

# The Incompatibility Hypothesis and the Automotive Sector: An Empirical Study

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## Abstract

The aim of the present empirical study is to show that mathematical effects that may be relevant to the effect of "stuck-in-the-middle" contributory cause. The automotive industry is recognized as one of the largest and most important industries. This enormous volume and the concomitant dependence on upstream and downstream industries is called the automotive industry as the "industry of industries". There is no question what value content (competitive) hold strategies in the automotive industry. The objective is to exemplary review of salaried by Porter considerations. According to the incompatibility hypothesis, businesses should either pursue a differentiation or a cost leadership strategy or concentrate on focal areas. Businesses which don't follow this principle, might have to face lower profitability. This article investigates the validity of the hypothesis by looking at the global automotive market.

## Keywords

Incompatibility Hypothesis, Stuck-in-the-Middle, Profitability, Competitive Strategies, Automotive Sector, Strategy of Cost Leadership

## 1. Porter's Competitive Strategies: Classification and Concepts

According to Porter there are three general so-called generic competitive strategies at business division strategy level, which are [13]

- Comprehensive cost leadership;
- Differentiation;
- Concentrating on focal areas [11].

They serve as a guideline, to define coherent competitive strategies.

The competitive strategy of cost leadership has the objective of realising a cost edge over any of its competitors. The strategy of differentiation, however, is aimed at creating a unique product, which cannot be replaced easily. A successful differentiation stimulates higher customer loyalty which makes customers less price sensitive. This can be achieved by offering additional services or high quality products or

specific design features. [10] The third generic competitive strategy mentioned by Porter lies in the concentration on niche markets. This can be a certain customer group, a defined section of a product range or a geographically zoned market.[11] Some authors consider the niche strategy just a special form of cost leadership and differentiation strategy and accordingly they don't view the niche strategy as a separate concept; for them the niche strategy does not constitute an individual concept. [8].

The incompatibility hypothesis says that the three strategies are usually not compatible with one another and that a combination of the basic strategies will lead to comparatively low profitability. [11].

Contrary to the incompatibility hypothesis some authors are of the opinion that so-called hybrid strategies may make sense, too. They are considered a mixture of differentiation and cost leadership strategy. They are diametrically opposed to Michael E. Porter's incompatibility hypothesis. [3].

## 2. Incompatibility Hypothesis and Influential Factors

The incompatibility hypothesis outlines the fundamental incompatibility of differentiation and comprehensive cost leadership strategy. In line with the thesis, enterprises that neither adopt a clear differentiation nor a distinct cost leadership strategy are hence “stuck in the middle”. [11].

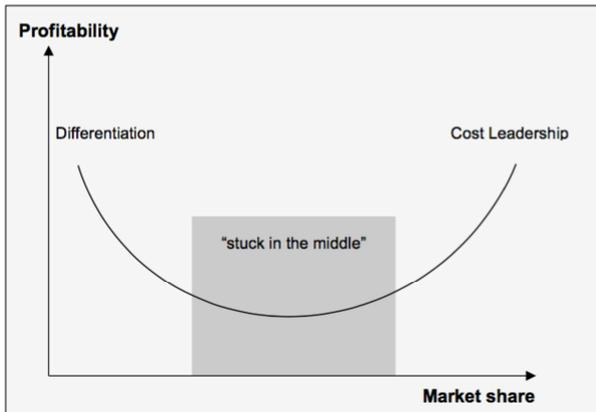


Fig. 1. Incompatibility Hypothesis.

This is illustrated in Fig. 1. According to the incompatibility hypothesis there are two basic options to achieve above-average profitability. Enterprises either strive for cost leadership which usually assumes a high market share to benefit for example from economies of scale. Or they go for the differentiation strategy with the intention to make high quality, top-of-the-line— meaning pricy—products to achieve an above-average price. According to the incompatibility hypothesis, a combination of both these strategies will lead to low profitability. Whether this thesis also applies to the automotive sector, will be analysed below.

## 3. Methodology of Empirical Study

To verify the validity of PORTER’s statements as a statistical method, the regression analysis is applied to provide the evidence for a possible link between market share and profitability.

Figures required were (EBIT, operating profit, number of sold cars etc.) gathered in consolidated financial statements. The period surveyed was the business year 2012. Additionally, the following assumptions were made:

- Comparable accounting standards (IFRS, US GAAP);
- Uniform profit indicator(s) (EBIT, Operating Income / Profit);
- Number of cars sold used as basis for market share;
- View of calendar year.

In each case the assumptions refer to the operational earnings achieved in the segment of the respective group of companies (e.g. Automobile/Automotive). In addition to segmental reporting by means of external accounting, all separately compiled financial statements of the individual

subsidiaries have been considered. The EBIT resp. operating income has been selected as earnings indicator. The “non-operating income“ has not been considered.

When randomly picking the viewed corporate groups, the concentration process was applied. [15/18]. It is applied, when some elements of a basic quantity can make a significant explanatory contribution to the situation to be examined. The realised random test represents more than 91% of turnover of the year 2012 of the entire automotive industry.

For this reason it can be assumed that the data collected are representative. The random check covers the main part of the market being investigated. Therefore it can be assumed that a realistic reflection of the basic quantity viewed is in place. [1].

Automotive groups are coherently diversified according to their brand names. They pursue different competitive strategies. Hence, individual brands are viewed separately in the present study. A strict separation is not always possible due to lacking availability and the lacking disclosure obligation of separate financial statements. In most cases the financial statements of subsidiaries are depicted in the consolidated financial statement of the parent company within the segment reporting. In this context it used to be possible - depending on the segmental reporting in the consolidated financial statement - to gather single brand data separately and separate the following single brands based on this.

Table 1. Data baseRegression Analysis 2012.

Corporate Group	Turnover in TSD.	Market Share	EBIT mn EUR	Turnover (mn EUR)	Return on Sales
General Motors	9.288	15,55%	5.534	116.905	4,73%
VW	9.143	15,31%	9.405	148.021	6,35%
Toyota	7.352	12,31%	0.213	166.581	0,13%
Ford	5.668	9,49%	4.675	98.45	4,75%
Nissan	4.914	8,23%	3.977	87.419	4,55%
Hyundai	4.392	7,35%	4.577	70.845	6,46%
Fiat	4.223	7,07%	3.682	81.476	4,52%
Honda	3.137	5,25%	-0.757	56.909	-1,33%
PSA	2.965	4,96%	-1.504	38.299	-3,93%
Suzuki	2.802	4,69%	1.123	21.652	5,19%
Renault	2.55	4,27%	-0.615	38.859	-1,58%
BMW	1.845	3,09%	7.642	70.208	10,88%
Daimler	1.451	2,43%	4.389	61.66	7,12%
Total	59.73	1	42.341	1.057.284	

The corporate groups of Chrysler and KIA have not been considered. Chrysler Group LLC is included in the annual accounts of Fiat, since both groups merged in 2012. The figures of KIA could not be covered since the group’s annual report only disclosed the consolidated earnings. Those enterprises that show negative profit indicators (PSA, Renault and Honda) have not been included. Due to their size and their below-average profitability these enterprises confirm that the incompatibility hypothesis is true. Nevertheless, their disclosed results were so negative that they clearly deviated in a downward trend from the underlying U-form.

Additionally, there was the need caused by the global recall campaign in 2009 and untypical environmental impacts (e.g. the Tōhoku earthquake) in 2011 and 2012 [7], to modify the results of Toyota by determining the average return on sales at 6.5% (average value within the last 10 years). [5/16/17/18].

To implement the regression analysis, the following two hypotheses were formulated:

- H0: There is no U-shaped correlation between return on sales and market share in the automotive sector
- H1: There is a U-shaped correlation between return on sales and market share in the automotive sector.

$\alpha = 0,05$  has been defined as significance level. A coefficient of determination ( $r^2$ ) of 0.75 as well as the corrected coefficient of determination ( $r^2$  corrected) of 0.80 is usual for the quality criteria of the regression analysis. The corrected coefficient of determination is considered a secondary condition, as the impact of individual independent variables is being investigated. [2].

With the aid of the statistical method of the regression analysis, the validity of Porter’s statement is mathematically proven and the study meets the first minimum requirement of scientific work [12]. Likewise, the reliability and the accuracy of measurement is guaranteed by the depicted and comprehensible procedure. [5].

### 4. Result

The goal of the study is to verify the validity of the incompatibility hypothesis for the automotive industry. This is done by providing the evidence of a U-shaped correlation between the market share of an enterprise as an impacting variable and profitability as a dependent variable.

The underlying regression function for the automotive sector, which derives from the annual statements and consolidated annual statements for 2012 is as follows:

$$2012: y(x) = 3,1803x^2 - 1,2331x + 0,1601$$

This U-shaped correlation between market share and return on sales in the automotive sector is illustrated in Fig. 2. It is striking that the profitability indicators of the group of premium suppliers on the left of the U-shaped function show higher profitability than cost leaders. [11/14].

In the lower part of the function there is the section which can be characterized as being „stuck in the middle“, where enterprises like Nissan, FIAT or VW can be found. [10]. Toyota and GM are located on the right of the curve [4/6/8]. They show – when expressed in relative terms – lower profitability than suppliers of the premium segment or differentiators like Audi or Porsche. This is due to the fact that Toyota and GM have established themselves over many years as cost leaders and were able to benefit from entailed cost and price advantages. VW, Fiat, Ford and Nissan are in the central part of the regression curve due to their market share and the classification neither to the group of cost leaders nor to the group of premium suppliers. (cf. Fig. 2).

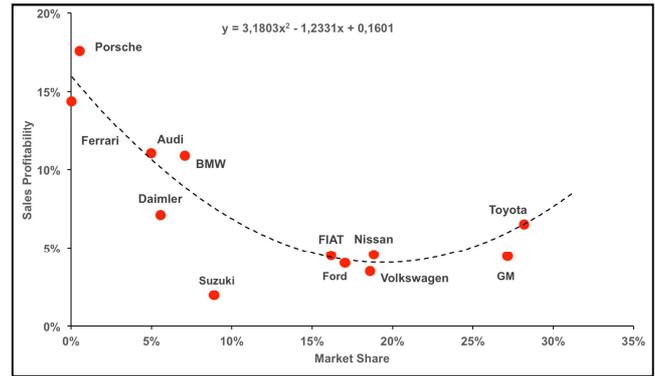


Fig. 2. Business Year 2012.

The null hypothesis is rejected by the subsequent calculation and Porter’s hypothesis is supported. The result is statistically significant and all requirements specified in terms of model accuracy of the regression are met. The coefficient of determination achieves a value of almost 90% and  $F_{krit}$  with some 0,0014; also the p-values of the coefficients are below  $\alpha$  (0,05).

Table 2. ParameterRegression Analysis 2012.

Parameter	Manifestation
1. Coefficient of determination	0,887409504
2. F-Test ( $F_{krit}$ )	0,001427267
3. t-statistics of the coefficient c (p-value)	0,0000125492
4. t-statistics of the coefficient b (p-value)	0,001987928
5. t-statistics of the coefficient a (p-value)	0,010315229
6. Confidence interval of coefficient c	(0,13009071; 0,19020579)
7. Confidence interval of coefficient b	(-1,811775008; -0,65438708)
7. Confidence interval of coefficient a	(1,066363026; 5,294199446)

### 5. Conclusion

Evidence shows that there is a U-shaped correlation between market share and return on sales in the automotive sector in 2012. This is all the more surprising in view of the fact that numerous impacting variables are present in the market concerned such as deviating accounting standards, restrictions in the level of detail of the segment reporting in the annual financial statement or exchange rate fluctuations.

It is also apparent that those enterprises that can clearly be attributed to one of the three generic competitive strategies are found in the same section of the respective curve. It can therefore be concluded that the incompatibility explains the varying dispersion of profitability in the automotive market to a certain extent. Hence the displayed result confirms Porter’s incompatibility hypothesis.

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