Ophthalmic Optical industry in Spain

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Area: Intput-Output Analysis

Abstract

In order to deal with population needs and to take an advantage of productive possibilities as a result of its demand, it is necessary to analyze health sectors structure. Due to the diversity of sectors conforming health services we propose the analysis of an specific sector, optical industry sector, which importance arise from its position as a supplier of health services as well as from its inherent technological character.

In the field of Social Accountability and based on the use of SAMESP08, we develop the disaggregation and comparison of the sector within the branch in which is contained. Due to limited accounting data of businesses, use of mathematical analysis will be considered. Assessment of direct and indirect effect of the industry at regional and national level allows to better understand the significance of a sector predictably facing variations in demand.

Palabras Clave: Optics; Ophthalmic Optics; Input-Output Analysis; Disaggregation

Clasificación JEL: C67, L60

1. Introduction

Prosper economic situation taking place in Spain for several years, disregarded the importance of sectors that presented a sustained economic growth. Today, it is a matter of fact that many of them have been damaged due to the economic crisis and are still suffering the consequences of a decrease in final-demand growth. Therefore, the determination of growth possibilities in those sectors, and the quantification of its impact in the rest of the economy, has to be accomplished.

The previous situation closely affects optical manufacturing and specialized retail trade, referred as Visual Corrective Products[1] (PCV). These sectors provide and sell health products and services, among them, ophthalmic lenses, frames, contact lenses or sunglasses.

Health sector is defined as all the public and private organisations specialized in health services (Guinness & Wiseman, 2011), what shows the wide range that this sector embraces and the complexity of the concept. For this reason, and to analyze the existing relations with the rest of the economic system, we must pay attention separately to their components or sub-sectors and their suppliers.

Three factors influence ophthalmic optical activities: (i) aging of population (ii) technological development and (iii) increasing visual needs. All of them, affect in the same manner to household consumption patterns of PCV, and this consumption is a determinant of total output demand of specialized retail trade sectors. At the same time, this specialize trade represents the main demand from the ophthalmic optical industry. The relations among the three factors are exposed in **¡Error! No se encuentra el origen de la referencia.**.

Regarding the statistical classification, PCV manufacturing belongs to class 32.50 in CNAE-2009[2], *Manufacture of medical and dental instruments and supplies*,

[1] PCV will be used to make reference to ophthalmic optical products, that is, optics related to the eye and the correction and protection of vision with optical lenses.
[2] CNAE-09 is the Spanish adaptation of the Statistical Classification of economic activities in the European Community Revision 2 (NACE Rev.2).

corresponding to "other manufactures" in Spanish Input-Output Tables. While PCV specialized retail trade, which will be denote as Optometry Sector in the rest of this paper, belongs to class 47.78 as *other retail sale of new goods in specialised stores*, which includes *activities of opticians*, and is a component of *retail trade in Spanish Input-Ouput Tables.*

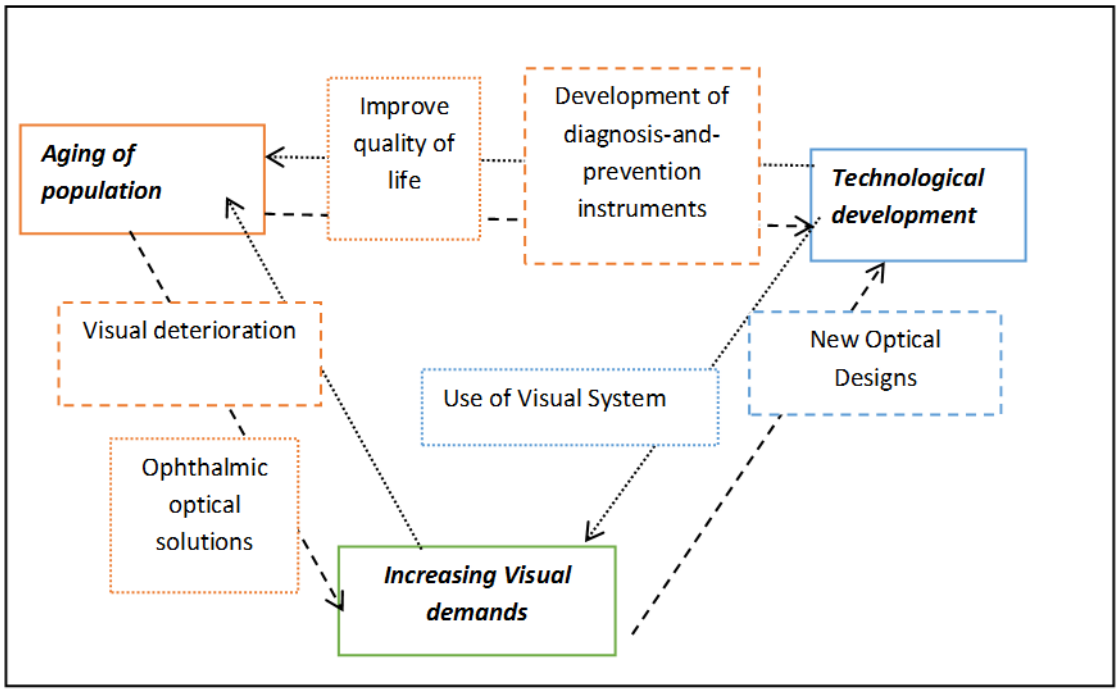

Figure 1 . Increase in Visual needs and its relations to key components of variations in final demand

The level of aggregation of National Accounts limits the analysis of ophthalmic-optics economic behaviour. As a result, a double disaggregation has to be accomplished, in terms of intermediate inputs and the difference between intermediate inputs and total output organized in different types of final demand. Given the weight of household demand of PCV, our analysis seeks to assess economic interrelations of PCV industry in a social accounting matrix framework.

Difficulties in the collection of data from companies conforming ophthalmic optics, due to the confidential character of the data, makes mathematical analysis necessary for determining economic relations affecting manufacturers and specialized

retail traders of PCV[3]. For this reason, Wolsky method will be used in order to determine the economic impact of ophthalmic optics in Spain.

The remainder of this paper is structured as follows. Section 2 summarizes relevant literature. Section 3 introduces the methodology used in both aspects: impact analysis and sectoral disaggregation. Results of the disaggregated SAMESP08 in terms of inter-sectoral relations will be given in Section 4. And at last, Section 5 will summarize the conclusions of this research.

2. Literature in input-output disaggregation procedures and optical industry in Spain.

In general, there are two problems affecting the division of input-output tables by sectors. On the one hand, the aggregation bias, that indicates the error of joining several sectors within one economic activity branch. On the second hand, the disaggregation problem, that occurs when sectoral structure of previously aggregated sectors causes a shortage of information, as a result of the previous aggregation. Regarding the former, there is a large literature and Miller and Blair give a detailed description of the problem (Miller & Blair, 2009). Regarding the latter, despite the number of researches being fewer, it has never been forgotten along the years. For instance, Fei deals with the problem of aggregation bias offering a first approach to the disaggregation process (Fei, 1956), and by first time he makes a reference of augmenting matrices and relations among inverse matrices as a tool to obtain a disaggregated new matrix. Later, Wolsky seeks an implementation of a similar process, proposing a technique based on the use of weights to disaggregate two sectors previously aggregated (Wolsky, 1984). Other authors, for instance Guillen and Guccione or Aislabie and Gordon, tackle sectoral disaggregation considering different factors, the former consider several variables for use in disaggregation (Gillen & Guccione, 1990) whereas the later provides different disaggregation approaches starting from an original disaggregated table (Aislabie & Gordon, 1990). More recent publications deal with disaggregation in aspects related with

[3] A process of collection of data was unsuccessfully carried out and therefore a non-survey method of disaggregation had to be considered.

coefficient of emissions and environmental impact as those by Marriot (Marriot, 2007), Lenzen (Lenzen, 2011), Wood and Weinzettel (Wood & Weinzettel, 2012) or Lindner, Legault and Guan (Lindner, Legault, & Guan, 2012) (Lindner, Legault, & Guan, 2013). Meanwhile, in relation to social accountability, Cazcarro, Duarte and Sánchez carry out the disaggregation of a regional Social Accounting Matrix based on water consumption for the agrarian sector (Cazcarro, Duarte Pac, & Sánchez-Choliz, 2010) while Llop & Manresa analyze and compare aggregation bias in input-output tables and social accounting matrices (Llop & Manresa, 2014).

Wolsky's technique enable the disaggregation of one branch into two on the basis of financial data of businesses, for instance, sectoral turnover, and gives an insight of how to deal with more than two sectors, which is more recently developed by Lindner, Legault & Guan (2012). However, the particularity of our analysis relies in the field of application, social accounting matrices, which makes certain assumptions and the customization of the technique necessary, in order to obtain data on final demand components.

Beyond the mathematical process to solve the lack-of-data problem, few reports on manufacturing (DBK , 2009) and specialized retail sectors of PCV exist (DBK, 2010) (Gómez, 2009) (Visión y Vida; FEDAO, 2009). Moreover, data on PCV personal demand is offered in sectoral reports (Visión y Vida; FEDAO, 2009) comparing data of several European countries, and showing the potential increase of this demand in Spain, which is still the lowest of all these countries.

3. Methodology

The analytical process of this research is sub-divided in two aspects. First of them, is the impact analysis of the ophthalmic optical sector within the Spanish Economy, and the basis of this methodology will be explained above. Second of them is the process to obtain a disaggregated sector within Social Accounting Matrices (SAM) in order to obtain the impact of the variation of variables, for which an approximation to Wolsky's technique will be sketched.

3.1. Field of implementation: Social Accounting Matrices

Social Accounting Matrices represent an extension of input-output tables. Therefore, we start by making a reference to the principles of input-output analysis. Input-output tables give information of flows between economic activities, value added and final demand. Whereas, Social Accounting Matrices disaggregate value added and final demand in order to better ascertain how different institutional sectors and elements of value added behave and influence productive activities and vice-versa.

Although conventional input-output tables offer data on intermediate inputs of productive activities, final demand and value added, as mentioned before, and it would enable the quantification of input-output multipliers[4], the purpose of this study, analysing a sector that is mainly affected by household demand, is needed of data on elemental accounts and therefore, Social Accounting Matrices become especially interesting.

Social Accounting Matrices (SAMs) are data bases in which disaggregation of national accounts is developed. SAMESP08, which represents the most recent data on Spanish Social Accounting, will be used as a benchmark of our study. Since SAM division may vary depending on the target of its construction, a scheme of SAMESP08 structure is given in (Table 1).

			1	2	3	4	5	6	7	8	9	
	Sectors		AP	L	K	HOG	SOC	AA.PP.	I-S	UE	RM	PT
			Productive Activities	Labour Factor	Capital Factor	Households	Societies	Public Administration	Savings/Investment	European Union	Rest of the World	Total Output
1	AP	Productive Activities	CI			DFH		DFSP	INV (FBC)	XUE	XRM	RAP
2	L	Labour Factor	RFT							TUEFT	TRMFT	RFT
3	K	Capital Factor	RFK									RFK

[4] Multiplier or impact analysis gives information of direct and indirect effects of different changes in which a certain sector might be involved.

4	HOG	Households		RFTH	RFKH	TH	TSH	TSPH		TCUEH	TCRMH	RH
5	SOC	Societies			RFKS	THS	TS	TSPS		TCUES	TCRMS	RS
6	AA.PP.	Public Administration	INAP	RFTSP	RFKSP	PHSP	TSSP	TAAPP	IPK	TUESP	TRMSP	RSP
7	I-S	Savings/ Investment				ABH	ABS	ABSP		TUE	TRM	AE
8	UE	European Union	MUE	RFTUE		TCHUE	TSUE	TSPUE				RUE
9	RM	Rest of the World	MRM	RFTRM		TCHRM	TSRM	TSPRM				RRM
	PT	Total Output	GTAP	GTFT	GTFK	GTH	GTS	GTSP	IE	GTUE	GTRM	PIB

Table 1. SAMESP08 Structure. Own elaboration. Source: (Fuentes & Mainar, 2013)

Sixty four branches are included among the economic productive activities of the matrix, aggregated within thirty six sectors. Value Added is divided in: labour factor and capital factor, while final demand is divided in: households, Public Sector, Societies, Saving and Investment, European Union and Rest of the World. Therefore, the resulting SAMESP08 is a 40×40 matrix.

Based on SAMESP08 and supported by the use of weighting factors of manufacturing PCV sector, a new version of the same matrix will be obtained: SAMESP08-V, a more detail explanation of the process will be given in the following sub-section (3.2). With the resulting data, a model based on input-output analysis will be made, in order to determine variation of endogenous variables as a consequence of changes on exogenous variables.

Considering as an exogenous variable final demand (y) and the rest of economic flows as endogenous variables, the following approximation of economic impacts can be made: $y = Ay + x$, or: $y = (I - A)^{-1}x$, and can be expressed as in the following expression: $y = (1 + A + A^2 + A^3 + \cdots)x$. Last equation ease the understanding of what the initial (1), direct (A), indirect (A^2+A^3+…) and induced (when the model is closed with respect to households) impact of a variation of final demand are (Miller &

Blair, 2009). Meanwhile, $(I-A)^{-1}$ represents the similar implications of Leontief Inverse in a SAM framework, and it will denoted by M, the accounting multiplier matrix: $M = \begin{pmatrix} m_{12} & \cdots & m_{1j} \\ \vdots & \ddots & \vdots \\ m_{j1} & \cdots & m_{jj} \end{pmatrix}$, where m_{ij} is the effect of one euros' value increase in final demand (or other exogenous variable) for sector j output in sector i; $\sum_{i=1}^{n} m_{ij}$ is the total effect of one euro's value increase of final demand for sector j in the rest of sectors., that is, the effect of an exogenous unitary shock of a j account in the rest of the economy or Backward Linkage; $\sum_{j=1}^{n} m_{ij}$ is the total effect of one euros' value increase of final demand (or other exogenous variable) for each-sector output in sector i, that is, the effect of one additional unit of income in all the endogenous account produce in another i account or Forward Linkage.

3.2. Sectoral disaggregation.

In this section an introduction to Wolsky's technique for disaggregation of input-output tables will be given. This method represents a solution to the disaggregation problem when accounting data of those companies conforming the target sector, are scarce. To begin, a presentation of PCV industry, will be given to identify different variables.

Ophthalmic optical manufacturing belongs to High Technology according to OECD sectoral classification of high R&D expenditure by industries. In the statistical taxonomy of NACE Rev.2, it belongs to class 32.50, which is medical instrument manufacturing industry. As mention before, 32.50 is generally mixed with other sectors within "other manufacturers" in the frame of input-output tables and SAMs. When interest in analysing the target sector overcomes, the first choice facing a shortage of data is to request the data to companies. However, such a data is classified as confidential and the unique resources are the publicly available businesses accounts[5], while SABI data-base offers some of them. With the support of data obtained through SABI, sectoral reports, SAMESP08 and an adequate mathematical process, it is possible to disaggregate SAMESP08 in order to

[5] The governmental institution dedicated to keep this accounts charge for the consultation of them, therefore an in depth analysis would imply an extraordinary time and money consuming task.

assess the direct and indirect effects of the target sector, manufacturers of PCV or, which is the same, ophthalmic optical manufacturing.

Once the background of our analysis is given, the mathematical process, that is, Wolsky's technique (Wolsky, 1984), will be explained. Final matrix will be 37x37, since we add a new productive branch when the original "other manufactures" is disaggregated.

The process starts with the aggregated matrix, which in our case is SAMESP08, summarize in equation (1) as S, while the end is the obtaining of SAMESP08-V, summarized in equation (3)as V. Wolsky proposes the use of a new matrix with the size of V as half a way, denoted by H in equation (2), where $h_{ij} = s_{ij}$ for $i, j = 1 \dots 35$, while $h_{nj} = w_1 s_{in}$ and $h_{n+1,j} = w_2 s_{nj}$ in reference to rows, and $h_{in} = h_{i,n+1} \equiv s_{ij}$ in reference to columns. The remaining of the matrix will follow rows structure, as in $\begin{pmatrix} h_{nn} & h_{n,n+1} \\ h_{n+1,n} & h_{n+1,n+1} \end{pmatrix} \equiv s_{nn} \begin{pmatrix} w_1 & w_1 \\ w_2 & w_2 \end{pmatrix}$. Therefore, S and H will coincide in each row and column, except those containing part of "other manufactures" or what is the same, H will have the same continent as S from 1st to 35th sector, but one sector of S, other manufacturing, will be transformed into two in H. New branches included in H will divided by the weight of two factors, target-sector turnover (w_1) and the rest of other manufactures ($w_2 = 1 - w_1$).

$$S = \begin{pmatrix} s_{11} & \cdots & s_{1n} \\ \vdots & \ddots & \vdots \\ s_{n1} & \cdots & s_{nn} \end{pmatrix} \quad (1)$$

$$H = \begin{pmatrix} h_{11} & \cdots & h_{1,n} & h_{1,n+1} \\ \vdots & \ddots & & \vdots \\ h_{n,1} & \cdots & h_{n,n} & h_{n,n+1} \\ h_{n+1,1} & & h_{n+1,n} & h_{n+1,n+1} \end{pmatrix} \quad (2)$$

According to Leontief inverse, direct and indirect effects of an change in an exogenous variable is given by $(I - A)^{-1} = L$. Wolsky considered a matrix that is the

difference between the half a way matrix and the final matrix, this matrix is Δ, Δ= V − H, where $\Delta_{nj}= \sigma_j\delta_i = -\Delta_{n+1,j}$ in relation to rows, $\Delta_{in}= w_2\delta_i$ and $\Delta_{i,n+1}= -w_1\delta_i$ in relation to the columns and $\begin{pmatrix}\Delta_{n,n} & \Delta_{n,n+1}\\ \Delta_{n+1,n} & \Delta_{n+1,n+1}\end{pmatrix} = \frac{1}{2}\delta_n\begin{pmatrix}w_2 & -w_1\\ w_2 & -w_1\end{pmatrix} + \sigma_n\begin{pmatrix}1 & 1\\ -1 & -1\end{pmatrix} + \xi\begin{pmatrix}w_2 & -w_1\\ -w_2 & w_1\end{pmatrix}$ in the intersection between missing rows and columns. Therefore, V matrix would be obtained by difference of H and Δ, as in equation (3) and Δ composition is in (4).

$$V = H + \Delta \qquad (3)$$

$$\Delta = \begin{pmatrix} d_{11} & d_{12} & \cdots & d_{1,n-1} & w_2\delta_1 & -w_1\delta_1 \\ d_{21} & d_{22} & \cdots & d_{2,n-1} & w_2\delta_2 & -w_1\delta_2 \\ \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ d_{n-1,1} & d_{n-1,2} & \cdots & d_{n-1,n-1} & w_2\delta_{n-1} & -w_1\delta_{n-1} \\ \sigma_1 & \sigma_2 & \cdots & \sigma_{n-1} & (\frac{1}{2}\delta_n + \xi)+\sigma_n & -(\frac{1}{2}\delta_n + \xi)+\sigma_n \\ -\sigma_1 & -\sigma_2 & \cdots & -\sigma_{n-1} & (\frac{1}{2}\delta_n - \xi) - \sigma_n & -(\frac{1}{2}\delta_n - \xi) - \sigma_n \end{pmatrix} \qquad (4)$$

Following Wolsky, δ_i is the difference between the n^{th} and $(n+1)^{th}$ sectors in their demand for input from the i[th] sector; σ_j is the departure from average in what the n[th] and (n+1)[th] sectors supply to the j[th] sector; δ_n, σ_n and ξ are intra-aggregate exchanges between the disaggregated sectors and the initial aggregated sector. δ_i,σ_j, δ_n, σ_n and ξ are bounded with the weight factors of manufacturers of PCV, w_1 and w_2 for total turnover and the rest of sectoral-relations weights for difference-matrix columns.

In our analysis, Wolsky methodology has been modified in order to adapt the model to the PCV industry characteristics. These particular circumstances imply that both aggregated- columns and rows will not be divided into two from the original aggregation, but instead PCV industry will be extracted from other manufacturing but will not modify the original distribution. Not only does this method respect the heterogeneity of the "other

manufacturing" but also respects the relative size of the aggregated sector in relation to PCV industry. The main difference of this method with respect to Wolky's takes place in the difference-matrix, Δ for Wolsky, that we will denote by D in our methodology, equation (5).

$$D = \begin{pmatrix} d_{11} & d_{12} & \cdots & d_{1,n-1} & d_{1,n} & -w_1\delta_1 \\ d_{21} & d_{22} & \cdots & d_{2,n-1} & d_{2,n} & -w_1\delta_2 \\ \vdots & \vdots & \ddots & \vdots & \vdots & \vdots \\ d_{n-1,1} & d_{n-1,2} & \cdots & d_{n-1,n-1} & d_{n-1} & -w_1\delta_{n-1} \\ d_{n,1} & d_{n,2} & \cdots & d_{n,n-1} & d_{n,n} & -(\frac{1}{2}\delta_n + \xi)+\sigma_n \\ -\sigma_1 & -\sigma_2 & \cdots & -\sigma_{n-1} & (\frac{1}{2}\delta_n - \xi) - \sigma_n & -(\frac{1}{2}\delta_n - \xi) - \sigma_n \end{pmatrix} \quad (5)$$

Where: $d_{ij} = 0$ for $i, j = 1 \dots n$,

$\delta_i = [demand\ n - demand\ (n+1)]\ from\ sector\ i$ and

$\sigma_j = \left[\frac{supply\ from\ n\ to\ j + supply\ from\ (n+1) to\ j}{2}\right] - supply\ from\ (n+1) to\ j.$

Next step coincides with Wolsky's bounding process in order to determine whether the process meets the criteria to be consistent or not. Following identities indicate the bounds for each variable:

$$\max\left\{-\frac{s_{in}}{w_2}, -\frac{(1-s_{in})}{w_1}\right\} \leq \delta_i \leq \min\left\{\frac{s_{in}}{w_1}, \frac{(1-s_{in})}{w_2}\right\}$$

$$\max\{-w_1 s_{nj}, -1 + w_2 s_{nj}\} \leq \sigma_1 \leq \min\{-w_2 s_{nj}, -1 + w_1 s_{nj}\}$$

$$\max (2w_1 w_2)^{-1}\{max - w_1 + (w_1 - 2{w_1}^2)s_{nn} - 2w_1\sigma_n, -w_2 + (w_2 - 2{w_2}^2)s_{nn} + 2w_2\sigma_n\}$$

$$\leq \xi \leq$$

$$\min (2w_1w_2)^{-1}\{min\, w_1 + (w_1 - 2{w_1}^2)s_{nn} - 2w_1\sigma_n, w_2 + (w_2 - 2{w_2}^2)s_{nn} + 2w_2\sigma_n\}$$

The bounding process concludes that the results obtained in the disaggregation carried out with the available data is consistent and therefore multiplier analysis can be developed on the basis of SAMESP08-V.

3.3. Multiplier analysis

Rasmussen-Jones multipliers are used as indicators to assess the impact of PCV industry. For further extension on multipliers analysis Cardenete, Mainar, Fuentes and Rodriguez give an in depth exposition of methods (Cardenete, Mainar, Fuentes, & Rodriguez, 2014). Backward linkages (BL) are calculated based on equation (6), following Rasmussen, according to Leontief model, where $B_{.j} = \sum_{i=1}^{n} b_{ij}$ and $V = \sum_{i=1}^{n}\sum_{j=1}^{n} b_{ij}$, providing the power of dispersion of the sector analyzed. Whereas, forward linkages (FL) are calculated based on equation (7), following Jones, according to Gosh model, where $B_{i.} = \sum_{j=1}^{n} b_{ij}$, $G_{i.} = \sum_{j=1}^{n} g_{ij}$ and $W = \sum_{i=1}^{n}\sum_{j=1}^{n} b_{ij}$, providing the sensitivity of dispersion.

$$BL_{\,j} = \frac{B_{.j}}{\frac{1}{n}V} \qquad (6)$$

$$FLG_{\,i} = \frac{G_{i.}}{\frac{1}{n}W} \qquad (7)$$

Assessment of both, forward and backward effects, enable to determine key sectors in terms of demand and in terms of supply, strategic and driver sectors of the economy respectively. Therefore, the aim of this analysis is to ascertain the influence of income

variation on PCV manufacturing, in light of a possible increase of such demand in the future.

4. Results

Considering all the available data we have proceed to the disaggregation of ophthalmic optical manufacturing and the results are consistent with the previously mentioned bounds. After obtaining SAMESP08-V, different methods to determine whether the target sector has an considerable effect within the whole economy have been carried out and the results can be seen in Table 1.

Classification of productive activities due to economic impacts

	Power of Dispersion	***Sensitivity of Dispersion***	***Sensitivity of Dispersion (Jones)***	***Rassmussen taxonomy***	***Rassmussen – Jones taxonomy***
1	1.1430	0.4879	1.0535	Driver	Key
2	0.8117	0.1875	0.9910	Rest	Rest
3	0.2989	0.6240	1.1489	Rest	Strategic
4	1.0738	0.9409	1.0154	Driver	Key
5	0.6619	0.3918	0.9848	Rest	Rest
6	1.0067	0.2941	1.1983	Driver	Key
7	1.0115	0.4955	1.1473	Driver	Key
8	0.4530	0.5115	1.0058	Rest	Strategic
9	0.7136	0.6101	0.9889	Rest	Rest
10	0.8489	0.3525	1.0748	Rest	Strategic
11	1.0434	0.4128	1.0538	Driver	Key
12	0.8745	0.8864	1.0623	Rest	Strategic
13	0.7205	0.4090	1.0015	Rest	Strategic
14	1.0289	0.2341	1.0996	Driver	Key
15	0.6235	0.5352	1.0010	Rest	Strategic
16	0.7366	0.5987	0.7920	Rest	Rest
17	0.8594	0.3166	1.0185	Rest	Strategic
18	**0.9530**	**0.1627**	**1.0185**	**Rest**	**Strategic**
19	1.0095	0.7480	1.1509	Driver	Key
20	1.2220	2.0129	0.8515	Key	Driver
21	1.1815	0.3516	1.0279	Driver	Key
22	1.1996	0.8352	1.0677	Driver	Key
23	1.2220	0.6942	1.0344	Driver	Key
24	1.1971	0.9547	1.0087	Driver	Key

25	1.0583	1.0345	1.0711	Key	Key
26	1.1500	0.5238	1.1355	Driver	Key
27	1.1198	0.8162	1.1063	Driver	Key
28	1.1551	0.9043	1.0644	Driver	Key
29	1.0673	1.2228	1.0426	Key	Key
30	1.1891	0.2344	0.5713	Driver	Driver
31	1.2190	0.2629	0.6400	Driver	Driver
32	1.1918	0.3677	0.6116	Driver	Driver
33	0.9591	0.2995	1.2271	Rest	Strategic
34	1.1826	0.2016	1.0664	Driver	Key
35	1.1531	0.4431	1.0564	Driver	Key
36	1.2190	0.2155	1.0256	Driver	Key
37	1.2447	0.2124	0.8953	Driver	Driver
38	1.0844	4.4120	1.0537	Key	Key
39	1.0492	3.9852	1.1374	Key	Key
40	0.9268	7.4929	1.0217	Strategic	Strategic
41	0.9244	3.6732	0.9927	Strategic	Rest
42	1.2119	1.6499	0.4840	Key	Driver

Table 2 Multiplier effects: SAMESP08-V[6]

Manufacturing of PCV indicators are in sector number eighteen in Table 2, and based on Jones, Rasmussen and Rasmussen-Jones indicators of multiplier effects, Ophthalmic Optical manufacturing power of dispersion index is very close to 1 (0.9530), therefore is in the average of the economy in what respects to backward linkages, and the effect in the total economy of a variation in the final demand of the sector, would be considerably important. Furthermore, sensitivity of dispersion value indicates that ophthalmic optical sector is a strategic sector of the Spanish economy, which implies that the forward linkages to the rest of the economy are above average. To conclude, Ophthalmic Optical industry represent a strategic sector in the Spanish economy. Furthermore, due to the high level of the power of dispersion the sector is very close to be a key sector of the economy and, in fact, it can be considered as a key sector.

5. Conclusion

[6] See appendix 1 for sectoral correspondences.

Due to the importance of health needs of society, sectors related to health sectors has to be considered for analysis in all aspects, since the linkages of industry within the rest of the economy is highly important in terms of multiplier effects. Furthermore, the fact that industries considered as high technological sectors being mixed and hided in a sector denominated "other manufacturers" represents an obstacle when economic policies has to be design.

The specific problem of increasing visual needs together with the fact that demand of visual corrective products in Spain is, for instance, half of the existing in France and only fifteen percent of the per capita demand for PCV in the US, it makes a deeper analysis necessary to discover how important would be to promote the progress of this industry in Spain, facing a possible growth according to visual needs, aging of population and new optical design and applications.

Therefore, once the classification of PCV manufacturing sector has been made, and it has been concluded that it represents a key sector in the Spanish economy, we will continue analysing the sector to allow an in-depth perspective of its structure in order to make a painstaking policy program possible for ophthalmic optics. Furthermore, such analysis would represent a benchmark for the rest of sectors defining the medical industry.

Appendix 1.

SAMESP08-V structure		
Productive activities	1	Agriculture, livestock and forestry
	2	Fishing and aquaculture
	3	Mining and quarrying
	4	Food, Beverages and Tobacco
	5	Textiles and Textile Products and Leather, Leather and footwear.
	6	Wood and Products of Wood and Cork
	7	Pulp, Paper, Paper , Printing and Publishing
	8	Coke, Refined Petroleum and Nuclear Fuel
	9	Chemicals and Chemical Products
	10	Rubber and Plastics
	11	Other Non-Metallic Mineral
	12	Basic Metals and Fabricated Metal
	13	Machinery and mechanic-equipment construction industry
	14	Machinery and equipment installation and repair
	15	Electrical and Optical Equipment
	16	Transport equipment manufacturing
	17	Other Manufactures
	18	Manufacturing of visual corrective products
	19	Electricity, Gas and Water Supply
	20	Construction
	21	Sale, Maintenance and Repair of Motor Vehicles and Motorcycles; Retail Sale of Fuel
	22	Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles
	23	Retail Trade, Except of Motor Vehicles and Motorcycles; Repair of Household Goods
	24	Hotels and Restaurants
	25	Inland transport, water transport, air transport, Other Supporting and Auxiliary Transport Activities.
	26	Post and Telecommunications
	27	Financial Intermediation, insurance and auxiliary activities.
	28	Real Estate Activities

	29	Research and Development, , information technology activities and Other Business Activities
	30	Public Admin and Defence; Compulsory Social Security
	31	Education
	32	Health and Social Work
	33	Sanitation and similar activities
	34	Activities of membership organizations
	35	Recreational, cultural and sports activities
	36	Other personal services activities
	37	Private Households with Employed Persons
Productive factors	38	Labour Factor
	39	Capital Factor
Institutional sectors	40	Households
	41	Societies
	42	Public Administration
Saving and investment	43	Saving / Investment
Foreign sectors	44	European Union
	45	Rest of the World

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