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Introduction

Car manufacturers, called Original Equipment Manufacturers (OEMs), have production plants in several countries. Many suppliers of these OEMs have their facilities in the same places or near them. Therefore, there are many groups of multinational enterprises. Due to Germany is an important producer of vehicles, which for instance manufactured 5 to 6 million units per year between 2005 and 2014 (OICA, 2015), there are many suppliers with headquarters in Germany. Some of them have evolved into groups of multinational enterprises.

Since the lead author has developed the procedure presented in this paper in one of these multinational suppliers based in Germany, it will be taken the laws and regulations of the Federal Republic of Germany as reference in addition to the international laws and regulations of the Organization for Economic Co-operation and Development (OECD) and those of the European Union (EU). If these multinational companies are associated enterprises, the laws and regulations on transfer prices are applicable.

According to the Foreign Tax Act (AStG, 2008, article 1), an associated enterprise is one that: (i) has a direct or indirect participation (essential participation) in a taxpayer amounting at least to a fourth part of it, or (ii) has a stake in the other company's profit generation or vice versa.
Transfer prices are part of the sales of associated enterprises in each country and therefore have an impact on their bottom line according to the Profit and Loss Plan (P&L) and, consequently, on tax payables. EU member states have been working for years on the harmonization of transfer prices (BMF, 1999, p.1341). This is due, on one hand, to the fact that some EU member states do not consistently apply the OECD Guidelines (OECD, 1995) and, on the other, to the differences in documentation requirements between the countries (European Commission, 2005, p.7).

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The relevant laws and regulations (OECD, 2010) recognise different methods to apply transfer prices. Among the documents used by OEMs and their suppliers there is a cost breakdown, which complies with the requirements of the German Ministry of Finance (BMF, 2005, chapter 3.3.2, p.14). Different OEMs give it different names, such as cost breakdown (CBD) in the Volkswagen Group and price breakdown (PBD) in Mercedes-Benz. In this paper we will use CBD for all these breakdowns.

In order to avoid these international problems the EU asked the OECD to draw up a regulation (OECD/G20, 2015). This regulation is intended to avoid an erosion of the taxable base and the shifting of profits to other jurisdictions.

Based on the automotive industry and the above-mentioned CBD, this research aims to develop a procedure to apportion surcharges and profits among associated enterprises that is as compliant as possible with the laws and regulations on transfer prices. It intends to make an appropriate distribution in light of the functions performed taking into account assets used and risks assumed. The proposed procedure aims at achieving a calculation of transfer prices that results in a situation as close as possible to reality, that is, to what the market is willing to pay for each operation, based on the CBD. The purpose is not only to comply with the laws and regulations in this regard, but also to be able to analyze the results of each production plant.

1. Background

The literature has discussed the possibilities for companies to reduce their taxes using transfer prices. In this regard, Hiemann (2012) proposes three alternatives to minimise tax payables where the solution focuses on complying with the arm's length principle. Huh (2013) optimises tax payables according to the method chosen after comparing the cost-plus method with the resale price method. More

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recently, Gao (2015) develop a model to reduce companies' taxes by using transfer prices, concluding that division managers must adjust transfer prices according to the taxes to be paid in the countries where they buy and sell.

The basic document defining the transfer pricing policy for a whole group at the international level is called "master file" (OECD, 2013, p.8; GAufzV, 2007, article 4), and can be found in the EU Transfer Pricing Documentation – EUTPD (European Commission, 2005, chapter 1.6, 1.7, 4). To implement it, a "country file", or country-specific documentation, is to be drawn up for each country (OECD, 2013, p.9) according to the spirit of the master file and the specificities mentioned above. The purpose of the calculation of transfer prices must be the contribution of appropriate taxes in light of the functions performed taking into account assets used and risks assumed. This statement can be found in the definitions of different transfer pricing methods such as the resale price method, the cost-plus method or the profit split method (OECD, 2010, pp.59-105).

The OECD and EU criteria set forth in the documents mentioned above make it clear that each group of companies must follow the method it chose in its "master file". The company's failure to implement it may lead to such system being rejected by the public administrations of the different countries according to BMF (2005). This may have significant financial impacts due to sanctioning procedures and subsequent retroactive payment of taxes including interests.

The research objectives in the studies mentioned above primarily focus on a profit-sharing scheme design (Gao, 2015). However, the German Ministry of Finance does not accept profit split methods to assess transfer prices (Kaminski, 2001). Bearing in mind that in the chosen automotive industry several important companies, both OEMs and suppliers, have their headquarters and/or delegations in Germany, these methods are to be excluded. Besides, the global profit split method is also excluded, as it is not accepted by the OECD for not complying with the arm's length principle (OECD, 2001).

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Lakhal (2006) proposes an operational profit sharing model for network-manufacturing companies focusing on a mathematical model that simulates the cooperation of different companies not belonging to the same group, such as joint ventures. This model contemplates the cost of materials within the profit split. According to this author, it is a model that helps companies seeking an advance pricing arrangement (APA). It is based on the official procedure of asking binding questions to the tax administrations of the countries involved in a transaction that requires transfer prices (OECD, 1999).

The approach adopted in this paper, consisting in splitting charges and profits in an appropriate manner in light of the functions performed taking into account the assets used and the risks assumed by each member of the group of associated enterprises is, to our knowledge, a novel proposal.

2. Methodological Framework to Calculate Transfer Prices

The laws and regulations analysed do not provide an explicit description of how to apply transfer pricing (TP) to automotive industry suppliers. The explanations refer to all industries in general. The automotive industry suppliers' sector has special circumstances (Sturgeon, 2009). In the case of our research this means that we must adapt the transfer pricing procedure to the special CBD circumstances.
The diagram described by Martini (Martini, 2005) reflects the order of preference of transfer pricing methods according to the OECD. However, this author does not contemplate the hypothetical arm's length principle procedures, that our research considers (**Figure 1**).

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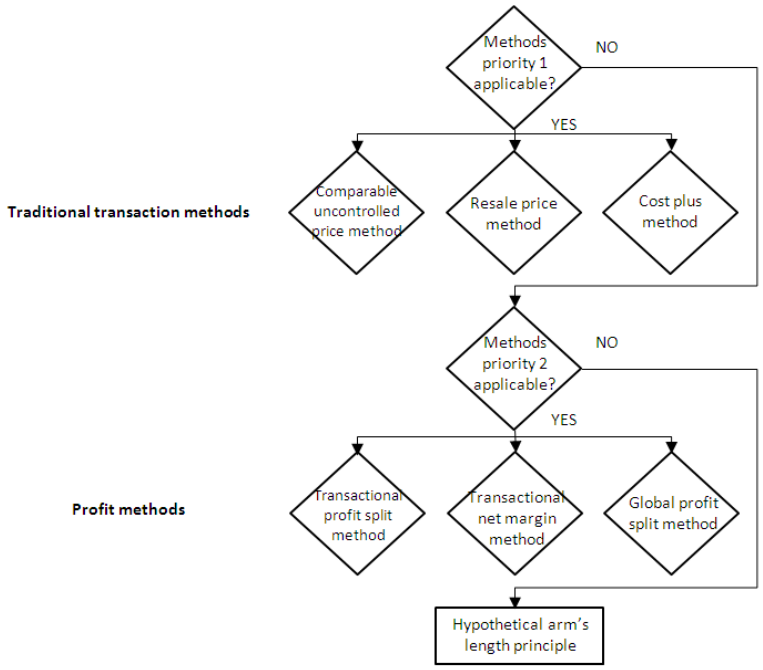

Figure 1 Order of preference of transfer pricing methods (adapted from Martini (2005)

Source: Martini, 2005.

Figure 1 shows an order of preference for methods from top to bottom and from left to right (AStG, 2008, article 1), (BMF, 2005, chapter 3.4.10.3, p. 28-31). The OECD directives express a preference for traditional methods over methods based on determining the profit of the transaction (Sansing, 2014), having adopted the arm's length principle to assess international transfer prices (Pendse, 2012). The

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descriptions of these methods are based on the OECD definitions (OECD, 1995, chapter 3.4.10.2, 1.20-1.27). The purpose is to find the most appropriate method (OECD, 2010, chapter II). The main requirement is to comply with the arm's length principle.

This research is applied to the automotive industry, where suppliers belonging to a group of companies provide products to each other. Given that such sales are not made to third parties, the comparable uncontrolled method is not applicable (Huh, 2013). The method proposed in this paper is based on the Comparable uncontrolled price method (CUP) complying the arm's length principle.

3. Current Situation and Proposed Approach

The main requirement to be met for the apportionment of surcharges and profits among associated enterprises is the arm's length principal, being the comparable uncontrolled price method the preferred method. From these guidelines arises the following question: How can this method be applied to the automotive industry suppliers sector? In order to properly implement this method, it has to be demonstrated that a third party would accept the same conditions/ price for the work that a company of the group is doing for another company of the same group. Within the tender procedure for the supply organised by the OEM, the OEM usually requests quotations for the specified supply from companies around the world and evaluates the different operations to be carried out, thus obtaining a price which takes into account market prices at the world level.

At the final stage of the project, before the award of the contract, the OEM usually identifies several possible suppliers. In order to be awarded the contract, each of these suppliers accepts the CBD. This means that the terms and conditions applicable between the OEM and the awardee are the same that would have been accepted by the rest of suppliers that were at the final stage of the negotiation (otherwise, they would have been discarded during the tender procedure).

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Thus the OEM usually applies the comparable uncontrolled price method at the international level for its projects. Each certified company has its work procedures documented. The tax administration in each relevant country may require the OEM to provide such documentation even by specific projects and verify the procedure. Considering that the certificates are regularly renewed (for instance, once a year), the work procedures should be highly up-to-date.

The procedure shows the OEM's negotiating power, which is important to take into account when analysing market and competition conditions (BMF, 2005, chapter 3.4.10.3, p.28-31). The following explains the proposed method to apportion surcharges and profits in an appropriate manner in light of the functions performed taking into account assets used and risks assumed by each member of the group of associated enterprises. This procedure ensures that each group member's participation in the profits is appropriate according to the above (BMF, 2005, chapter 3.4.12.6, p.46).

Starting from a situation where two associated enterprises carry out two operations (o) in two Production Stages (s): (i) s1, carried out by the company ONE, o1 (Stamping), in a Country A; and (ii) s2, carried out by the company TWO, o2 (Assembly Welding), in a Country B. At Production Stage 1, parts are manufactured which are later assembled at Production Stage 2 to obtain an Assembly. Thus, Table 1 gathers a description of the problem in Production Stage 1 (s1). The values shown in the table, according to the client's CBD, come from the experience of the authors in the automotive industry. The OEM´s includes surcharge for Material Overhead (MOH) and surcharge for Sales and Administrative Overhead (SAOH).

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Table 1 Problem approach in s1

s1: o1 (Stamping), Company ONE of Country A	
External materials consumption	100.00 €
Payments for scrap metal [(a)]	*-10.00 €*
MOH 5 % (on materials consumption without payments for scrap metal)	5.00 €
Manufacture (carrying out "Stamping" process)	20.00 €
SOAH 10 % (on Total 1) [(b)]	11.50 €
Profit 5 % (on Total 2) [(c)]	6.33 €
Sum of Income: Total 2 + Profit	*132.83 €*

[(a)] During the "Stamping" operation, material is transformed (before processing) into stamped material (after processing), producing excess material, which is withdrawn. This withdrawn material is not generally useful to produce. It is collected and sold to scrap metal merchants. Income from this scrap metal is indicated under "Payments for scrap metal".

[(b)] Total 1= Materials consumption + Payments for scrap metal + MOH+ Manufacture

[(c)] Total 2= Total 1+ SAOH

The company that carries out the operation in question is remunerated by the OEM according to the CBD with the sum of income. Considering the above we notice that the value which the supplier can directly influence is manufacture.

On the other hand, at production stage 2 two items are identified: (i) *External*: expenditure in purchases of materials to third parties unrelated to the group of enterprises and their respective surcharges and profit, and (ii) *Internal*: expenditure

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in purchases of materials to group members and their respective surcharges and profit. **Table 2** gathers a description of the problem in Production Stage 2 (s2).

Table 2. Problem approach in s2

S2: o2 (Assembly Welding), Company TWO of Country B		
	External	**Internal**
Materials consumption "s1"	--	132.83 €
Materials consumption "s2"	2.00 €	--
Payments for scrap metal	-0.00 €	--
MOH 5 % (on materials consumption without payments for scrap metal)	0.10 €	--
Manufacture (carrying out "Assembly Welding" process)	--	15.00 €
SOAH 10 % (on Total 1 without internally purchased parts) [(d)]	0.21 €	1.50 €
Profit 5 % (on Total 2 without internally purchased parts)	0.12 €	0.83 €
Sum of Income:	*2.43 €*	*150.16 €*

[(d)] "Internally purchased parts": some operations require parts produced by previous operations, carried out by any member of the group of associated enterprises. These parts are called "internally purchased parts" because they are not bought to a third party but to a member of the group. The SAOH surcharge is not applied to the value of these "internally purchased parts" because it has already been charged in the previous operation. This procedure is also valid for parts from previous operations produced within the same company or production plant.

Company TWO must pay a higher amount (132.83 €) to purchase the material than company ONE (100.00 €) because it already includes the added value of having carried out operation 1 "Stamping". If operation 2 handles a more expensive material than that of operation 1, it means that the remuneration for handling the material must be higher in operation 2 than in operation 1.

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The procedure proposed in this paper tries to solve the problem of inadequate cost sharing within manufacturing processes between associated enterprises through the apportionment of cost between the operations.

4. Model Formulation

This section presents the formulas and nomenclatures used in the proposed model.

4.1. Starting Situation: OEM's CBD

Table 3 presents the nomenclature used for the calculation of the model initial stage, which starts with the CBD.

Table 3 Nomenclature used in the initial stage: CBD

s	Production stage	o	Operation
CM	Cost of materials (value according to CBD)	SM	Payments for scrap metal (value according to CBD)
α	Surcharge factor for MOH	β	Surcharge factor for SAOH
γ	Surcharge factor for Profit	MAN	Manufacturing cost (value according to CBD)

In this initial stage it is necessary to calculate the following parameters:

- Material Overhead, *MOH*, by using the following expression:
$$MOH = CM * \alpha \quad (1)$$
- Sales and Administrative Overhead, *SAOH*, which is calculated as follows:
$$SAOH = (CM + SM + MOH + MAN) * \beta \quad (2)$$

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- Profit, *PR*, calculated as the following expression:
$$PR = (CM + SM + MOH + MAN + SAOH) * \gamma \quad (3)$$
- Sum of Income, *SI*, which follows the equation expressed as:
$$SI = CM + SM + MOH + MAN + SAOH + PR \quad (4)$$

4.2. Apportionment of MOH According to OEM (Before Apportionment) to Obtain New MOH (Internal, after Apportionment)

The next stage consists of the calculation of the following indicators:

- Sum of Basic Value of Materials, *ΣBVMo*, which is the sum of all the basic values of the operations that manipulate materials, expressed as:
$$\Sigma BVM_o = CM_1 + \sum_{i=2}^{n} CM_{i-1} SM_{i-1} + MAN_{i-1} \quad (5)$$
where *n* is the amount of operations that manipulate materials, and *i* is a counter of the number of operations that manipulate materials from 1 to n.
- New MOH (after apportionment), *New MOH$_i$so*, which varies according to the following conditions (in function of *i*):
$$If\ i = 1 \rightarrow New\ MOH_1 = \frac{CM_1}{\sum BVM_o} * MOH_{so} \quad (6)$$
$$If\ i > 1 \rightarrow New\ MOH_i = \frac{CM_{i-1} + SM_{i-1} + MAN_{i-1}}{\sum BVM_o} * MOH_{so} \quad (7)$$

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4.3. Apportionment of the SAOH According to OEM (Before Apportionment) to Obtain New SAOH (Internal, after Apportionment)

In this stage, it is calculated the following indicator:

- New SAOH (after apportionment), *New SAOHso*, expressed as:

$$New\ SAOH_{so} = \frac{SAOH_{so}}{n} \tag{8}$$

4.4. Apportionment of Profit According to OEM (before Apportionment) to Obtain the New Profit (Internal, after Apportionment)

This stage consists of the calculation of the following indicators:

- Total Profit, *ΣPR*, which is the sum of all profit for all operations at all production stages. It is expressed in (9).

$$\Sigma PR = \sum_{i=1}^{n} PR_{so} \tag{9}$$

- Sum of the Basic Values of Profit, *ΣBVPR*, which is the sum of all the basic values of the operations that manipulate materials, expressed as:

$$\Sigma BVPR = \sum_{i=1}^{n} (MOH_{so} + MAN_{so} + SAOH_{so}) \tag{10}$$

- New Profit (after apportionment), $New\ PR_{so}$, which is calculated as follows:

$$New\ PR_{so} = \frac{(MOH_{so} + MAN_{so} + SAOH_{so}}{\sum BVPR} * \sum PR \tag{11}$$

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Conclusions

This paper shows a procedure oriented towards compliance with the relevant laws and regulations using transfer prices to provide each member of a group of companies an appropriate participation in costs and profits. The calculation system proposed facilitates the creation of an analysis tool allowing automotive industry suppliers to apply this procedure to their product range. Practice shows a large amount of products (single parts, assemblies and subassemblies) that must be documented.

By taking advantage of transfer prices as a solution to internal problems or discussions and identifying the processes to be improved, given the use of the same data that were processed to comply with administrative requirements for purposes of internal performance analysis, transfer prices now show they also provide internal added value. The company improves its competitiveness as it reduces its manufacturing costs by improving the said processes and in turn minimises the risk of possible sanctions for failing to comply with the laws and regulations, with all their consequences.

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