

Market shares and dominant market positions in the case of emissions trading

An economic analysis based on US, European and Japanese competition law

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Abstract

Emissions trading is becoming more and more important. So far, emission rights have almost always been allocated free of charge. This in turn has started a discussion of possible dominant market positions. In this context, existing literature either simply assumed that such a position exists and analysed the implication or determined market shares based on entitlements allocated to individual players. With regard to the second line of literature we argue that this approach is not satisfactory and propose an approach based on 1) initial allocation together with 2) marginal abatement costs curves and 3) business-as-usual emissions. Together with a given market price these three factors allow a determination of market shares. Based on competition law systems in the US, the EU and Japan we discuss possible relevant market shares that may provide the floor for dominant market positions. Applied to the international climate regime we conclude that certain allocation rules that might be perceived as “fair” may imply possible dominant market positions for Parties that would have to reduce their emissions considerably.

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I. Introduction

In the context of fighting global warming, greenhouse gas emissions trading is one of the most important instruments on both global and regional levels. On the global level the Kyoto Protocol and the related Marrakech Accords define the framework. On the regional level the EU emissions trading scheme is the most predominant system. These agreements create new markets for emission entitlements.² Such new markets inherently raise competitive issues both concerning the introduction of the instrument itself and within the emission market.

Regarding the first aspect one may fear that a player subject to a trading scheme may use the entitlement market to influence the product market in order to prevent new players from entering the market or to squeeze existing players out of the market³. Tietenberg argues for airborne pollutants that such fears seem to be far-fetched as installations regulated with respect to a certain pollutant generally operate in different product markets.⁴ This in turn assures sufficient competition. This argument is true for greenhouse gas (GHG) trading schemes on company level which comprises numerous sectors like e.g. power generation, cement production and pulp and paper. For emissions trading on state level, however, Hagem/Maestad find that Russia has an incentive to use its market position to influence the entitlement price and thus support exports of natural gas.⁵

The second aspect is the question of market shares and market share concentration within the GHG entitlement market. It implies the issue of a dominant market position by individual players. Such situations are undesirable as the dominant player may influence the entitlement price which results in inefficient abatement strategies by other participants.

The present paper deals with the second aspect i.e. the determination of these market shares in the context of GHG emissions trading. As greenhouse gases are emitted in a number of

² Depending on the system and the instrument the emission entitlements are labelled differently. In this paper the term “emission entitlement” and “emission right” are used equivalently. They describe the right to emit a certain amount of a greenhouse gas in general. Emission rights specific to a certain system are introduced where necessary.

³ See e.g. Tietenberg, *Emissions Trading: An Exercise in Reforming Pollution Policy*, Washington D.C. 1985, pp. 125-126.

⁴ *Ibid.*, p. 139)

⁵ Hagem/Maestad, *Market power in the market for greenhouse gas emissions permits – the interplay with fossil fuel markets*, Working Paper 2002:08, Centre for International Climate and Environmental Research Oslo, Oslo 2002

industries, it is possible to have a dominant market position only in the emission market but not on the product market.⁶ We challenge earlier findings regarding the definition on market shares. We use the GHG market under the international climate regime to show the difference between earlier approaches and the one presented here.

The paper is structured as follows: The next section discusses market share and market share concentration from both an economic and a legal perspective. Section 3 puts the findings in the context of emissions trading in general. The following section analyses the case of the international climate regime. Section 5 concludes.

II. Market Shares and Dominant Market Positions

1. Economic and legal aspects

a. Economic aspects

Market share concentration can lead to dominant market positions. Dominant positions are generally undesirable from an economic and social perspective as they may result in welfare losses. Such a dominant position may either be held by a single player, what is generally referred to as monopoly or monopsony⁷, or by a group of players that agrees to act together in order to exert market power as monopolist or monopsonist. The latter form is called cartel. With regard to the welfare effects there is no difference.

If the dominant player exerts its power in order to increase its rents it can influence the price which in turn leads to an inefficient use of resources and undesirable social aspects. This provides the motivation for governments to intervene. With regard to any product market, economic theory, however, does not provide much guidance on the question if a dominant market position exists. In practice, jurisprudence⁸ has developed rules to face this issue.

⁶ For example the operator of the lignite fired power plant may be a major player on the emission market but a small player on the product (i.e. power) market where he may compete with non-emitting power plants.

⁷ Posner e.g. writes: "When I speak of "monopoly" or "monopolist" [...] I mean a firm with monopoly power, not necessarily a firm with a 100 percent market share." Posner, *Antitrust Law*, Chicago 2001, p. 196.

⁸ Jurisprudence includes courts, competition authorities, lawyers etc.

b. Legal aspects

In this section we analyse if market shares are important from the legal perspective and how it is assessed in practice. We look at a choice of competition law systems, namely the US, the EU and Japanese system and investigate the importance of market shares.

It is helpful to start with defining the term ‘dominant market position’ and probably also ‘competition’. Competition has been described as the struggle or contention for superiority in the market place. Competition law relates to intervention in the market place and limitations on the freedom of market players to engage in certain practices that are deemed to be in restraint of trade. It deals with the misuse of dominant market positions⁹ or, under the US legal terminology, „antitrust law“¹⁰, meaning more or less the same thing.¹¹

A dominant market position is “the power to raise price or exclude competition”¹², and “the ability to reduce output and herewith significantly enhance profit”¹³.

Competition law deals with the behaviour of firms that bear the risk of creating an undesired dominant market position reducing the efficiency of the market system.

Two main cases exist:

1. A company that already holds a strong market share position and that can exert “market power”, for example by overcharging customers (“excessive pricing”). This case is also called abuse of market power. Abuse of a market power is thus an ex-post analysis of behaviour, i. e. already exerted market power that might have caused deviation from the market equilibrium in competitive markets.
2. Merger of two or more firms forming one player with a dominant market position that advantageously combines the respective market shares and that may subsequently negatively affect the market. Whether or not the merged company later exerts market power or not, can not substantially be subject of an ex-ante investigation. Thus, a behavioural element is not needed here.

⁹ Herdegen, Mathias Internationales Wirtschaftsrecht, München 2003, p. 222

¹⁰ Herdegen, Mathias Internationales Wirtschaftsrecht, München 2003, p. 222

¹¹ Whish, Competition Law, London 2001, p. 393.

¹² US v. EI du Pont de Nemours & Co., 351 US 377, 391 (1956), Hylton, Antitrust Law: Economic Theory and Common Law Evolution, Cambridge 2003, p. 230; Elsing/Van Alstine, US-amerikanisches Handels- und Wirtschaftsrecht, Heidelberg 1999, p. 309.

¹³ Gey, Potentieller Wettbewerb und Marktbeherrschung, Baden-Baden 2004, p. 125.

Both case types deal with the exploitation of a dominant market position.¹⁴ While the first one assesses dominant positions and its potential abuse in retrospect, the latter concentrates on a future development (see Table 1). In fact, criteria and thresholds about market share can be different for these two types.

	Case type	
	Merger Control	Abuse of Market power
Time horizon	Ex-ante	Ex-post
Behaviour element	Weak	Strong

Table 1: Basic differences between merger control and abuse of market power assessment.

As the allocation of emission entitlements, which needs to be done prior to the start of a scheme, is currently one of the most important issues in emissions trading schemes we focus on merger control and check which criteria define a dominant market position.

The following section is not meant to provide a detailed discussion of the investigated competition law systems. It shall rather give an overview on criteria applied in the countries’ jurisdictional practise to define and assess market shares and market power.

2. Overview of competition law regulations

a. International regulations

One might wonder if there are regulations either internationally or nationally that directly govern cases of a dominant market position in a global permit market.

So far however, such explicit and pertinent regulations do not exist – neither in the Kyoto Protocol itself nor in any other multinational legal context¹⁵ – nor are there any national regulations that are applied to the behaviour of states or to the exploitation of (market) positions that derive from – or result as outcomes from – international treaties of the *ius gentium*.

¹⁴ The methodology of comparisons as part of the so-called comparative law compares “such rules which regulate the same situations in people’s lives” (Bogdan, Comparative Law, Deventer 1994, p. 59).
¹⁵ WTO, Ministerial Declaration, Fourth Session of the Ministerial Conference, Doha, WT/MIN(01), 9-14 November 2001, recognizing the need for a multilateral framework to enhance the contribution of competition policy to international trade and development.

An international law of competition has been discussed, but has not developed so far.¹⁶ However the intention to work on a future agreement on competition was declared at the end of the WTO conference in Doha in 2001.

b. National competition law regulations

US, EU and Japanese law are considered a representative choice for the following analysis.

b1. Market shares and dominant market positions according to US competition law

Productive efficiency, innovation and economic values are the explicitly and clearly indicated ideas that form the basis of the US competition and antitrust law¹⁷, and efficient competition in the market is understood as a necessity for truly economic reasons¹⁸.

US law as part of the anglo-american law system differs strongly from the European law systems, also called continental law systems. It bases to a much lesser extent on regulations set out by the legislative or the executive powers, and more on a system crafted by jurisdiction. Despite this, its antitrust law is regulated by legislation through the Sherman Antitrust Act and the Clayton Act, the latter dealing especially with merger regulation. Having stressed traditional differences in the legal systems, one will see that the issues to assess market dominance are rather similar.

The criteria defining an unrightful merger are set out by these legal regulations, and are supplemented by a number of US court decisions. Market power in general is said to be determined through the factors: “market share, demand-side substitution, and supply-side substitution”¹⁹.

As for the merger case, it depends even more on the question if the later evolved, combined firm unrightfully “substantially lessens competition”²⁰ or “restrain[s] trade”²¹ in the player’s respective market. The market needs to be defined, and we will apply this in the forthcoming section on our emissions rights market.

¹⁶ See e.g. Goyder, *EC Competition Law*, Oxford 2003, p. 514; Ehlermann, *WTO-Wettbewerbsregeln: Lehren aus den bestehenden Streitbeilegungsverfahren in: Konvergenz der Wettbewerbsrechte – Eine Welt, ein Kartellrecht*, Referate des XXXV. FIW-Symposiums, Cologne 2002, pp. 93-122, p. 93.

¹⁷ Areeda/Kaplow, *Antitrust Analysis*, Boston 1988, p. 46.

¹⁸ See *United States v. Microsoft Corporation*, 253 F 3d 34, 58, 89-90, cit. in Gey, *Potentieller Wettbewerb und Marktbeherrschung*, Baden-Baden 2004, p. 123.

¹⁹ Hylton, *Antitrust Law: Economic Theory and Common Law Evolution*, Cambridge 2003, p. 236.

²⁰ See Clayton Act Section 7, in Goyder, *EC Competition Law*, Oxford 2003, p. 368.

²¹ Gellhorn et al., *Antitrust Law and Economics in a Nutshell*, St. Paul 1991, p. 337.

‘Lessened competition’ is measured by (1) the gradual change in market share concentration and (2), how easy the entry²² from outside is for potential competitors²³ or if supply can be substituted through alternative producers.

If the merger creates substantial efficiency gains for a company’s customers²⁴, this can lead to the merger’s approval. This means that evidence can be brought from the challenged firm that competition is not endangered²⁵ or there be desirable effects.

For the merger’s assessment, a difference is made between concentrated and unconcentrated markets. Concentrated markets have a threshold for horizontal mergers: 30 % market share would unrightfully increase its concentration.²⁶

25 to 30 % were also elsewhere considered as a critical market share for competitors willing to merge.²⁷

In addition to court practise and legal regulations, administration guidelines can be of relevance, such as the Justice Department Merger Guidelines.²⁸

They indicate mandatory official action if a firm with a market share of over 35 % is involved.²⁹ This means its market share percentage is seen as a player’s per se critical value in the respective market.

Another important factor is the HHI-Index that will be explained in more detail later. It integrates a statement of market concentration and the competitors’ market shares. In US

²² One way to define entry barriers offers the Banian approach, „which treats as a barrier any factor that as a realistic matter discouraged entry“ (see Sullivan/Grimes, *The Law of Antitrust: An Integrated Handbook*, St. Paul 2006, p. 69). One can also ask if the market is a ‘contestable market’: “A contestable market is one into which entry is absolutely free and exit absolutely costless” (see Baumol, *Contestable Markets: An Uprising in the Theory of Industry Structure*, in *American Economic Review*, Vol. 72, 1982, p. 1-15, p. 1).

²³ Hylton 2003, p. 319.

²⁴ Hylton 2003, pp. 40, 311.

²⁵ *U.S. v. PHILADELPHIA NAT. BANK*, 374 U.S. 321 (1963) 374 U.S. 321, cit. in Hylton 2003, p. 322.

²⁶ *U.S. v. PHILADELPHIA NAT. BANK*, 374 U.S. 321 (1963) 374 U.S. 321 cit. in Hylton 2003, pp. 322, 323.

²⁷ *US v. Alcoa*, 377 U.S. 271 (1964) and *US v. Continental Can*, 378 U. S. 441 (1964), cit. in Gellhorn et al., *Antitrust Law and Economics in a Nutshell*, St. Paul 1991, p. 362.

²⁸ Hylton 2003, p. 328.

²⁹ Hylton 2003, p. 329.

Merger Guidelines, over 1800 HHI points are considered critical³⁰, indicating a high market concentration, and calling for investigation by public authorities.

Altogether, US competition law holds market access in the sense of potential competition and market share as crucial factors.

b2. Market shares and dominant market positions according to EU competition law

Main principle of the European Union competition law is to ensure the functioning of the EU market.³¹ The articles ensuring competition and the functioning of the Common Market are therefore directly seen as a means of reaching the objectives of the EC treaty.³² This objective would be dominant³³, whereas elsewhere in competition law systems, the approach of implementing thoughts of welfare economics through competition law rules is stressed. Both approaches are not mutually exclusive.

The EU competition law's basis is codified in the articles 81-85 of the Treaty establishing the European Community (TEC), with merger control being regulated in article 82.

A number of notices and regulations supplement these articles. And case law – decisions of both European Commission and European Court of Justice (ECJ) – outlining criteria in detail has developed since the act of codification. In this context, the European Commission's Guideline on Merger Regulation (ECMR) is of special importance.

The central question of EU merger control is if firms “gain dominance through the merger”, differing slightly from the US approach to investigate an effect to “substantially lessen competition”.³⁴

Merger analysis is referred to as a “two-stage process”: “first to define the relevant market, and then assess competition within that relevant market”³⁵. Key elements are in fact two

³⁰ US Department of Justice, cit. in Hovenkamp, Economics and Federal Antitrust Law, St. Paul 1985, p. 305.

³¹ See Whish, Competition Law, London 2001, p. 46; Aicher/Schumacher, in Grabitz/Hilf (eds), Das Recht der Europäischen Union, Kommentar II, München 2004, Article 81/10.

³² Whish 2001, p. 46.

³³ Aicher/Schumacher 2004, Article 81/13.

³⁴ For both citations see Goyder, EC Competition Law, Oxford 2003, p. 368.

³⁵ Korah, Cases and Materials on EC Competition Law, Oxford 2006, p. 646.

issues, while the first is regulated in an EC guideline on Market Definition³⁶ that will be described and applied later:

- a) What is the relevant market?
- b) How is the market share determined?

There is also a third criterion of relevance.

- c) Market access

Market entry barriers or the degree of “potential competition”³⁷ are important in our context, however, they are sometimes difficult to text in practise. A barrier is seen in both higher costs for the entrant compared to present market players and in anything that complicates market entry for a firm.³⁸ According to some economists ‘only two kinds of entry barriers exist that exclude equally efficient firms: a minimum efficient scale of operation that is large in relation to the market and government regulation of all kinds’³⁹.

Despite this, there are thresholds irrespective of the existence of barriers. Percentages are also set for the activity of competition authorities by published guidelines, especially the ECMR. Below a market share of 25 % (ECMR), a merger is assumed legal. A full-scale assessment has obligatory to be carried out once the market share exceeds 40 %.⁴⁰

These three aspects deliver then a picture of the relevant market, market share of the players and on market access. If a share of e. g. over 70 % is critical or not, depends furthermore on market access and market concentration (measured by a Herfindahl-Hirschmann Index of over 1800 or 2000, see separate section)⁴¹. Also, on demand elasticity e. g. if consumer or demanding parties do find alternatives on substitution products market, or if they can restrain from demand.⁴²

³⁶ Commission Notice on the Definition of the Relevant Market for the Purpose of Community Competition Law, OJ [1997] C372/5, [1998] 4 CMLR 177

³⁷ Whish 2001, p. 775.

³⁸ Whish 2001, p. 156.

³⁹ Korah Oxford 1997 p. 14.

⁴⁰ Van der Woude/Landes, Survey of Merger Control in Europe: European Union, in Verloop/Landes, Merger Control in Europe. EU, Member States and Accession States, The Hague 2003, p. 48.

⁴¹ Thorsten Mäger (editor), Europäisches Kartellrecht 2006, p. 237.

⁴² Mäger 2006 p. 237.

This means, even a market share of 74 % can meet no objections⁴³, if barriers to entry for potential competitors are low: Competitors must enter in the near future, and their entry must be of a certain impact on the market. Also, consumer behaviour and preferences must allow this estimation⁴⁴. In other cases less than 30 % (Carrefour/Promodes), in another case 40-50 % market share (MCI/Worldcom/Sprint) were held critical.⁴⁵

What exactly easy or difficult market access (or, high or low entry barriers) is, depends –apart from these key indicators given here- on the details of the case and the specific market situation.

It can be summarised that similarly to the US system, EU competition law considers market shares – both of a potential dominant player and his competitors – and market entry conditions important.

b3. Market shares and dominant market positions according to Japanese competition law

The Japanese traditional understanding of competition for many years differed from other systems in the world. Foremost, competition was not per se seen as a positive value, even as an undesirable effect.⁴⁶ Industrial trusts and higher market concentration were therefore even promoted.⁴⁷

Despite this former and unique way, the contemporary approach has been similar for a longer period to the EU or US understanding. Section 1 of the Japanese Antimonopoly Law (AML) nowadays gives a clear and unambiguous statement on the benefits of competition, when it says it is to “promote free and fair competition, to stimulate the creative initiative of entrepreneurs, to encourage business activities of enterprises, to heighten the level of employment and people’s real income, and thereby to promote the democratic and wholesome development of the national economy as well as to assure the interests of consumers in general.”

⁴³ Mercedes-Benz/Kässbohrer Case IV/M477 1995 OJ L211/1, 66, also AKZO 61985J0005 1986. - AKZO CHEMIE B. V. and AKZO CHEMIE U. K. LTD vs. EU COM: In absence of any barriers, even high market shares give no dominant position.

⁴⁴ Mäger 2006 p. 237.

⁴⁵ Whish, Competition Law, London 2001, p. 774.

⁴⁶ See Kotabe/Wheiler, Anticompetitive practices in Japan: their impact on the performances of foreign firms, Westport 1996, p. 86; Schaefer, Wettbewerbsrecht in Japan und Europa, doctoral thesis, University of Erlangen-Nuremberg, Nuremberg 2000, p. 35.

⁴⁷ Schaefer 2000, p. 36.

There are a number of legal institutes, i.e. unrightful private monopolisation (Section 3 AML, merger (Section 15 I AML) and acquisition of a company's substantial parts (Section 16 AML).

Similar to the European law's merger control approach, a market structure and a market performance test is carried out to assess a future critically dominant position in the market.⁴⁸ The market structure test checks the categories of goods and the respective market. It defines what are same goods and similar goods. Barriers to enter these markets of same and similar goods are investigated.⁴⁹ For the market defined in this manner, shares of relevant competitors are then assessed.

The merger case category is regulated in Section 15 AML, using the guidelines stated above. The regulation itself does not indicate how restraining competition is assessed. Due to the Japanese particularity, the authority Federal Trade Commission (FTC) contacts companies very early in case of mergers – hence not much case law has developed to date. At least, the regulations of the FTC indicate that market share is important, since Section II 2. orders a mandatory investigation when one of the companies or the merging companies altogether exceed the market share of 50 %.

For merger, Section 15 I AML demands an “effect...to restrain competition in any particular field of trade”. At the end of the 1990ies, a so-called „one significant competitor doctrine“ was no longer applied.⁵⁰

As can be seen, the Japanese practise makes no fundamental differences, because it stresses the importance of market share and entry to assess mergers.

c. Herfindahl-Hirschmann Index and Lerner Index

All three law systems – US, EU as well as the Japanese competition law regulations – operate with a player's market share in relation to the competing players' shares in the market place, applying the ‘Herfindahl-Hirschmann Index’.

⁴⁸ Iyori/Uesugi, *The Antimonopoly Laws and Policies of Japan*, New York 1994, pp. 188, 193.

⁴⁹ Iyori/Uesugi 1994, p. 188.

⁵⁰ Murakami, *History and Development of the Japanese Anti-Monopoly Act*, Tokyo 2003, p. 37.

The index has an advantage in regard to the single market share statement, which makes it a valuable source of information about market dominance. It integrates a statement of market concentration and the relative market shares of competitors. It is “the sum of the square of the market shares for all firms in the market”⁵¹. The index alone, however, does not give much information on market power without the player’s market share, and can therefore not be used as an alternative, but only in conjunction with the market share analysis.

Another index in use is the ‘Lerner Index’. Law systems try harder than before to adopt economic theory, as can also be seen with the integration of this index. It offers an independent approach to assess market dominance.

The index combines (1) market share of a company, (2) market demand elasticity (3) fringe supply elasticity and (4) easiness of entry into the market from outside. Access to the market is a factor that determines the elasticity of fringe supply as long as entrants enter on a small scale.⁵² If access is easy, dominance is much more difficult to assume and less obvious, as potential competitors can quickly enter the respective market from outside.

This model is in use in jurisdictional practise, for example in the cases of *US v. du Pont de Nemours* and *US v. Aluminium Co. of America*. However, using the Lerner Index has its disadvantages.⁵³ It is often difficult to determine the elasticity of demand facing a firm⁵⁴ or marginal costs⁵⁵, and therefore the usage of the Lerner Index in practise is limited to situations where the crucial data is at hand. It is moreover an instrument to measure exercised power rather than potential power⁵⁶, and therefore less helpful with regard to the ex-ante allocation analysis of emission entitlements.

As ‘second-best’ approach, the market share criterion and market concentration manage to retain a prominent role.⁵⁷ Following this second-best approach, attention is redrawn on the shown findings in the investigated national competition law systems.

⁵¹ Korah, *Cases and Materials on EC Competition Law*, Oxford 2006, p. 669.

⁵² Hylton 2003, p. 236.

⁵³ Sullivan/Grimes, *The Law of Antitrust: An Integrated Handbook*, St. Paul 2006, p. 387.

⁵⁴ Hylton 2003, p. 236.

⁵⁵ Sullivan/Grimes 2006, p. 387.

⁵⁶ Hylton 2003, p. 235.

⁵⁷ See Hovenkamp/Sullivan, *Antitrust law, policy, and procedure: cases, materials, problems*, Charlottesville 2004, p. 623; Sullivan/Grimes 2006, p. 63.

d. Summary

Having shown the single national system's approaches, across the examined national antitrust law systems, we can summarise as follows:

- (a) Market share plays a crucial, but not the only role for assessing market dominance. Market share threshold values depend on entry conditions, concentration in the market etc. Different scales are applied.
- (b) The percentage of 30-50 % is understood as a critical market share for merger of a single competitor in all three law systems analysed. However, 25 % can exceptionally also be a relevant threshold.⁵⁸
- (c) *A market structure* and a market performance *assessment accompany the use of a market share threshold* in competition law for merger control, assessing
 - market entry or access conditions,
 - demand- and supply-side substitutability
 - concentration in the respective market (Herfindahl-Hirschmann-Index of importance)

Table 2 below shows the criteria in combination. Note that these market share values are simplified, and shall only express tendencies.

⁵⁸ The EU European competition law system does not differentiate how the dominant position came into existence (EGV Aicher Article 82/ 72). Differing from that the Japanese system (footnote above).

Market concentration / HH-Index	LOW		HIGH	
	Biggest share 20 - 40 % and HHI below 1800		Biggest share over 40 % or HHI higher than 1800	
Market access	EASY	DIFFICULT	EASY	DIFFICULT
Demand / supply side elasticity	HIGH	LOW	HIGH	LOW
Market share indicating unwanted market power	Below 25 %: assumption that a merger will not affect markets. 40 % potential dominance under Article 82 TEU (Virgin/British Airways, see Whish p. 43).	Below 25 % assumption, that a merger will not affect markets. 40 % potential dominance under Article 82 TEU (Virgin/British Airways, see Whish p. 43).	Higher HHI makes higher market share more critical for EU COM ⁵⁹ . 50 % meets in EU law not necessarily legal presumption of dominant market position if no barriers of entry (AKZO see Korah p. 91). Very large market share seen as per se indicating dominant position, 'Vitamins in Korah p. 90.	Higher HHI makes higher market share more critical for EU COM. 30 % share critical in any concentrated US market (Hylton). Less than 30 % (Carrefour/Promodes), in another case 40-50 % market share (MCI/Worldcom/Sprint) were held critical, Whish 2001, p. 774. 50 % under legal presumption of dominant market position (AKZO see Korah p. 91).

Table 2: Market concentration and possible thresholds for dangerous market share in the context of (ex-ante) merger control

⁵⁹ See Mäger, Thorsten (editor), *Europäisches Kartellrecht* 2006, p. 237.

III. Dominant Market Positions and Emissions Trading

Very little work can be found that closely looks at the criteria that clearly define market power instead of simply assuming such a position. Hahn develops a model for the analysis of market power in the context of transferable property rights and applies this model for a specific scheme in the Los Alamos region. He analyses how a dominant firm can affect the market and finds that the initial distribution of permits does not only matter with regard to equity considerations but also to costs. He does, however, not provide any framework for the analysis whether a firm has this dominant position. Prior to the study of the Los Alamos study he explicitly states that such an operational test needs to be developed.⁶⁰ Furthermore, he finds that the extent of market power generally depends on

- a) the level of allowable emissions
- b) the shape of the marginal abatement costs (MAC) curve of the (potential) dominant player
- c) the shape of the marginal abatement costs curve of all other players.

We will come back to these findings below. Tietenberg starts his analysis with the supposition that one or more firms seek to exercise market power. For the model that follows he assumes for simplicity that only two firms participate in the auction studied, one of which uses market power. Regarding the question if a player can manipulate the auction, it is found that one important factor “(...) is the relative importance of the price setting source’s demand for permits compared with those of competitive deviations.”⁶¹ No framework for the question whether a firm has this dominant position is provided.

However, during the revision of the three different competition law systems it became clear that market shares are of crucial importance and the following three questions need to be answered to allow a competition law analysis of the emission trading schemes:

- a) What is the relevant market?
- b) How is the market share determined?
- c) Is Market access possible?

⁶⁰ Hahn, Market Power and Transferable Property Rights, in: The Quarterly Journal of Economics, Vol. 99, 1984, pp. 753-765, p. 756.

⁶¹ Tietenberg, Emissions Trading: An Exercise in Reforming Pollution Policy, Washington D.C. 1985, pp. 125-148.

It goes without saying that the answers to these questions depend heavily on the scheme analysed. However, some general findings exist, which inherently result from the instrument itself. They are discussed below. The international climate regime is studied in the next section.

1. Emissions trading

Emissions trading is a market based instrument. Two different kinds can be distinguished: a cap and trade system and a baseline and credit system. We focus on the former approach only which allows to meet an absolute emission target.

Under a cap and trade scheme participants receive an initial allocation of emission entitlements. Regarding this initial allocation the regulator may distribute the entitlements free of charge or offer them for a fee. So far, most of the time major parts of the entitlements in existing schemes have been allocated free of charge.⁶²

The difference between a participant's business-as-usual emissions path and the initial allocation in a free-of-charge setting defines the required reduction. The only obligation the participants face is that they must, at the end of the period, surrender as many emission entitlements to the competent authority as they vented emissions into the air. Theoretically it is possible to design the system in such a way that emission entitlements from future periods can be used for compliance in earlier periods. This is referred to as borrowing.

With respect to their obligation participants subject to the trading scheme are free to choose to reduce emission internally, to buy missing entitlements on the market or to sell surplus entitlement respectively. Emission entitlement and internal reduction are thus substitutable to a certain extent.

Whether or not a rational participant reduces internally or buys on the market depends

- a) on his reduction obligation
- b) the marginal abatement costs in that point
- c) the price of entitlements on the market.

⁶² See e.g. EU Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, OJ 2003 L275/32; Stavins, Market-Based Environmental Policies: What can we learn from U.S. Experience (and Related Research)?, in Resources for the Future, Discussion Paper 03-43, Washington D.C. 2003, p. xx, retrievable on <http://www.rff.org/documents/RFF-DP-03-43.pdf>

The price evolves on the market and is a function of aggregated reduction obligation and the aggregated marginal abatement cost curve (see Figure 1).

Regarding an individual player's role on the market, we can find the following: If the price of the entitlements (P^*) is higher than the marginal abatement costs at the point of his reduction obligation, the participant sells emission rights equalling x_s on the market (figure 2). If the entitlement price is lower than the marginal abatement costs at the point of the reduction obligation, he reduces until his marginal costs equal the price and buys the missing permits on the market (equalling x_b in figure 2). In the equilibrium marginal abatement costs are the same for all participants regardless of the initial allocation.⁶³

Depending on the three aspects listed above the same player can thus be a supplier or a consumer on the entitlement market, depending inter alia on the initial allocation. The lower the initial allocation is, the more likely a player becomes a buyer and thus a monopsonist.

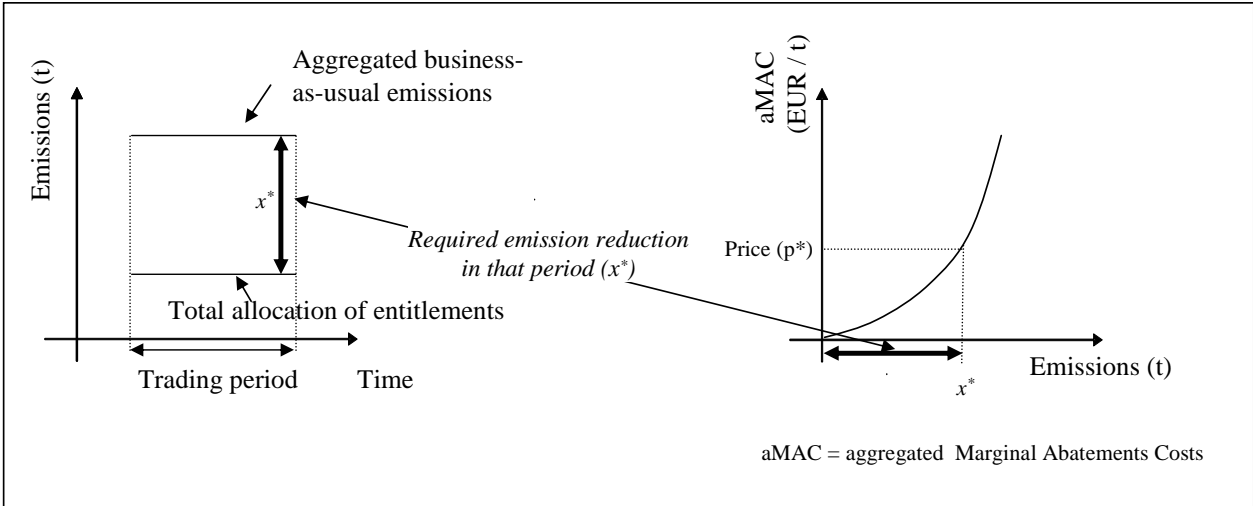


Figure 1: Determination of the entitlement price as a function of required reductions and marginal abatement costs

⁶³ Stavins (1995) shows that in the existence of transaction costs initial allocation can matter.

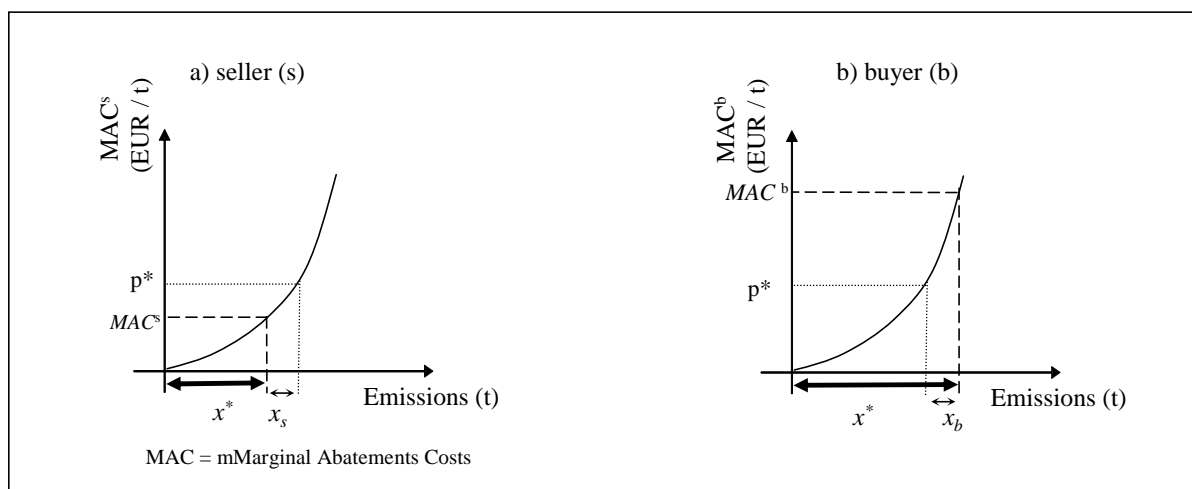


Figure 2: Determination of participants' role in the entitlement market as a function of required reductions and marginal abatement costs

2. Market shares in the case of emissions trading

After revising the basic concept of emissions trading let us go back to the three questions.

a) What is the relevant market?

Regarding this question, the EU Commission (1997) distinguishes between the relevant product and the relevant geographic market. The latter aspect can only be answered for a specific trading scheme. We will do this for one scheme below. With respect to the first aspect, some conclusions are already possible at this stage. The Commission writes:

“A relevant product market comprises all those products and/or services which are regarded as interchangeable or substitutable by the consumer, by reason of the products' characteristics, their prices and their intended use.”

Although we have seen that emission entitlements and internal reductions are interchangeable with regard to compliance, under this approach the product market comprises only the entitlements themselves. Emission reductions cannot be traded. They can only be used to generate surplus entitlements which then may be traded on the market.

b) Is market access possible?

Under a cap and trade system the total budget of emission entitlements is fixed. It can generally not be enlarged. However, this does not imply that market access is impossible. There are three options.

- Assume that a monopolist uses its market power to increase the price. How can the consumers react? As shown above they will reduce more emissions internally compared to the situation with competitive markets. More precisely they will reduce internally until their marginal abatement costs equal the increased entitlement price. By doing so, they implicitly produce additional entitlements which they consume themselves. As a conclusion we find that market access is possible. The extent to which the consumers can react depends heavily on the slope of the MAC curves.
- The second option is borrowing entitlement from future compliance periods. In the case borrowing is allowed it is another option for market access. If a dominant player tries to increase the entitlement price, buyers can simply borrow. If banking is allowed, a dominant supplier can use his emission entitlements not sold in a certain period in future periods.
- In the case where borrowing is not possible a participant may decide not to comply. He would thus implicitly create new entitlements.⁶⁴

c) How is the market share determined?

The determination of market share is not obvious. One may think that the share of total entitlements held by an individual player is relevant. For the European trading scheme, for example, Svendsen et al. analyse the potential of a dominant market position of major power producers under the EU trading scheme. They refer to the treaty (Articles 3, 10, 81-86, 87-89) and provide thresholds for market shares that stipulate a dominant market position. And they also add up figures for the five, ten and fifteen largest firms (see Table 3) and conclude “(...) that both electricity market and the CO₂ market are competitive.”⁶⁵

⁶⁴ An OECD/IEA-paper discusses the option of non-compliance without classifying this as market access, see OECD/IEA, Market power and market access in international GHG emissions trading, Information Paper COM/ENV/EPOC/IEA/SLT(2000), Paris 2000, p. 5.

⁶⁵ Svendsen/Vesterdal, How to design greenhouse gas trading in the EU?, in Energy Policy, Vol. 31, 2003, pp. 1531-1539, p. 1533.

	Electricity market shares (%)	CO ₂ market shares (electricity producers) (%)	CO ₂ market shares (emitter) (%)
R ₅	38	25	34
R ₁₀	51	40	44
R ₁₅	58	43	49

Table 3: Market shares in the EU Power Sector (Source: Svendsen/Vesterdal, How to design greenhouse gas trading in the EU?, in Energy Policy, Vol. 31, 2003, pp. 1531-1539, p. 1533.)

The analysis is not convincing, though. To underline our point, let us assume that a single player receives even 80 % of the total budget of entitlements under the initial allocation for free. Should one be concerned with this situation as implied by Svendsen et al.? No, as it is not even possible to say whether this player is a buyer or seller on the market. Assume that due to the characteristics of the MAC-curves the player holds 85 % of total emissions rights in the equilibrium after trade has taken place, i.e. in the efficient allocation of the rights. In this case this player would not be a monopolist but rather a buyer. Whether he is a monopsonist, cannot be answered without additional information. It requires information on the characteristics of aggregated demand (see Figure 1 and 2).

IV. Market shares in the Case of the International GHG emissions trading scheme

The international GHG emissions trading scheme is chosen for two reasons. First, because a lot of data from different models is available. Second, because the difference of the two approaches presented above can clearly be seen due to the fact, that only industrialised parties to the Kyoto Protocol (Annex B countries) receive an initial allocation while developing countries may also supply on the market under the so-called clean development mechanism. Prior to answering the three questions for the international climate regime, its relevant aspects are briefly described below.

1. The international climate regime

Following to Kyoto Protocol (KP), countries can be divided in two groups: countries with a quantified emissions limitation, the so-called Annex B countries, and countries without any emission target, the so-called non-Annex B countries. The quantified emission limitation is also called assigned amount. Annex B countries are allowed to trade emission entitlements, so-called assigned amount units (AAU), to meet the emission target (international emissions

trading (IET) according to Article 17 KP). This is essentially a cap and trade system as discussed above. According to Article 12 KP, Annex B countries may also trade in emission reduction units (ERU) on a project basis, called Joint Implementation (JI). However, any ERU generated through a specific project must be deducted from the host country's AAU budget. Furthermore, Removal Units (RMU) exist that can also be generated in Annex B countries.

A clean development mechanism (CDM) is also defined (Article 6 KP). Through this mechanism additional emission rights, so-called certified emission reductions (CERs), can be generated by specific projects in non-Annex B countries.⁶⁶ The total budget can thus be enlarged.

Compliance of the Annex B countries is verified at the end of the five year period lasting from 2008 to 2012 by a compliance committee. Countries that failed to surrender as much eligible emission rights as the vented emissions into the atmosphere must surrender the missing quantity multiplied by a factor of 1.3 in the next commitment period.⁶⁷

2. The relevant market

As mentioned earlier, this question has two dimensions: relevant product market and relevant geographic market.

Above we found that the relevant products are entitlements that can be used for compliance. Referring to the description of the international climate regime we can define the relevant market as follows: Any emission right that can be used to comply with the obligations from the emission targets under the UNFCCC. This means AAUs⁶⁸, RMUs and CERs.

The relevant regional market encompasses all countries that have ratified the Kyoto Protocol, comply with certain rules and which are thus able to generate one of the aforementioned permits and are allowed to participate in the market.

⁶⁶ More precisely in non-Annex I countries to the UNFCCC.

⁶⁷ UNFCCC, report of the conference of the parties on its seventh session, Marrakesh, 29 october - 10 november 2001, addendum, part two: action taken by the conference of the parties, Volume III, Document FCCC/CP/2001/13/Add.3, Bonn 2002, p. 76, retrievable on <http://unfccc.int/resource/docs/cop7/13a03.pdf>

⁶⁸ ERUs from JI also belong to this group.

3. Market access

Regarding market access the findings for emissions trading in general are applicable in the international climate regime. I.e. one option is to increase internal emission reductions instead of buying permits on the market. Market access is thus generally inherently possible for emissions trading. Another option which is very specific to the international emissions trading scheme is CDM. As mentioned above, countries without an emission target can enter the Annex-B scheme by supplying CERs generated under the CDM.⁶⁹

Whether entry is (economically) possible depends strongly on the slope of the MAC-curves.

Although officially not referred to as borrowing the current provisions for non-compliance essentially are borrowing with a discount factor. Thus, a third option for market access exists.⁷⁰

4. Market shares

In order to analyse market shares following our approach proposed above, we use data from existing models. In this context, one should remember that supply and demand are determined by the allocation, BAU emissions and MAC curves. While the allocation is given through the emission targets of the Kyoto Protocol, both BAU emissions and MAC curves generally differ for the different models. The models' structures also differ.⁷¹ Table 4 shows the results. To underline the different approach proposed in this paper against existing ones, the 'market share' based on initial allocation under the Kyoto Protocol is given in Table 5. The difference becomes most obvious for non-Annex B countries that do not face an emission target under the Kyoto Protocol. They have a share under the initial allocation of zero; still they can supply on the market and hold a dominant market position (on the supply side). But also for the Annex-B countries the difference is remarkable.

⁶⁹ See OECD/IEA, Market power and market access in international GHG emissions trading, Information Paper COM/ENV/EPOC/IEA/SLT(2000), Paris 2000, p. 7. Generally, the use of CERs should be supplementary to domestic reductions. However, there is no legal binding limit.

⁷⁰ The aforementioned OECD/IEA-paper discusses non-compliance as an option to avoid higher entitlement prices in case of a dominant player exerting market power. They do not draw the link to market access in the context of a competition analysis. See OECD/IEA 2000, p. 7.

⁷¹ For more detailed discussion see e.g. Springer/Varilek: Estimating the price of tradable permits for greenhouse gas emissions in 2008-12, in Energy Policy, Vol. 32, 2004, pp. 611 - 621.

Data Source:	Model 1: Sijm et al. (2000)		Model 2: MacCracken et al. (1999)		Model 3: Criqui et al. (1999)	
	Country	Share	Country	Share	Country	Share
Demand						
max 1	USA	0,69	USA and Australia	0,61	USA	0,59
Demand						
max 2	Japan	0,15	Western Europe	0,17	EU	0,25
Supply						
max 1	Asia (China and India)	0,6	Asia (China and India)	0,47	FSU Annex 1	0,49
Supply					Asia (China and	
max 2	CEE and FSU Annex 1	0,14	FSU	0,38	India)	0,39

Table 4: Market shares and HHI based on supply and demand for different models for the international GHG market

Party	Share
USA	32,7 %
Former Soviet Union	23,3 %
Japan	6,5 %
Asia and other non-Annex B countries	0,0 %

Table 5: “Market shares” based on initial allocation under the Kyoto Protocol^{*)}

*) based on approach proposed by Svendsen/Vesterdal, How to design greenhouse gas trading in the EU?, in Energy Policy, Vol. 31, 2003, pp. 1531-1539.

5. Dominant market positions

After market shares have been defined, one may investigate to which degree the market is concentrated and thus possibly provides the floor for dominant market positions. Table 6 shows the results for three models. Note that all three consider the US and Australia as Parties to the Kyoto Protocol. As can be seen the results differ quantitatively between the models. However, they show already the biggest player both on the supply and the demand side has an HHI significantly greater than 1800. Referring to Table 3 one may be concerned about

possible dominant market positions. However, as market access is general possible in emissions trading schemes the relatively high HHI may not be that decisive.⁷²

Data Source	Model 1: Sijm et al. (2000)	Model 2: MacCracken et al. (1999)	Model 3: Criqui et al. (1999)
	HHI	HHI	HHI
Demand side*)	4,961	4,005	4,116
Supply side*)	3,722	3,615	3,890

Table 6: Market concentration / HHI based on supply and demand for different models for the international GHG market

*) Figures in brackets show contribution of players share and thus minimum value for HHI. HHI calculated based on markets share shown in Table 4.

The role of the initial allocation on supply and demand of individual players has been mentioned above. For the post-2012 international climate regime this implies that allocation rules that imply high reductions compared to business-as-usual emissions imply the risk of dominant market positions especially on the demand side. Certain allocation rules such as equal emissions per capita⁷³ or equal emissions per capita over time⁷⁴ may therefore possibly be less suitable when a competitive emission entitlement market is desired.

⁷² Remember that whether entry is (economically) possible depends strongly on the slope of the MAC-curves.

⁷³ Meyer, Contraction & Convergence, Green Book Ltd, Dartington 2000

⁷⁴ Bode, Equal Emissions per Capita over Time – A proposal to Combine Responsibility and Equity of Rights, in: European Environment Vol. 14,2004, pp. 300 – 316.

V. Conclusion

Emissions trading is becoming more and more important. Recently trading of greenhouse gas emission entitlements entered the centre of the discussion. So far, emission rights have almost always been allocated free of charge. This in turn has started a discussion of possible dominant market positions. Existing literature determines market shares based on allowances allocated to individual players. We argue that this approach is not satisfactory. The absolute number of entitlements held does not even say whether this player is a buyer or seller on the market. To answer that aspect we propose to base on 1) initial allocation together with 2) marginal abatement costs curves and 3) business-as-usual emission path. Together with a given market price these three factors allow a determination of market shares. Subsequently, we draw on parameters from competition law systems in the US, the EU and Japan to come up with indicators for the international emission entitlement market based on well established legislative systems and jurisprudence.

The application to the international climate regime until 2012 shows – more strongly for the demand side than the supply side – massive concentrations.

The presented results give reason to demand that risks of a higher concentration of market shares be a criterion for the selection and decision for allocation approaches. However, difficulties arise because of the fact that abatement costs and BAU emissions are uncertain. The period after 2012 has so far been excluded from the study. Further investigations may be necessary and offer potential for future research. The European Emissions Trading System may be an item of separate research on market dominance through competition law thresholds. Table 6 summarises the approaches from competition law for different questions in the context of GHG emissions trading.

Issue / Case type	Merger Control	Abuse of Market power
Time horizon	Ex-ante	Ex-post
Behaviour element	Weak	Strong
Relevance and application in the context of international emissions trading (example)	Discussion of different allocation, post 2012 in 2009	In 2015 for period 2008 – 2012

Table 7: Market shares and possible dominant market positions in different contexts of competition law and its possible transfer to international emissions trading.