The effects of mergers on prices: an empirical analysis of the European car market

by

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Submitted to

Central European University

Department of Economics

In partial fulfilment of the requirements for the degree of Master of Arts in Economics

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Budapest, Hungary

2009

Abstract

In this thesis I examine how mergers affect the prices. For this purpose I analyze the important merger case between Peugeot and Citroen. I find that the merger price effects differ through the markets. After the merger the relative prices for PSA Peugeot-Citroen cars decreased on the market for small cars, and increased on the market for higher quality and more expensive cars. Estimation results of the relation between PSA Peugeot-Citroen prices and its market shares confirm that the company was able to exercise its market power more on the latter market than the former one. I also examine the relation between the degree of concentration and prices. The results of estimation show that the effect of change in concentration is positive and stronger on the markets for high quality and expensive goods. This means that on these markets a company has more market power and can increase the prices.

Acknowledgements

First and foremost I would like to thank my thesis advisor, Dr. Andrzej Baniak, for his support and advise which really helped and encouraged me during my work with the thesis. I would also like to thank Professor Frank Verboven for the idea of this thesis, Professor Gabor Kezdi, Professor Gabor Korosi, and Gabor Antal who helped me with econometric part of the thesis. Finally, I would like to thank my friends who were irreplaceable and gave me the support and friendship I needed.

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Introduction

Horizontal merger is a well known way of corporate restructuring which aims to reach synergies in production, to raise shareholders' value, and to decrease the competition pressure. When it comes to competition issues, mergers which involve large companies may have a significant effect on the market structure and prices by increasing the level of concentration and exercising market power.

Economic theory suggests that total merger price effects depend on the scope of efficiency gains and the market power effects created by the merger (Farrell and Shapiro (1990), McAfee and Williams (1992), Motta (2004)). In their empirical work, economists find that price effects differ through the industries. Some of the studies show that mergers generally lead to increase in prices (Borenstein (1990), Kim and Signal (1993)). Other papers, however, provide evidence that mergers do not necessarily affect the prices (Hosken and Taylor (2004)) or they may lead to price decrease in the long run (Focarelli and Panetta (2003)). The purpose of this thesis is to expand the existing research and examine how mergers affect the prices within the European car market.

I examine the important merger case between Peugeot and Citroen which took place in 1976. The merger had a significant impact on the French automobile industry and the European car market in general. The analysis of this case provides valuable information about the actual post-merger effects and allows to compare them with theoretical predictions. In brief, I find that the analyzed merger indeed had price effects but they differed through the markets. After the merger the relative prices for PSA Peugeot-Citroen cars decreased on the market for small cars which provide evidence of efficiency gains prevailing on this market. Relative prices on the market for higher quality and more expensive cars, however, increased which means that the market power effects dominated on this market. Estimation results of the relation between PSA Peugeot-Citroen prices and its market shares confirm that the company was able to exercise its market power more on the latter market than the former one.

To understand how the price effects vary across markets, I examine the relation between the degree of concentration and prices. The results of estimation show that the effect of change in concentration is positive and stronger on the markets for high quality and expensive goods. This means that on these markets a company has more market power and can increase the prices.

The thesis is organized as follows. Section I presents the background: it reviews the previous theoretical and empirical research made in this field, the regulation of horizontal mergers within the EU market, and describes the main features of the European automobile industry. Section II describes the data. The analysis of the PSA Peugeot-Citroen case is presented in Section III. It contains the description of the research questions, reports of relative price changes, and results of estimation of the relation between market concentration and prices.

I. Background

A. Literature Review

Nowadays there is an increasing number of theoretical and empirical papers which analyze the unilateral effects of horizontal mergers within different industries. When analysing the total price effect of a particular merger, the efficiency gains obtained through the merger, are compared with the increase and exercise of market power. If the improvements, synergies, and economies of scale which decrease marginal costs are greater than the market power effects, the merger makes prices fall and is beneficial for the consumers. Otherwise, it has an adverse effect on prices and makes the consumer surplus decrease (Motta, 2004). Furthermore, overall price effect of a particular merger depends not only on the actions of merged firm, but also on reaction of actual and potential competitors, the scope and the number of the relevant markets etc. Hence, the direction of price change is ambiguous.

Farrell and Shapiro (1990) analyze mergers with the Cournot competition model and show that post-merger prices will increase if the merger does not generate any synergies. The necessary condition for the prices to fall is that the new firm's marginal costs at the premerger joint output level have to be substantially lower than the marginal cost of the more efficient merger partner (Whinston, 2006):

$$C'_{M}(q_{1}+q_{2}) < \min\{C'_{1}(q_{1}),C'_{2}(q_{2})\},\$$

where $C'_{M}(q_1+q_2)$ is the marginal cost of the merged firm at the joint pre-merger level, and $C'_{1}(q_1), C'_{2}(q_2)$ are pre-merger marginal cost levels of each merging firm accordingly (Baniak, 2009). Moreover, the economies of scale required for the price decrease are greater, the greater is the joint market share of the merging firms.

McAfee and Williams (1992), also using Cournot framework, prove that consumer surplus and industry output after merger fall, i.e. the prices increase. The output of the postmerger firm also decreases but it produces more than any of the pre-merger partners did. The market share is lower than the sum of market shares of the merging firms but it is still higher than the market share of the largest pre-merger company.

Another important point in the merger analysis is market concentration. Herfindahl-Hirschman index is usually used as a measure of market concentration. It is defined as the sum of squared market shares within the market:

$$HHI = \sum_{j=1}^{n} s_j^2$$

The higher is the market concentration, the larger is the Herfindahl-Hirschman index. The index is directly related to market power and price elasticity of demand. In particular, Dansby

and Willing (1979) showed that the Lerner index as the measure of firm i's markup is equal to equilibrium Herfindahl-Hirschman index divided by the price elasticity of demand:

$$L = \frac{p - MC_i}{p} = \frac{HHI}{e}$$

Hence, keeping Lerner index constant, the higher is the market concentration, the lower is the price elasticity of demand. Another interpretation of the equation is that the higher is the concentration and/or the lower is the elasticity, the higher is the Lerner index (Baniak, 2009). Some economists though think that Herfindahl-Hirschman index is not a good measure of concentration for markets of differentiated goods since it does not account for the degree of differentiation (Milne, 1992). Nevertheless, this index is used by the European Commission and U.S. Federal Trade Commission when solving competition issues, and therefore will be used in the thesis as measure of concentration as well.

Even though most of the theoretical papers agree in their predictions about the effects of mergers, the results of empirical analysis of various industries remain rather ambiguous. A number of empirical papers show positive correlation between prices and market concentration measures. In particular, Borenstein (1990) examines relative fare changes at the US airline industry caused by two important airline mergers which took place in 1986. He provides evidence that the analyzed mergers led to significant price increase and airport dominance of the merged companies during that time. Moreover, the price increase was observed not only on the routes (which can be considered as separate markets) where both airline companies where present, but also on the routes where only one of the partners competed.

More expanded empirical analysis of mergers' price effects in the airline industry was performed by Kim and Signal (1993). They analyze mergers that involved both "normal" and financially distressed firms within merger announcement and completion periods. They conclude that, even if merger implies more efficient operations, the overall effect of mergers can be overweighed by exercise of their market power and increase of prices. The authors also provide evidence that there is a difference in pricing policy and fare changes between mergers where only "normal" firms participated and mergers which also involved financially distressed firms. In particular, they show that, in contrast to mergers between "normal" firms, pre-merger prices of the financially distressed firms were lower than the markets averages until merger completion. After merger completion prices do increase, but they still remain under market averages. Apart from that, the authors find positive and significant correlation between fare changes and change of concentration ratio.

Prager and Hannah (1998) look at the price effects of mergers in the US banking industry. They state that the total prices effect and the direction of price change depend on both the efficiency gains and the exercise of increased market power. Similar to Kim and Signal (1993), they also separate the announcement and merger competition periods. Their analysis shows that in the case of US banking industry market power exercise overweighs the efficiency improvement caused by merger, i.e. prices increase, which complies with Kim and Signal (1993) findings. More recent study of long-term price effects on the banking deposits market in Italy is performed by Focarelli and Panetta (2003). According to their study, efficiency gains from merger can be reached only in the long term, since cost-cutting, restructuring or adjustment take longer time while the adverse price effects due to exercise of market power prevail right after the merger completion. They find evidence that such postmerger price increase does take place only in the short run and is dominated by the efficiency gains in the long run.

One more interesting study of merger price effects was performed by Hosken and Taylor (2004). They examine the case of Marathon and Ashland oil companies' joint venture on the retail gas station operations market in Louisville and Kentucky. In their analysis, Hosken and Taylor distinguish between the wholesale prices and the retail prices, and do not find evidence

of increase of neither the wholesale prices nor the retail ones. They conclude that in moderately concentrated markets such as Louisville and Kentucky, merger do not necessarily raise prices.

Another group of empirical papers use demand estimation with nested logit methodology or simulation techniques when analyzing market power and the effects of mergers. Berry, Levinson and Pakes (1995) develop the empirical model to estimate demand and supply for differentiated products markets and apply these tools for the US automobile market. A similar demand model is used by Ivadi and Verboven (2004) when analyzing recent merger case between Volvo and Scania, by Peters (2003) when estimating merger performance in US airline industry and others.

Summing up, the results of previous research show that the direction of price change caused by merger depends on the trade-off between the obtained efficiencies and exercise of increased market power. It also depends on the size of the market and its structure, differentiation and durability of goods. Therefore, the overall effect of each particular merger case remains an empirical question.

B. EU Regulation of Horizontal Mergers

In 1976 when the merger between Peugeot and Citroen took place there was no specific merger regulation. Existing merger cases at that time were examined in the frame of Article 85 and Article 86 of the Treaty of Rome and there was not even pre-merger notification requirement. The first Merger Regulation (4064/1989) was passed only in 1989 as a result of increasing number and scope of merger cases within the European market.

Nowadays the regulation of horizontal mergers is based on two main documents: Council Regulation (EC) No 139/2004 and Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings (2004/C 31/03). The purpose of the regulation is to prevent the mergers which would result in "creation or strengthening of a dominant position in the common market or substantial part of

it". A dominant position is defined as

'a situation where one or more undertakings wield economic power which would enable them to prevent effective competition from being maintained in the relevant market by giving them the opportunity to act to a considerable extent independently of their competitors, their customers and, ultimately, of consumers.'(Council Regulation (EC) No 139/2004).

The assessment of merger by the Commission implies, first, definition of the relevant geographic and product markers and, second, competitive examination of the merger. According to Commission Notice on the definition of relevant market, the main purpose of such definition is

'to identify those actual competitors of the undertakings involved that are capable of constraining those undertakings' behaviour and of preventing them from behaving independently of effective competitive pressure.'(Commission Notice, 97/C 372/03)

The definition of the relevant market enables to calculate market shares and to meaningfully estimate the change in concentration and market power caused by merger. The relevant market has two dimensions: product and geographical. The relevant product market is defined as follows:

'A relevant product market comprises all those products and/or services which are regarded as interchangeable or substitutable by the consumer, by reason of the products' characteristics, their prices and their intended use.' (Commission Notice, 97/C 372/03) The relevant geographical market is defined as follows:

'The relevant geographic market comprises the area in which the undertakings concerned are involved in the supply and demand of products or services, in which the conditions of

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competition are sufficiently homogeneous and which can be distinguished from neighbouring areas because the conditions of competition are appreciably different in those area.' (Commission Notice, 97/C 372/03)

When defining the relevant market, Commission gathers and estimates three key factors: the demand and supply substitution, and potential competition.

The second step is the competitive assessment of merger which implies analysis of market structure, concentration levels, possible anti-competitive effects, and efficiencies. There is no market share threshold which is considered as creating a dominant position. However, from the previous practices and cases, the market share higher than 50% will always be regarded as dominant. At the same time, market shares in the range of 40-50% and in some cases below 40% may also raise market power concerns depending on the market conditions (Whinston, 2006).

To measure concentration changes the Commission applies the Herfindahl-Hirschman Index (HHI). In particular, the Commission is not likely to raise competition concerns in a market where post-merger HHI value is below 1000, or if it is between 1000 and 2000 and the change in HHI is below 250, or even if HHI is above 2000 but a delta is below 150. Otherwise, merger is given "yellow" or "red" light and requires further investigation (Council Regulation 2004/C 31/03).

By anti-competitive effects the Commission means unilateral (non-coordinated) effects and coordinated (pro-collusive) effects. Unilateral effect implies elimination of important competitive constraints on the market which leads to increase and exercise of market power. This effect is the greater, the lager is the market shares of the merging firms, or if they are close competitors, or the less elastic is demand.

One of the recent developments in merger regulation is that the Commission also takes into consideration possible efficiencies gained from the merger. The efficiencies have to be

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such that they "enhance the ability and incentive of the merged entity to act pro-competitively for the benefit of consumers, thereby counteracting the adverse effects on competition which the merger might have" (Council Regulation 2004/C 31/03). Therefore, the efficiencies have to be, first of all of consumer benefit, i.e. consumers should not be worse off compared with the pre-merger market conditions. Furthermore, efficiency gains have to be merger-specific and timely (Council Regulation 2004/C 31/03).

Commission may approve otherwise incompatible merger if it involves a failing firm. The main requirement for such merger to take place is that the deterioration of market conditions will be even larger without the merger than in the case where the merger is permitted. This may happen, for example, when due to financial difficulties the failing firm will be forced to exit the market if not taken over by a stronger partner.

When analyzing changes in market structure, concentration, and price effects of the merger between Peugeot and Citroen, I will apply the modern guidelines and conclude whether this merger would be given a "green" light nowadays, given the modern regulations.

C. Industry Background

The automobile industry, sometimes called as "the engine of Europe", is one of the most important and strategic sectors in the European economy. From the very beginning it has played a crucial role in the development of European economy and society in general. It is one of the leading employers, investors and exporters in Europe. The automobile industry has been growing on average 2.3% per year since 1975, after recovering from the oil crisis in 1973. The major players on the passenger car market are BMW, Daimler, FIAT, Ford of Europe, General Motors Europe, Jaguar Land Rover, Porsche, PSA Peugeot Citroën, Renault, Toyota Motor Europe, Volkswagen and Volvo. In '70s when the analyzed merger took place, the industry was considerably concentrated, geographically segmented, with one or two dominant (usually domestic) producers in each country (Kirman and Schueller, 1990). Table 1 contains the market share of the largest manufacturer in each country in 1973, and all of them are leaders in their home markets, except for Belgium, which did not have any domestic car producers.

Country	Top manufacturer	Market Share
Belgium	Fiat	17.97
France	Renault	32.32
Germany	Volkswagen	32.13
Italy	Fiat	69.76
UK	Rover	32.25

Table 1. Market shares of top manufacturers in 1973

A crucial feature of the automobile industry in the time, when the Peugeot-Citroën merger took place, was price differences across countries, with Italy and UK being the most expensive, and Belgium being the cheapest market. Goldberd and Verboven (2000) state that the maximum price differential could reach 30% of the car price. Large price differences across countries can be first of all caused by exchange rate fluctuations and incomplete response of local prices to such changes. Different levels in value-added taxes and taxes on cars also contribute to price dispersion across countries. Kirman and Schueller (1990) indicate that taxes on cars differed considerably between countries, from Germany having the lowest and Denmark having the highest tax rate on cars. Value-added taxes also vary across countries with Germany having VAT rate 13% and France having rate 33% of the same tax.

From the other side, a number of studies suggest that the price dispersion is also a result of other differences between the countries: variation in demand elasticities, differences in supply side, concentration levels, and import quotas on Japanese cars starting from in the late '70s. Goldberd and Verboven (2000) state that one of the reasons of high prices in Italy was a strong demand bias towards home brands. When prices for one of the domestic cars increased, consumer preferred to switch to another model but from the same national manufacturer. This enabled Fiat to have market share in Italy close to monopolistic, and exercise market power. High prices in UK, however, can be explained by supply side and, for example, by differences in the dealer discount practices.

Summing up, the automobile industry was in the 1970s and remains now the key industry in Europe and any positive or negative changes in it will have an effect far beyond the car market. Therefore, actions which may induce changes in the market structure or concentration etc. should be examined in detail. Another important point is that car markets do differ across the countries. There is strong evidence of variations in the demand and supply sides, prices, taxes, import quotas, and industry regulations between the countries. Such differences are crucial when defining the relevant geographical markets and will be analyzed in more detail in the Section III.

II. Data

The data used in this study case has three dimensions: 1) product: there are around 150 models in each year; 2) markets: the data contains 5 countries: Belgium, France, Germany, Italy, and UK which account for 85% of total car sales in Europe each year; 3) time: the sample includes observations for years 1970-1999 (Goldberd and Verboven, 2000).

Furthermore, the data contains information on brands, brand ownership, car classes, sales (number of new car registrations) and prices in both domestic and common currencies. In total, sample contains 11 549 observations.

Variable Name	Definition	Mean and (Std. Dev.)
CLA	Car class code CLA=1 – subcompact cars CLA=2 – compact cars CLA=3 – intermediate cars CLA=4 – standard cars CLA=5 – luxury cars	(1.29)
COUNTRY	Country dummies (Belgium, France, Germany, Italy, UK)	- (1.44)
LOG(EURPR)	Price in common currency	8352.52 (5540.92)
LOG(PR)	Price in domestic currency	- (-)
LOG(HHI)	Herfindahl-Hirschman Index	2511 (1228)
MKTSHR	Market share of PSA Peugeot-Citroen	16.19 (13.62)
MKTSHR^2	Market share of PSA Peugeot-Citroen squared	447.47 (712.63)
YEAR	Year dummies (1970-1999)	(8.53)

 Table 2. Variable Definitions and Descriptive Statistics

The data was kindly provided by Prof. Verboven from the K.U.Leuven and is available online at his personal webpage.

III. Peugeot-Citroën merger case

From the very beginning both Peugeot and Citroen played a prominent role in the development of the European car industry. However, in contrast to Peugeot, which has always been a strong and profitable player, Citroen started to have financial difficulties in the late 1960s. The main reason was overinvestment in the radical models which never became successful. Apart from that, in spite of large Citroen's development costs, the company had no profitable models in the market of compact cars in Europe. Furthermore, the oil crisis in 1973, and withdrawal of Citroen cars from North America in 1974 due to design regulations made Citroen even weaker and financially vulnerable. In the same year Fiat, the controlling

shareholder of Citroen since 1968, returned its 49% stake to the previous owner – Michelin. Consequently, less than in one year Citroen went bankrupt.

A failure of one of the largest car manufacturers in France could have an unrecoverable impact on the French economy leading to huge job losses, decrease in exports and GDP. As a result, in 1974 French government initiated negotiations between Peugeot and Citroen aiming to merge two car manufacturers and therefore save failing Citroen from bankruptcy. In the same year Peugeot, financially successful and looking for expansion to new geographical markets, bought 38.2% stake in Citroen. The merger was completed in 1976, when Peugeot purchased 90% of Citroen and the new holding company PSA Peugeot-Citroen was established. Therefore, the negotiation period until the merger was fully completed took three years. Consequently, in the analysis of this merger the most appropriate would be to compare two years – 1973, a year before the negotiations just began, and 1976 when they were finished.

Undoubtedly, this merger had some important implications. First of all, it prevented Citroen from closure, which avoided strikes and saved hundreds of jobs. Second, it enabled Peugeot and Citroen to reach efficiency gains in production processes. Even though it was decided that the "Peugeot" and "Citroen" brands would remain independent from each other, they had a common technology and shared development, engineering and assembling costs. The merger was financially successful from the very beginning until the economic downturn in the 1980s. On the other hand, this merger created a new powerful player on the car market with the largest market share in France and second largest share on the Belgian market, which could lead to creation of dominant position and exercise of market power.

It is worth mentioning that the merger between Peugeot and Citroen is not a clear horizontal merger case usually analyzed in theoretical models. On one hand, the case should be considered as a horizontal merger since it combined two companies, which directly competed with each other on the same markets, into one single company. On the other hand, however, Citroen was not an independent manufacturer – before the merger took place, the controlling shareholder of Citroen was Fiat. This means that the agreement between Peugeot and Citroen was rather a takeover, or simply a transfer of ownership rights for one of production units of Fiat to another controlling shareholder – Peugeot. Such specifics of the case means that the effects of this merger may not coincide with the theoretical predictions. In particular, this refers to changes in prices and market concentration. The new established PSA Peugeot-Citroen indeed gained the efficiencies since technical and engineering resources were shared for production of both "Peugeot" and "Citroen" brands. The effect on the market concentration change is ambiguous though. Obviously, the market structure and distribution of market shares between Fiat, as the previous owner of Citroen, and Peugeot changed, but the overall change of market concentration and the exercise of market power by PSA Peugeot-Citroen are rather empirical questions.

A. Research questions

All in all, the price effect of the Peugeot-Citroen merger depends on the two main factors: scope of the efficiency gains and the market power. If by merging, Peugeot and Citroen were able to achieve the efficiencies in production through sharing the capacities, economies of scale etc., the marginal cost should fall, and the price should decrease. On the other hand, this merger eliminated direct competition between Peugeot and Citroen and made the new established firm a stronger player on the market with less competition. Therefore, the merger could possibly create for PSA Peugeot-Citroen a dominant position on the market and entail it with market power and ability to raise the prices. In this situation, the prices after the merger should increase. It is unclear, though, which of the effects, the market power or the efficiencies, will overweigh the other in the end. Therefore, I first examine whether this merger led to increase of prices for PSA Peugeot-Citroen cars relative to the rest of the market.

Pricing decisions PSA Peugeot-Citroen should also affect the behaviour of other companies on the market. If, as a result of decrease in marginal cost, PSA Peugeot-Citroen decreases its prices, the rival firms may also reduce their prices in order to keep their market shares. Hence, the overall price level should fall. On the other hand, if PSA Peugeot-Citroen will have a sufficient market power to raise the prices, the rest of market players may cooperate in increasing their prices as well.

Furthermore, the merger of two firms means that the concentration on the markets increases. But the fact of increase in market concentration, however, does not necessarily mean the exercise of market power. If the efficiency gains effect prevails and prices decrease, there should be negative relation between the concentration ratio and prices. Otherwise, it has to be positive. Therefore, I examine the relation between the concentration ratio and prices decrease differentiating through car segments and countries.

B. Defining the relevant geographical and product markets

The first step in the analysis of merger implications, i.e. changes in market shares, prices etc., is defining the relevant geographical and product markets. As was mentioned in the Section I, the main purpose of defining the relevant market is to identify the actual market players and to calculate their market shares in the way that would provide an interpretable information about the market structure and possible dominance. When defining the relevant geographical and product markets, I follow the study of Verboven (2002). He bases his analysis on the historical evidence, previously published papers, and the econometric estimation of the demand for new cars using the same data set as in this study.

Basing on the results of his analysis, Verboven (2002) states that each country within the analyzed geographical area (Belgium, France, Germany, Italy, and UK) can be considered as separate geographical markets due to the existing international price differentials, different market structures, low degree of parallel imports, and obstacles to cross-border trade. In particular, Degryse and Verboven (2000) provide evidence that price dispersion across the countries is significant, and it still exists even when controlling for exchange rates, differences in tax rates, dealer discounts and other factors. Furthermore, Verboven (2002) also states that the level of parallel imports between the countries is very low which together with price differences indicates that there were large arbitrage opportunities on the market.

Another group of factors which make market conditions different form each other across the countries are barriers to cross-border trade. First of all, the national approval systems were different in each country until 1995. Second, in the 70s countries imposed different levels of import quotas, especially against the Japanese producers. Third, the transportation and administrative costs were different for each manufacturer and country as well. Finally, the exclusivity and selectivity of distribution systems towards the dealers and independent resellers also restricted the arbitrage opportunities between the countries (Verboven, 2002).

Both Peugeot and Citroen were present on the markets of all the five countries analyzed. Therefore, taking into consideration the abovementioned cross-country differences, the effects of Peugeot-Citroen merger should be considered on the five separate relevant geographical markets: Belgium, France, Germany, Italy, and UK.

For the definition of the relevant product markets within each relevant geographical market, three main criteria should be analyzed: demand and substitutability, and potential competition. Verboven (2002) bases his market definition on demand substitutability, referring to supply substitutability and potential competition as less immediate factors. To estimate the demand substitutability he calculates own and cross elasticities (Table 3) and,

then, uses the SSNIP-test (small but significant non-transitory increase in prices). The test verifies whether 5-10% joint price increase on a candidate relevant market product market would be profitable to the producers. If such price increase is profitable, it means that there is not much substitution on the candidate market and it should be considered as a relevant product market.

	Own elasticity		Cross elasticity with respect to ca			ars from
			Same segment		Different segme	
	Average	St. Dev.	Average	St. Dev.	Average	St. Dev.
Subcompact	0.983	0.192	0.0021	0.0029	0.0021	0.0029
Compact	1.417	0.329	0.0033	0.0044	0.0033	0.0044
Intermediate	1.811	0.496	0.0025	0.0033	0.0025	0.0033
Standard/Luxury	2.569	0.587	0.0018	0.0028	0.0018	0.0028
Sports	2.516	0.740	0.0005	0.0007	0.0005	0.0007
Minivan	2.068	0.608	0.0011	0.0014	0.0011	0.0014

 Table 3. Own and cross elasticities (by Verboven, 2002)

According to the results of the demand estimation and SSNIP-test, Verboven (2002) defines six segments of cars: subcompact, compact, intermediate, standard/luxury, sports cars, and minivans (Table 4). Each segment constitutes separate relevant product market. Such classification basically coincides with the Commission classification in its price report, which determined same segments with the exception of mini and small cars that united in the subcompact class.

Segment	EC Report 1999	Example	Peugeot presence	Citroen presence
Subcompact	A+B (mini cars and small cars)	Ford Fiesta	Yes	Yes
Compact	C (medium cars)	VW Golf	Yes	No
Intermediate	D (large cars)	Peugeot 406	Yes	Yes
Standard/Luxury	E+F (executive and luxury cars)	Audi A8	Yes	Yes
Sports	G (multi purpose and sports utility)	Mercedes SLK	No	No
Minivans	G (multi purpose and sports utility)	Renault Espace	No	No

. . .

Peugeot and Citroen are jointly present in three segments – subcompact, intermediate, and standard, which constitute three separate relevant product markets affected by the merger. Consequently, there are five separate relevant geographical markets and three relevant product markets within each geographical market, i.e. fifteen relevant markets in total.

C. Relative changes in market concentration and prices

The market shares of new established PSA Peugeot-Citroen and changes in concentration ratio are presented in Table 5 and Appendix. As it was predicted, the relation between the market share change and concentration ratio is ambiguous.

Country and product marketPSA Peugeot-Citroen market share (%) in 1976 and (change relative to 1973)		Joint market share of new entrants in 1976, %	Herfindahl-Hirschman Index in 1976 and (change relative to 1973)
Belgium			
Subcompact cars	16,36 (11,42)	21,14	1177 (-432)
Intermediate cars	13,75 (9,62)	16,88	1419 (-924)
Standard cars	39,09 (15,05)	27,26	2213 (249)
France			
Subcompact cars	27,33 (12,16)	5,26	3305 (626)
Intermediate cars	42,37 (40,31)	1,62	2912 (-2057)
Standard cars	69,80 (18,02)	18,52	4872 (2191)
Germany			
Subcompact cars	5,98 (2,93)	9,14	2260 (-726)
Intermediate cars	2,75 (1,77)	25,87	2730 (-1174)
Standard cars	9,38 (3,12)	24,24	2059 (-1922)
Italy			
Subcompact cars	7,48 (6,46)	0,46	5085 (-1936)
Intermediate cars	16,50 (16,50)	26,18	2507 (-3403)
Standard cars	17,83 (8,85)	4,59	2980 (63)
UK			
Subcompact cars	4,074 (3,37)	28,94	1826 (-873)
Intermediate cars	5,06 (4,89)	21,83	4381 (514)
Standard cars	18,51 (13,14)	9,07	1967 (-143)

Table 5. Changes in PSA	Peugeot-Citroen market shares	, new entrants and concentration ratio
		,

Obviously, the market share of PSA Peugeot-Citroen, as a successor of Peugeot S.A., increased on all the markets. The highest jump in the market share was in France, where on

the standard market PSA Peugeot-Citroen had the market share close to monopolistic – 69,80percent. The level of concentration, however, did not necessarily increase. In some countries, like Italy, it in fact significantly fell. The main reason is that the market share of the other big player Fiat, which was the previous controlling shareholder of Citroen, shrank after selling off its stock in Citroen. Apart from that, the number of new players appeared in the market in the mid 70s, mainly Japanese manufactures, which decreased the level of concentration as well.

To analyze whether the merger had any price effects I calculated the relative changes in prices separately for each of the two brands ("Peugeot" and "Citroen") as a difference between the relative price change of each of the brands and relative market price change for the same period. In particular:

$$Pchg = \frac{P_{76}^b - P_{73}^b}{P_{73}^b} * 100 - \frac{P_{76}^m - P_{73}^m}{P_{73}^m} * 100,$$

where *Pchg* is the relative price change, P_{76}^{b} and P_{73}^{b} are real prices for a particular brand (Peugeot or Citroen) in 1976 or 1973, and P_{76}^{m} and P_{73}^{m} are the average market prices for the same period within each segment (excluding Peugeot and Citroen). The results are presented in Table 6.

There are three main implications which can be seen from the calculations. First, there is a clear decrease in the relative prices for both brands on the subcompact cars market after the merger, which may allow thinking about the efficiency gains prevailing on this market. The average price drop on the subcompact market is around 9,4 percent relative to the rest of market. Second, on the market for standard (executive) cars there is evidence of price increase (except for fall in "Citroen" prices in Italy). This fact can be explained by ability to exercise more market power on the market for high-quality cars. The price increase varies from 3,52 percent in UK up to 56,84 percent in Italy. The interesting phenomena in the price changes is that both the largest drop and the largest increase in prices is observed in Italy which must be somehow attributed to the fact that namely Fiat was the previous controlling shareholder in Citroen, and also to the specifics of the Italian car market. Finally, changes on the market for intermediate cars are rather ambiguous, since the relative price changes for "Citroen" differ through the countries, and "Peugeot" brand has been extracted from the market in 1973 until the late 80s.

Country	Subcompact	Intermediate	Standard
Belgium			
Peugeot	-8,74	-	29,90
Citroen	-2,32	0,28	12,13
France			
Peugeot	-8,94	-	41,52
Citroen	-0,19	7,86	14,17
Germany			
Peugeot	-7,76	-	52,96
Citroen	-3,01	-4,34	12,56
Italy			
Peugeot	-21,83	-	56,84
Citroen	-21,38	-16,73	-5,04
UK			
Peugeot	-19,07	-	23,53
Citroen	-0,89	-0,77	3,52

Table 6. Changes in Relative Price for "Peugeot" and "Citroen" brands in 1973-1976

The question that arises from these results is why the efficiency gains prevail on the subcompact cars markets, and, from the other side, why the market power is exercised on the market for more expensive and higher quality cars. To find an explanation for this interesting result I examined the relation between the market share of PSA Peugeot-Citroen and the price for its brands. The regression was estimated with fixed effects under the following specification:

 $LOG(PR)_{it} = \beta_0 + \beta_1 * MKTSHR_{it} + \beta_2 * MKTSHR^2_{it} + \beta_3 * MKTSHR_{it} * (CLA=2) + \beta_4 * MKTSHR^2_{it} * (CLA=2) + \beta_5 * MKTSHR_{it} * (CLA=3) + \beta_6 * MKTSHR^2_{it} * (CLA=3) + \beta_7 * MKTSHR_{it} * (CLA=4) + \beta_8 * MKTSHR^2_{it} * (CLA=4) + YEAR * COUNTRY + u_i$

The effect of *MKTSHR* is expected to be different for different classes or segments, that is why the interaction terms between the market share variable and class dummies were included in the regression. Furthermore, I assume that there may be nonlinearities in the relation between market share of PSA Peugeot-Citroen and its prices, hence, the regression contains also a quadratic term of market share *MKTSHR*^2. The results of the model are presented in the Table 7.

Explanatory Variables	Coefficient
•••	(l-Statistic)
С	11.8457
	(126.67)
MKTSHR	-0.0643
	(-30.04)
MKTSHR ^2	0.0013
	(22.99)
MKTSHR *(CLA=2)	0.0232
	(6.84)
MKTSHR ^2*(CLA=2)	-0.0003
	(-2.88)
MKTSHR *(CLA=3)	0.0478
	(24.44)
MKTSHR ^2*(CLA=3)	-0.0011
	(-18.18)
MKTSHR *(CLA=4)	0.0925
	(46.93)
MKTSHR ^2*(CLA=4)	-0.0018
	(-31.18)
YEAR*COUNTRY dummies	Yes
Observations	1370
R-squared	0.95

Table 7. Random Effects Estimates of LOG(PR)Dependent Variable – LOG(PR)

** white cross-section standard errors & covariance (d.f. corrected)

As it was expected, the relation between the PSA Peugeot-Citroen market share and price varies through classes. First of all, it is nonlinear for the first three classes of cars: subcompact, compact, and intermediate. The nonlinearity means that at the beginning there is a negative relation between the market share and price until some threshold value of the market share, which is different for each class, and after which the price increases with the increase of the market share. The main implication of such relation is that the firm (PSA Peugeot-Citroen in this case) is able to exercise the market power and increase the prices only after its market share reaches some particular value.

According to the estimation results, the threshold value of the market share for the subcompact cars market, after which it is possible to raise the prices, is around 25 percent, whereas the actual market share of PSA Peugeot-Citroen after the merger in this segment in all the countries, except for France, is much less than this value. Even though the market share increased, it was not large enough for PSA Peugeot-Citroen to exercise the market power. Hence, on the market of small/subcompact cars the merger between Peugeot and Citroen did not create a dominant position for the successor company, and the efficiency gains, reached through sharing the development, engineering and production cost, prevailed.

The nonlinear relation between the price and market share remains for the compact and intermediate class of cars – the threshold market share values are 21.3 and 32.2 percent accordingly. The nonlinearity, however, disappears for the higher-quality executive cars – standard segment. The effect on price on the standard market is positive and increasing for all the values of the market share. Such relation may allow to think about PSA Peugeot-Citroen's ability to exercise market power on the higher-quality cars segment. The prediction of the model consists with the actual price changes on standard cars market presented in Table 6. In each country PSA Peugeot-Citroen had the largest market share exactly on the standard market, and the prices, in fact, increased after the merger. Therefore, on the market of height-quality cars the effects of the exercise of market power by PSA Peugeot-Citroen overweigh the efficiency gains, leading to increase in prices.

The difference in relation between the market share and price within different segments may also mean that a company can exercise more or less market power depending on the specifics of product, and the quality of the product in particular. This brings me to the question how the relation between market concentration and price changes with the quality of product, which will be discussed in the next section.

D. Relation between prices and concentration

The changes in prices examined in the previous section show that mergers and changes in concentration do affect the pricing behaviour of the company. Moreover, these effects differ through the markets depending on the quality of the product. In the case of the automobile market each class can depict the level of quality of the car – the higher the class, the higher is the quality and the more expensive is the car. Hence, the luxury class represents the highest quality, and the subcompact class – the lowest.

I took Herfindahl-Herschman index (HHI) as a measure of concentration and estimated the relation between HHI and prices differentiating between the car classes for each country separately, and then for the full cross-country sample. In particular, the following regression was estimated with fixed effects:

$$LOG(PR)_{it} = \beta_0 + \beta_1 * LOG(HHI)_{it} + \beta_2 * LOG(HHI)_{it} * (CLA=2) + \beta_3 * LOG(HHI)_{it} * (CLA=3) + \beta_4 * LOG(HHI)_{it} * (CLA=4) + \beta_5 * LOG(HHI)_{it} * (CLA=5) + YEAR + u_i$$

The coefficients of the estimation are described in Table 8. Similar to the previous regression results, the relation between concentration ratio and price differs through the classes. According to the results, it is negative for the first (subcompact cars) and the second (compact/small cars) classes depending on the sample. For the full cross-country sample the effect of HHI is positive for all classes, except for the lowest one, and increases for executive (class 4) and luxury (class 5) cars. Generally speaking, the higher is the class (or quality) of the car, the more positive is the relation between the HHI and prices. Obviously, this implies

that a company may exercise more market power on the market for more expensive and qualitative goods.

Explanatory Variable	Belgium	France	Germany	Italy	UK	Full Sample
	8.2883	6.4518	4.5396	11.4298	4.3582	7.4285
С	(64.08)**	(27.77)	(30.40)	(128.89)	(36.33)	(180.58)
	-0.0726	-0.0670	0.0152	-0.0186	-0.0670	-0.0178
LOG(HHI)	(-4.18)	(-2.31)	(0.74)	(-1.81)	(-4.28)	(-3.62)
	0.0463	0.0412	0.0396	0.0402	0.0425	0.0441
LOG(HHI)*(CLA=2)	(14.42)	(9.87)	(9.81)	(11.56)	(8.60)	(66.45)
	0.0665	0.0595	0.0573	0.0575	0.0607	0.0665
LOG(HHI)*(CLA=3)	(21.04)	(15.89)	(10.68)	(17.53)	(11.42)	(101.11)
	0.1158	0.1004	0.1013	0.1080	0.1084	0.1087
LOG(HHI)*(CLA=4)	(29.35)	(25.92)	(17.49)	(29.28)	(17.30)	(157.47)
	0.1541	0.1414	0.1229	0.1470	0.1502	0.1378
LOG(HHI)*(CLA=5)	(26.04)	(21.09)	(17.37)	(32.60)	(12.89)	(143.84)
YEAR dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2673	2265	2283	2027	2300	11549
R-squared	0.96	0.96	0.96	0.98	0.94	0.92

 Table 8. Relation between Prices and Concentration

 Dependent Variable: LOG(PR)

** white cross-section standard errors & covariance (d.f. corrected)

The question that naturally arises from the results of the regressions is why the market power effects prevail exactly on the market for more expensive cars. The reasons should be attributed to the specific features of the market and its product. There may be few explanations for this relation.

First of all, even though the own elasticities of high-quality cars are higher than those of the lower class cars, the cross elasticities of high-quality cars with respect to cars from the same segment and to cars from different segments are considerably low (Table 3). It means that consumers are less likely to switch to another brand in the same segment or to another model from different segment, which enhance a particular producer with a power to raise the prices. Furthermore, low cross elasticities may also imply that there is significant horizontal differentiation within each class. Horizontal differentiation within the segment helps producers to avoid price competition, strengthens their competitive position against existing players and new comers, increasing their ability to raise the prices.

Apart from that, the model variety on the expensive segments is lower. Table 9 shows the number of models available in each segment and in each country in 1976. In all the countries the number of models in standard class is considerably smaller then the model variety on the market for small cars (subcompact class). Therefore, on the market for expensive cars consumers have a lesser choice of models which may imply that the manufacturers on this market have more market power to increase the prices.

Segment	Country	Model Variety
Subcompact:		
	Belgium	26
	France	24
	Germany	23
	Italy	22
	UK	18
	Total	113
Intermediate		
	Belgium	18
	France	11
	Germany	16
	Italy	10
	UK	10
	Total	65
Standard		
	Belgium	17
	France	14
	Germany	14
	Italy	11
	UK	14
	Total	70

 Table 9. Model variety across the markets in 1976

Another interesting argument, which may also contribute to the explanation of the increasing market power on the high-quality cars market, is provided by Mussa and Rosen (1978). They analyze the problem of vertical product differentiation in the frames of monopoly. They show that by raising prices for high-quality good, monopolist creates

incentives for consumers to switch to lower quality product. Therefore, there is a quality downshifting which impedes the monopolist to extract the consumer surplus. As a result, the monopolist will try to reduce the supply of lower quality product in order to eliminate the alternatives for the consumers and to gain the profits from the higher quality products. Even though this model is developed for the monopoly analysis, its result could be useful for the PSA Peugeot-Citroen case. In particular, in 1973 when the negotiations about merger between Peugeot and Citroen started, Peugeot S.A. withdrew "Peugeot" brand from the intermediate cars market, class of less expensive and lower quality cars next to the standard (executive) segment. Such action, as the model predicts, could aim to concentrate more on the higher class market and to exercise more market power there, what actually happened according to relative price changes.

All the arguments mentioned above provide some but not a complete explanation about why the marker power effects prevail exactly on the market for higher quality products. Furthermore, since most of the markets, examined for dominance and market power by competition authorities, are markets of differentiated goods, the relation between the vertical and/or horizontal product differentiation and market concentration remain interesting topics for further research with the availability of more data and more powerful econometric tools.

Conclusions

In this thesis I have studied the price effects of mergers on the European car market. The total merger price effect was considered as a trade-off between the efficiency gains obtained by the merger and market power effects. To examine the overall price effects, I analyzed the merger between Peugeot and Citroen of 1976, which on one hand enabled the post-merger company to reach efficiencies through sharing engineering, production, and assembling costs, and on the other hand strengthened its market position providing with some market power.

I have found that this merger led to price changes and that these changes varied between different sectors of the market. After the merger took place the prices on the market for small cars fell, and on the market for standard, i.e. more expensive cars, increased. The conclusion that follows from these results is that market power effects prevail on the standard car market, and they are outweighed by the efficiency gains on the market for smaller and less expensive cars. The estimation results of the relation between the market share of PSA Peugeot-Citroen and its prices uncover the reasons for such a difference in price effects. They show that even though the market share of PSA Peugeot-Citroen increased on the subcompact market, it was not sufficiently large to exercise the market power and raise the prices on this market. That is why the prices on this market decreased. At the same time the regression results also show that, in contrast to the lower classes markets, on the standard segment the company was able to exercise the market power with much lower market shares which consequently led to price increase on this market.

To examine how and why the price effects differ through the markets, I have also estimated the relation between the concentration ratio and prices. The estimation results support those of the previous regression. They show that the effect of market concentration is positive and increasing for the higher classes (or the quality) of the cars. Therefore, the higher the quality of the good, the more market power a firm has. The suggested reasons for such relation are low cross-elasticities within the higher quality segments, higher level of horizontal differentiation and lower variety within the high quality product markets.

Overall, the study suggests that when examining a particular merger, the single analysis of changes in market shares and concentration ratio may not provide sufficient predictions about post-merger effects on the market. Apart from changes in concentration, competition authorities should also take into consideration the specifics of the product which the

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concentration ratio, as the main indicator in the merger analysis, may not account for, i.e. level of differentiation, quality etc.

The study raises interesting topics for further research. One of the extensions of the thesis could also be the examination of relation between the level of horizontal differentiation and product quality, as well as the relation between product variety and its quality. According to the results of this study, high quality implies higher level of horizontal differentiation but less variety. Another extension of this study would be to analyze empirically the relation between the quality and the price-to-cost ratios with the availability of data on firms' costs.

Appendix



Figure 1. Belgium. Changes of PSA Peugeot-Citroen market shares 1970-1980









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