canary Isles.

The Commission considered toilet tissue, kitchen towels, handkerchiefs & facial tissues and napkins to constitute separate product markets as they differed on price, physical characteristics, and end use.

The Commission also considered whether private label and branded products where part of the same product market and concluded that the products competed at retail level but where separated at wholesale level. The Commission based its decision on the distinctly different ways in which the products were procured as well as on the differences in margins. It noted that "the supply of branded and private-label tissue products [was] characterised by two different sets of competitors which [had] only limited economic incentives and financial capabilities to seriously challenge each other's product markets". However, even if the products had been part of the same market, the Commissions conclusions would have remained valid.

In the AFH segment, the Commission however considered branded and private label tissue to be part of the same market as this segment focuses more on value for money than brand appeal. Non-paper products where considered to compete somewhat but not to substitute substantially as they had different applications (did not compete on price).

The relevant geographical market was only defined for the Scandinavian countries while the definition for the rest of the EU was left open. For branded products, the market was considered to be national due to issues such as consumer preferences, national differences (language), distribution costs and the national scope of sourcing by customers. The Commission relied on indicators such as market share, transport costs and consumer

⁷¹ The Away-From-Home group includes supplies to hotels, restaurants, catering firms, and other corporate customers.

surveys. For private label products, the markets where also defined as national, the primary reasons given were sourcing patterns of buyers, transportation costs the location of production facilities.

For branded products, the combined entity would have a market share of between 80% and 90% of the Swedish market for toilet tissues and kitchen towels. This share was estimated by the Commission to effectively restrict any countervailing buying power in the market. For private label products, the combined entity would have 60%-70% market share for toilet tissue and 80%-90% for kitchen towels. As for branded products, countervailing buying power was unlikely to exist. For both segments, the entry costs where considered to be prohibitively high relative to the maturity of the markets.

The Commission concluded that the proposed merger would result in the creation of a dominant position in the markets for branded and private label toilet tissue and kitchen towels in Sweden. Similar arguments where carried for the Norwegian, Finnish, and Danish markets. The Commission therefore declared the merger incompatible with the common market and prohibited the merger.

Market hypothesis by economic reasoning: Facial tissue

In the tissue industry, the barriers include transportation costs, national preferences and advertising.

On the *demand* side the primary barrier to market integration is probably cost of transportation because the products are low in value and high in volume.

Also, on the *supply* side transportation costs constitute a major barrier. It is estimated that the upper limit on the geographical distance, which branded tissue products can feasible be transported to market, is 750-1,000 km.⁷² For private label products the picture is similar, with the exception of Italian manufacturers who can reach the double of that distance as their more efficient production methods allows them to absorb more transportation costs.

Furthermore, entry on a foreign market may be costly due to the combination of brand preferences on the demand side and the national scope of advertising. For example, British consumers are strong proponents of high quality, branded tissue products. Other consumers, e.g. the Italian, are more interested in cheaper products and are less concerned about brand as long as minimum requirements are met in terms of quality. At the same time, advertising has a distinctly national scope. Branded products are advertised fairly heavily on a national level as a result of the national scope of most media as well as language barriers.

To summarise, we tend to conclude that demand substitution as well as supply substitution is limited. We stipulate that a hypothetical monopolist on a national market would be able to profit from a 5%-10% increase in prices. Thus, markets for facial tissue are national.

Market delineation by price tests: Facial tissue⁷³

We have analysed the product and market delineation for tissue. It would have been ideal to use a variety of different approaches with each their strengths and weaknesses. In this case however, the limited scope of available data made any serious statistical or econometric analysis futile. The main conclusion is that high quality data must be available before any informed conclusions can be derived quantitatively.

⁷² Based on the findings made by the European Commission in case no. M.2097 SCA/Metsä.

⁷³ For a detailed account, cf. appendix 3E.

The data source for the facial tissue study is *Economist Intelligence Unit*. From the data documentation annual consumer prices of facial tissues in "Mid-priced stores" and "Supermarkets" are available for the capitals within the EU for the period 1990-2001. However, it appears that the collected "Mid-price store" and "Supermarket" consumer prices are identical in the database. Hence only one category is considered. The prices being measured are in the domestic currency but all prices have been converted to the same currency, Euros (ECU). Prices measure the consumer price of a box of 100 tissues.

The capitals included in the study are:

Amsterdam (AMS), Athens (ATH), Berlin (BER), Brussels (BRU), Copenhagen (KBH), Dublin (DBN), Helsinki (HSK), Lisbon (LIB), London (LDN), Madrid (MAD), Paris (PRS), Rome (ROM), Stockholm (STH), and Vienna (VNN).

Figure 5.7 shows large discrepancies in prices across the stores being examined. For instance, in 2001 the unit price in Stockholm and London is approximately 3 times larger than the unit price in Amsterdam. Also there has been a tendency for prices in especially Stockholm and London to grow much more rapidly than prices in the remaining capitals. The rest of the capitals have prices clustering (relatively) more together but still with large differences existing. From visual inspection of the data, there does not appear to be any similar pattern in price movements across the data series.

Figure 5.7: The consumer price of a box of 100 tissues in Mid-priced (or Supermarket) store in EU capitals.



Source: Economist Intelligence Unit and own calculations.

Testing the order of integration

It would have been ideal to undertake a careful analysis of the price data using more or less advanced statistical methods. However, only 12 data points – covering 12 years of observations – are available and this is insufficient to do serious statistical and econometric analyses of questions related to market delineation.

It will frequently help to have data available sampled at a higher frequency, e.g. monthly observations. Although the increase of sampling frequency can generate new problems due to seasonal variation, say, methods exist to deal with this problem.

A second problem with the existing data set is that the data quality can be questioned. It is not clear from the data documentation how data is sampled, whether sampling has taken place at the same time within the year, or whether the single prices are found as (weighted) average across a range of stores, that being supermarkets or mid-priced stores.

Given the above difficulties we cannot draw any conclusion regarding market delineation. From a visual inspection of the available data one gets the impression that price discrepancies are large for a number of EU capitals, which suggests that markets are segmented. However, we cannot provide any definite answer based on proper statistical testing.

Chapter 6 : Referral of merger cases to national authorities

In this chapter, we analyse the procedures for referring merger cases from the Commission to the member states. Firstly, we describe the current referral rules and the proposal for facilitation of referral put forward by the Commission. Secondly, we put forward a proposal for new referral criteria that are based on sound economic theory and evaluate the consequences if these referral criteria were hypothetically applied to EU merger cases in the period 1990-2001.

We propose the following set of criteria for referral of merger cases to national competition authorities.

A merger case with a Community dimension can be referred in full to a national competition authority on the request of the Commission or a member state if...

- ...the merger affects competition ...
- ...on a distinct market within a member state...
- ...where trade with other member states is not significant, viz. smaller than, say, 10 per cent of total output.

We, hypothetically, apply these criteria on 32 actual merger cases from the period 1990-2001, with distinct markets within a member state and with the required information about trade flows. The 32 cases were split equally between Phase I and II cases: 16 Phase I merger cases handled by member states and 16 Phase II merger cases handled by the Commission.

If the proposed criteria had hypothetically been applied, we estimate that the number of merger cases handled by the Commission would drop, while the number of cases handled by member states would increase. With respect to the 32 cases, the Commission would have handled 9 merger cases, while national competition authorities would have handled the remaining 23 merger cases.

The chapter is organised in the following way. Firstly, we briefly describe the current referral procedure and the proposal for facilitation in Section 6.1. Secondly, we review the current practice of referral in Section 6.2. In Section 6.3, we propose a new set of criteria for referral and estimate their impact on the distribution of merger cases between EU and national competition authorities.

6.1 The current referral procedure

European merger cases may or may not have a Community dimension. If a merger case has a Community dimension, the jurisdiction belongs exclusively to the Commission. If a merger case does not have a Community dimension, the jurisdiction belongs to national competition authorities in member states. In principle, this distinction guarantees a one-stop-shop

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principle, which is regarded as an essential part of keeping the regulatory costs at a reasonable level.

Merger regulation

A merger case has a Community dimension if the merger is sufficiently large, as defined by the rather complicated turnover-based thresholds in article 1 of the Merger Regulations, cf. Box 6.1.

Box 6.1: The definition of a Community dimension in the Merger Regulation

- 1. Without prejudice to Article 22, this Regulation shall apply to all concentrations with a Community dimension as defined in paragraphs 2 and 3.
- 2. For the purposes of this Regulation, a concentration has a Community dimension where:
 - a. the combined aggregate worldwide turnover of all the undertakings concerned is more than ECU 5000 million; and
 - b. the aggregate Community-wide turnover of each of at least two of the undertakings concerned is more than ECU 250 million,
 - c. unless each of the undertakings concerned achieves more than two-thirds of its aggregate Community-wide turnover within one and the same Member State.
- 3. For the purposes of this Regulation, a concentration that does not meet the thresholds laid down in paragraph 2 has a Community dimension where:
 - a. the combined aggregate worldwide turnover of all the undertakings concerned is more than ECU 2 500 million;
 - b. in each of at least three Member States, the combined aggregate turnover of all the undertakings concerned is more than ECU 100 million;
 - c. in each of at least three Member States included for the purpose of point (b), the aggregate turnover of each of at least two of the undertakings concerned is more than ECU 25 million;
 - d. the aggregate Community-wide turnover of each of at least two of the undertakings concerned is more than ECU 100 million; unless each of the undertakings concerned achieves more than two-thirds of its aggregate Community wide turnover within one and the same Member State.
- 4. Before 1 July 2000 the Commission shall report to the Council on the operation of the thresholds and criteria set out in paragraphs 2 and 3.
- 5. Following the report referred to in paragraph 4 and on a proposal from the Commission, the Council, acting by a qualified majority, may revise the thresholds and criteria mentioned in paragraph 3.

Source: Article 1 in EU Merger Regulation 4086/89.

However, the Merger Regulation also contains escape clauses allowing for the transfer of merger cases between EU and national competition authorities. In some cases, mergers *with* a Community dimension may not have Community interest. This is handled by Article 9 that provides the Commission with an opportunity to refer, fully or in part, the assessment of a merger case to member states *on the request* of the member state(s). The opportunity for down-referral has been used in 34 cases since 1990.

In other cases, mergers *without* a Community dimension may have a Community interest. This is handled by article 22 that provides the Commission with an opportunity to review mergers that fail to meet the thresholds *on the request* of a member(s). The opportunity for up-referral has been used less, only in 6 cases, all before 1998.

The procedures for down-referral are described in detail in article 9 of the Merger Regulation. The main provision is the criteria for referral in sub paragraph 9(2). Currently, the Commission can down-refer a merger case to a member state, if the merger creates a dominant position

such that effective competition is impeded on a distinct market within that member state *or* if a merger effects competition on a distinct market within a member state provided this market does not constitute a substantial part of the common market; cf. Box 6.2. In practice, the Commission uses the first argument.

Box 6.2: Criteria for referral request

Within tree weeks of the date of receipt of the notification a Member State may inform the Commission, which shall inform the undertakings concerned, that:

- a. a concentration threatens to create or to strengthen a dominant position as a result of which effective competition will be significantly impeded on a market within that Member State, which presents all the characteristics of a distinct market, or
- b. a concentration affects competition on a market within that Member State, which presents all the characteristics of a distinct market and which does not constitute a substantial part of the common market.

Source: Article 9(2) in EU Merger Regulation 4086/89.

Green paper on Merger regulation

The Commission has issued a Green Paper on the review of the Merger Regulation where the Commission suggests some changes that could facilitate the referral of cases. The suggestions are based on a survey among all notifying parties (companies) in the period November 1996 to January 2001. In §§ 69-99 of the Green Paper the Commission puts forward proposals to facilitate referrals to member states. The goal of reforming referral is - in brief - to increase *efficiency*, *transparency* and *consistency* as stated in § 72 of the Green Paper:

"... the establishment of an efficient procedure which ensures sufficient transparency between the companies involved, the Commission and Member States, which limits duplication of efforts and waste of time, and which guarantees timely and consistent decisions."

The key elements of the Commission proposals are a revision of the referral criteria and the introduction of a right for the Commission to down-refer merger cases to member states on the initiative of the Commission.

The Commission proposes in the Green Paper, § 81(a), to keep only article 9(2)b but to remove the requirement that the market is not a substantial part of the common market. Instead there would be a requirement that the alleged effect on competition does not extend beyond the Member State's borders. Dropping article 9(2)a would mean disjoining the referral request from the need to show that there is at threat of a dominant position being created or strengthened. The tests in article 9(2)a and b have shown not to be very transparent and predictable, and they place a heavy burden of proof on the member states that seek referral.

The Commission also proposes in the Green Paper, § 81(b), that the Commission should be given the opportunity to refer cases on its own initiative, when cases due to a lack of significant cross-border effects, would be most appropriately assessed at national level. Providing the Commission with the possibility to refer cases on its own initiative could spare the member states the procedural steps needed in preparing a request.

The Green Paper and the proposals from the Commission have given rise to a large number of comments from interested parties. The comments have shown that there is a strong interest in whether the Commission can choose to make a partial or full referral, whether the procedures in member states need to be further harmonised and whether the Commission should publish a set of guidelines for referral cases.

Most comments would favour the establishment of "predictable", "simple" or even "automatic" criteria. Proposed examples include "clearly distinguishable product and geographical markets", "absence, or very low flow, of intra-Community trade". The respondents want one clearly effect-oriented test such as creation or strengthening of a dominant position, or any combination of the above.

Some comments have also pointed out the downsides to partial referrals. Partial referral necessitates dealing with two or more authorities, which might lead to additional cost for the merging parties. There is a widespread uncertainty over partial referrals and their outcomes. They are deemed to cause confusion, delay, conflicting negotiations and conflicting outcomes. Partial referrals diminish the benefit of the one-stop-shop principle, which is intended to keep regulatory costs associated with cross-border transactions at a reasonable level.

There is some concern about the treatment of referred cases by national competition authorities, mainly with regard to the aspects of procedure. Uncertainty persists regarding the length of national procedures and the protection of business secrets in the treatment of referred cases. Many would like to see more alignment of national procedural rules, at least to a minimum standard.

Many interested parties have requested an establishment of an efficient procedure, which ensures sufficient transparency between the companies involved, the Commission and the member states. The companies have stressed the need for guidelines to help companies assess when referrals will take place.

6.2 The current practice of referral

We have surveyed 23 Phase I cases that have been down-referred to national competition authorities in member states between 1990 and 2001. Of these cases, 16 are included in the analysis. The 16 cases constitute about two thirds of all referrals in the same period. The other 7 cases are excluded from the analysis, as the exact definition of the relevant geographical markets has been left out, either because it was "Not necessary", "Other" or "Left open". The 16 Phase I merger cases referred to national authorities include 43 markets, most of them within manufacturing and mining, cf. Table 6.1.

	Cases		iviarket d	etinitions
Industry	Number	Percent	Number	Percent
C. Mining and quarrying	3	18,8	8	18,6
D. Manufacturing	7	43,8	25	58,1
E. Electricity and water supply	2	12,5	6	14,0
F. Construction	1	6,3	1	2,3
G. Wholesale & retail trade etc.	1	6,3	1	2,3
I. Transp., storage, comm.	1	6,3	1	2,3
L. Public administration and defence	1	6,3	1	2,3
Total	16	100	43	100

Table 6.1: Phase I merger cases referred to member states by industry

Source: Database

The relevant geographical market is in all cases defined as equal to *or* less than the national market, with 50 per cent each in the two categories. This is no surprise given the requirements for referral. The analysis of the relevant geographical market does not seem to

be different from the analysis in Phase II cases according to the criteria listed in the database. The SSNIP-methodology is rarely applied, and demand and supply substitution are rarely mentioned.

In more than 55 per cent of the cases, the Commission does not explicitly state, which sub paragraph of Article 9(2), the referral is based on. Of the remaining cases 32 per cent are referred on the basis of sub paragraph a, and 12 per cent referred by sub paragraph b. The Commission provides in all cases supplementary argumentation for the referral, mainly that the national competition authorities are better placed to assess the case. Referral has been partial in 60 per cent of the cases and full in the remaining 40 per cent.

6.3 A proposal for a new referral procedure

As part of the modernisation of European competition policy, the Commission has proposed that more cases with a community dimension may be referred to the national competition authorities of the member states.

The main reason for increasing the number of referrals to member states must be that the national competition authorities in some cases are better positioned to handle the cases. They may be better acquainted with the merging companies and (possibly) their rivals and customers, and thus able to reach the right conclusion faster. We take for granted that such an informational advantage exists and that referring more cases to member states – everything else equal - increases *efficiency*.

It is material that mergers in the EU are treated in the same objective manner independently of which authority will determine the case. Thus, it must be ensured that the national authorities will arrive at the same conclusion as the Commission had it taken upon itself to carry out the investigation. Thus, a binding condition for referral is a presumption of equal treatment by the national authorities, or *consistency*. The next natural question is: When can national authorities be expected to decide the case as the Commission would?

Industrial economists have studied this question (Barros & Cabral, 1994). The key assumption is that national authorities care about welfare in the member state while the Commission cares about welfare in the entire European community.⁷⁴

Welfare consists of producer surplus and consumer surplus, and these two elements are likely to change when a significant merger takes place in one of the member states⁷⁵. The merger is likely to *increase* the producer surplus of the merging parties and *decrease* the producer surplus of their rivals in the same member state or in the other member states. In addition, merger will *increase or decrease* the consumer surplus of the consumers in the member state and of the consumers in the other member states.

It is clear that a competition authority that evaluates the merger from the perspective of community welfare can reach a different decision than a competition authority that evaluates the merger from the perspective of national welfare, *as long as* there is some asymmetry in the distribution of producer and consumer surplus on the national and community level.

The analysis by Barros and Cabral (1994) shows under certain simplifying assumptions that the main results of the conclusions can be stated in terms of type I and type II errors:

⁷⁴ While the specific assumption is debatable, and indeed has been debated, we stress that the conclusions to follow are likely to hold whenever there is some kind of asymmetry between the goals of member states and the Commission and between the member state's share of benefits and costs.

⁷⁵ Or in a merger between companies in two different member states

- A member state will be prone to accept a merger between two companies in the member state if it is a large net-*exporter* of their products, even if the merger would reduce Community welfare such that the Commission would have rejected this merger. In this case, a referral to a member state would have resulted in the acceptance of a merger that should have been rejected. We dub this a Type-I Error.
- A member state will be inclined to reject a merger between two companies in the member state if is a large net-*importer* of their products even if the merger would increase Community welfare such that the Commission would have accepted this merger. In this case, a referral to a member state would have resulted in a rejection of a merger that should have been accepted. We dub this a Type-II Error.

The intuition behind these results is that if the member state is a large net-exporter of the product, then a disproportionately large part of the (presumably positive) producer surplus and a lower-than-average part of the (presumably negative) consumer surplus accrues to the member state. The member state may thus be inclined to allow the merger. If, on the other hand, the member state is a large net-importer of the product, the ratios of producer surplus and consumer surplus are reversed. The member state may thus be inclined to disallow the merger.

An extreme example is a merger between two companies in a member state that export all output to another member state. All the positive changes in producer surplus accrue to the member state where the merger takes place, while all the (presumably) negative changes in consumer surplus accrue to the other member state. Clearly, the national competition authority in the member state of the merging parties would be inclined to accept the merger, while the national competition authority in the other member state would be inclined to reject the merger. But the Commission would be required to weigh properly the gains and losses of producer and consumer surplus in both member states.

The framework of analysis can be used and recommended even if consumer surplus is used as the measuring rod instead of total welfare. If the Commission is concerned only with consumer surplus, the problem is exacerbated when countries are big net exporters: Assume that the member states care about their own producers (for reasons of industrial policy). Then they trade off producer and consumer surplus at the member-state level. For net exporters, this means that the member countries will be inclined to accept a merger that should be disallowed if maximization of EU consumer surplus the goal of the central authority.

On the other hand, when the Commission is concerned only with consumer surplus, it could delegate its authority to large net importers since these, as the Commission, are concerned with consumers' welfare. In this case there is a perfect alignment of interests.

It could be argued that member states' interests in principle should be aligned with the Commission's focus on consumer surplus since member states should employ community legislation to mergers when these are referred. However, this amounts to assuming away the problem that member states and the EU may have different priorities in a certain case.

At this point we could remark that there is some affinity between the issues involved here and well-known antitrust issues related to export cartels and mergers with a transatlantic dimension. The treatment of export cartels also shares the feature that the cartel parties (or parties to a merger if a joint export company is set up by competitors) export everything, so that domestic consumers are left unaffected. This, of course, explains why both North American and European competition authorities have traditionally taken a lenient view towards export cartels. Similarly, there has been some disagreement between North

American and European competition authorities over merges with a transatlantic dimension. This disagreement also relates intimately to who is the net exporter and who is the net importer. These issues could easily be seen through the lenses of Barros and Capral.

On the basis of the analysis, we can formulate the following proposal for criteria for referral of merger cases to national competition authorities.

A merger case with a Community dimension can be referred in full to a national competition authority on the request of the Commission or a member state if...

- ...the merger affects competition...
- ...on a distinct market within a member state...
- ...where trade with other member states is not significant, viz. smaller than, say, 10 per cent of total output.

The exact formulation of the criteria must either be very precise and operative or be supplemented with some sort of mechanism to handle potential disagreements between national competition authorities and the Commission with respect to the proper location for handling the merger case.

We propose that the Commission can refer a case to national authorities in full or it can handle the merger case itself. We are sceptical about partial referrals, because they are likely to significantly increase the administrative burden of the merging companies.

Most merger cases involve several relevant markets. It follows that the same case may contain relevant markets that ideally could be referred to national authorities and relevant markets that ideally should be handled by the Commission. But if cases can only be referred in full, the Commission must evaluate the pros and cons of referring all relevant markets or none. Of course, it is possible to establish rigid rules, for example saying that: if at least one relevant market within a merger case ideally should be handled by the Commission, then the entire case should be handled by the Commission. However, we have doubts of the practical relevance of such rigid rules, and can only suggest that in each case the Commission must weigh the potential for efficiency gains of full referral against the risk of reaching a wrong decision, from the viewpoint of the Community.

We are positive towards the idea that the EU competition authorities in cooperation with the national competition authorities publish guidelines for up- and down-referral of merger cases. Properly formulated, they may significantly enhance transparency for companies.

We note that our proposal for referral does not seem to be far from the ideas of the Commission contemplating referral, whenever significant cross-border effects are absent, or from some of the comments to the Green Paper talking about "absence, or very low flow, of intercommunity trade".

What if the proposed criteria had been in place in 1990?

We now hypothetically assume that our proposed criteria had been enacted in 1990. We evaluate the hypothetical distribution of a selected number of EU merger cases between the member states and the Commission, and compare the hypothetical distribution with the actual distribution based on the current criteria. We emphasise that the evaluation is rough and can only illustrate general tendencies.

We select a sample of all 16 Phase I cases actually referred to member states, and 16 Phase II cases handled by the Commission and fulfilling the following two conditions: i) relevant

geographical markets are defined as national or less than national, and ii) the cases contain information about the trade flows in the relevant markets.

We review all actual phase I merger cases referred to member states. All these cases have distinct markets within a member state and for each market defined in a case we evaluate whether significant trade took place between member states. If the answer is yes in at least one market, we argue that the Commission, according to the proposed criteria, should have handled the merger case. It turns out, that 3 of the 16 phase I merger cases according to the new criteria should have been handled by the Commission rather than a member state, cf. Table 6.2.

An example is merger case *M.2662 Danish Crown/Steff-Houlberg*, which was referred to the Danish competition authorities. However, the merging company has significant export, above 40 per cent, to other member states on several markets. If the proposed guidelines had been implemented, the case should instead have been handled by the Commission to avoid a potential type I error. We note that the Danish competition authorities later accepted the merger with conditions.

We have also reviewed a sample of phase II cases, where at least one of the relevant geographical markets is defined as national or less than national and where information about trade flows between member states is available. The sample comprises 16 merger cases of the total 67 phase II merger cases. In 10 of these cases, trade flows between member states are not significant, that is smaller than 5-10 per cent of total output. In the remaining 6 cases, either export or import is significant, that is in the range 20-40 per cent.

It turns out, that if our proposed criteria were used on 32 EU merger cases between 1990 and 2001, then the national competition authorities would handle 23 cases, or about 75 per cent, while the EU competition authorities would handle the remaining 9 merger cases, or about 25 per cent.

	Actual distribution			Hypothetical distribution			
	Phase I	Phase II	Total	Phase I	Phase II	Total	
Referred	16	0	16	13	10	23	
Non-referred	0	16	16	3	6	9	
Total	16	16	32	16	16	32	

Table 6.2: Actual and hypothetical distribution of merger cases between member states and the Commission

Source: Database

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