



Faculty of Business & Social Sciences
Department of Business

MASTER THESIS

***Impact of the HHI in European Antitrust Proceedings and its Relevance to
Market Entry Strategy Design***

By

Thorben Frederik Sievers

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First examiner

Prof. Dr. Natalia Ribberink

Second examiner

Prof. Dr. Michael Gille

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Abstract

The HHI concept has been part of the merger guidelines in US American and European antitrust legislation. Criticism around the official application of the HHI has been rising recently, claiming that the HHI is an outdated tool, incapable of delivering probative value in antitrust proceedings. This thesis compares US American and European merger guidelines and assesses the actual application practices of these guidelines in official merger reviews. European cases are discussed in detail. In the second part of this thesis the option of using the HHI in the private sector to vet internationalizing opportunities are discussed.

Keywords: HHI, Herfindahl-Hirschman-Index, Merger Guidelines, European Commission, Antitrust Proceedings, Market Entry Mode, Federal Trade Commission, Internationalization

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List of Abbreviations

Abbreviation	Full Text
BKartA	Bundeskartellamt
DoJ	United States Department of Justice
EC	European Commission
EU	European Union
FTC	Federal Trade Commission
GWB / ARC	Gesetz gegen Wettbewerbsbeschränkungen (en: Act against restraints of competition)
HHI	Herfindahl-Hirschman-Index
HI	Hirschman Index
HL	Hirschman List
WW I	First World War
WW II	Second World War

1 Introduction

1.1 Starting Point

When Albert O. Hirschman published his book *“National Power and Foreign Trade”* in 1945, the allied forces were in the final struggle to end World War II. In his work, Hirschman reviewed the economic and political benefits and threats of two contradicting concepts; Free trade on the one hand and protectionism on the other. While free trade would supposedly increase the interdependence between nations (creating common interests), and hence would decrease the risk of armed conflicts, protectionism would secure the availability and supply of essential goods during a time of crisis.¹ Hirschman’s review also shed light on the then-contemporary discussion of relative political power, a criterion of utmost importance after the previous world-wide catastrophe. As the aforementioned concepts, free trade and protectionism arguably have an impact on such relative political power, Hirschman made use of their underlying arguments in order to propose a course of action, as to how the defeated axis powers should be treated economically in the post war era. His main motivation was to find a way in which economic restrictions would successfully prevent aggressive rearmament *“without impairing [a country’s] capacity to produce for the purpose of civilian consumption.”*² In his eyes, economic isolation and restrictive trading compulsions were among the reasons for the continuous growth of aggressions after World War I.³

In order to substantiate his proposals, Hirschman devised an index measuring concentration of trade among nations. Central to Hirschman’s train of thought was his definition of concentration. He defined concentration as a matter of distribution *and* fewness. Other renowned measuring techniques, such as the Lorenz-Curve and the closely related Gini-Index, had so far not considered the aspect of fewness and had only considered the level of distribution equality. Accordingly, the concentration of a country’s trading pattern, and therefore its dependency on its trading partners, were regarded by Hirschman as a function of even distribution of trade as well as the number of trading partners.

For example, by Hirschman’s definition, a country with its trade evenly distributed amongst five trading partners exhibits a larger degree of trading concentration than a country that

¹ Hirschman, 1945, Chapter 1

² Hirschman, 1945, p.71

³ Ibid.

engaged in evenly distributed trade with ten other countries. In both cases the classical Gini-Index would amount to the same, as the number of trading partners is disregarded. Certainly however, the country engaging in trade with only five partners will have more difficulty adjusting, should one of the partners end the trading. Hence this country is more dependent in economic, and by extension, in political terms.

With this line of reasoning, Hirschman argued that concentration of trade correlated to dependencies on a political level. He especially took a closer look at the import and export patterns of smaller countries. By applying the index, he was able to substantiate that smaller countries concentrating the majority of their trade with a single larger country also exhibited a high degree of political dependency to that particular larger country. Basis for the index was Hirschman's hypothesis that there is an exponential relationship between shares in trade and dependency. In other words, if a smaller country doubled the portion of trade with a larger country (whether in terms of imports or exports), its dependency toward that country didn't just double, it quadrupled. In Hirschman's opinion, such monodimensional trading patterns were a fertilizer of isolation that ultimately contributed to the armed conflict the world had to endure at the time. Translated into economic terms, the larger country gradually assumes the position of a monopoly as the smaller country is left with little to no alternatives to redirect its trade. Subsequently, Hirschman identified the analysis of competitive commercial markets as a second potential area of application.

Following this supposition, Hirschman formulated an index, using a simple function of the number of companies in a market and their respective market shares. By design, a smaller number of competitors and an uneven distribution suggested a higher concentration and thus more market power. The central premise was that, at a certain point of concentration, leading companies would be able to limit effective competition.

Five years after Hirschman's proposal, economist Orris Herfindahl independently suggested a similar measurement for market concentration. Other than Hirschman, Herfindahl had always focused on the application in economic markets, not on international trade or relative political power. In particular, he concerned himself with the analysis of monopolies and their (gradual) formation. With the exception of the scaling, Herfindahl and Hirschman had de facto devised one and the same measure of market concentration.

In 1982, after some disputes about the origin of the index had been sorted out, the United States Department of Justice and the Federal Trade Commission introduced Hirschman's index, now commonly referred to as "*Herfindahl-Hirschman-Index*" (HHI), as a measure to interpret market composition in antitrust proceedings. Specific index thresholds were linked to certain assumed stages of competitiveness of the market. Using the index, the United States authorities were trying to quantify the likelihood of a pending merger to impede effective competition.

The HHI replaced the traditional four-firm concentration ratio, a measure which up to that point had served as means to evaluate market concentration by simply adding up the market shares of the four largest firms of the scrutinized market. This measurement had not been sensitive to the aforementioned effects of market concentration. In the eyes of the four-firm ratio it made no matter whether the four largest firms had similar market shares or if one or two firms made up the majority of the market. As long as the sum of these four firms remained below a certain threshold, this tool raised no concerns.

Just like Hirschman had originally proposed it, the commission thus deemed the central benefit of the HHI to be its notion of assigning "*proportionately greater weight to the market shares of larger firms, which probably accords with their relative importance in any collusive interaction.*"⁴ The United States authorities henceforth used the HHI as an indicator in determining the market conformity of pending mergers and acquisitions.

More than 20 years after its debut in the US American guidelines, the HHI was incorporated into the guidelines of the European Commission in 2004. In an effort to harmonize European and domestic legislation, the HHI was also introduced into the German antitrust guidelines. However, criticism surrounding the official application of the HHI has been rising recently. While the simplicity had once been central argument to include the index into the guidelines, the probative value of such a condensed performance indicator is currently called into question.

The authorities are also faced with the constant struggle to synchronize their guidelines with the actual application practices and vice versa. After all, the guidelines are not only created for the sole benefit of the authorities, but are also devised to ensure the highest degree of

⁴ U.S. Department of Justice and the Federal Trade Commission, 1982 , Horizontal Merger Guidelines (1982)

transparency possible. Thus, the authorities should be eager to close any gaps between guidelines and merger enforcement practices.

1.2 Research Aim and Motivation

Albeit all apparent criticism, to this day the index remains part of the legislation of Germany, the European Union, and the United States. Other jurisdictions have also included the HHI in their merger assessments. In order to determine the merit of the criticism, the recent application of the index seems worth reviewing. Gaps between enforcement and guidelines as well as the structural deficiencies of the index might be worthwhile examining.

Yet even with the official application under scrutiny, the HHI might prove useful in areas different from official merger review. As was already argued by Hirschman and Herfindahl, the index runs on very little information. A commercial employment of the index might therefore possibly be a valid approach of market analysis for private enterprises.

In particular for those companies globally assessing internationalization opportunities, the index may serve, if not more, as a first impression of an unfamiliar market. Again, inferred from the simple arithmetic principle of the index and the resulting limited expenses required, it could be argued that an initial market sounding using the index enables companies to vet a large number of potential markets at little cost, in little time. Employed in this manner, the HHI possibly provides some insight not only into whether the market is worthwhile entering at all, but rather which market entering strategy might prove most lucrative. If conclusive, this market impression derived from HHI could potentially serve as the foundation of developing a suitable market entry strategy.

In its first part, this thesis therefore reviews the rationale and origin of the HHI and assesses its official application practice. The reasoning behind the recent criticism is evaluated. This first part of the thesis is concluded with the evaluation of the following hypothesis:

H1: *The HHI as a measure of market concentration is not suited to describe market power up to a degree at which antitrust officials should substantially base their merger assessment upon it.*

The second part of the thesis goes beyond the assessment of the official application practice. A potential commercial application of the index is discussed. To that effect, common market entry strategies and internationalizing motives are reviewed, in an attempt to logically link such strategies to corresponding HHI levels. The second part of the thesis hence concludes with the evaluation of the following hypotheses:

H2: *The HHI is a powerful and cost-efficient indicator for expanding enterprises to determine the attractiveness of potential new markets and can be utilized as a starting point to choose the best suited market entry strategy.*

1.3 Research Method and Course of Investigation

In general, the thesis is divided into two major parts. The first part (chapters 2 and 3) will focus on origin and official application of the HHI. The second part (chapter 4) will comprise potential new fields of application of the Herfindahl-Hirschman-Index in the sphere of private enterprises.

Following this introduction, the second chapter will start out with a literature based review on the origin and development of the HHI. The index's original fields of application are discussed and put into historical perspective. Consequently, conceptual strengths and weaknesses are discussed. A brief summary concludes the second chapter.

The third chapter focuses on a literature based review of HHI appearance in antitrust legislation in the United States, the European Union, and Germany. The historical development of the different legislations is reviewed and differences are compared. Commentary by critics is also included in the analysis. Furthermore, a qualitative and statistical review of relevant merger cases sheds light onto the application practice in the different jurisdictions. Gaps between theoretical guidelines and application patterns are explored. The evaluation of hypothesis H1 and a brief summary of the central findings conclude chapter three and thereby the first part of this thesis.

Based on the results of the first part of the thesis, the fourth chapter opens with a literature review on market entry and internationalization strategies and motives. A special focus lays with connections of certain strategies to specific market compositions or market concentration. The remainder of the fourth chapter focuses on constructing logical links

between certain HHI levels and corresponding market entry modes. Subsequently, hypothesis H2 is evaluated, thereby concluding the second part of the thesis. The fifth and final chapter comprises the key findings, a critical acclaim, and an outlook.

2 Development of the Herfindahl-Hirschman-Index

2.1 Origin of the Index

2.1.1 Hirschman's Research Goal

To understand the motivation of Albert Hirschman's work throughout his life, a closer look at his personal life is inevitable. Six months after Hirschman's death in December of 2012, founder of the "American Prospect" magazine Robert Kuttner honored the "great economist" and "philosopher" in his article titled "Rediscovering Albert Hirschman".⁵

Albert Hirschman, originally named Otto Albert Hirschmann, was born into a Jewish family in Berlin in 1915. Expelled from university soon after the Nazis rose to power in 1933, Hirschman left Germany to finish his studies in Paris, London, and Trieste. In Trieste, he earned his doctoral degree in 1938. During the early years of World War II, Hirschman was part of the French resistance, smuggling enemies of Hitler Germany out of the country. In 1941, he himself escaped and sought refuge in the United States.⁶

In 1942, Hirschman conducted a study on the interaction of international trade and national power policy. The study was facilitated by the "Bureau of Business and Economic Research" of the University of California. The program was formed under the general direction of a presidential committee. The study was then later titled "National Power and the Structure of Foreign Trade" and was published with slight amendments in 1945.⁷ Though mainly triggered by the recent events in Europe, Hirschman was trying to analyze recurring patterns in trade and national power politics. He states:⁸

"The present inquiry is directed to a more fundamental problem. It is concerned with the nature of a system of international trade that can very easily be exploited for purposes of national power policy. Is there in the trading system some inherent weakness which makes it vulnerable to the will of any government so minded to use it in the pursuit of power? Very little attention seems to have been given to this question.

⁵ Kuttner, 2013

⁶ Ibid.

⁷ Hirschman, 1945, p.Foreword

⁸ Ibid., p.x

Yet its importance is obvious, since it points to an element in the international situation which is not necessarily temporary nor confined merely to the techniques and circumstances of which the Nazis took such good advantage. Upon the answer to this question may depend our position concerning the kind, extent, and organization when the present war ends."

In Hirschman's eyes, trading policy and national power politics seem to be deeply intertwined and one cannot be changed without affecting the other. Following the rationale of his opening statement, Hirschman suspects that prior trading policies unwittingly contributed to the chances of armed conflict. By understanding this reciprocity between trading policies and national power he hoped to avoid repeating past mistakes that had contributed to the devastating war.

As a built up to his considerations, Hirschman first reviews two very basic, yet completely contradicting concepts of trade. For one, he discusses the concept of free trade. The second paradigm he explores is the concept of protectionism. Though originally born out of mainly economic deliberations, he reviews both economic and noneconomic features of the two policies. After all, the Second World War (WW II) was not yet over and any discussion on future international trade policy would naturally have to reflect the experiences of the ongoing war as well as the threat of new wars to come. Thus, focusing on purely economic arguments at the expense of war preparedness, would have been considered grossly negligent and would probably have fallen on deaf ears.

Central noneconomic argument supporting free trade policy is the international entanglement with other nations, presumably leading to closer and friendlier relationships. Basically, free trade would create a web of interdependencies that neither party could easily walk away from unscathed. On the other hand, the paramount economic argument for free trade policy is the gain of welfare for all parties involved through gains from trade.⁹

As Hirschman points out, the protectionist point of view somewhat reverses the free trade arguments. While the free trade policy seeks to minimize international conflicts by creating a wide spun web of international interests, protectionists counter by arguing that this kind of

⁹ Ibid. p.6-7

policy is hazardous to begin with. In their point of view, free trade creates the unnecessary risk of supply shortages of crucial goods in case of a conflict. After all, no degree of entanglement would be a certain safeguard against military conflicts.¹⁰

Given the ongoing war at the time, it seems plausible that the chance of gains in welfare through free trade did not outweigh the reasonable fear of further destructive conflict. From this point of view, gains from trade were a luxury that shouldn't be paid for at the expense of security. As gains from trade are based on comparative advantages and specialization in particular commodities, it can also be argued that the trade between two countries might be uneven in terms of cruciality of the goods exchanged. While in peace times this would not be considered an issue, in times of war the different levels of cruciality might leave one country more exposed and dependent on the other than vice versa.

As a proposed solution, Hirschman introduces German economist Herbert Wergo's concept of dividing policy in accordance with the cruciality.¹¹ According to Wergo, one option for the state is to pursue free trade for nonessential goods and protectionism for essential ones.¹² While it would arguably be manageable for countries to go without certain luxury goods for the duration of the conflict, basic foods, fuels, and armaments on the other hand would not be dispensable. In a way, this policy creates some middle ground between free traders and protectionists.

In his pursuit to logically connect trade policy and national power, Hirschman establishes that in a scenario where the benefits from trade are divided equally between the various trading nations, no shift in relative power would be taking place. Yet Hirschman immediately dismantles his theoretical approach of equality and concludes that this theorem would supposedly never hold in practice. To substantiate this thought, he introduces evidence pointing to the actual occurring trading inequality between nations.¹³ Also connecting the rationale of gains from trade and the relative power of nations, Hirschman makes reference to another Economist, Ralph Hawtrey:

¹⁰ Ibid., p.6-7

¹¹ Ibid., p.9

¹² Wergo, 1928

¹³ Hirschman, 1945, pp.10-10

“So long as welfare is the end, different communities may cooperate happily together. Jealousy there may be and disputes as to how the material means of welfare should be share. But there is no inherent divergence of aim in the pursuit of welfare. Power, on the other hand, is relative. The gain of one country is necessarily loss to others, its loss is gain to them. Conflict is the essence of the pursuit of power.”¹⁴

Following this rationale, free trade in the absence of even, if not perfect distribution of welfare gains will therefore lead to a shift in relative power. Such a shift may then gradually translate to open conflict as the gap between the profiting and the disadvantaged nations grows.

2.1.2 Contemporary Parallels in Trade Policy

The impact of trade policy on national power is still basis of an ongoing discussion. Just recently, Donald J. Trump has made trade policy the cornerstone of his presidential election campaign. His promises of introducing trade barriers to protect American companies from cheap imports may arguably have contributed significantly to his victory over the Democratic candidate Clinton.¹⁵ While Trump’s motives were probably no longer fueled by the classic protectionist argument of essential goods in times of war, the planned, and by now partially executed measures stem from the basic protectionist playbook. On his first day in office, Trump signed an executive order to terminate the US’s participation in the Transpacific Partnership (TPP) negotiation. Additionally, Trump plans to renegotiate the North American Free Trade Agreement (NAFTA). The introduction of tariffs is also still part of his agenda.¹⁶

This shows the extent to which the contemporary discussion is still based on theories and practices from the beginning of the very same discussion. Naturally, the proponents of liberal trade policy have pointed out the risk of a world-wide economic downward spiral, should other countries decide to introduce retaliatory measures themselves as a response to US protectionism.¹⁷ After all, the positive domestic effect is disputed by free traders:

¹⁴ Hawtrey, 1930, p.27

¹⁵ Allen, 2016

¹⁶ Graceffo, 2017 , Trump’s New Protectionism: Economic and Strategic Impact

¹⁷ Bryan and Holodny, 2016 , Trump’s new tariff proposal could put the economy on a path to “global recession”

“A crucial thing to consider here is that this type of price increase is not caused by the virtuous wage and price increase cycle, but rather by an exogenous shock to prices without a boost to the labor market. In plain English, that means that while parts manufactured in China instantly become more expensive for Americans under tariffs, wages do not necessarily go up the corresponding amount to offset this cost increase.”¹⁸

Interestingly enough, advocates of the protectionist measures planned by the Trump administration do not even seem to dispute the existence of a negative impact from a potential trade war on the US economy:

“The threat of a trade war would most likely hurt the surplus countries more.”¹⁹

From this short excerpt, the motivation of protectionist measures may be extracted. Free traders focus on the overall increase in welfare (with little concern for its distribution amongst parties), paying little to no mind to the shift or equilibrium of relative power. On the other hand, one proposition might be that protectionist put greater emphasis on relative power between trading nations, even at the expense of overall welfare loss, as long as other countries suffer a larger piece of those losses (i.e. are “hurt more”).

2.1.3 Hirschman’s Synopsis of Trade Policy vs. National Power

Considering current trade policy negotiations, the connection can be drawn to the unbroken relevance of Hirschman’s synopsis on trade policy in his publications from the early 1940s. To recap, Hirschman’s goal was to determine to what extent trade policy translates into relative power among nations and which measures are employed to ensure such increase in power. His ultimate goal was to find the best course of action to rebuild a war-torn Europe after the end of the Second World War and in particular to find a successful way of regulating trade policy and thus power of the eventually defeated Axis Powers. The struggle Hirschman faced was the juxtaposition of two potentially mutually exclusive aims.

¹⁸ Bryan and Holodny, 2016 , Trump’s new tariff proposal could put the economy on a path to “global recession”

¹⁹ Graceffo, 2017 , Trump’s New Protectionism: Economic and Strategic Impact

For one, his thoughts followed the overall consensus of minimizing the chance of a rearmament of the Axis Powers and future aggressions. On the other hand, the strict penalties imposed on Germany after the First World War by the “*Treaty of Versailles*” were arguably part of Germany’s economic distress following the First World War, which ultimately lead to Hitler’s ascension to power in 1933.²⁰ Hence, not to repeat past mistakes, Hirschman was looking to find a middle way to both ensure the disarmament as well as the economic prospering of the defeated nations. Hirschman identifies the interconnectedness of international trade and national power as the central aspect of his deliberations:

“How can we escape from a process of causation leading directly from one war to another? The first step toward the solution of the problem is to recognize fully its existence in all its implications. We have seen [...] the political aspect of international trade relations arises out of the system of national sovereignties.”²¹

From investigating the influences of various trading policies on national power, Hirschman summarizes the following methods prone to enhance relative power of a nation. Though not all methods are directly linked to Hirschman’s eventually devised index, the table is given in its entirety, as following chapters will draw parallels to the table (**“Hirschman List”, HL**). Whenever following chapters make reference to this table, the corresponding symbols will be given as well for orientation:

Table 2.1.3.1 Principles of a Power Policy Using Foreign Trade as Its Instrument²²

Foreign Trade Policies	
I.	Policies relying on the <i>supply effect</i> of foreign trade and trying to insure its working even in times of war
	<ul style="list-style-type: none"> A. Concentrate imports on goods needed for the war machine. B. Accumulate large stocks of strategic materials. C. Redirect trade to neighboring politically friendly or subject nations.

²⁰ Hirschman, 1945, pp.71–73

²¹ Ibid., p. 73

²² Ibid., pp. 34-35

D. Secure control of the oceanic trade routes.

II. Policies relying on the *influence effect* of foreign trade

- A. Policies designed to make it more difficult for the trading partner to *dispense entirely* with the trade.
1. Increase the trading partners' gain from trade (without impairing the supply effect),
 - a. Develop exports in articles enjoying a monopolistic position in other countries and direct trade to such countries.
 - b. Direct trade toward poorer countries.
 2. Increase the trading partners' adjustment difficulties in case of stoppage of trade.
 - a. Trade with countries with little mobility of resources.
 - b. Induce a wide discrepancy between the pattern of production for exports and the pattern of production for home consumption.
 3. Create vested interests and tie the interests of existing powerful groups to the trade.
- B. Policies designed to make it difficult for the trading partners to *shift* trade to each other or to third countries.
1. In general: Direct trade toward the small trading countries.
 2. With respect to the exports of the trading partners:
 - a. Import products for which there is little demand in other countries.
 - b. Drive prices of the export products of the trading partners above world priced:
 - i. By fostering high-cost production.
 - ii. By monetary manipulations.
 - c. Grant to the trading partners' exports advantages not relating to the price of their products,
 3. With respect to the imports of the trading partners:
 - a. Export highly differentiated goods creating consumption and production habits.
 - b. Develop trade on bilateral basis.
 4. Develop transit trade.

According to Hirschman, most of these policies can be observed in German trading patterns after 1933 until the outbreak of the Second World War, though Hirschman is reluctant to attribute such coinciding of various policies to a "*consciously worked out [...] master plan.*"²³

²³ Hirschman, 1945, p.35

One of the central recurring patterns in the Hirschman List is the direction of trade to poorer and/or smaller countries (e.g. HL I.C., II.A.1, II.A.2, II.B.1.).

First, favorable trading terms are offered to induce complacency with the smaller country, even at the expense of higher prices for the larger country at first. Once the smaller country has rearranged its production factors toward the needs of the larger country, it is heavily reliant on the larger country. Ideally this shift is even toward items not as frequently demanded in the smaller country, thus even increasing future dependency (HL II.A.2.b.). The export of highly differentiated goods to smaller countries even increases said dependency (HL II.B.3.a.).

If this dependence has progressed enough, the smaller country will have significant difficulties to flee the grasp of the larger country. This way the larger country arguably has secured the smaller countries allegiance in times of crisis, if not by declaration then by de facto economic dependence. Hirschman's goal was to substantiate, formalize, and numerically prove this pattern, a pattern that was by no means limited to Germany, but rather applied to all *"large trading nations"*.²⁴ Hence, Hirschman directed his research to the development of import and export figures of smaller countries throughout the years leading up to the outbreak of the Second World War.

2.1.4 Hirschman's Index

To compare different countries and different years, Hirschman devised a way to measure concentration of imports and exports with an index (*"Hirschman's Index", "HI"*) that followed two basic premises:²⁵

1. Number of countries with which a country trades
2. The even / uneven distribution of trade among these countries

Starting point for Hirschman's index is the distribution of the examined country's trading (exports or imports) with other nations. The square root of the summed-up squares of these share percentages form the final index. Hence the following formula is devised:

²⁴ Ibid., p.98

²⁵ Ibid., p.98 „The concentration of a nation's trade depends on the number of countries with which it trades and on the more or less equal distribution of its trade among these countries.“

$$HI_{Country\ examined} = \sqrt{\sum_i^n ((x_i/X) * 100)}$$

With:

$x_i = [Imports; Exports]$ from/to Nation i

$X = Total [Imports; Exports]$ of examined Country

The table below illustrates the concept:

Table 2.1.4.1 Example Cases of the Hirschman Index²⁶

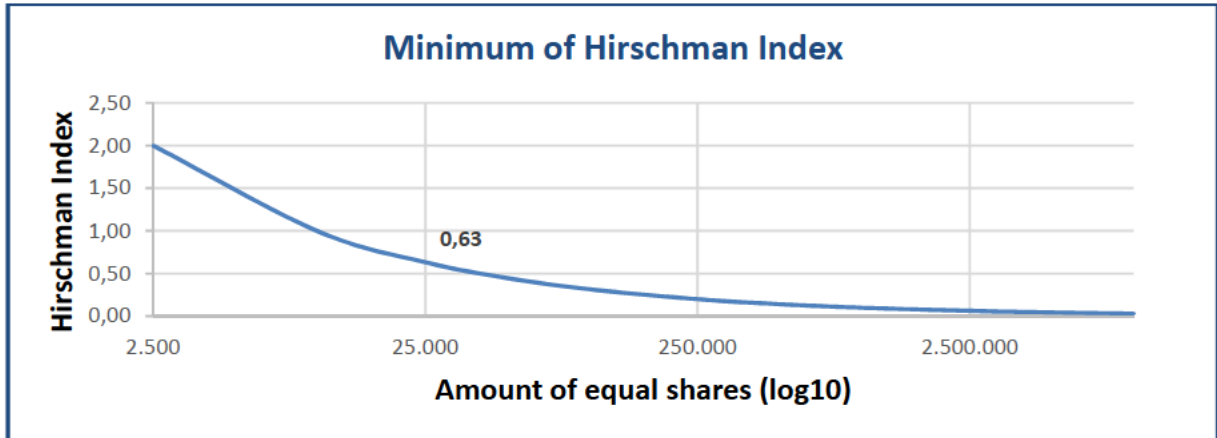
Illustration Table of the Hirschman Index							
Scenario	Shares in %					Total	HI
	Nation 1	Nation 2	Nation 3	Nation 4	Nation 5		
Scenario A	100	0	0	0	0	100	100,0
Scenario B	85	10	5	0	0	100	85,7
Scenario C	75	15	10	0	0	100	77,1
Scenario D	50	25	20	5	0	100	59,6
Scenario E	20	20	20	20	20	100	44,7
Scenario F	33	33	33	0	0	100	57,7
Scenario G	50	50	0	0	0	100	70,7

For example, if the examined country exports half its goods to Nation 1 and the other half to Nation 2 (Scenario G), the index amounts to 70,7. Looking at the formula and the scale of the Hirschman Index, two things become evident. If a single nation is attributed with all trade of the observed nation (100%), the highest possible value is reached at 100.²⁷ The other extreme is reached if the trade is equally shared among a multitude of nations. In this case the squared shares become infinitesimally small, leaving the square root of the summed squares asymptotically closing in on zero. The index can however never reach 0. The following figure illustrates this phenomenon:

²⁶ Own calculations, regardless whether Imports or exports, e.g. $HI_{Scenario\ C} = \sqrt{(75^2) + (15^2) + (10^2)} = 77,1$

²⁷ $Hirschman\ Index_{max} = \sqrt{100^2} = 100$

Figure 2.1.4.1 Minimum of Hirschman Index²⁸



To illustrate, if the examined country was to (hypothetically) trade evenly with 25.000 other parties, the Hirschman Index would amount to 0,63.²⁹ Yet no matter how many more trading parties were to be added to the equation, the index would never reach 0.

Besides developing an understanding for the maximum and minimum of the scale at hand, both the figure and the table above give testimony as to why Hirschman's idea of measuring concentration varies from the practices of those who came before him.

Arguably, the most renowned measure for distribution equality stems from Italian statistician Riccardo Gini. The Gini coefficient measures the equality of distribution among parties (e.g. income distribution in a country). The coefficient uses the Lorenz curve to illustrate the distribution.³⁰ Gini's computation is not concerned with the number of parties (Hirschman's first premise above). It solely focuses on the equality in distribution (Hirschman's second premise).

The importance for emphasizing the latter premise of "*fewness*" can easily be explained with the table above. If the Hirschman Index merely described equal distribution (in the way e.g. the Gini Index describes income distribution equality), Nations E, F, and G would amount to the same index, as the total is shared equally among the Nations (e.g. 2 shares of 50, 3 of 33, and 5 shares of 20). As the table shows however, the Hirschman Index varies significantly among these three cases, ranging from 70,7 (2 shares of 50) to 44,7 (5 shares of 20).

²⁸ Own calculations

²⁹ $\sqrt{25.000 * \left(\frac{100}{25.000}\right)^2} = 0,63$

³⁰ Krämer, 2017, Definition » Gini-Koeffizient « | Gabler Wirtschaftslexikon

The figure above indirectly attests to the same confound difference between Hirschman and Gini. It illustrates how the Hirschman Index goes further down, the more parties are involved (although in all cases the shares are equal). Arguably, the neglect of the fewness aspect by Gini can be explained. It stands to reason that Gini's aim was to calculate and compare income distribution as a proxy for fairness. Thus, his measure focused on the relationship between the different income receivers. Hirschman on the other hand looks at the dependency of the examined country to the trading partners, not the relationships and fairness amongst different trading partners.

When he was challenged to claim paternity of the index more than 20 years after its first introduction (a subject that will be touched upon later in detail), Hirschman once more explicitly named the two basic premises as being the central difference to other concentration measures:

*"[...] the use of the index is indicated when concentration is a function of both unequal distribution **and fewness**. The traditional measures of concentration, generally devised in connection with income distribution and the Lorenz curve, are sensitive only to inequality of distribution, and we do owe several such measures to Gini."³¹*

Again, Hirschman chose to include fewness in his calculations because in his reasoning regarding influence of trade policy on national power, the fewer countries a country trades with, the higher the dependency. If a country was to only import from two other countries (at even shares), the level of dependence of the observed country would be significantly higher than if the country was to trade evenly with 10 partners (HI of 70,7 vs. 31,6³²).

In reverse, if the underlying shares for calculating the HI are unavailable and just the HI itself is known, certain conclusions about the share composition can be drawn. Mathematically, the largest single share must at all times be smaller than the Index itself. Assuming the rest of the shares are not infinitely numerous nor evenly distributed (thus not leading to small squares),

³¹ Hirschman, 1964, p.761

³² $Hirschman\ Index_{10\ equal\ shares} = \sqrt{10 * (10^2)} = 31,6$

the largest single share is likely to be somewhat smaller than the index.³³ This principle is of value as it allows the quick interpretation of the index for any given nation / party.

To recap, Hirschman's original research was directed at the question of trading policies and their impact on national relative power. Dominant theme of the earlier introduced Hirschman List was the directing of trade by larger nations to smaller / weaker nations, in order to insure their obedience in a time of crisis. Hirschman was determined to find corroborating evidence to substantiate his assertions regarding the impact of trade policies on national power and the development of international conflicts.

Using his index, Hirschman was able to provide such testimony. Ex- and import concentration of smaller countries had an overall tendency to decrease after World War I. However, the concentration yet again increased for many southeastern European countries after Hitler's ascension. Their trading parameters were susceptible to Germany's strategy of importing raw materials and exporting manufactured goods. This resembles the patterns Hirschman had set forth in his list of power enlarging policies (i.e. HL II B). Other countries could not be pressured into that pattern and were not as targeted, as their economies were *"industrialized and their exports able to compete with [...] other regions of the world."*³⁴ Summing it up, Hirschman managed to utilize his index to synchronize his conjectures about national power and trading policy with actual trading figures. Though primarily concerned with trade concentration between nations, Hirschman also suggested to apply his index to measure market concentration within a specific industry to establish an idea about the market power of single enterprises.³⁵

2.2 Herfindahl's Approach

In 1950 Orris Clemens Herfindahl concerned himself with the question whether the US American steel industry had grown more, or less monopolistic. Herfindahl describes his approach in his introduction to his doctoral thesis as one of many parts of answering the broader question as to whether the *"monopoly problem in the whole economy is becoming*

³³ Hirschman, 1945, p.99, „From the construction of the index it will be clear that it is always higher than the percentage held by the largest importing or exporting country. It will be helpful to keep this in mind.”

³⁴ Ibid., p.112

³⁵ Hirschman, 1945, p.158

more serious."³⁶ In his opinion this broader question could only be discussed thoroughly if it was broken down into smaller bits and pieces. Ergo, his suggestion was to conduct research on single industries first to avoid generalization. Only later, the broader question might be answered using the multitude of prior research results.³⁷

Cornerstone of Herfindahl's research is the close relationship of the terms "*monopoly*", "*concentration*", and "*domination*". Herfindahl summarizes that the close association of the term monopoly on the one hand and the term concentration on the other hand is due to the loosely usage of the term monopoly in cases of high concentration. Technically, such stages are not quite monopolies, as there is still more than one market participant. As far as Herfindahl's work is concerned, monopoly is a synonym for a market showing a high level of concentration.³⁸ This thesis will likewise make use of the terms synonymously, unless the technical sense of a monopoly is explicitly pointed at. In a second step, Herfindahl links concentration and domination and acknowledges the "*equating*" of the two to be well established in the economic discussion.³⁹

To substantiate this correlation of domination and concentration, an analogy might be proposed. As established before, a high level of concentration in ex- and imports leaves the examined country at a high level of dependency. Vice versa, the few countries controlling the majority of the trade will hold significant sway over the examined country. The examined country is basically a customer left with very few options. Analogously, customers in the steel industry may just as well be left with few options if only one or two major players make up the market. Even if the market is equally divided between these two players, this high level of concentration translates to dominance of the market.

Therefore Herfindahl, like Hirschman, is not content with the neglect of the amount of companies in concentration measurements and stresses the importance to distinguish between the concepts of inequality and concentration:

³⁶ Herfindahl, 1950, p.1

³⁷ Ibid., p.2

³⁸ Ibid., p.2

³⁹ Ibid., p.5,7

“The equating of the concentration to domination is so widespread that there are only faint suggestions in the literature that the number of firms should be incorporated in the concept of concentration. It will be suggested that the concept can usefully be broadened so as to distinguish concentration from inequality.”⁴⁰

Just like Hirschman, Herfindahl thus stresses the importance of fewness, not only distribution. As mentioned above, the center of Herfindahl’s research were the supposed monopolistic tendencies within the US American steel industry. Although still self-admittedly lacking a *“precise knowledge of the determinants of monopolistic policy”*,⁴¹ Herfindahl nonetheless offers a new heuristic concept of concentration that both incorporates the number of firms in the industry, as well as the *“size-location configuration.”*⁴²

According to his remarks, former concentration measures were too closely based on the concept of income distribution, focusing merely on the largest players. Summing it up, conventional measures focusing only on distribution and the largest firms could not provide such insights into the overall market configuration and were thus useless to answer Herfindahl’s inquiries into the monopolization of the US American steel industry.⁴³ Herfindahl therefore proposes the following measure:⁴⁴

$$\text{Herfindahl Index} = \frac{\sum_i^n x_i^2}{(\sum_i^n x_i)^2}$$

With:

$x_i = \text{Output of Company } i$

Looking at this formula it becomes evident as to how similar Hirschman’s and Herfindahl’s approach are. Both incorporate the number of parties as well as the distribution configuration, countries’ ex- or imports in Hirschman’s case, companies’ output in Herfindahl’s. Both use squaring as means to attribute exponentially larger dominance to larger shares. However, the scale is different, even if similar effects occur. Just like Hirschman’s Index, the Herfindahl Index approaches zero with a rising number of equally small shares. While the denominator stays

⁴⁰ Ibid., p.5

⁴¹ Ibid., p.15

⁴² Ibid., p.16

⁴³ Ibid., p.16

⁴⁴ Ibid., p.19

the same regardless of the distribution configuration, the numerator approaches zero with a growing number of equally small shares. The upper limit of Herfindahl's scale is one. If one market participant represents the entirety of the turnover in the reviewed market, the numerator will be equal to the denominator. Hence, the concentration will amount to one. The profound difference between the two measures is the missing square root in Herfindahl's approach. Again, both use squaring as means to assign more weight to larger shares, but Hirschman's approach uses an overall square root to arrive at his scale. This difference in exponentiality is to be kept in mind when comparing results from the two indices.

2.3 The Herfindahl-Hirschman-Index

The similarities between Hirschman's and Herfindahl's respective concepts can hardly be overlooked, although the fields of research were entirely different. While Hirschman concerned himself with the economic and macropolitical aftermath of the Second World War and only marginally discussed commercial application, Herfindahl's approach was entirely focused on economic principles in a specific industry. Yet arguably, these two different research areas had more in common than a first glance would lead to believe. Hirschman's strive to link relative national power of a country to its trade policies is quite similar to the phenomenon of monopolization, which was the subject of Herfindahl's explorations. Central to both approaches, is the concentration of power, ergo dominance. In Hirschman's case, this is demonstrated in the context of international struggle for power by economic policy. Herfindahl examines the concept of domination in the market place.

The root of both is the concept of dependency. In Hirschman's most important research, the index describes the level of dependency the reviewed country faces. Looking at Herfindahl, the dependency of the consumer in the market place is focused on. Consumer and the reviewed country share a similar position. If only few trading partners, or companies respectively, are available, the level of dependency increases.

Undisputedly, Hirschman was the first to formulate and publish the concept. Anyhow, when devising his method some five years after Hirschman's publication, Herfindahl was supposedly unaware of Hirschman's prior work. It was only later that Herfindahl learned of Hirschman's work, which he acknowledges in his own publication.⁴⁵ Yet in the following years, the matter

⁴⁵ Herfindahl, 1950, p.21

of origination of the index was not laid to rest. In a somewhat bitter remark titled *“The Paternity of an Index”* published in 1964, Hirschman expresses his discontent. After once more stressing the differences between his index and Gini’s work (to whom Hirschman’s index had been falsely attributed by other writers), he summarizes the following:

“Given the sudden popularity of the measure, I feel that I should stand up for my rights as its originator. [...] To complicate the story, I must add that there was a posterior inventor, O. C. Herfindahl (2), who in 1950 proposed the same index, except for the square root. [...] Nevertheless, when the index is used for measuring industrial concentration, the second principal area of its application, it is now usually referred to as the “Herfindahl Index,” owing to a well-known paper by Rosenbluth (7) who has, however, recently made a valiant, but probably vain, attempt to straighten the matter out [...].

The net result is that my index is named either after Gini who did not invent it at all or after Herfindahl who reinvented it. Well, it’s a cruel world.”⁴⁶

In the end, the Index has become widely known today as *“Herfindahl-Hirschman-Index”* (*“HHI”*, or the index as far as this thesis goes). Insofar Hirschman’s pessimistic foretelling has only come true in part. His name reclaimed its proper place in the index’s name, even if it is alongside the posterior inventor Herfindahl. The index has been widely applied throughout the last decades.

Given the confusion in the years following its inception, it should come as little surprise that the index was configured in numerous ways. The divergent factor in these configurations was whether the superordinate square root was used or not. As discussed earlier, Hirschman introduced his index with such a square root, while Herfindahl neglected such. Depending on the underlying data and index formula used, results from different sources therefore need to be recomputed in order to ensure comparability. For the purpose of this thesis the following index formula will be used to compute the HHI:

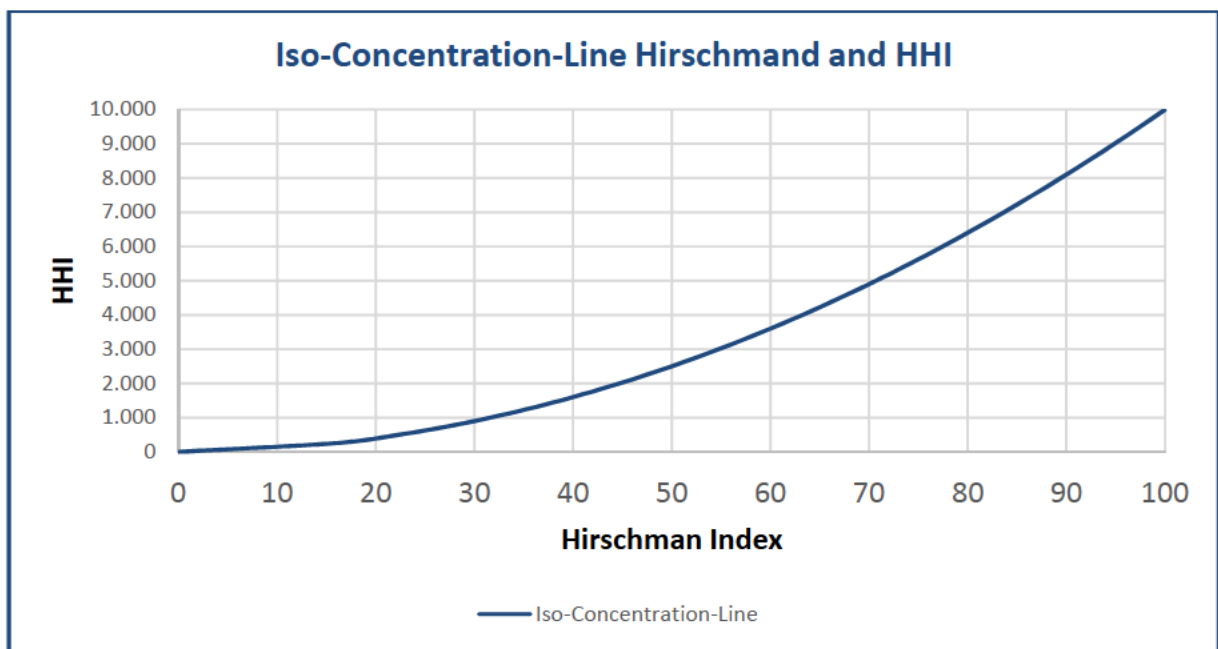
⁴⁶ Hirschman, 1964, p.761

$$HHI = \sum_i^n x_i^2$$

With x_i being the market share of company i

In this configuration, the index resembles Herfindahl's approach, but directly uses market shares, not output in absolute numbers. This way, the denominator of Herfindahl's approach can be neglected. As shares are entered into the calculation as integer numbers (e.g. 50% is entered as 50), the scale for the index changes. While similar to all adaptations of the index, the lower end always approaches zero for the reasons explored above, the upper limit in the latter application is 10.000.⁴⁷ The upper limit, as with all other adaptations of the index, is reached if one enterprise holds 100% of the market share, thus making the market under consideration a monopoly in the most technical sense. The following figure visualizes the effect of the missing square root, which, besides the scale, is the obvious deviation from Hirschman's original formula.

Figure 2.3.1 Hirschman and HHI Iso-Concentration-Line



The curve in the above figure shows the iso-concentration-line of both the HHI scale, as it is used in this thesis, as well as the original Hirschman approach. The exponential development of the slope depicts the missing square root in the HHI adaption. As to why this lack of square rooting is advantageous in comparison to the Hirschman approach, will be discussed

⁴⁷ $HHI = 100^2 = 10.000$

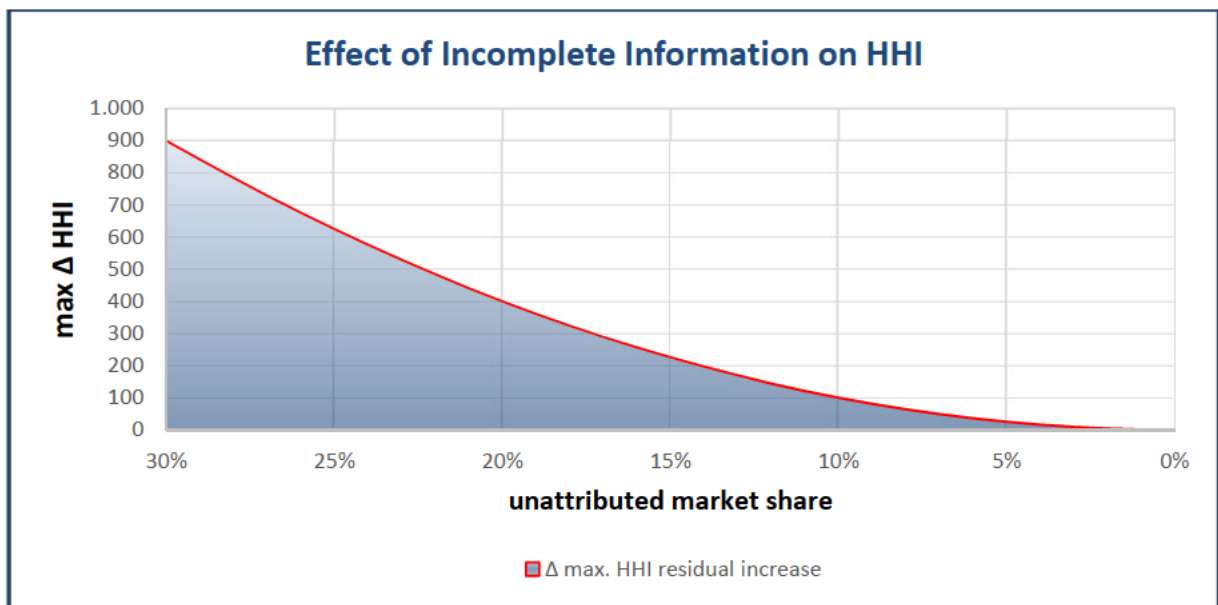
throughout the next sections. However, this slope clearly attests to the complexity of comparing data from different sources. A doubling of the index in the Hirschman sense indicates a quadrupling of the index in the HHI sense.

2.4 Strengths and Weaknesses of the HHI

2.4.1 Strengths of the HHI

To determine proper fields of application, strengths, and weaknesses of the HHI need to be reviewed. Arguably, the greatest strength lies within the simplicity of the computation, which can easily be done manually. Besides the trivial computation process, the little amount of data needed is just as advantageous.⁴⁸ With regard to the amount of data needed to compile, Herfindahl points out that even incomplete data sets suffice to provide a close enough approximation of the final value. This holds true as long as market share data for the largest firms is available.⁴⁹ Assuming that in most markets the larger players and their shares are known, the residual shares of the smaller companies will have little impact on the overall result. Hence, knowledge about their exact shares is not of great importance. The following figure visualizes this deteriorating importance of remaining shares:

Figure 2.4.1.1 Effect of Incomplete Information on HHI



⁴⁸ Maverick, 2015 , What are the benefits and shortfalls of the Herfindahl-Hirschman Index?

⁴⁹ Herfindahl, 1950, p.30

Even if only 70% of the market shares are attributed (ergo 30% are not), the remaining shares can only translate to an increase in HHI of up to 900, and this only in a highly unlikely case, where a single company with a market share of the entirety of 30% was grossly overlooked. Following the prior rationale, it is more likely that the residual increase due to missing data will be significantly lower, somewhere within in the shaded area. The figure merely provides information to the mathematically possible remaining increase, given any number of unattributed shares. Considering the overall scale of up to 10.000 it becomes obvious as to how little inaccuracy occurs with reasonably incomplete information. This represents the aforementioned general advantage of the HHI. Regarding the simplicity, Herfindahl suggests his approach as a cost-efficient option for antitrust evaluations.⁵⁰

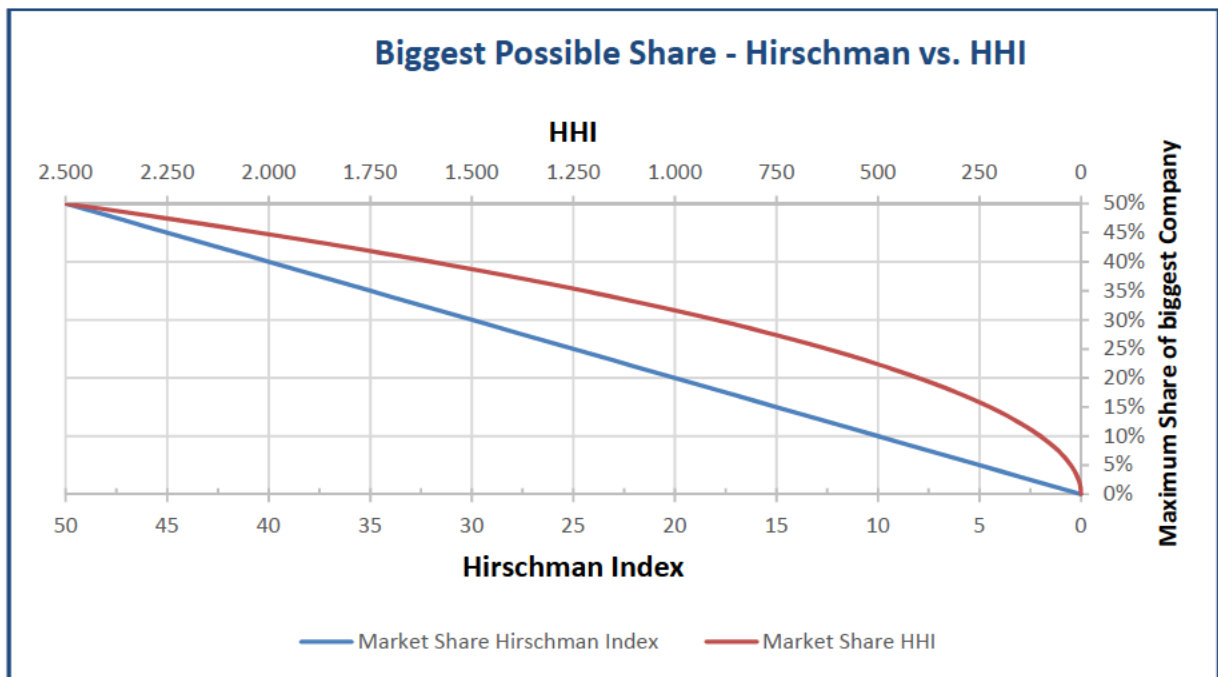
A further advantage is the easy interpretability of the index. Whenever secondary data with already established indices is available, some conclusions about the market shares can be derived. For the first conclusion, a second look at the original setup of the index by Hirschman is helpful. Although there is no plain reason offered by Hirschman as to why he chose to include a superordinate square root,⁵¹ his intentions may have been directed toward the interpretability. As discussed in a prior chapter, the Index in Hirschman's configuration allows for immediate assumptions about the largest company. Following the mathematical setup, no market share could ever surpass the index. Of course, this interpretation is somewhat not as obvious with the HHI concept. The missing square root causes the linear relationship (Hirschman approach) to disappear. The following figure depicts the differences:⁵²

⁵⁰ Herfindahl, 1950, p.171

⁵¹ Roberts, 2014, p.905

⁵² It should be taken into account that the opposing scales of Hirschman and HHI have to be viewed separately. Although they use the same grid the scales do not translate to the respective index values across (e.g. a Hirschman index of 25 does not translate to a HHI of 1.250).

Figure 2.4.1.2 Biggest Possible Share - Hirschman vs. HHI



This figure might be useful at a later stage to interpret given indices. Admittedly, the chosen HHI concept does not translate as easy as the Hirschman Index. However, this disadvantage of the chosen concept is somewhat compensated, if not overcompensated by two advantages that only come to pass with the chosen concept, but not Hirschman’s approach.

Quite possibly, the above discussed principle of the biggest possible share is only of limited use in an actual market situation. It can only serve as a first indicator to assess the mathematically highest possible share, yet it does not allow for assumptions about the actual composition of the market. Attributing the observation to economist M.A. Adelman,⁵³ Roberts makes note of a further interpretation of the HHI:⁵⁴

“The index also allowed for an easy practical interpretation. Taking the inverse of the HHI yields the number of “effective competitors,” or the number of equal-sized firms that would produce an equivalent HHI score.”

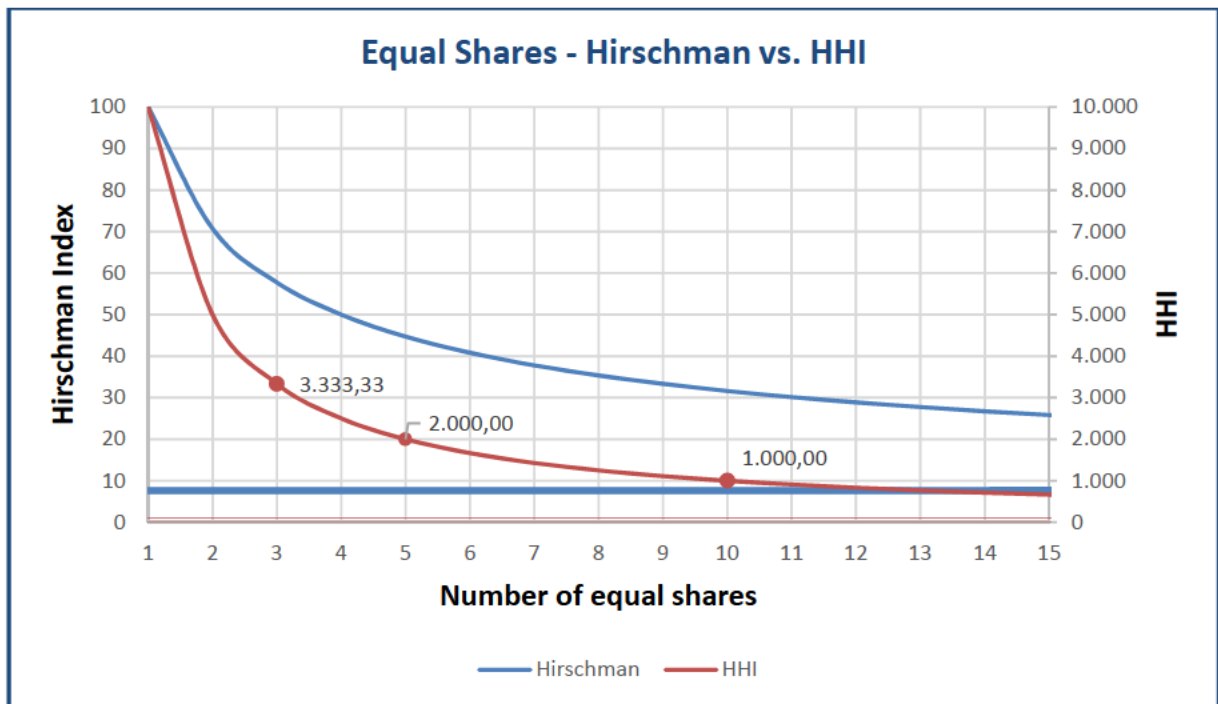
Even though the idea of an evenly split market is regularly not met under actual market conditions, this interpretation approach might cut closer to the truth than the approach of

⁵³ Adelman, 1969, p.101

⁵⁴ Roberts, 2014, p.908

one single superior market participant. The figure underneath displays this advantage of taking the reverse index to arrive at the concept of corresponding number of equal-sized firms. The original Hirschman Index is again included in the figure to show, in this case, the advantages of the HHI over the Hirschman Index:

Figure 2.1.4.3 Equal Shares - Hirschman vs. HHI



Dividing the maximum of 10.000 by any given HHI results in the corresponding number of equally-sized firms (e.g. $10.000/2.000=5$). Such conclusion cannot be drawn as easily using the original Hirschman approach. In this case, the omitted square rooting serves the interpretability.

The final advantage of the chosen concept is central to the contemporary application of the HHI. Such application primarily concerns governmental use throughout antitrust proceedings. This legislation regularly not only looks at the HHI in absolute terms (before and after the reviewed merger), but also at the occurring delta. Because of the exponential weighing of greater shares, such delta thresholds are reached the sooner the larger the starting market share is. For example, if a company holding a 30% market share was to purchase a competitor holding a 5% market share, the resulting delta would compute at 300.⁵⁵ If the purchasing

⁵⁵ $\Delta HHI = HHI_{neu} - HHI_{alt} = 35^2 - (30^2 + 5^2) = 1.225 - 925 = 300$ [The remaining composition of the market remains unchanged and is therefore omitted]

company only held a 20% share, the resulting delta amounts to only 200.⁵⁶ Consequently, threshold restrictions are sensitive to starting market shares. This advantage will be discussed in greater detail in the section on contemporary application of the HHI.

2.4.2 Weaknesses of the HHI

Certainly, the HHI also bares some disadvantages. These shortcomings can be split into two categories. For one, there are deficiencies in the conceptual composition of the index (methodological challenges). Secondly, apart from the underlying framework, the actual application also displays some difficulty (applicational challenges).

Methodological Challenges

As reviewed in the beginning of this chapter, the most profound principle of the index lies within the exponential weighing of market shares with increasing size. Both Herfindahl and Hirschman independently make their case as to why such weighing is reasonable. While Herfindahl argues from the perspective of exponential market power of large companies the closer the market tends toward a monopoly,⁵⁷ Hirschman derives his conclusion from the disproportionate increase in dependency a small country faces when its trade gets more and more directed to a single or few trading partners. Both lines of argument foot on the principals of domination, whether it is with respect to the relative power of countries or the relative power of players in the market place. However, neither Hirschman nor Herfindahl offer numeric testimony as to why the exponential increase in (market) power should be the one of squaring. Arguably, any other exponent than two might just as well be the correct one. Herfindahl admits as much in the preface of his deliberations:⁵⁸

“But since our knowledge of the determinants of monopolistic policy and their interrelationships is incomplete, a concentration ratio cannot be deduced which is firmly grounded in theory.

⁵⁶ $\Delta HHI = HHI_{neu} - HHI_{alt} = 25^2 - (20^2 + 5^2) = 625 - 425 = 200$ [The remaining composition of the market remains unchanged and is therefore omitted]

⁵⁷ Herfindahl, 1950, p.19

⁵⁸ Herfindahl, 1950, pp.15–16

Although the theoretical foundation of the concentration ratio may be somewhat obscure, it may still possess heuristic value and, in turn, may provide the theorist with valuable clues.”

Another disadvantage of the index is the loss of information that is inherent to any aggregated index. In a way, this disadvantage is the flipside of the advantageous simplicity. Herfindahl himself makes mention of this structural flaw and suggests not to employ the index as the only means to evaluate a market. Following Herfindahl’s remarks, an unduly strict application of the index would run the risk of *“harassment of some industries whose performance is actually quite competitive but whose structure, by the conventional standards, is not.”*⁵⁹

One example of such undue *“harassment”* is brought up by Roberts, who points out that *“one result of reliance on the HHI has been an erroneous conflation of market power (as proxied by market share) with consumer disutility.”*⁶⁰ In his opinion, this generally accepted notion does not hold up for network firms that are able to deliver customer benefit and cheaper prices *because* of their larger market shares, not despite them. He brings up the example of the credit card market, where a higher fragmentation of the market would lead to less user utility due to compatibility and acceptance issues.⁶¹ Again, the dominating theme is to use the index as one of many indicators.

Applicational Challenges

Besides the methodological challenges, the index also exhibits some difficulties when it is actually applied. For one, exact calculations require conclusive data on market shares. Still, even with limited data, useful approximations can be made, somewhat negating this applicational disadvantage. More importantly, antitrust proceedings employing the index as an indicator have to decide upon precise market definitions. Not only can markets be outlined in numerous ways, antitrust proceedings have to deliver a judicially solid ruling that is not easily overturned on appeal. Merging companies are likely to be active in more than one market, both in terms of products sold or services rendered, as well as with regard to regional differences. If the merging parties are active in more than one market, the HHIs will have to

⁵⁹ Ibid., p. 172

⁶⁰ Roberts, 2014, p.895

⁶¹ Ibid.

be calculated for every market. Which yet opens up the challenge of weighing relative market importance. While one market might not exhibit critical HHI, another market might show problematic tendencies. This problem might arguably be solved by allowing mergers to go forward under certain obligations, e.g. the divestment of assets in a critical market. Yet at the center of any market definition, the question about product substitution has to be answered. Arguably, even if products are not per se similar, they might still be counted as close enough substitutes. For example, if one was to evaluate the merger of two airlines, a decision had to be made if the market in question only encompasses air travel or also bussing or rail. Depending on that decision, the HHI naturally might be completely different.

Besides market definition by product type, there are also other applicational difficulties. Depending on the granularity of market separation, certain critical constellations may be overlooked. If the index is calculated on a national basis and indicates no critical degree of concentration, there is no safeguard against companies colluding by dividing up the national market into highly concentrated regional markets. Such a constellation would still leave the consumers at a disadvantage due to lack of competition in their region. In such a case, the index on a national level would be of little use.⁶² Summing it up, the definition of a market and gathering information on market shares are the central challenges of applying the index.

2.5 Summary of Key Findings

The HHI was originally designed to assess trading patterns amongst nations and subsequently evaluate national power. It also has a second field of application in commercial markets. The HHI is a tool to ascertain concentration and dominance in the market place. The central advantage of using the HHI is its comparatively simple arithmetical concept. It allows to quickly compare various market compositions on the same scale by summing up the squares of all market shares. But this simplicity comes at a price. For one, the underlying rationale is admittedly only heuristic in nature. Though a qualitative argument can be made that an exponential relationship between market concentration and market dominance seems plausible, the exact quantification of such a relationship remains a matter of discussion. There is no numerical evidence available as to why it is more accurate to square the market shares

⁶² Maverick, 2015 , What are the benefits and shortfalls of the Herfindahl-Hirschman Index?

instead of, for example, cubing them. After all, in this regard the approach by Hirschman and Herfindahl remains to some extent arbitrary.

Yet also beyond the mere theoretical criticism, the application of the index also holds its challenges. To be accurate, all market shares must be known. This difficulty is, however, not to be overestimated. As was shown in the previous subchapter, the impact of the exact composition of remaining market shares is very limited, as long as the majority of market shares are accounted for.

Besides knowledge of the exact market composition, an exact understanding of the market confines is necessary to apply the index. While incomplete information about smaller, remaining market shares can be made up for, an inexact market definition cannot be compensated. At times, it might be difficult to conclusively ascertain as to whether two products may be regarded as close enough substitutes, which would consequently allow for a consolidation of the markets. This problem of market definition may arguably be the most paramount obstacle in official application, because the definition comes down to qualitative analysis and judgement calls. Whether this is actually the most challenging aspect of application will be discussed in the following chapter.

3 Contemporary Laws and Application of HHI in Merger Proceedings

3.1 HHI in United States Antitrust Law

3.1.1 Regulations and Guidelines in US Antitrust Law

To recap, Hirschman concentrated his studies on relative national power among different countries. Although he made room for using his approach with regard to market power, this aspect was not his prime concern. Herfindahl, on the other hand, was primarily concerned with the developing of monopolies in US American key industries and already entertained the idea of using the index in antitrust proceedings.⁶³

The “*Federal Trade Commission*” (“FTC”), one of the independent bodies of the government to oversee antitrust proceedings in the US, defines its mission as follows:⁶⁴

“Working to protect consumers by preventing anticompetitive, deceptive, and unfair business practices, enhancing informed consumer choice and public understanding of the competitive process, and accomplishing this without unduly burdening legitimate business activity.”

In short, antitrust laws are established to enforce the rules of the competitive marketplace. Antitrust law in the United States of America has been around since 1890. Back then the “*Sherman Act*” passed Congress as a “*comprehensive charter of economic liberty aimed at preserving free and unfettered competition as the rule of trade.*”⁶⁵ Besides the Sherman Act as the first and oldest pillar, the second and third pillar of US American Antitrust Law are the *Federal Trade Commission Act* and the *Clayton Act* (both 1914). These federal pieces of legislation are enforced by the US Department of Justice Antitrust Division (“DoJ”) and the Federal Trade Commission (“FTC”). Additional state laws exist.⁶⁶

⁶³ Herfindahl, 1950, p.171

⁶⁴ Federal Trade Commission, n.d. , About the FTC

⁶⁵ Federal Trade Commission, n.d. , Guide to Antitrust Laws

⁶⁶ Federal Trade Commission, n.d. , Guide to Antitrust Laws

Guidelines of 1968

These pieces of legislation set the legal framework. Their application, however, required interpretation. To that end, the DOJ adopted its first guidelines in 1968.⁶⁷ The purpose of these guidelines was given as follows:⁶⁸

“The purpose of these guidelines is to acquaint the business community, the legal profession, and other interested groups and individuals with the standards currently being applied by the Department of Justice in determining whether to challenge corporate acquisitions and mergers under Section 7 of the Clayton Act.”

This way, companies planning mergers ideally could evaluate the likelihood of their mergers being challenged by the authorities. With regard to market concentration, the 1968 guidelines made use of the “*four-firm concentration ratio*”. This ratio focuses on the market shares of the four largest firms. Whenever the four largest firms held more than 75% market share between them, the DOJ reserved the right to ordinarily challenge mergers if the acquired firm held more than a 4% market share. Expressed in terms of HHI, such markets would present a HHI of at least 1.400.⁶⁹ By including the 4% threshold not only the current concentration was assessed, but also the expected increase. If the four-firm concentration ratio fell below 75%, the thresholds for the DOJ to challenge the merger were loosened all together, meaning that also larger firms could likely be acquired without further antitrust proceedings.⁷⁰

Guidelines of 1982, 1984, 1992, and 1997

In 1982 the DOJ and the FTC reworked their merger guidelines to stay current with their de facto enforcement habits. The four-firm ratio was no longer included in these new guidelines. Instead the HHI had been put in its place. In section “*III Horizontal Mergers*” of the guidelines three scenarios are discussed.⁷¹

⁶⁷ Roberts, 2014, p.901

⁶⁸ U.S. Department of Justice, 1968 , Merger Guidelines (1968), p.1

⁶⁹ $(75\%/4)^2 \times 4 = 1.406,25$ (assuming the four largest firms to have the same market shares)

⁷⁰ U.S. Department of Justice, 1968 , Merger Guidelines (1968), p.6

⁷¹ U.S. Department of Justice and the Federal Trade Commission, 1982 , Horizontal Merger Guidelines (1982)

The first scenario practically exempted all mergers from further review should the post-merger HHI fall below 1.000 points. Following the prior introduced interpretation technique of equal shares, 1.000 points are the equivalent of 10 equal market shares of 10% each. The DOJ reserved the right to still challenge any merger below this threshold if extraordinary circumstances applied.

The second scenario went beyond the mere post-merger HHI as a reference. Just like the original guidelines from 1968, this scenario also included a mechanism about the increase of concentration, henceforth referred to as “delta”. According to the guidelines, any post-merger HHI between 1.000 and 1.800 is therefore unlikely to be challenged, as long as the delta in HHI is less than 100 points. Should the delta be higher than 100 points, the merger was theoretically more likely to be challenged. Such a post-merger HHI between 1.000 and 1.800 points was referred to and considered as a moderately concentrated market.

The third scenario covers potential mergers with a post-merger HHI above 1.800. Such a HHI would result, for example, from one large company with a little more than 40% market share or e.g. 5-6 companies with equal market shares.⁷² This level of concentration was theoretically considered to be high. In this range, mergers with a projected delta of as little as 50 points would in theory likely be challenged. If the increase exceeded 100 points, the merger would supposedly lessen competition and thus be subject of intense scrutiny. In 1984, 1992, and 1997 the Guidelines were once more updated. However with regard to HHI thresholds, nothing was changed.⁷³

Criticism and Guidelines of 2010

Leading up to 2010, concerns were raised about the then current guidelines from 1997. Five workshops were held by the DoJ and the FTC to review the horizontal merger guidelines.⁷⁴ At the time heading up the Antitrust Division of the DoJ, Assistant Attorney General Christine A. Varney stated:⁷⁵

⁷² $(100\%/6)^2 \times 6 = 1.667$; $(100\%/5)^2 \times 4 = 2.000$

⁷³ U.S. Department of Justice and the Federal Trade Commission, 1984 , Horizontal Merger Guidelines (1984); U.S. Department of Justice and the Federal Trade Commission, 1992 , Horizontal Merger Guidelines (1992); U.S. Department of Justice and the Federal Trade Commission, 1997 , Horizontal Merger Guidelines (1997)

⁷⁴ Zöttl, 2010 , USA: Auf dem Weg zu neuen Richtlinien für horizontale Fusionen

⁷⁵ Varney, 2010, p.2; 4

“Much has changed in the way the Agencies evaluate mergers in the past eighteen years. [...] The evolution of antitrust law needs to keep pace with the advancement of economic thinking. [...] Gaps between what the Agencies say we do and what we actually do are unfortunate for a number of reasons. Our Guidelines are meant to inform practitioners and the business community of the Agencies’ standards for evaluating mergers. Gaps run counter to our goal of being transparent. That transparency helps businesses make accurate predictions about our likely enforcement intentions and adjust their behavior accordingly. Gaps increase uncertainty and thus can lead to unnecessary surprises. We want to avoid that.”

In fact, Varney saw such gaps in the recent practice of applying the HHI. At the time, she saw massive discrepancies between the thresholds given by the guidelines and the actual enforcement practices of the agencies. On this specific issue, she said:⁷⁶

“As the Merger Challenges Data that I referred to earlier in this talk indicate, it is relatively rare for the Agencies to challenge mergers that will lead to HHI concentration levels below 1,800. Yet the Guidelines indicate that such mergers “potentially raise significant competitive concerns. Similarly, the Guidelines suggest that a 100 point increase in an HHI concentration level raises competitive concerns. In actual practice, however, the Agencies have only infrequently challenged mergers unless they increase concentration several times that much.”

Varney, appointee of the Obama administration, arguably was not only looking to align the guidelines and actual practice of the agencies, but also was charged with taking a stricter stance on mergers. During his presidential campaign, Barack Obama, had repeatedly criticized the Bush administration for its *“lax attitude”* toward antitrust proceedings.⁷⁷

The new 2010 guidelines exhibited some changes to the HHI thresholds. In fact, the theoretical constraints from HHI were loosened, or rather moved in the direction of recent US antitrust

⁷⁶ Varney, 2010, pp.7–8

⁷⁷ Shughart and Thomas, 2013, pp.1–2

enforcement. Considering Obama's remarks on the campaign trail that had constantly criticized the supposed carelessness of the prior Bush administration, this somewhat seems out of place. In a New York Times comment a renowned professor, with vast knowledge on US American antitrust proceedings, tackles this paradox:

*"It was becoming legendary that the Bush administration wasn't enforcing the old guidelines. [...] What good is a guideline that doesn't provide any guidance? The Obama administration conceded that perhaps the old guidelines were too strict. So it made it easier, but at the same time said, 'We're going to enforce this.'"*⁷⁸

The 2010 guidelines are still in effect to today. They redefine the different states of market concentration. Whenever a market shows a HHI of below 1.500 the market is referred to as a *"unconcentrated market"*. A HHI between 1.500 and 2.500 suggests a *"moderately concentrated market"*, anything above 2.500 is considered a *"highly concentrated market"*.⁷⁹ Regardless of market composition, a change in concentration of below 100 ordinarily requires no further analysis (*"small change in concentration"*). If a merger in a unconcentrated market occurs and the post-merger HHI stays within the confines of an unconcentrated market, the change in concentration is ordinarily not regarded. Thus, in such a market, the proposed merger could exhaust the 100-point threshold without raising any concerns.⁸⁰

Should the post-merger HHI stay within the limits of what is deemed a moderately concentrated market, any change above 100 points *"often warrants scrutiny"*. Should the post-merger HHI exceed the limits of a moderately concentrated market, any delta between 100 and 200 would likely be reviewed, whereas any delta above 200 would most likely be challenged, at least in theory. Even if the thresholds are exceeded, this presumption of *"enhanced market power"* may be refuted by the companies with compelling evidence to the contrary.⁸¹

⁷⁸ Stewart, 2011 , AT&T and T-Mobile Merger Is a Textbook Case - Common Sense, quoting Professor Herbert Hovenkamp

⁷⁹ U.S. Department of Justice and the Federal Trade Commission, 2010 , Horizontal Merger Guidelines (2010), p.19

⁸⁰ Ibid.

⁸¹ Ibid.

3.1.2 Application of HHI in US Antitrust Proceedings

The guidelines provide lots of leeway to all parties. Neither are there binding clauses that disallow mergers on the spot, nor are there definite rules that assure a free pass to certain mergers without further ado. The DoJ and the FTC are free to go beyond the guidelines and challenge any merger as they see fit.

However, the DoJ and the FTC do not get final power to decide on the lawfulness of any merger. In fact, they can only sue in court. The courts then give their ruling on the lawfulness of the merger in question, ideally basing their decision close to the legislative framework, i.e. the guidelines.⁸² Though the guidelines are supposed to be an important reference for the courts, they are not binding since their content is formulated explicitly non-binding to begin with:⁸³

“These Guidelines should be read with the awareness that merger analysis does not consist of uniform application of a single methodology. Rather, it is a fact-specific process through which the Agencies, guided by their extensive experience, apply a range of analytical tools to the reasonably available and reliable evidence to evaluate competitive concerns in a limited period of time.”

The HHI is considered by many to be the starting point of any US antitrust proceeding. However, presence of further factors is required to proceed with any antitrust enforcement.⁸⁴ Reversing this finding suggests that the likelihood of being challenged is minimized if the HHI thresholds are not exceeded.

A survey conducted in 2007 can attest to this line of reasoning. In fact, since 1985 the de facto threshold for authorities to start further investigations lay well over 2.000. In fact, cases with HHIs above 4.000 were regularly closed and not pursued further. The statistical median for closed cases remained around 2.500 between 1985 and 2007.⁸⁵ This finding for one collaborates above remark that mergers are reasonably safe from official contest if their HHI

⁸² Zöttl, 2010 , USA: Auf dem Weg zu neuen Richtlinien für horizontale Fusionen; Brannon and Bradish, 2010, p.1

⁸³ U.S. Department of Justice and the Federal Trade Commission, 2010 , Horizontal Merger Guidelines (2010), p.1

⁸⁴ Ulshöfer, 2015, p.59

⁸⁵ Scheffman et al., 2007 , 20 Years of Merger Guidelines Enforcement at the FTC: An Economic Perspective, p.30

lies below the official limits, even though the guidelines preserve the right to pursue despite meeting the HHI thresholds. On the other hand, the numbers of the survey support the prior discussed mission statement of the Obama administration, namely that antitrust enforcement had been negligent during the previous administration and that there was a severe gap between the guidelines and actual enforcement practices. Keeping this in mind, the numbers of the 2010 revision of the guidelines somewhat seem more appropriate. With these new guidelines, at least this gap is closed a little, which still leaves the question regarding the actual impact of the HHI in antitrust enforcement. Though admittedly published three years prior to the introduction of the new guidelines, the general demeanor of antitrust proceedings may still provide some insights. The survey concludes the part on HHI as follows:

“Thus, consistent with the FTC Merger Statement, these data indicate that the HHI thresholds in the Guidelines, alone, have generally not been determinative in enforcement decisions.”⁸⁶

As to the development of antitrust proceedings following the introduction of the 2010 guidelines, it can be concluded that the emphasis has shifted from mere *“structural remedies”* to *“behavioral remedies”*. Structural remedies are onetime occurrences, usually prohibiting the consummation of mergers altogether. Behavioral remedies take a more ongoing approach, as compliance has to be reviewed continuously. This shift has purportedly moved the antitrust enforcement away from their role as law enforcers and has rather set them up as regulatory agencies.⁸⁷

There is, however, no evidence found that would suggest a change in attitude toward the role of the HHI since the introduction of the current guidelines. Even though the infamous gap between guidelines and practice has been somewhat closed, there was no reason found to assume that the HHI has recently risen above its role as starting point of any investigation or has any say in final determination once an investigation is underway in US American antitrust proceedings. Given the findings of the 2007 study, it still seems reasonable for companies to

⁸⁶ Ibid., p.31

⁸⁷ Shughart and Thomas, 2013, p.1

assume that their mergers are unlikely to be challenged, as long as the HHI stays below the 2.500 threshold.

3.2 HHI in European Antitrust Law

3.2.1 Regulations and Guidelines in European Antitrust Law

Naturally, antitrust proceedings are not exclusive to US American law enforcement. For enterprises interested in entering or already operating in a member state of the European Union, the relevant antitrust authorities are either the European Commission or national antitrust agencies on the respective member state level. For the purpose of this thesis, only the proceedings and guidelines of the European Commission (“EC”) and Germany are reviewed in particular.

Council Regulation (EC) 139/2004

In 2004, some 22 years after the United States had adopted the HHI in their guidelines, European law makers adopted the new Council Regulation (EC) 139/2004. The European Commission has the exclusive right to take on merger review in cases where an EU-wide impact on competition is likely (“*Concentration with a community dimension*”⁸⁸). This EU-wide impact on competition is codified in certain turnover thresholds that have to be crossed in order for the EC to be in charge. If those criteria are not met, the national antitrust agencies can begin inquiries in their own right.⁸⁹ The thresholds are set forth in Council Regulation (EC) No 139/2004, Article 1 (2-3):⁹⁰

“2. A concentration has a Community dimension where:

(a) the combined aggregate worldwide turnover of all the undertakings concerned is more than EUR 5 000 million;

and

(b) the aggregate Community-wide turnover of each of at least two of the undertakings concerned is more than EUR 250 million, unless each of the

⁸⁸ Official Journal of the European Union, 2004a, p.2 Preamble (10)

⁸⁹ Bundeskartellamt, 2004 , Factsheet on the Scope of EU merger control

⁹⁰ Official Journal of the European Union, 2004a

undertakings concerned achieves more than two-thirds of its aggregate Community-wide turnover within one and the same Member State.

3. 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 EUR 2.500 million;

(b) in each of at least three Member States, the combined aggregate turnover of all the undertakings concerned is more than EUR 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 EUR 25 million; and

(d) the aggregate Community-wide turnover of each of at least two of the undertakings concerned is more than EUR 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.”

Summing it up, the Council Regulation grants jurisdiction to the EC if the case under review is both significant in size as well as important to various members states, with no disproportionately high share in turnover in a single member state (“*more than two-thirds*” see above). Arguably, the EC did not wish to interfere, or take away decision power from member states, if those member states were ultimately the most affected by the proposed merger.

Even if the above criteria are met and jurisdiction would remain with the EC, member states may still request referral of the case, if special circumstances apply.⁹¹ Vice-versa, one or more member states can request the EC to take over antitrust proceedings, even if the above criteria are not met and the case would regularly be transferred to the national authorities.⁹² According to Article 4 (5) of the Council Regulation, member states may request a referral to the EC if the proposed merger does not trigger jurisdiction of the EC, yet the merger proposal would be subject to the antitrust authorities of at least three member states at the same

⁹¹ Official Journal of the European Union, 2004a, p.12

⁹² Bundeskartellamt, 2004 , Factsheet on the Scope of EU merger control, p.5; Official Journal of the European Union, 2004a, p.18 Article 22

time.⁹³ This way, a consistent treatment of the merger is possible, as different agencies in different countries would run the chance of delivering different assessments.

Similar to the United States' regulation, merging parties are obligated to register their merger intentions with the EC if the concentration is likely to amount to above discussed Community dimension characteristics. Following this notification, the EC is obligated to examine the case within 25 working days ("*first phase*"). The Commission is left with three options.⁹⁴ Firstly, the EC may conclude that the case falls outside the scope of the EC (Article 6 (1) lit. a). Secondly, the EC may conclude that the intended merger "*does not raise serious doubts as to its compatibility with the common market*" (Article 6 (1) lit. b). In this case the merger may go through without further ado.

As a third option, the Commission may open up a full-grown investigation into the merger, requesting further information (Article 6 (1) lit. c, "*second phase*"). The time limits are extended if referrals to or from national antitrust agencies are involved.

Like the DoJ and FTC across the Atlantic, the EC may allow the merger to go through, with some conditions attached. Such conditions and obligations may require the sale of a specific part of the business that is central to the concerns regarding competition. Other measures insuring competition may also be imposed post-merger.⁹⁵ It stands to reason that this option requires continuous monitoring by the EC. Such continuous review of compliance was regarded as "*behavioral remedies*" earlier, in the context of US American antitrust policy. Analogously to this prior assessment, such practices move the EC's role from law enforcement to regulatory tasks. However, this practice enables the EC (and the DOJ/FTC for that matter) to find some middle way between a simple affirmation on the one hand and a mere prevention of the merger on the other hand. Whether this middle way is regularly used will be discussed in the chapter on application.

Unlike the antitrust agencies in the United States, the EC *does* have final decision power over pending mergers and *does not* have to file a lawsuit with the courts. Of course, this does not

⁹³ Bundeskartellamt, 2004 , Factsheet on the Scope of EU merger control, p.6; Official Journal of the European Union, 2004a, pp.8–9

⁹⁴ Official Journal of the European Union, 2004a, p.10

⁹⁵ Official Journal of the European Union, 2004a, p.10 Article 6 (2)

restrict the merging companies from bringing legal actions themselves, should they not accept the Commission's ruling.

Another essential change in the 2004 Council Regulation is the switch from the so-called "Dominance-Test" to the "SIEC/SLC-Test".⁹⁶ SIEC stands for "*significant impediment of effective competition*", SLC is short for "*substantial lessening of competition*". The terms can be used synonymously. The old EU Merger Regulation dating back to 1990 prohibits mergers that "*create or strengthen a dominant position as a result of which effective competition would be significantly impeded*".⁹⁷ The focus of the old regulation therefore lies on the market dominance, or market structure, not necessarily on competitive effects. Although on its face a dominant market position and the ability to impede competition may fall together on most occasions, some critics argued that "*despite creating or strengthening a dominant position, a merger may lead to welfare gains for consumers in the form of lower prices or increased innovation*".⁹⁸ The other way around, arguably not all impediment of competition requires a dominant market position to begin with.

The newly introduced regulation of 2004 takes a more circumspect stance by disallowing *any* kind of concentration that would impede effective competition. Still, the possibility of this resulting from the forming of a dominant position is still explicitly given as a potential reason:⁹⁹

"A concentration which would significantly impede effective competition, in particular by the creation or strengthening of a dominant position, in the common market or in a substantial part of it shall be declared incompatible with the common market."

Market domination is therefore no longer a necessary requirement to challenge a merger. Arguably, this is closing a gap of under-enforcement where mergers that showed serious anticompetitive effects could not be challenged.¹⁰⁰ The broader approach of the SIEC-Test includes analysis of prices, outputs, efficiencies, and other potentially important factors that

⁹⁶ Röller and De La Mano, 2006, p.9

⁹⁷ Röller and De La Mano, 2006, p.10

⁹⁸ Röller and De La Mano, 2006, p.12

⁹⁹ Official Journal of the European Union, 2004a Article 2(3)

¹⁰⁰ Röller and De La Mano, 2006, p.14

go beyond mere dominance.¹⁰¹ Arguably, this broad stance may cause the Commission to be somewhat less predictable in their decisions. On the other hand, this may be considered a small price to pay if the chance of false negatives becomes smaller¹⁰² and the chance of protecting customer welfare increases.

EC Guidelines and HHI

Similar to the already discussed application of the HHI in the United States, the council regulation sets the legal framework of antitrust proceedings. To fill this framework with life, guidelines were issued shortly after introducing the council regulation in early 2004.¹⁰³ Again, these guidelines are formulated in an open-ended way to give the Commission leeway in its application:

“The purpose of this notice is to provide guidance as to how the Commission assesses concentrations when the undertakings concerned are actual or potential competitors on the same relevant market. In this notice such mergers will be denoted ‘horizontal mergers’. While the notice presents the analytical approach used by the Commission in its appraisal of horizontal mergers it cannot provide details of all possible applications of this approach. The Commission applies the approach described in the notice to the particular facts and circumstances of each case.”¹⁰⁴

Concerning the overall concentration level in a market, the guidelines introduce the HHI as means to “provide useful information” and describes it as an “often applied measure” in competition analysis.¹⁰⁵ Considering the change in testing philosophy from dominance to SIEC-Test, the shifting away from mere market dominance (or market shares) toward a more circumspect process somewhat undercuts the idea of the HHI. With the HHI substantially functioning on the premise of a direct correlation of market dominance and likelihood of competition impediment, it seems fair to argue that the HHI’s probative value was considered

¹⁰¹ Röller and De La Mano, 2006, p.15

¹⁰² Röller and De La Mano, 2006, p.16

¹⁰³ Official Journal of the European Union, 2004b, p.1

¹⁰⁴ Official Journal of the European Union, 2004b, p.1 I (5)

¹⁰⁵ Official Journal of the European Union, 2004b, p.2 III (16)

limited by the lawmakers. Nonetheless, the HHI had been referenced in EC decisions some years prior to its official adoption in the guidelines. The earliest example is supposedly the merger case of Exxon and Mobil.¹⁰⁶ In this particular case, the going forward of the merger was granted under certain restrictions, namely the divestment and sale of certain branches of the business.¹⁰⁷

With regard to HHI thresholds, the EC guidelines share some similarities with the US guidelines. They set forth that the *“Commission is unlikely to identify competition concerns in a market with a post-merger HHI below 1.000.”*¹⁰⁸ At the time of adoption, this *“Safe Harbor Rule”* corresponded directly to the then-active US guidelines.¹⁰⁹ Again, even while considered a *de facto* safe harbor provision, the wording leaves room for further proceedings and does not provide merging companies with legal certainty.

The EC guidelines introduce a second HHI threshold of 2.000 points. Any market between 1.000 and 2.000 points is designated as a market with mild concentration. Within a mildly concentrated market, mergers are ideally only considered critical if the HHI delta exceeds a threshold of 250 points. Like the US guidelines, the EC guidelines use a combination of post-merger HHI and HHI delta.

Finally, a third class of mergers is defined. Any merger that results in a post-merger HHI of 2.000 is considered to move the market into a highly concentrated market. In such cases the guidelines assume a serious level of concentration. Like the second scenario, the merger is likely to be allowed to proceed, if a certain HHI delta is exceeded. This delta is, however, reduced to merely 150 points. Any delta beyond this threshold is theoretically warrants a thorough review and possibly prohibition of the merger.

Given these two different deltas in the second and the third scenario, markets with comparatively mild concentration allow for larger acquisitions. If the HHI scores above 2000, suggesting a noteworthy concentration, the delta of 150 points only allows for small acquisitions. If staying within the confines of 2000 points, mergers can entail a HHI delta of up to 250 points, allowing for larger acquisitions. The EC of course maintains its right to raise

¹⁰⁶ Zöttl, 2010 , Fusionskontrolle: HHI und Marktanteile

¹⁰⁷ European Commission, 1999 , Case No IV/M.1383 EXXON - MOBIL

¹⁰⁸ Official Journal of the European Union, 2004b, p.3

¹⁰⁹ Ulshöfer, 2015, p.60; U.S. Department of Justice and the Federal Trade Commission, 1997 , Horizontal Merger Guidelines (1997)

concerns even without these thresholds crossed, especially if one or more of the following criteria are met:¹¹⁰

- “(a) a merger involves a potential entrant or a recent entrant with a small market share*
- (b) one or more merging parties are important innovators in ways not reflected in market shares*
- (c) there are significant cross-shareholdings among the market participants*
- (d) one of the merging firms is a maverick firm with a high likelihood of disrupting coordinated conduct*
- (e) indications of past or ongoing coordination, or facilitating practices, are present*
- (f) one of the merging parties has a pre-merger market share of 50 % or more”*

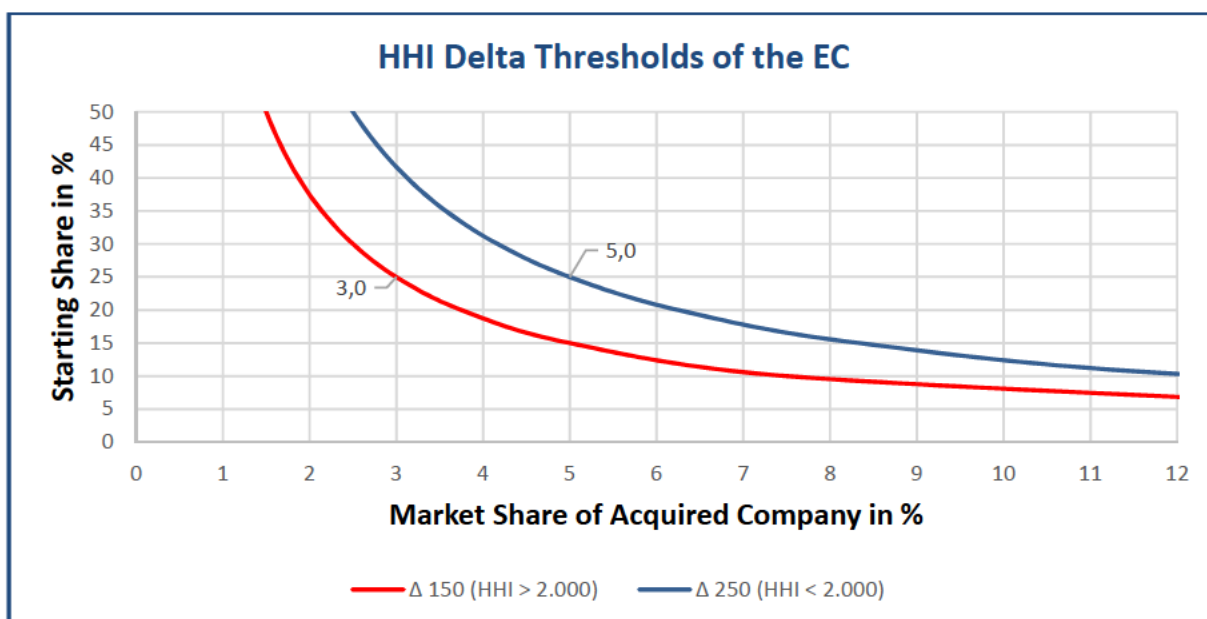
Looking at the HHI delta, the arithmetical simplicity of the concept allows to determine the delta, even if only the market shares of the two merging companies are known. This is done by doubling the product of the market shares of the two merging firms.¹¹¹ The following figure depicts the impact of the delta thresholds:¹¹²

¹¹⁰ Official Journal of the European Union, 2004b, p.3 Paragraph 20

¹¹¹ U.S. Department of Justice and the Federal Trade Commission, 1992 , Horizontal Merger Guidelines (1992), p.16

¹¹² Own depiction, calculations in Appendix 2.5.2.1

Figure 3.2.1.1 HHI Delta Thresholds of the EC



The figure illustrates as to how the exponential effect of the HHI computation is used for the delta thresholds. This might be considered a reason for choosing the adaptation of the Herfindahl scale and not the original Hirschman version. Companies with a larger market share reach these thresholds a lot quicker. For example, a company with a 25% stake in the market is only likely to be exempt from further investigation up to a newly purchased market share of 3% (or 5% if the post-merger HHI still remains under 2.000 points). A company with a starting share of only 15% is likely to be allowed a purchase of another company with a market share of up to 5% (or 8% respectively) without further ado. If these post-merger levels and deltas play a role in practice will be discussed in the following subchapter.

3.2.2 HHI Application in EU Antitrust Proceedings

Looking at the statistics of EC antitrust notifications, the mitigation approach was widely applied.¹¹³ From 1990¹¹⁴ till May 2017, a total of 5.799 cases (88%)¹¹⁵ out of 6.578 notified cases were approved without even opening a second phase investigation. Another 281 cases were resolved during the first phase by imposing obligations. In 246 cases, second phase proceedings were initiated, out of which 122 cases could be resolved by imposing

¹¹³ European Commission, 2017, Merger Statistics as of 31 May 2017

¹¹⁴ Before the adoption of the Council Regulation 139/2004, Council Regulation 4064/89 included a similar process, therefore statistics include cases prior to 2004

¹¹⁵ Disregarding any additional cases that stem from member state referrals

commitments. Only 27 cases were prohibited to go forward all together (0,4% out of all cases reported). The rest of the cases were resolved in another matter, 177 cases alone were withdrawn by the notifying party.¹¹⁶ These statistics show that a simple ban of a merger is a relatively rare occurrence. The mere number of withdrawn cases in itself does not necessarily mean that merging firms withdrew because of the upcoming confrontation with the authorities. Some merger negotiations may have simply failed. However, it can also not be ruled out that the number of prohibited mergers might have increased if not formally withdrawn prior to the ruling.

The chances of merger conditions being imposed, however, rises significantly once a second phase investigation is underway. Once such investigations were initiated, almost half the cases ended up approved under certain conditions (122 out of 246 cases in second phase).

As to the application and importance of the HHI in the proceedings, decisions of the EC were analyzed. Two datasets were taken into consideration. The first group comprises all cases since 2012 that were allowed under certain restrictions in the second phase (28 cases). In comparison, in the same time frame only 7 cases were deemed compatible with the common market, once the second phase had been initiated.

The second group of cases encompasses all the mergers that were prohibited during the second phase in accordance with Article 8 (3) of the regulation (8 cases since 2004). For all cases, the published decisions by the EC were reviewed as to their mentioning of HHI. Arguably the cases in these two groups were the ones scrutinized the most. Out of the many cases brought before the Commission these relatively few cases were reviewed in the second phase. Thus, the concerns about competition rose to the level where the Commission was likely to only allow their going forward under strict obligations or forbid their commencing all together. It stands to reason that in these cases the mentioning of the HHI in general and the reported levels of HHI and HHI delta in particular may provide some insight into the application practices of the European Commission. Deriving from that analysis, companies could potentially ascertain the likelihood of their intended merger being challenged.

¹¹⁶ European Commission, 2017 , Merger Statistics as of 31 May 2017

Article 8(2) Decisions

The first group reviewed concerned the cases that were allowed to proceed under some restrictions. The table below lists the 28 cases and indicates whether the concept of HHI is mentioned in the decision. If such were given, HHI levels and deltas are provided in their respective columns.

Table 3.2.2.1 EC Cases with Imposed Obligations since 2012 (Article 8(2))

Art. 8(2)	Case	Title	HHI in decision	HHI	HHI Delta	Decision Date
1	M.6266	J&J – SYNTHES	no			18.04.2012
2	M.6286	SÜDZUCKER - ED&F MAN	no			16.05.2012
3	M.6410	UTC - GOODRICH	no			26.07.2012
4	M.6458	UNIVERSAL MUSIC GROUP - EMI	no			21.09.2012
5	M.6471	OUTOKUMPU - INOXUM	redacted ¹¹⁷			07.11.2012
6	M.6497	HUTCHISON 3G AUSTRIA - ORANGE AT	yes ¹¹⁸	5000	500-1000	12.12.2012
7	M.6576	MUNKSJÖ - AHLSTROM	yes ¹¹⁹	5500-6500	2000-3000	24.05.2013
8	M.6690	SYNIVERSE – MACH	yes ¹²⁰	redacted	2300	29.05.2013
9	M.6800	PRSFM - STIM - GEMA - JV	no			16.06.2015
10	M.6905	INEOS - SOLVAY – JV	yes ¹²¹	3784-4109	1404-1558	08.05.2014
11	M.6992	HUTCHISON 3G UK – TELEFONICA IE	yes ¹²²	3486	620	28.05.2014
12	M.7000	LIBERTY GLOBAL - ZIGGO	no			10.10.2014
13	M.7018	TELEFONICA DEUTSCHLAND - E-PLUS	yes ¹²³	3500	1200	02.07.2014
14	M.7061	HUNTSMAN CORP. - ROCKWOOD	no			10.09.2014
15	M.7194	LIBERTY GLOBAL - CORELIO - W&W	no			24.02.2015
16	M.7265	ZIMMER – BIOMET	no			30.03.2015
17	M.7278	GENERAL ELECTRIC - ALSTOM	yes ¹²⁴	3933-4150	1308-1403	08.09.2015
18	M.7292	DEMB - MONDELEZ - CHARGER OPCO	no			05.05.2015
19	M.7408	CARGILL - ADM CHOCOLATE BUSINESS	n/a			17.07.2015
20	M.7421	ORANGE – JAZZTEL	yes ¹²⁵	3157-3273	370-461	19.05.2015
21	M.7555	STAPLES - OFFICE DEPOT	no			10.02.2016
22	M.7567	BALL – REXAMli	no			15.01.2016
23	M.7637	LIBERTY GLOBAL - BASE BELGIUM	yes ¹²⁶	3000-3500	500	04.02.2016
24	M.7724	ASL – ARIANESPACE	n/a			20.07.2016
25	M.7758	HUTCHISON 3G ITALY - WIND - JV	yes ¹²⁷	3000-4000	500-1000	01.09.2016
26	M.7801	WABTEC - FAIVELEY TRANSPORT	n/a			04.10.2016
27	M.7932	DOW – DUPONT	n/a			27.03.2017
28	M.7962	CHEMCHINA - SYNGENTA	redacted ¹²⁸			05.04.2017

¹¹⁷ European Commission, 2012 , Case No M.6471 OUTOKUMPU - INOXUM, p.71

¹¹⁸ European Commission, 2012 , Case No M.6497 HUTCHISON 3G AUSTRIA - ORANGE AUSTRIA, p.37

¹¹⁹ European Commission, 2013 , Case No M.6576 MUNKSJÖ - AHLSTROM, p.109

¹²⁰ European Commission, 2013 , Case No M.6690 SYNIVERSE - MACH, p.44

¹²¹ European Commission, 2014 , Case No M.6905 INEOS - SOLVAY - JV, p.125

¹²² European Commission, 2014 , Case No M.6992 HUTCHISON 3G UK - TELEFONICA IRELAND, p.52

¹²³ European Commission, 2014 , Case No M.7018 TELEFONICA DEUTSCHLAND - E-PLUS, p.61

¹²⁴ European Commission, 2015 , Case No M.7278 GENERAL ELECTRIC - ALSTOM (THERMAL POWER - RENEWABLE POWER & GRID BUSINESS), p.103

¹²⁵ European Commission, 2015 , Case No M.7421 ORANGE - JAZZTEL, p.44

¹²⁶ European Commission, 2016 , Case No M.7637 LIBERTY GLOBAL - BASE BELGIUM, p.51

¹²⁷ European Commission, 2016 , Case No M.7758 HUTCHISON 3G ITALY - WIND - JV, p.80

¹²⁸ European Commission, 2017 , Case No M.7962 CHEMCHINA - SYNGENTA, pp.86–88

Out of these 28 cases, decisions on 4 cases were not published at the time of writing (“n/a”). Out of these 24 remaining cases, half of the decisions (12 cases) make reference to the HHI concept. In 2 of these 12 cases, the HHI figures are not disclosed publicly, leaving 10 cases with explicit information on HHI levels.

On initial review, this sample already exhibits some interesting results. In 6 out of the 12 cases mentioning HHI (50%), the merging companies are (wireless) telecommunication providers (marked green in the table). For one, this shows a disproportionately high occurrence of cases concerning this particular line of business. Arguably, this does not necessarily come as a surprise. Given the high entry barriers associated with the telecommunication sector and the already limited number of service providers (one might even consider this market to be a “*natural oligopoly*”),¹²⁹ the large number of mergers under second phase reviews should be expected. With regards to the application of the HHI however, the use of the index in decisions regarding the telecommunication business seems to be much more common than in other sectors. In fact, in *all* cases regarding wireless telecommunication, the HHI is used (6 out of 6).¹³⁰ Although the HHI is also used in other sectors, this imbalance is noteworthy. This holds true even though the number of telecommunication cases is already high. Yet still the use of HHI in this sector is likely not coincidental.

Considering the weaknesses of the HHI outlined in an earlier subchapter, it stands to reason that the frequent use of HHI in the telecommunication sector, and the infrequent use in other sectors for that matter, is not arbitrary. As discussed before, one of the central challenges in applying the HHI is a proper market definition. To that end, the Commission has to assess product differentiation and the ability of customers to substitute products. The Commission has to evaluate whether two products of the two merging companies are close enough substitutes to be counted within one market.¹³¹ Although the guidelines suggest some ways to measure the “*degree of substitutability*”, naturally such assessments can never amount to exact quantifiable science and are rather judgement calls on qualitative analysis. Some

¹²⁹ Valletti, 2003

¹³⁰ Although the two Liberty Global cases “Ziggo” and “Corelio” also concern telecommunications, the focus of these mergers was on the cable network business, thus the cases were not grouped with the other 6 cases.

¹³¹ Official Journal of the European Union, 2004b, p.4 Paragraph 27-30

necessary assumptions may just come down to opinion. The guidelines suggest a couple of instruments to make the assessment as objective as possible:¹³²

- Customer preference surveys
- Analysis of purchasing patterns
- Estimation of the cross-price elasticities
- Diversion ratios

However, it stands to reason that these tools will regularly not provide an irrefutable assessment of the market definition. In absence of an undisputed market definition, any further discussion on exact and therefore reliable HHI calculations is moot. This problem might be a contributing factor for the Commission not to put the HHI in some of their decisions.

Looking again at the telecommunication sector and the respective decisions, the problem of substitutability and market definition might not be as paramount. Comparably, the telecommunication market consists of fairly homogeneous services with little product differentiation between different providers. The argument of inadequate market definition might be hard to make by the merging firms. With a likely uncontested market definition at hand, the Commission might have more confidence in using the HHI in their official decisions. Subsequently, an argument might be made that the homogeneity of the services or products provided has influence on whether or not the HHI is useful in the Commissions assessments. This coherence between homogenous goods and the publication of the HHI may be substantiated by looking at the remaining cases. As discussed before, 6 out of 12 cases referencing the HHI concern wireless telecommunication enterprises. The remaining 6 cases are from different sectors.

The first out of these 6 cases involves companies in the steel industry.¹³³ The second case concerns a merger of companies in the paper industry.¹³⁴ The third case has strong ties to the telecommunication sector and involves two companies invested in services and hardware required by telecommunication providers.¹³⁵ The fourth case involves companies in the

¹³² Official Journal of the European Union, 2004b, p.4 Paragraph 29

¹³³ European Commission, 2012 , Case No M.6471 OUTOKUMPU - INOXUM

¹³⁴ European Commission, 2013 , Case No M.6576 MUNKSJÖ - AHLSTROM

¹³⁵ European Commission, 2013 , Case No M.6690 SYNIVERSE - MACH

petroleum sector.¹³⁶ The fifth case concerns two companies in the industry of manufacturing turbines for renewable energy power generation.¹³⁷ The remaining merger decision mentioning the HHI refers to two companies producing agrochemical products.¹³⁸

It seems fair to conclude that the majority of these sectors (i.e. steel, chemicals, paper, and petroleum) deal in fairly homogeneous goods. To define precise market outlines for these particular mergers would not appear to be an insurmountable objective.

To see whether the application practices of the HHI are truly coherent with high levels of product homogeneity, the characteristics of the remaining cases not mentioning the HHI were reviewed. In 12 cases with decisions on record the HHI was not used. Out of these 12 cases only 3 concerned industries where homogeneity of goods might be assumed, namely cases M.6286 (manufacturing of sugar), M.7061 (manufacturing of chemicals), and M.7567 (manufacturing of light metal packaging). Following the above hypothesis, the HHI should have been used in these cases. The remaining 9 cases however, support the hypothesis. The sectors in these particular cases all rather deal with a diverse set of goods, for example music publishing labels, or companies manufacturing highly specialized medical and dental instruments.

In conclusion, there is indeed some evidence supporting the existence of a link between the use of the HHI in official decisions and the homogeneity of goods. Arguably, the challenge of drawing undisputable market lines discourages the Commission to officially argue their case based on HHI numbers. As to what extent the Commission relies on the index internally during preliminary stages can of course not be answered by this assessment. Internally it might still be a helpful tool, even if exact market confines are not established beyond a doubt.

A further observation that might be made is that the distribution of HHI in the decisions is spread evenly throughout the years. Accordingly, there does not seem to have been a change in attitude toward using the HHI in decisions. After all, the most likely pattern in HHI application seems to be the connection between homogeneous goods and the subsequent ability to define markets.

¹³⁶ European Commission, 2014 , Case No M.6905 INEOS - SOLVAY - JV

¹³⁷ European Commission, 2015 , Case No M.7278 GENERAL ELECTRIC - ALSTOM (THERMAL POWER - RENEWABLE POWER & GRID BUSINESS)

¹³⁸ European Commission, 2017 , Case No M.7962 CHEMCHINA - SYNGENTA

HHI levels in 8(2) decisions

After shedding some light on the application patterns, the question about actual HHI levels seems worth looking at. Following the EC guidelines, all mergers with a post-merger HHI of more than 2.000 should raise serious concerns with the Commission, given that the HHI delta exceeds 150 points. Whether these thresholds actually come close to the reality of actual antitrust proceedings remains to be seen.

Looking at the table covering the decisions under Article 8(2) since 2012, it becomes obvious that the thresholds provided in the guidelines are regularly exceeded significantly. Without going into further detail on individual cases and commitments, this divergence between guidelines and actual proceedings is rather noteworthy. In fact, no merger on record in the reviewed time period shows a HHI of less than 3.000 points. The average post-merger HHI of this sample rather lies between 3.500 and 4.000. One particular merger even exhibits an index of up to 6.500 points.

Regarding the HHI delta, the results are just as remarkable. The decisions on record show deltas of even up to 3.000 points. But even the regularly reported deltas between 500-1.000 points exceed the threshold of 150 points manifold. Again, all these mergers were allowed to go through, even if some commitments by the merging companies were required. Yet, it must not be omitted that the obligations in most cases entailed the sale of particularly critical parts of the businesses. The actual post-merger HHI and HHI deltas after implementation of such commitments may therefore have been smaller in the respective cases. The levels reported in the table have therefore be regarded as worst-case scenarios under which commitments were deemed necessary in the first place. Still the reported levels significantly exceed the theoretical guideline limits.

As a takeaway, it seems reasonable to assume that most mergers are unlikely to be contested as long as they stay below 2.500-3.000 points and 500 points in delta. At the same time, this assessment puts the relevance of the HHI levels in the guidelines in question. It does, however, come close to the applied levels in US American enforcement.

As stated above, the Commission can also affirm a merger proposal with some conditions during the first phase. To make sure that the application of the HHI in these critical first phase decisions is not entirely different from the application during the second phase, a sample of conditioned first phase approvals was reviewed. This review shows that the HHI is not used in

the official decisions for first phase assessments. Between January 2016 and June 2017, a total of 37 cases were allowed to proceed with some obligations attached, following Article 6(1)lit.b of the Council Regulation. Out of these 37 decisions not a single one referenced the HHI.¹³⁹ Supposedly, while the Commission may have actually deployed the HHI in its internal review, difficulties to ascertain exact market outlines and numbers may have kept the Commission from publishing any HHI figures this early into the investigation. Hence, in the first phase of Commission review, the HHI arguably may regularly not overcome its role as a rough starting point.

Article 8(3) Decisions and HHI Levels

In the above subsection, the decisions following Article 8(2) are discussed in detail. The cases subjected to this article all were allowed to go forward under certain restrictions. But the Council Regulation also includes the possibility of shutting down the proposed mergers all together. Since the adoption of the new regulation in 2004, only 8 cases were prohibited under Article 8(3).¹⁴⁰ The table below lists the relevant cases:

Table 3.2.2.2 EC Prohibited Cases since 2004(Article 8(3))

Art. 8(3)	Case	Title	HHI in decision	HHI	HHI Delta	Decision Date
1	M.4439	RYANAIR - AER LINGUS	yes ¹⁴¹	6000-6500	3000-3500	27.06.2007
2	M.5830	OLYMPIC - AEGEAN AIRLINES	no			26.01.2011
3	M.6166	DEUTSCHE BÖRSE - NYSE EURONEXT	no			01.02.2012
4	M.6570	UPS - TNT EXPRESS	no			30.01.2013
5	M.6663	RYANAIR - AER LINGUS III	yes ¹⁴²	5009-5035		27.02.2013
6	M.7612	HUTCHISON 3G UK - TELEFONICA UK	redacted ¹⁴³			11.05.2016
7	M.7878	HEIDELBERGCEMENT - SCHWENK - CEMEX HUNGARY - CEMEX CROATIA	n/a			05.04.2017
8	M.7995	DEUTSCHE BÖRSE - LONDON STOCK EXCHANGE GROUP	n/a			29.03.2017

Although the reviewed number of cases is fairly limited in comparison, some patterns can be established. The airline industry seems to be particularly affected by the regulation. While

¹³⁹ European Commission, n.d. , Search competition cases, Cases 6(1)lit.b Jan 2016-June 2017

¹⁴⁰ European Commission, n.d. , Search competition cases

¹⁴¹ European Commission, 2007 , Case No M.4439 RYANAIR - AER LINGUS, p.83

¹⁴² European Commission, 2013 , Case No M.6663 RYANAIR - AER LINGUS III, p.117

¹⁴³ European Commission, 2016 , Case No M.7612 HUTCHISON 3G UK - TELEFONICA UK, pp.102–103

airline enterprises were not amongst the reviewed mergers under Article 8(2) at all, 3 out of 8 cases that were prohibited und Article 8(3) concern the airline industry. Two of those cases even involve the very same companies (Ryanair and Aer Lingus). Furthermore, the wireless telecommunication industry is represented once again. Hutchison had already been subject of half the telecommunication cases under 8(2) decisions. Two further cases involve “*Deutsche Börse*”, Germany’s leading stock exchange.

Looking at the industries in this section, it is noteworthy that the goods produced and services offered all seem to be rather homogeneous in kind. Following the above developed rationale, the frequent use of the HHI should be expected. This is, however, not the case. Only 6 out of 8 decisions are publishes for further assessment. In 3 out of these 6 cases the HHI mentioned, but it is redacted in one of these cases. The remaining two cases both involve the merger attempts of the two companies Ryanair and Aer Lingus. Both merger attempts were shut down, six years apart. The first time Ryanair and Air Lingus filed for a merger in 2007, the Commission prohibited the commencing of the merger, referencing a post-merger HHI of affected markets between 6.000-6.500 and a HHI delta of 3.000-3.500. The second time the merger was prohibited in 2013, arguing HHI post-merger levels of around 5.000.

Being mindful of the highest HHI scores under Article 8(2) cases, these numbers do not appear to be overly extreme. But they are well above the average of those Article 8(2) cases. This again shows the limits of the HHI concept. Some cases were possible to go forward by imposing conditions. These conditions for the most part consist of commitments to divest very specific parts of the enterprises. This way the consumers in particularly concentrated (sub)markets are protected by surgical cuts, yet also the interests of the companies to go forward with the merger are accounted for.

It would appear that in the case of the comparatively few prohibited mergers such surgically imposed conditions could not satisfy consumer protection concerns. Looking at the press release following the 2007 prohibition of the airline merger, it becomes visible were mere divestment would have probably proved insufficient:¹⁴⁴

¹⁴⁴ European Commission, 2007 , Commission prohibits Ryanair’s proposed takeover of Aer Lingus

“The Commission’s extensive in-depth investigation [...] showed that Aer Lingus and Ryanair currently compete directly with each other on 35 routes to and from Ireland. On 22 of these routes, the merger would have left customers with a monopoly. On the remaining routes, Aer Lingus and Ryanair are each other’s closest competitors, and the merger would have significantly reduced consumer choice, with the merged entity holding market shares of over 60%.”

The second Ryanair decision showed similar reasoning,¹⁴⁵ so does the third airline decision regarding “Aegean Airlines” and “Olympic Airlines” which attest to a “quasi-monopoly on the Greek air transport market” in case of commencement of the merger.¹⁴⁶ The term “monopoly” is also used in two further prohibition decisions. In the case of “Deutsche Börse” and “NYSE Euronext” the Commission Vice President concluded that “the merger would have led to a near-monopoly in European financial derivatives worldwide.”¹⁴⁷ In another instance concerning Deutsche Börse’s merger with the “London Stock Exchange”, the Commission similarly stated that the merger “would have significantly reduced competition by creating a de facto monopoly in the crucial area of clearing of fixed income instruments.”¹⁴⁸

Summing it up, in 5 out of 7¹⁴⁹ prohibition cases the press releases use the term monopoly. In these cases, a severe impediment of market competition was apparently obvious. In fact, the only case that is neither designated as a potential monopoly nor is argued based on the HHI is the case of “UPS” and “TNT Express”.

Preliminary Results of HHI Application by the EC

At first glance, the developed hypothesis of a suspected correlation of HHI usage and homogeneity of goods and services could not be substantiated further by the results in the subchapter on merger prohibitions. After all, the industries affected by the Article 8(3) prohibitions could quite well be considered to deal in homogeneous goods and services, such

¹⁴⁵ European Commission, 2013 , Commission prohibits Ryanair’s proposed takeover of Aer Lingus

¹⁴⁶ European Commission, 2011 , Commission blocks proposed merger between Aegean Airlines and Olympic Air

¹⁴⁷ European Commission, 2012 , Commission blocks proposed merger between Deutsche Börse and NYSE Euronext

¹⁴⁸ European Commission, 2017 , Commission blocks proposed merger between Deutsche Börse and London Stock Exchange

¹⁴⁹ The case of “HeidelbergCement” is disregarded because the decision was not published at the time of writing. Thus, it can only be concluded that the term “monopoly” was not used in the press release. Whether the HHI will be part of the final documentation of the decision remains to be seen.

as financial services, air travel, and parcel services. Arguably, the cases where a merger would have resulted in or close to a monopoly may have rendered the need for a HHI analysis obsolete. Again, the HHI had been developed by Hirschman and Herfindahl to analyze complex market compositions. Their goal was to condense various market shapes into a comparable index figure. If a monopoly becomes obvious at first sight, further analysis using the HHI seems rather pointless, as results will cross the thresholds many times over in any case. The lack of more frequent use of HHI in prohibited mergers may thus be explained. However, the available sample of only 8 cases is probably too small for a final determination.

In conclusion, the observed correlation between HHI usage and homogeneous services and goods seems to be sufficiently substantiated by the findings set forth in the subchapter on conditional mergers.

With regards to critical levels usually applied by the European Commission, the observed practices are similar to the practices of the Commission's counterpart in the United States. Like DoJ and FTC, the Commission regularly did not impose conditions on mergers during the second phase review if the post-merger HHI scored below 2.500-3.000 points or below 500 points in HHI delta. The higher thresholds set forth in the EC guidelines are therefore somewhat lower than the actual application practice.

3.3 HHI in German Antitrust Law

3.3.1 Regulations and Guidelines in German Antitrust Law

Not all merger cases in the European Union fall under the jurisdiction of the European Commission. If the cases concern companies in Germany and the cases do not meet the turnover thresholds of Article 1 of the EU's Council Regulation No 139/2004 (as discussed in the previous subchapter), the case is reviewed by the German Antitrust Office "*Bundeskartellamt*" ("*BKartA*").

The relevant legislation in Germany concerning cartel and antitrust proceedings is the "*Act against Restraints of Competition*" ("*Gesetz gegen Wettbewerbsbeschränkungen*", "*GWB*"). The act dates back to 1957.¹⁵⁰ Since then, it has undergone nine amendments, the last coming into effect in 2017.¹⁵¹ Regarding its relationship to legislation of the European Union, the sixth

¹⁵⁰ Deutscher Bundestag, 1957

¹⁵¹ Hausding, 2017, Deutscher Bundestag - Bundestag beschließt Änderungen im Wettbewerbsrecht

(1998) and the seventh (2005) amendment of the GWB already included a high degree of harmonization in the areas like collusion and price fixing. The harmonization did, however, not go as far as to harmonize horizontal merger and market abuse regulations at that point in time.¹⁵² On EU level, horizontal mergers had been central to the 2004 Council Regulation, as was discussed earlier.

Following the seventh amendment of the GWB, critics suspected that further harmonization in the areas of mergers and market abuse was only a matter of time. Especially the SIEC-Test was expected to be integrated into German legislation, as it had been previously introduced into EU legislation.¹⁵³ Although later than some had expected, the eighth amendment of the GWB in 2013 finally harmonized the testing philosophy to the SIEC-Test. Other aspects of the act remained without harmonization, such as the privilege of the Federal Minister of Economics and Technology to overrule a decision by the BKartA.¹⁵⁴ This *“Ministerial Authorization”* was only recently invoked by the Minister of Economics in 2016 in the case of *“Kaiser’s Tengelmann”* and *“EDEKA”*.¹⁵⁵ Four years after the eighth amendment of the GWB, the act was again reworked in 2017. This ninth amendment focused on collusion and abuse prevention in digital markets. This particular aspect had not been properly covered until then.¹⁵⁶

The seventh chapter of the GWB deals with the *“Control of Concentrations”*. In general, only mergers crossing certain thresholds are governed by the GWB. If these thresholds are not crossed, the GWB does not apply. The central provision on applicability, Article 35(1), reads as follows:

- “(1) The provisions on the control of concentrations shall apply if in the last business year preceding the concentration*
- 1. the combined aggregate worldwide turnover of all the undertakings concerned was more than EUR 500 million, and*

¹⁵² Zimmer et al., 2007, p.424

¹⁵³ Zimmer et al., 2007, p.425

¹⁵⁴ Bürger and Lehmann, 2013, Das neue deutsche Kartellgesetz - Änderungen durch die 8. GWB Novelle

¹⁵⁵ Bundesministerium für Wirtschaft und Energie, 2016, Die Ministererlaubnis im Fall Edeka - Kaiser’s Tengelmann

¹⁵⁶ Bundesministerium für Wirtschaft und Energie, 2017, 9. GWB-Novelle - ein modernes Wettbewerbsrecht im Zeitalter der Digitalisierung

2. *the domestic turnover of at least one undertaking concerned was more than EUR 25 million and that of another undertaking concerned was more than EUR 5 million.*¹⁵⁷

At this point a look back on the thresholds set forth by the European Council Regulation seems helpful. As discussed earlier, an EC investigation is regularly triggered if a combined aggregate worldwide turnover of EUR 5.000 million is exceeded. Accordingly, any merger showing an aggregate turnover between EUR 500 and 5.000 million is regularly reviewed domestically by the BKartA. Should the above mentioned turnover thresholds not be exceeded, the merger cannot be prohibited by the BKartA. This is a noteworthy difference to the United States. In the US, the FTC is free to challenge *any* merger, not just those exhibiting a certain turnover dimension. Arguably, this disregard for smaller transactions by the GWB unburdens the BKartA at the expense of potential market abuse in these smaller markets. Especially in young industries, competition impeding mergers may therefore follow through without any further ado.

Should the proposed merger fall under the jurisdiction of the BKartA, the concentration may be prohibited for reasons similar to the EC and FTC approach:

*“A concentration which would significantly impede effective competition, in particular a concentration which is expected to create or strengthen a dominant position, shall be prohibited by the Bundeskartellamt.”*¹⁵⁸

It is rather obvious that this provision is almost identical to the European piece of legislation. Again the *“significant impediment of competition”* is a vital prerequisite for prohibition. Though *“a dominant position”* is once more mentioned as a likely driver for such impediment. It is, however, by no means a necessary precondition for prohibition. This fine distinction illustrates the change in German legislation from the *Dominance Test* over to the previously discussed *SIEC-Test*.

¹⁵⁷ Deutscher Bundestag, 2014 , Act against Restraints of Competition §35(1)

¹⁵⁸ Deutscher Bundestag, 2014 , Act against Restraints of Competition §36(1)

Although the GWB explicitly allows for reasons beyond mere market dominance, the matter of market dominance plays a prominent role with regard to prohibition of potentially harmful mergers. The GWB goes as far as to provide specific thresholds of market shares at which market dominance should be assumed. In this regard, the German legislation sticks somewhat out. The previously discussed legislations in the United States and the European Union content themselves with rather vague vocabulary. It is only in the corresponding guidelines where specific thresholds and interpretations are provided. In the case of the German GWB the assumption of market dominance based on market share is set forth in Article 18(4; 6):¹⁵⁹

“(4) An undertaking is presumed to be dominant if it has a market share of at least 40 per cent.

[...]

(6) A number of undertakings is presumed to be dominant if it

- 1. consists of three or fewer undertakings reaching a combined market share of 50 per cent, or*
- 2. consists of five or fewer undertakings reaching a combined market share of two thirds.”*

Transposing those market share thresholds into likely HHI equivalents, it becomes apparent that the GWB has a similar understanding of critical concentration like the European and US American guidelines. Any market with a market participant holding more than a 40% market share already exhibits a HHI beyond 1.600¹⁶⁰. Assuming that the rest of the market shares would most likely not be equally distributed amongst a large number of competitors, that HHI score would most likely increase into areas were both US American (2.500 points) and European (2.000) guidelines would already suspect a serious level of market concentration.¹⁶¹ Although giving rather precise definitions for market dominance thresholds, the GWB does not make any mention of the HHI. In this regard, the German act is the same as the European and the US legislation.

¹⁵⁹ Deutscher Bundestag, 2014 , Act against Restraints of Competition §18(4;6)

¹⁶⁰ 40²

¹⁶¹ The HHI would for example already amount to 2.200 if the remaining 60% of the market were shared among six equally sized competitors (40²+6*(10²)=2.200)

3.3.2 Application of HHI in German Antitrust Proceedings

As discussed in the preceding subchapter, the HHI has no part in the GWB. Yet just like its foreign equivalents, the Bundeskartellamt makes use of a set of guidelines to bring the GWB to life and to provide transparency. The last set of guidelines were released in March 2012, just before the last major harmonization (8th amendment in 2013) with the EU legislation. Yet again, the guidelines come with a disclaimer attached, allowing the BKartA to render decisions as *they see fit*:

“Not all the criteria mentioned in this document play a role or are accorded the same importance in every merger case. In addition, it may become necessary to refine the analytical concept outlined in the guidance document in light of future developments in the BKartA’s case practice. Therefore, the text cannot claim to be exhaustive nor does it conflict with possible further developments in the BKartA’s practice.”¹⁶²

Although the harmonization process between European and German legislation has progressed significantly, not all instruments and practices have been synchronized to date. With regard to the HHI, only a partial harmonization has occurred. As reviewed above, specific market share thresholds are the corner stone of market dominance assumptions in the German legislation. In fact, the HHI is only regarded once in § 33 of the German guidelines:

“The level of concentration in a market and the distribution of market shares can be illustrated by means of the Herfindahl-Hirschman Index (HHI). [...] The BKartA has not set any presumptions based on particular HHI levels or changes in HHI levels, given that the legislator has chosen to use market share levels for the presumptions contained in the GWB. However, in cases where the HHI appears to be helpful as a short-hand for concentration levels it can be included in the overall assessment.”¹⁶³

¹⁶² Bundeskartellamt, 2012 , Guidance on Substantive Merger Control, p.1

¹⁶³ Bundeskartellamt, 2012 , Guidance on Substantive Merger Control, p.13 Paragraph 33

This paragraph underlines the rather subordinated role of the HHI in German antitrust proceedings. The HHI is only assigned a supporting role, the focus remains with the dominance assumption thresholds set forth in the GWB. It does not come as a surprise that the HHI apparently also wasn't paid any mind prior to the official incorporation of the HHI into the guidelines.¹⁶⁴

To assess whether the assumed subordination does in fact exist, critical merger cases were researched with focus on any note on the HHI. Since the adoption of the new guidelines in March 2013, merely 10 cases were scrutinized by the Bundeskartellamt up to a degree where the cases were only allowed to go forward with conditions attached or where they had to be prohibited all together. The following table list these cases:¹⁶⁵

Table 3.3.2.1 Bundeskartellamt Cases: Prohibitions and Conditional Approvals

#	Case No.	Title	Industry	Decision	Datum
1	B2-51-16	REWE - Coop ¹⁶⁶	Groceries	Approval with conditions	28.10.2016
2	B9-48-15	Wessels & Müller SE - Trost ¹⁶⁷	Automotive	Approval with conditions	13.08.2015
3	B2-96-14	Edeka - Kaiser's Tengelman ¹⁶⁸	Groceries	Prohibition	31.03.2015
4	B3-135-13	Klinikum Esslingen - Kreiskliniken Esslingen ¹⁶⁹	Hospitals	Prohibition	14.05.2014
5	B6-98-13	Axel Springer SE - Funke Mediengruppe ¹⁷⁰	Print Media	Approval with conditions	25.04.2014
6	B4-18-13	Brink's - Prosegur Compania de Seguridad ¹⁷¹	Cash Management	Approval with conditions	18.07.2013
7	B3-132-12	Asklepios Kliniken - Rhön-Klinikum ¹⁷²	Hospitals	Approval with conditions	12.03.2013
8	B7-70-12	Tele Columbus - Kabel Deutschland ¹⁷³	Telecommunication	Prohibition	22.02.2013
9	B3-64-12	Lenzing AG - Kelheim Hygiene Fibres GmbH ¹⁷⁴	Fabrics and Fibres	Prohibition	22.11.2012
10	B3-43-12	Klinikum Worms GmbH - HDV ¹⁷⁵	Hospitals	Prohibition	05.09.2012

¹⁶⁴ Beninca and Zschocke, 2007, p.179

¹⁶⁵ Bundeskartellamt, n.d., Entscheidungsdatenbank

¹⁶⁶ Bundeskartellamt, 2016, Case No B2-51-16 REWE - Coop

¹⁶⁷ Bundeskartellamt, 2015, Case No B9-48-15 Wessels & Müller SE - Trost Auto

¹⁶⁸ Bundeskartellamt, 2015, Case No B2-96-14 Edeka - Kaiser's Tengelman

¹⁶⁹ Bundeskartellamt, 2014, Case No B3-135-13 Klinikum Esslingen - Kreiskliniken Esslingen

¹⁷⁰ Bundeskartellamt, 2014, Case No B6-98-13 Axel Springer SE - Funke Mediengruppe

¹⁷¹ Bundeskartellamt, 2013, Case No B4-18-13 Brink's - Prosegur Compania de Seguridad

¹⁷² Bundeskartellamt, 2013, Case No B3-132-12 Asklepios Kliniken - Rhön-Klinikum

¹⁷³ Bundeskartellamt, 2013, Case No B7-70-12 Tele Columbus - Kabel Deutschland

¹⁷⁴ Bundeskartellamt, 2012, Case No B3-64-12 Lenzing AG - Kelheim Hygiene Fibres GmbH

¹⁷⁵ Bundeskartellamt, 2012, Case No B3-43-12 Klinikum Worms GmbH - HDV

In none of these 10 decisions on record the HHI is mentioned or introduced as evidence to substantiate the decision of the BKartA. The subordination of HHI in German antitrust proceedings therefore apparently does not only exist in the legislation but also in the actual application practice. This is a noteworthy difference between German and European Commission proceedings.

3.3.3 HHI levels in the German Production Sector

Although the BKartA does not rely on the HHI in a meaningful manner, another German public body apparently deems the HHI important enough to include it in some of its publications. The German Federal Statistical Office (*“Statistisches Bundesamt”*) regularly issues figures on market performance and market composition of the German production sector. The biyearly publication was last updated in 2016, featuring numbers of 2013 and 2014. Among other measures, the publication also includes concentration information measured in HHI. Interestingly enough, the Statistical Office again uses a different scaling and computation method. As discussed in previous chapters, the scaling method of the HHI has been a matter of disputes and no common standard could thus far be established. Any interpretation has therefore to be mindful of the scaling used. In the case of the Statistical Office the following formula was used:

$$HHI = \frac{1000}{X^2} * \sum_i^n x_i^2$$

With X being the sum of all market shares and x_i being the market share of country i

The HHIs given by the Statistical Office amount to exactly $\frac{1}{10}$ when compared to the definition of HHI used by the antitrust agencies.¹⁷⁶ The scale therefore has its upper limit at 1.000 points, not 10.000. There is no reasoning given as to why the Office diverts from the calculation method used by the BKartA.

The table below shows the numbers of the aggregated main divisions of the German production sector, following the official numbering.¹⁷⁷ The HHI figures have been adjusted to the predominantly used scaling in this thesis (upper limit 10.000).

¹⁷⁶ The first part of the formula will always amount to $\frac{1.000}{10.000} = \frac{1}{10}$, the rest of the formula remains the same

¹⁷⁷ Statistisches Bundesamt, 2008, Klassifikation der Wirtschaftszweige 2008 (WZ 2008)

Table 3.3.3.1 HHI in the German Production Sector¹⁷⁸

HHI in the German Production Sector		2013			2014		
Nr.	Sector	Turnover in MEUR	HHI	HHI Rank	Turnover in MEUR	HHI	HHI Rank
19	Manufacture of coke and refined petroleum	97.336	2.389	1	89.136	2.358	1
12	Manufacture of tobacco products	17.773	1.928	2	18.523	2.006	2
09	Mining support service activities	417	1.213	3	379	1.208	3
29	Manufacture of motor vehicles	387.005	1.083	4	395.768	1.082	4
15	Manufacture of leather and related products	3.234	661	7	3.452	965	5
27	Manufacture of electrical equipment	106.768	861	5	109.517	860	6
30	Manufacture of other transport equipment	34.180	781	6	39.554	789	7
21	Manufacture of basic pharmaceutical products	45.294	561	8	47.453	583	8
20	Manufacture of chemicals and chemical products	157.312	341	9	153.462	368	9
14	Manufacture of wearing apparel	7.457	328	10	7.663	350	10
11	Manufacture of beverages	19.707	259	11	19.989	253	11
33	Repair and installation of machinery and equipment	29.947	234	12	30.513	247	12
24	Manufacture of basic metals	95.794	210	13	93.720	208	13
26	Manufacture of computer, electronic and optical products	64.154	141	15	66.954	150	14
32	Other manufacturing	24.914	141	15	26.369	147	15
31	Manufacture of furniture	17.606	109	17	18.040	114	16
08	Other mining and quarrying	4.669	156	14	4.828	111	17
28	Manufacture of machinery and equipment n.e.c.	222.504	68	20	234.569	79	18
13	Manufacture of textiles	11.059	85	18	11.301	79	19
17	Manufacture of paper and paper products	38.661	68	19	38.438	68	20
18	Printing and reproduction of recorded media	15.232	59	22	15.121	63	21
16	Manufacture of wood and of products of wood	18.778	62	21	19.130	60	22
22	Manufacture of rubber and plastic products	74.890	56	23	76.623	52	23
23	Manufacture of other non-metallic mineral products	39.832	45	24	40.123	40	24
10	Manufacture of food products	159.054	37	25	154.366	33	25
25	Manufacture of fabricated metal products	103.276	11	26	105.879	10	26
05	Mining of coal and lignite	2.447	n/a	n/a	2.220	n/a	n/a
06	Extraction of crude petroleum and natural gas	3.031	n/a	n/a	2.921	n/a	n/a
07	Mining of metal ores	n/a	n/a	n/a	n/a	n/a	n/a
	Minimum	417	11		379	10	
	Quartil 25	14.189	68		14.166	71	
	Quartil 50	32.063	183		34.475	179	
	Quartil 75	96.179	636		90.282	738	
	Maximum	387.005	2.389		395.768	2.358	
	Mean	64.369	457		65.215	472	

It is worth noticing that the maximum HHI lies at only a little more than 2.300 points. Compared to the cases reviewed earlier, these numbers appear to be rather moderate. Still, these aggregate numbers do not shed light on potentially higher concentrations in submarkets. Some submarket may exhibit significantly higher concentration than the aggregate numbers suggest.

Nonetheless, it may on average be argued that the HHI is higher, the higher the homogeneity of the products offered. Looking at the top 5 sectors, all sectors arguably deal in relatively homogeneous goods. On the other hand, the bottom of the list exhibits products where a high degree of heterogeneity may be suspected. Also, the mean of 472 and the median of 179 are

¹⁷⁸ Statistisches Bundesamt, 2016 , Konzentrationsstatistische Daten für das Verarbeitende Gewerbe, den Bergbau und die Gewinnung von Steinen und Erden sowie für das Baugewerbe 2013/2014, pp.50–67

quite far apart, suggesting extreme values on the top end of the list. Subsequently, most subsectors of the production sector do not seem to regularly exhibit high HHIs. This finding also corresponds to the earlier reviewed merger cases. Companies from the production sector were seldom subject of these proceedings. One of these few examples is the top-ranking subsector of refined petroleum, which also sticks out in the above list.

Essentially, a prior finding is substantiated. As already proposed during the subchapters on antitrust cases, there seems to be a correlation between a higher HHI and the homogeneity of products. Markets with similar products seem to attract businesses to merge with or acquire other companies. Arguably, this might be due to scaling effects. Vice versa, a company may not be interested in further acquisitions, if products are highly differentiated and economies of scale cannot be realized. From this postulation, some insights on market entry strategy may be derived. If a market exhibits a high HHI, companies may already make some assertions about other aspects of the market, e.g. product homogeneity and potential for economies of scale. Especially if a market does not exhibit this expected correlation of high HHI and homogeneity of products, this market may be of particular interest. This train of thought will be picked up in the next chapter.

3.4 Evaluation of Hypothesis 1

After reviewing the merger legislation as well as the actual application with focus on the HHI, the first hypothesis can be assessed. The first hypothesis was formulated as follows:

***H1:** The HHI as a measure of market concentration is not suited to describe market power up to a degree at which antitrust officials should substantially base their merger assessment upon it.*

After the previous review of theory and application practice of the HHI, this hypothesis cannot be universally confirmed, although some criticism about the HHI appears to be warranted. For one, the computation method of the HHI remains to some extent arbitrary. There is no mathematical derivation to support the construction of the index in this particular manner. As Herfindahl admits, it is purely “*heuristic*”. On the other hand, the premise of an exponentially rising risk of market impediment given an increase in concentration seems to be sufficiently

established. Yet it may not be disregarded that the assessment of competition conformity by authorities is undoubtedly a multidimensional task. This multidimensional task is hardly covered by a single KPI. Though a high level of concentration may in fact indicate a potentially hazardous level of dominance, this dominance is not a prerequisite for market impeding behavior. The recent legislation in the reviewed jurisdictions acknowledges as much and shifted away from assessments purely focused on market dominance. The HHI therefore can by definition not be regularly central to the decision process.

Besides the theoretical shortcomings, the apparent application of the HHI in antitrust proceedings seems also to be limited by controversial market definitions. An exact market definition is paramount. In lack of such, the calculation of HHI cannot amount to a degree of probative value.

Considering above arguments, the hypothesis should be confirmed without reservations. There are, however, constellations in which the HHI can prove valuable in decision making. If the issue of market definition can be overcome, the HHI can be used. The application practices by the European Commission confirm as much. In its decisions, the Commission regularly used the HHI when companies in question offered homogeneous goods or services. This correlation of homogeneity and HHI usage is quite noteworthy. Arguably, homogeneity in products or services allows a rather undisputed market definition, hence overcoming the major problem of HHI application.

The hypothesis can therefore be confirmed and the use of HHI as means of decision making should be discouraged in most cases, unless the reviewed companies offer homogenous goods or services. In those constellations, the HHI may yet prove to be of same value for antitrust proceedings.

4 Application of the HHI in Market Entry Strategy Design

4.1 Market Entry Strategies

4.1.1 Motivation to enter New Markets

At the end of chapter three, conclusions about the practicability of the HHI in official merger proceedings were drawn. Essentially, an argument was made that a promising application of the HHI could only be expected under very narrow circumstances and that the use of HHI was arguably often made impractical by the lack of exact market definitions. Without precise market confines, there cannot be satisfactory probative value by means of the HHI. Yet undoubtedly, regardless of how the market is ultimately defined, the HHI provides insight into market composition and market characteristics. Therefore, the private application of the HHI may yet render fruitful results, as a means to quickly compare different markets.

It stands to reason that the particular problem of undisputed market definition is only paramount for official purposes, where the burden of proof resides with the authorities. In private application however, the market definition is not a matter of dispute. Any enterprise vetting markets may define markets at it sees fit. It comes down to a judgement call. Should the chosen market definition result in an unsuccessful business endeavor, the company itself is responsible for the misstep. In this case, the deciding party is the same party that has to suffer the consequences. In official application, this is not the case. The authorities get to define the market, but the resulting consequences have to be borne by others, namely the enterprises.

On the other hand, imperfect market definitions may still be tolerated in private application, as long as the overall tendency remains accurate. Such imprecision would not be tolerated in official proceedings. In private business however, risk taking and decision making under imperfect or incomplete information is not only common but the rule.

The question of market entry or internationalization is primarily driven by the objectives a company is pursuing as well as the risk a company is willing to take. While the risk factor is closely linked to the entry mode the company may select, the pursued objective dictates the

part of the business that should be subject to the internationalization. Dunning names and explains three main categories of objectives:¹⁷⁹

Resource-Seeking Objectives

One possible motivation for venturing abroad is the wish to secure a cost-efficient supply of raw materials or the wish to optimize cost by using physical infrastructure or by exploiting lower wage cost. This kind of objective is most likely concerned with the procurement, production, and logistic division of an enterprise.

Market-Seeking Objectives

Another motivation to enter a new market or to internationalize a business is the promise to find new clients and sell existing or new products to them. Arguably, the most likely concerned business division is the sales division.

Efficiency-Seeking Objectives

Lastly, a company may be motivated to internationalize in order to improve the efficiency of its processes. Center to this objective are regularly the wish to improve the economies of scale. Although this kind of objective seems to be similar to the resource-seeking category above, there are some differences. Although they may indeed render the same result at times, on other occasions they may contradict each other. For example, if only the resource-seeking objective would be followed, a decentralized structure in many countries might be the result, making use of cheap labor and short distances to different markets. In such a decentralized structure, no economies of scale could be achieved. Sometimes the efficiency of a centralized structure will outperform local advantages in wages and logistics.

Once the objective is stipulated, the parts of the business that will be affected by this objective need to be identified. Consequently, the actual market entry mode has to be designed. It is noteworthy that the definition of “market” is directly dependent on the kind of objective chosen. If the internationalization is driven by a market-seeking objective, the market in question is obviously the market for products or services offered by the enterprise. But if the objective is efficiency- or resource-seeking, the markets of concern are different ones. In this

¹⁷⁹ Dunning, 1993, pp.139–148

case the company does not have to review the market itself competes in, but rather the markets it has to purchase from, e.g. the local labor market, the local market for raw materials and machinery, as well as the local logistic market. Depending on whether the company is planning to compete in the market, or merely purchase from it, directly translates into desirable market characteristics. These desired market characteristics also depend on the attitude toward risk exhibited by the expanding company, something that will be taken up once more later on. If the company wishes to compete in a new market, different market entry modes are suitable, depending on the attitude towards risk. These will be discussed in the upcoming subchapter.

4.1.2 Market Entry Modes

After determining the target markets, the enterprise has to become self-aware of the risk it is willing to take when entering a new market. Schmid sums up the criteria that drive market entry decision as follows:¹⁸⁰

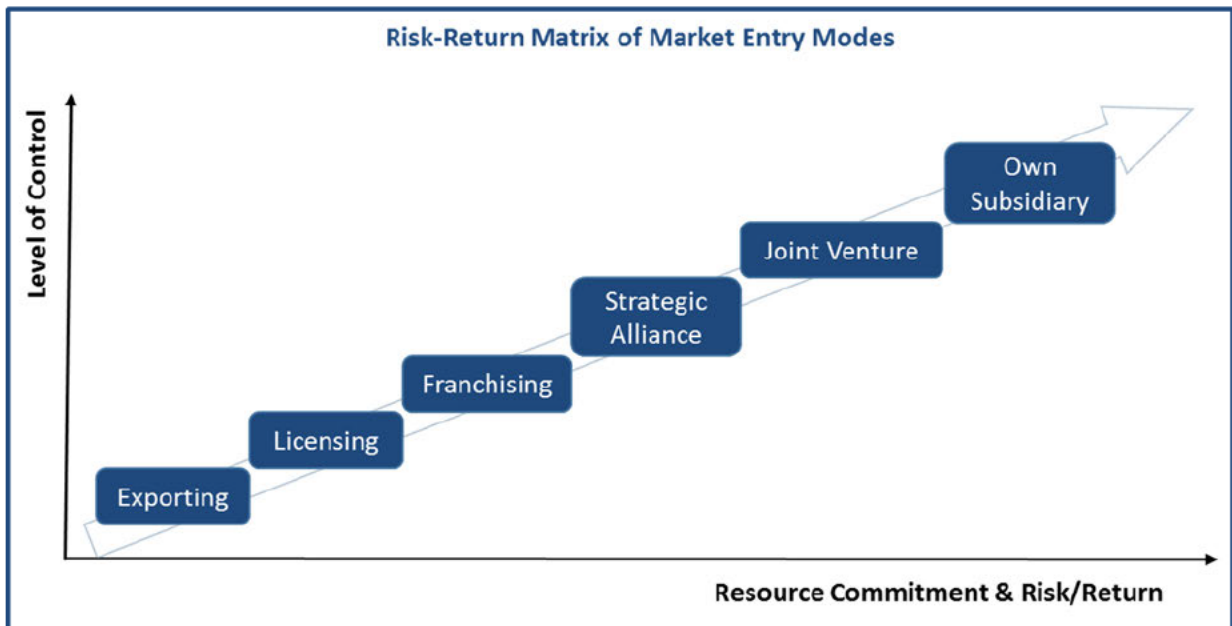
“Numerous criteria play an important role in choosing the appropriate market entry strategy, such as resource consumption, reversibility, flexibility, speed, possibilities for control and increased rivalry.”

In a way, all these different criteria can be translated into risk. A higher capital exposure or higher resource consumption translates to higher risk than a lower exposure would. Ideally, such commitment should result in more possibilities for control. If reversibility and flexibility are decreased, the risk is increased. Naturally, a higher risk should also potentially promise higher returns. Depending on the risk-return disposition of an enterprise, the fitting entry mode is chosen. These various modes are displayed in below figure as a risk-return matrix. Subsequently the main characteristics of these modes are discussed to illustrate their position in the matrix.¹⁸¹

¹⁸⁰ Schmid, 2009, p.14

¹⁸¹ Schmid, 2009, pp.13–14

Figure 4.1.2.1 Risk-Return Matrix of Market Entry Modes¹⁸²



Exporting

Exporting is the most basic method to sell goods or service abroad. The variant requiring the least involvement is called “*indirect exporting*”. This variant does not even require the internationalizing company to export itself, but makes use of a domestic intermediary that handles all the necessary steps to handle and distribute the goods. If the company sells its goods directly to foreign customers or via foreign intermediaries the method is regarded as “*direct exporting*”. Inherent to exporting is a low level of resource commitment but also a low level of control as the successful exporting is reliant on other parties and intermediaries. At the same time, the levels of flexibility and reversibility are high.

Licensing

A little more control than with exporting comes with the option of licensing. In licensing, a foreign company (licensee) is given permission to use certain assets, such as patents, trademarks, copyrights, or know-how. In exchange, the company is paid royalties. The resource commitment is slightly higher than with exporting, the risk is slightly increased. Among others, the risk of industrial espionage and the risk of a worsening reputation are

¹⁸² own depiction, adapted and enhanced from Sternquist, 2007

critical, should the licensee willing or unwittingly not meet the required standards or misappropriate confidential information.

Franchising

Franchising is similar to licensing, but takes the involvement a step further. Besides mere technology and trademarks, whole company structures and concepts are taken over by the franchisee. Especially in retail, a company may choose to internationalize this way because economic risk is limited and most of the immediate economic risk is taken on by the franchisee. At the same time, the risk of reputation and industrial espionage are further increased. From the customer's perspective, the difference between an original store and a franchise store will not be obvious. Any misconduct thus may therefore negatively impact both franchisor and franchisee.

Strategic Alliance

In strategic alliances, multiple companies (from different countries) work together in clearly outlined domains to achieve common goals. The partners see eye-to-eye and the relationship is set up for the long term. The increase in risk mainly stems from the commitments made to the other partners and the limited flexibility and limited reversibility. Prominent examples for strategic alliances can be found in the aviation industry.

Joint Venture

If not only contractual commitments are made between companies (as in strategic alliances), but rather a legal entity is formed to pursue a business opportunity abroad, this entry mode is called a joint venture. Resource commitment is fairly high, but also the level of control is increased significantly. The rise in risk stems from the long-term commitment and the economic risks taken on. A joint venture is usually set up with equal partners, but of course the purchase of a minority stake in a company is also a viable solution to make a market entry.

Own Subsidiary

The highest level of control can be achieved with creating a wholly owned subsidiary. At the same time, this of course also means the highest level of risk. The subsidiary requires the highest level of resource commitment and the decision to create an own subsidiary also is the hardest to go back from. Economically speaking, unshared control over a subsidiary also

provides the chance for high returns. A milder option is to simply form a branch in a foreign country without creating a legal entity in this country. Undoubtedly the most complicated and risky, but in some cases also most promising, method to enter a new market is by merging with another company to gain access to another country or another domestic market.

Of course, these different entry modes all exhibit many facets that can be further explored in detail. For the purpose of this thesis, however, the many subvariants and hybrid forms will not be focused upon. Paramount to this thesis is simply the reciprocity principle between risk affinity and suitable strategy.

4.1.3 Differences between the Service and the Manufacturing Sector

Although the afore discussed archetypes of market entry can be regarded as universally applicable across all businesses, an argument can be made that suitability of certain strategies might be limited for some enterprises. Following the arguments of Buckley et al.,¹⁸³ one important distinction between enterprises is the grouping into the service and the manufacturing sector. Buckley et al. state that *“it would not be false to assume that the greater the degree of intangible elements the more likelihood there of foreign expansion strategies differing from those traditionally associated with product manufacturing.”*¹⁸⁴

Central to their supposition are some distinct differences in product delivery and ultimately sources for customer satisfaction. The manufacturing industry relies on physical, tangible goods at the center of their product portfolio. Although customer service and other intangible components are also (necessary) parts of the portfolio, the most important factor in customer satisfaction is the physical product itself. In case of the service industry, however, physical components are only of subordinated significance. Instead, the service is central to whether or not the customer is satisfied.¹⁸⁵

Although the ways of internationalizing service firms will in general differ from those of manufacturing enterprises, different kinds of services also warrant different approaches in internationalization or new market entry. Boddewyn et al. propose a conceptual framework with three attributes. They differentiate services by the degree to which services are

¹⁸³ Buckley et al., 1992

¹⁸⁴ Buckley et al., 1992, p.40

¹⁸⁵ Ibid.

embodied in physical goods, the degree of tradability, as well as the degree of inseparability in provision of the service. Accordingly, they propose three general types of services:¹⁸⁶

1. Service commodities, which are distinct from their production process, are tradeable across national boundaries and are thus exportable;
2. Where the production cannot be separated from consumption as in the case of legal advice, a foreign presence is necessary;
3. Where services comprise a mix of distinct commodities and location-bound service elements, some location substitution is possible.

It may be argued that a service where performing of the service and consumption of the service occur simultaneously (low degree of separability), some modes of internationalization may not be suitable at all. In case of a low degree of separability, entry modes like exporting cannot be realized. In fact, Buckley concludes that *“those services which do not require direct contact between supplier and consumer, are the only services which can be exported as distinct from those which demand movement of factors of production to the consumer (e.g. repair services) or movement of the consumer to factors of production (e.g. tourism).”*¹⁸⁷

In turn, any service requiring direct contact with the consumer at least in part of the service has to opt for an entry mode that goes among mere exporting. Again, the general trade-offs between the different entry modes apply. If a company in the service sector is reluctant to dive into a long-term commitment or shies away from the massive financial exposure of a wholly owned subsidiary or a joint venture, licensing or franchising may be options. It is not unreasonable to argue, however, that the customer satisfaction of a service involving direct interpersonal contact between consumer and service provider is strongly dependent on the skills of the person. While the use of technological know-how or brand names can be broken down precisely in licensing agreements, the many nuances of a personally provided service may be somewhat harder to replicate with external partners. Quality control is arguably harder to quantify with services than it is with manufactured goods.

Consequently, Buckley argues that the most appropriate course of action for services requiring a lot of interpersonal interaction (e.g. legal advisory) is the forming of own branches or own

¹⁸⁶ Boddewyn et al., 1986 in Buckley et al., 1992, p.41

¹⁸⁷ Buckley et al., 1992, p.41

subsidiaries abroad. Both risk-affinity and the just described sector specific constraints already form substantial influence factors in picking a market entry mode. Whether the HHI can make a meaningful contribution under these circumstances is yet to be seen.

4.2 HHI as a Tool of Market Entry Strategy Design

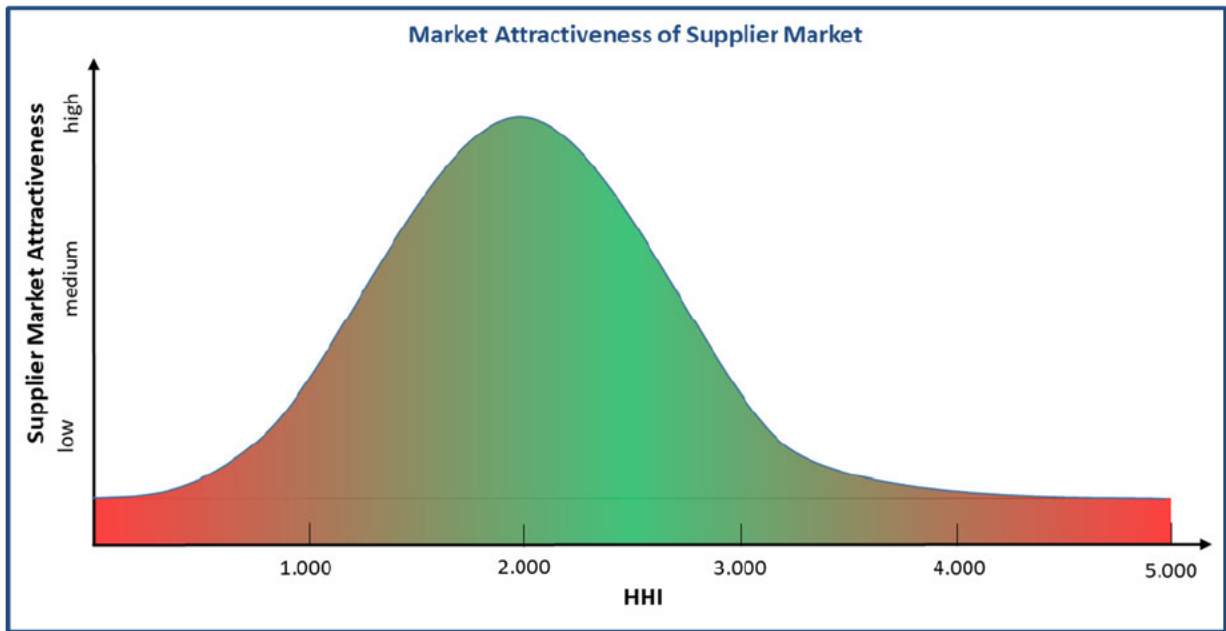
4.2.1 HHI under Resource- and Efficiency-Driven Motivation

When introducing the different motivations for internationalizing, two motives deal with the company as a new customer in the foreign market, not a new supplier. A company in the mission of cost cutting by looking for cheaper resources (e.g. labor, raw materials), will concern itself with the markets for those resources in demand. It will not concern itself with the market of the product they ultimately produce themselves, which does not even necessarily have to be sold in the foreign country at all. The perspective on the resource markets is therefore one of a customer, not a supplier. It may be argued that the desired market parameters may therefore be rather different from what they might be for a potential new supplier in the market.

In detail, any new supplier is likely to favor a market with certain market imperfections that may be exploited on the supply side. A company looking to purchase goods or services on a market, however, will favor a reliable and predictable market with close to perfect competition and a high degree of efficiency. In chapter two and three, different market compositions were discussed. In a very fragmented market the chance of collusion between different suppliers is comparatively small. Given a large number of small market participants, impediments like price fixing are arguably no likely to be present. On the other hand, such a fragmented market holds little promise with regards to efficiencies stemming from economies of scale. Ultimately, the lack of cost efficiencies may lead to higher prices. In a less fragmented, yet still competitive market, such cost advantages are more likely to translate into price cuts. The other way around, it is not unreasonable to assume that cost advantages will be higher in markets with only very few competitors. At this stage however, the chance of collusion is significantly increased and cost advantages may no longer result in decreased prices. Market dominance of the few suppliers in the market will most likely create market imperfections. It therefore stands to reason that any company motivated to go abroad because of cheaper resources should look for a country where the market in question exhibits a level of

fragmentation that suggests both the presence of cost efficiencies, as well as the absence of suppliers with potentially abusive market positions. Induced by the theoretical principles of the HHI as well as the results from HHI application in mergers, the following bell-shaped diagram is proposed.

Figure 4.2.1.1 Market Attractiveness of Supplier Market



As explained above, a very fragmented market with many suppliers will exhibit a relatively small HHI. The assumed absence of significant economies of scale in this configuration arguably result in a low degree of attractiveness of the market. It is further proposed that an increasing of the HHI translates to a higher attractiveness of the market, at least until a certain point. Following the findings of the reviewed HHI application in mergers, it is suggested that at a level of 2.000 HHI points the competition is regularly regarded by the authorities as relatively unthreatened by market abuse. This stands in contrast to the reviewed guidelines, which already assume a critical chance of competition impediment at this HHI level. In practice however, regulatory actions were usually taken at HHI levels well beyond 2.500 or 3.000 (see chapter three). Assuming that the authorities are actually correct in doing so, the level of 2.000 is considered the level where the threat of competition impediment is regularly not significant. At the same time, the level of cost advantages is already relatively high and the room for price cuts may reach its peak. Summing this up, it is suggested that, at least on average, the attractiveness of a supplier market is maximized at 2.000 points HHI. Going back to the

interpretation tool of equal market shares, this level translates to around five equally sized companies. Of course, the actual market composition may differ, but only within reason.

Above 2.000 points the likelihood of competition impediment is increasing and the attractiveness of the market correspondingly decreases, an assumption that falls in line with the application practice of the authorities. Should the market actually exhibit significantly increased HHI levels, the chances of being put at a disadvantage by colluding companies is increased up to an extent where resource- or efficiency-seeking will not be reachable.

Certainly, this generalization does not cover all potential market configurations. Should a company look for a new supplier in a market where economies of scale are only of subordinated interest, it may be advisable to look for a highly fragmented market where market power of the purchaser may be exploited. Also in this scenario, the HHI may be used to identify this high degree of fragmentation.

4.2.2 HHI under Market-Driven Motivation

Should a company vet the option of actually entering a new market as a supplier, the desired market configuration may differ completely from the preferred market conditions under resource-driven motivation. Two important drivers for selecting the fitting market entry strategy were already identified. For one, the disposition toward risk and the expectations about the level of control already narrow the choices for market entry. Secondly, the mere sector of interest may already dictate, or rather exclude certain options. Namely, the differences between the manufacturing and the service sector were discussed. It may thus be argued that these two chief factors already render any attempt of exclusively linking certain HHI levels to certain entry modes moot. There may yet still be some plausible correlations that may point in a promising direction, at least under the right circumstances. Assuming that the disposition toward risk is known and certain sector-specific limitations are considered, the HHI might be a helpful tool to assess the viability of the different entry mode options.

Markets with a High Entry Barrier

Arguably, any market exhibiting such a high entry barrier does require significant investment, involvement and thus willingness to assume risks. One motivation to follow a risky approach by entering such a market may be the promise that an existing high entry barrier may preclude other potential competitors from entering the market as well. The HHI might be used to

confirm the presence of such a high entry barrier. Or more precisely, the HHI disproves the existence of a low entry barrier. A low level of HHI would suggest that smaller market participants are in fact active in the market. The higher the HHI gets, the less likely it becomes to encounter a significant number of smaller companies. This in turn suggests that smaller companies are de facto precluded from entering the market. Accordingly, many companies shy away or are simply not able to employ a risky strategy, such as creating a joint venture, opening up a branch, or creating a wholly owned subsidiary. Following this rationale, a high degree of HHI may lead to the necessity of assuming greater risks in entering. Simple exporting in a market with high entry barriers may not be viable. Of course, the market size is also a factor. Relative to all endeavors of the company, exposure is arguably a function of funds required and risks assumed. Companies may therefore be more inclined to assume necessary risks in smaller markets as the overall exposure is relatively limited.

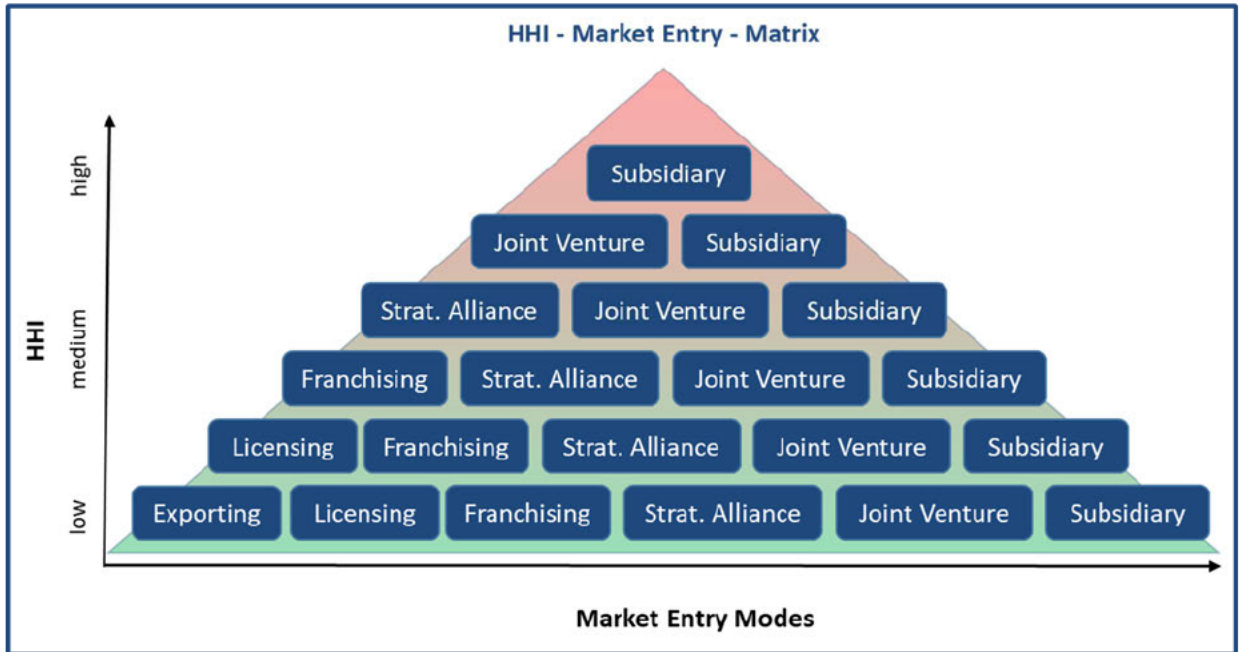
Markets with a low entry barrier

The other way around, a low level of HHI suggests the presence of smaller companies in the market. The entry barrier level is thus arguably little. In establishing this, the available options for entering the market may be derived. While a high level of HHI arguably leaves the company with only few options within the high-risk sector, a low level of HHI does not necessitate the employment of a low risk / low involvement strategy. In fact, a low level of HHI may merely be interpreted in a way that all options are on the table and the selected strategy is ultimately linked to the risk disposition. If the market in question exhibits a low entry barrier, the internationalizing company may therefore reasonably pick any mode between simple exporting and founding a subsidiary.

Market Entry Matrix under certain HHI levels

Following this line of reasoning, the HHI may not be employed to determine *the* correct entry mode, but rather may be employed to determine which entry mode(s) should *not* be taken. Using the logical link between HHI level and market entry barrier, the following matrix is proposed:

Figure 4.2.2.1 HHI - Market Entry - Matrix



The matrix shows how the amount of viable options gets more and more limited with an increasing HHI. Of course, regardless of the HHI other restrictions may still take precedence over this simple function. For example, even with a small HHI it may not be advisable for a company in the service industry to enter a market by mere exporting, regardless of other factors. It goes without saying that exceptions are of course possible. Should a company have exploited significant cost advantages in another country already, exporting for example may still be an option if the offered price is competitive to that of the local competitors, even if those are dominant in terms of market share.

Identifying Market Opportunities

Besides this approach of establishing the set of viable market entry methods, another method of employing the HHI may be suggested. A good part of the third chapter was spent on identifying patterns in which authorities saw fit to reference the HHI in their merger review decisions. It was established that the HHI was regularly used in cases where the offered product was very homogeneous in nature. All in all, cases about homogeneous goods were in fact comparatively plentiful. This is not in itself surprising since the production of homogeneous goods or rendering of homogeneous services holds the promise of economies of scale. It is therefore to be expected that markets for homogeneous goods and services are

prone to be served by a few, but large enterprises. This in turn leads to the observed frequency in antitrust proceedings.

This correlation infers two suggestions. For one, a company dealing in homogeneous goods may therefore make the assumption that the potential market is already fairly concentrated and therefore exhibits a high HHI. Following this train of thought and the prior suggested HHI-Market-Entry-Matrix, a company dealing in homogenous goods may therefore also assume that any market entry will most likely require a high level of involvement and thus a high level of risk. The other way around, a company serving markets with rather heterogenous goods may be faced with a whole set of market entry options, as the HHI in such markets may arguably be smaller. Overall, the viable entry methods are logically linked with the level of homogeneity. Using this link, a company does not even have to explicitly devote time and resources to employing the HHI as long as it is self-aware of the level of homogeneity of its products.

The second suggestion that may be deduced from the connection of HHI and level of product homogeneity is of a more opportunistic nature. Instead of trying to use the HHI as a means of selecting the right entry mode for an already selected market, the HHI may also be used to vet different markets to determine whether the market is even worth entering. In detail, the assumed correlation of market concentration and product homogeneity may be exploited. A multitude of markets might be scanned to identify a discrepancy between the expected high HHI level of a market with homogenous goods and the actually measured HHIs. If a certain market or submarket displays a low level HHI although the market is subject to a high level of good homogeneity, this market may be worth a second look. Such a constellation may hold opportunities to realize unused efficiencies. Considering all the above limitations however, the HHI should probably never be the only means to substantiate a decision in private application, just as this is not the case in official merger proceedings.

4.3 Evaluation of Hypothesis 2

While the first part was concerned with the official application by government authorities, the second part discussed a potential field of application in the private sector. In detail, logical links between specific levels of HHI and certain market entry modes were looked for. After all, the first part had identified the HHI to be of rather limited use. The second hypothesis was formulated as follows:

H2: *The HHI is a powerful and cost-efficient indicator for expanding enterprises to determine the attractiveness of potential new markets and can be utilized as a starting point to choose the best suited market entry strategy.*

Other than with the first hypothesis, the second hypothesis may rather be answered in favor of the HHI concept. Some logical links between market composition, service sector and manufacturing sector, as well as the level of homogeneity of goods could be established. A line of reasoning was created to show a relationship between these market parameters and HHI levels. But it should not be omitted that these logical links are limited and only work under specific circumstances. Furthermore, the level of HHI rather logically excludes certain entry modes, thus narrowing down the choices. The level of HHI did not, however, serve as means to identify the best entry mode. That decision is still rather subject to other factors, such as the level of risk affinity. Like the hypothesis suggests, the HHI therefore arguably does not rise above a status of a potential starting point. But besides using the HHI to pick a market entry mode, the HHI may have some value in identifying potential markets in the first place. This might be done by scanning potential markets for unexpected discrepancies in market composition. The use of HHI also may prove suitable in another area. If a company is not looking to enter a new market as a new supplier itself but is rather looking to exploit cheaper resources abroad, the HHI may come in handy. In such a constellation, the HHI may help to identify a promising equilibrium between threat of collusion and potential of market efficiency. All in all, the second hypothesis can therefore be confirmed. The HHI does seem to have some potential as a quick scanning tool in expansions, even though other factors such as risk affinity and desired level of control seem to have greater bearing on the matter.

5 Conclusion

5.1 Summary and Key Findings

5.1.1 Summary

In total, the thesis covered three major aspects surrounding the Herfindahl-Hirschman-Index. For one, origin and the basic principles of the HHI were discussed, going over strengths and weaknesses. Secondly, the official use of the HHI in US American, European, and German merger legislation was reviewed. Both legislative framework as well as actual application was touched upon. Thirdly, a potential use of the HHI in private application was looked at.

Origin and principle of the HHI

The HHI was originally devised during the Second World War to identify harmful dependencies of smaller countries in international trade. The originator of the HHI, Albert Hirschman, was looking to provide evidence as to the connection of trading patterns and national relative power. He deemed identifying such potentially abusive trading patterns as crucial to the effort of preventing another devastating war.

The index was later reused by other economists to identify the level of monopolization in the market place. The general principle was still that of summing up the squared market shares. This way, larger market participants were attributed with market power exponential to their market share.

Proponents of the index point out the arithmetical simplicity, allowing for quick and widespread application. Central counter arguments against the index is the difficulty of coming up with precise market definitions, something that is of utmost importance if the index is to have some probative value in antitrust proceedings.

In 1982 the HHI was introduced into the US American antitrust proceedings. More than 20 years later the European and the German authorities also adapted the HHI. By now the guidelines are somewhat harmonized with regards to the proposed HHI levels.

Official Application of the HHI in Antitrust Proceedings

The HHI in official application has recently been faced with some criticism. For example, the German Bundeskartellamt never adopted the habit of linking certain HHI levels with assumptions about the market composition. Within the US, critics have argued that the

probative value of the index is limited due to improper market definitions and that the actual antitrust decisions have been out of touch with the guidelines, rendering them somewhat pointless.

A review of the recent merger cases in the European Union and in Germany revealed two things. For one, analogously to the criticism in the US, the HHI levels in cases that were conditionally allowed forward already exhibited HHI levels well beyond the proposed levels in the guidelines. Enforcement of the guidelines may therefore be considered lax. Secondly, the chance of the HHI being used in the official rulings is correlating to the level of homogeneity of the products in the considered market. Also, the number of cases concerning markets with a high level of homogeneity were disproportionately abundant.

Using the HHI in Devising a Market Entry Strategy

Besides the official application of the HHI, a potential use in the private sector was discussed. Although other factors play a more important role in designing a market entry strategy, the HHI may prove useful in narrowing down the suitable options. If a company is looking to acquire resources abroad, the HHI may furthermore be employed to identify markets that exhibit a promising balance between potentially low prices stemming from cost efficiencies and the chance of falling victim to market abuse by dominant market participants. Lastly, the HHI may be used to identify promising new markets, that display discrepancies between expected and actual level of concentration.

5.1.2 Key Findings

Considering the first hypothesis, the HHI does in fact only seem to be of limited use in official antitrust proceedings. The application is only suitable under specific circumstances, where the central problem of market definition can be overcome. If this obstacle cannot be pushed out of the way, the HHI can hardly hold any probative value. Under the right circumstances, however, the HHI does appear to be a valid starting point for merger reviews. The first hypothesis is therefore only partially confirmed.

Considering the second hypothesis, the HHI may help to narrow down choices for market entry strategy design. It does, however, not point in the direction of a specific entry strategy. Its usefulness beyond the mere starting point is therefore arguably limited. The HHI may be used in identifying new potential markets, where the level of homogeneity of products do not

seem to correspond with the level of expected concentration. The second hypothesis is therefore confirmed.

5.2 Critical Acclaim

Throughout this thesis, different aspects about theoretical concept, the public, and private application of the HHI were covered, making use of several research methods. Depending on aspect covered and method employed, some limitations need to be considered.

Theoretical Approach

When covering the theoretical approach toward HHI, mostly literature based research was conducted. The arithmetical concept was discussed, yet although the arbitrariness was pointed out by the originators, no further effort was spent on assessing the reasons behind the way the originators devised the index. There was also no discussion on how the index may be extended, or amended, or how numerical evidence might be obtained retroactively, that would allow to prove or disprove the suitability of the index as a means to visualize the level of monopolization, or market power. No comparison was drawn between the HHI and other arithmetical approaches.

Official Application

Central to the chapter on official application of HHI was the comparison between the official guidelines and the actual rendered decisions. Out of the multitude of cases the European Commission had to concern itself with in the past, only a few cases were reviewed to ascertain application patterns of the HHI. Only cases that were not decided within the first phase and were later allowed to go forward under certain restrictions or prohibited all together in the second phase were discussed and scanned for HHI levels. Although it is reasonable to assume that cases going through the second phase were more likely to be critical with regard to competition impediment and thus more likely to involve information about HHI application patterns, it cannot be ruled out that cases decided during the first phase were also subjected to a HHI testing. Those rulings were not reviewed. It seems unlikely, however, that, if at all existent, any HHI pattern would be different from those cases ruled upon during the second phase.

Furthermore, the conditions that allowed the reviewed cases to go forward were not reviewed one by one on a detailed basis. This may explain some of the found extreme values. As shown in the respective chapter, some of the HHI values found were of rather extreme nature, yet the cases were allowed to proceed regardless. It stands to reason that these extraordinary levels of concentration were the subject of some of the applied conditions, mitigating the risk of competition impediment. The research merely sought to find patterns in application by establishing an overview of the bandwidth of decisions, ultimately allowing to propose an average.

Private Application

The last part of this thesis dealt with a potential application of the HHI in the private sector. It was identified that the HHI may in fact be useful to private enterprises looking to analyze market compositions and to vet markets. The findings throughout this subchapter were almost exclusively the result of logical links between general concepts regarding motivation, market entry modes, and application patterns of the HHI in official proceedings. No corroborating evidence, quantitative or qualitative, was found to substantiate these logical links.

5.3 Outlook

In reviewing the official use of HHI in merger proceedings, it was shown that the HHI merely played a subordinated role in merger decisions, if it played any part at all. The simplicity aspect that had once been one of the central strengths of the index will be of less and less importance. Difficulty to collect, store and process information may once have been reason enough to favor the use of the index. The development of information technology and the abundance of publicly available information are far from the days when Hirschman was tasked with numerically assessing global trade relations and the inherent influence on relative national power. Within milliseconds, complex calculations can be conducted, business models in various scenarios are made available within a heartbeat. Anybody vetting markets, whether it being private enterprises or public commissions, will have access to this technology and information. In its pure form, the Herfindahl-Hirschman-Index does not seem to be of much use anymore.

At some point, the four-firm ratio was abandoned by the US American authorities and replaced with the somewhat more responsive and precise tool HHI. Maybe, after some 35 years in service, the HHI is due to retire as well, only to be replaced by a more up to date concept.

This does not, however, negate the HHI's value as an easily explained concept that allows for a quick, preliminary assessment. This holds true for both the public and the private application. It also does not mean that the logical links between concentration, market power, and market entry options are no longer valid. It simply means that other concepts measuring concentration may deliver more accurate findings. This search for a more comprehensive concept to measure concentration may be the subject of future research. After all, such a new concept may still in large part foot on the basic principles that Hirschman and Herfindahl established more than sixty years ago.

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Appendix

Appendix 2.5.2.1 HHI Delta Thresholds

Appendix Table 2.5.2.1 HHI Delta Thresholds

Critical Shares x starting share y in %	Δ HHI Threshold z in %			
	100	150	200	250
80	0,6	0,9	1,3	1,6
70	0,7	1,1	1,4	1,8
65	0,8	1,2	1,5	1,9
60	0,8	1,3	1,7	2,1
55	0,9	1,4	1,8	2,3
50	1,0	1,5	2,0	2,5
45	1,1	1,7	2,2	2,8
40	1,3	1,9	2,5	3,1
35	1,4	2,1	2,9	3,6
30	1,7	2,5	3,3	4,2
25	2,0	3,0	4,0	5,0
20	2,5	3,8	5,0	6,3
15	3,3	5,0	6,7	8,3
10	5,0	7,5	10,0	12,5
5	10,0	15,0	20,0	25,0

$$z = (x + y)^2 - x^2 - y^2 \mid \text{binomic theorem}$$

$$z = x^2 + 2xy + y^2 - x^2 - y^2 \mid \text{shorten}$$

$$z = 2xy \mid : 2 \mid : y$$

$$\frac{z/2}{y} = x$$

with x = critical share acquisition

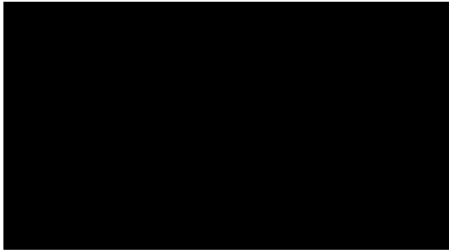
with y = starting market share

with z = delta threshold

$$\text{Example: } \frac{200/2}{30} = 3,3$$

Declaration of Originality

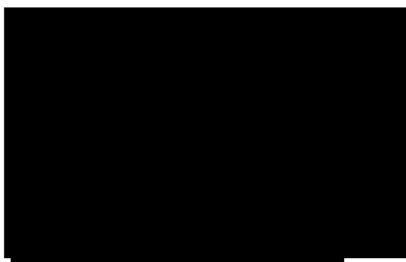
I hereby declare that this thesis and the work reported herein was composed by and originated entirely from me. Information derived from the published and unpublished work of others has been acknowledged in the text and references are given in the list of references.



Thorben Frederik Sievers

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I hereby consent to the online publication of this thesis by the HAW Hamburg in accordance with the terms expressed in the form "Einverständniserklärung zur Online-Veröffentlichung einer Abschlussarbeit auf dem Dokumentenserver der HAW Hamburg" July 21st, 2010. I furthermore consent to the publication of one hard copy of this thesis in the library of the faculty.



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