A use-side trade margins matrix for the Andalusian economy

By

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Abstract

The National Accounting Systems proposed by United Nations (1968, 1993) and Eurostat (1996) establish the concepts of use and make matrices and recommend that production costs of goods and services should be measured before they are conveyed to the markets (basic values). However, initial survey based use matrices are valued at purchasers' prices and therefore, trade and transport margins and net commodity taxes matrices are needed. This paper shows the methodology used presently by the Institute of Statistics of Andalusia for constructing trade margins matrices, which is based on the use-side procedure from the ESA–95 Input-Output Manual (Eurostat, 2002). Input-output compilers may profit from reading this work.

1 Introduction

The 1995 European System of Accounts (ESA 95) integrates use and supply tables as one of the new features of the system. Only symmetric input-output tables were included as part of it in the former ESA. As a result, the supply-use framework may provide more accurate and disaggregated descriptions of inter-industry flows for future economic analysis. Hence, many countries adopted the ESA 95 framework to construct supply and use tables and symmetric input-output tables. Particularly, the recently published ESA 95 Input–Output Manual – Compilation and Analysis (Eurostat, 2002) complements the United Nations Manual (UN, 1999), provides a good technical and methodological basis for low experienced countries in the compilation of input-output tables, proposes harmonized solutions and describes the best current practices in compilation and input-output analysis.

The National Accounting Systems proposed by United Nations (1968, 1993) and Eurostat (1996) recommend that production costs of goods and services should be

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measured before they are conveyed to the markets (basic values). However, initial survey based use matrices are valued at purchasers' prices and therefore, trade and transport margins and net commodity taxes matrices are needed. At the same time, the ESA 95 Input-Output Manual (Eurostat, 2002) provides a guiding procedure for constructing the so-called valuation matrices.

A *use* table comprises commodities i consumed by industries j (intermediate uses), final uses by commodities (final demand, including exports), and value added for each industry. According to the ESA 95 Input-Output Manual (Eurostat, 2002), the aim of the use table is twofold. Firstly, it presents the input structure of each industry (by column), that is, the cost of production in each corresponding industry; and secondly, it shows the use of different types of commodities (by row) for intermediate or final uses. The use table is defined at purchasers' values although basic values can be derived through some valuation adjustments on trade and transport margins and net commodity taxes[§].

A *supply* table shows the produce of sectors i in terms of commodities j (production matrix), the total imports by products, and some valuation adjustment items to transform the production values from basic prices to purchasers' prices. The purpose of the supply table is to provide the total supply of goods and services of an economy for a given period of time. The supply table is defined at basic values, which means that distribution margins (trade and transport) and net taxes on products[**] are left out of the valuation of the production.

However, supply and use flows should be valued at basic prices in order to construct a homogeneous input-output table, as shown in Eurostat (2002). Other analytical purposes like constructing technical coefficients are also involved. Because of these specific requirements, the use table must be transformed from purchasers' values to basic prices and therefore, the so–called valuation matrices must be compiled, i.e. trade and transport margins matrices, and the net commodity taxes matrix (including non deductible value added tax). A guiding procedure for the Andalusian economy can be seen in ten Raa and Rueda-Cantuche (2007). Particularly, this paper focuses on trade margins and describes the Andalusian experience in constructing trade valuation matrices on the basis of the use-side procedure included in the ESA 95 Input-Output Manual.

Next section discusses the use-side and supply-side procedures described in the ESA 95 Input-Output Manual for constructing trade margins matrices. Section 3 presents the Andalusian experience and results and section 4 concludes.

2 Methodology

According to the ESA 95, *a **trade margin** is the difference between the actual or imputed price realized on a good purchased for resale and the price that would have to be paid by the distributor to replace the good at the time it is sold or otherwise dis-*

[§] Notice that for exports the FOB valuation is comparable with purchasers' values.

[**] Notice that for imports the cif valuation is comparable with basic values.

posed of. (...). Trade margins are valued at basic prices.

Thus, trade margins can be derived as the difference between the trade turnover (at basic prices) and the costs of goods purchased for resale adjusted by changes in stocks. Recall that trading is defined as resale of goods without any transformation[††] and that trading activities are measured regardless whether done as main or secondary activity.

Trade services are generally divided into wholesale and retail sale. The ESA 95 Input–Output Manual (Eurostat, 2002) states that wholesale consists of re-selling new and used goods to retailers, industrial, commercial, institutional or professional users, or to other wholesalers; while retailing includes re-selling of new and used goods mainly for personal or household consumption. Neither exclusive trade services on second hand goods, waste and scrap, nor should transit trade be included as trade margins. Lastly, because of the valuation concepts of imports (cif), no imports of trade margins need to be considered either.

The compilation of trade margins matrices admits two procedures, either from the supply side or from the use side. The ESA 95 Input-Output Manual (Eurostat, 2002) favors the former arguing that data sources can be more likely available[‡‡]. However, the use side approach becomes more useful once this issue is solved, at least for the Andalusian experience, as we will show later.

Supply-side trade margin matrices

The starting point of this method is trade turnover data derived by surveyed establishments, that is, the total trade sales and changing in trading stocks. Sometimes, plausible assumptions should be made to achieve data on total trade margins of the economy (e.g. non-market services industries, recreational and sporting activities, etc.).

The first step would be to distinguish trade revenues between wholesale and retail sale, which can be easy for trade industries but not for the other industries. Even if that would be possible, costs of purchased goods for resale may not be required to be separated between wholesale and retail trade. Hence, the subdivision of trade revenues into wholesale and retail trade turnover must be done by using again plausible assumptions when no survey based data are available. For instance, trade sales of restaurants and hotels can be ascribed to retail trade; and trade activities of advertising agents to wholesale trade. Whether such trade turnovers correspond to one or to another will depend normally on the kind of industry.

Wholesale industries are classified in the industry classification NACE Rev. 1 under division 51, retail industries under division 52 and a mixture of both wholesale and retail trade activities under division 50, "sale, maintenance and repair of motor vehicles and motorcycles, and retail sale of automotive fuel".

The second step consists of subdividing trade turnovers by products or group of

[††] However, certain manipulations such as sorting, mixing, breaking bulk, and repacking for distribution in smaller lots are included.

[‡‡] Van den Cruyce (2004) also constructs a use-side trade margins matrix for Belgium but only makes a distinction between distributive channels (producers, wholesalers and retailers) in the case of imports and exports. In his approach, the valuation table of trade margins is compiled simultaneously with the use table of imports.

products, which would result in two trade turnover matrices industries by products, one for wholesale activities and one for retail trade. Here, again, plausible assumptions are usually required in case non-trade industries because of their lack of such data. Not surprisingly, estimating trade turnover by products is also a difficult task for many branches in the trade industries, generally when a lot of goods are traded (i.e. non-specialised supermarkets) or in some wholesale cases, due to the higher level of heterogeneity products sold. A possible solution proposed by the ESA 95 Input-Output Manual is to get some information by asking selected units with important trade turnovers.

The following step is to transform the trade turnover matrices by multiplying them by the assumed product margin ratios, which are defined as the share of a trade margin in relation to the trade turnover. Such ratios can be defined at the level of products (or group of products) or at the level of industries. Particularly, the ESA 95 Input-Output Manual favors the product approach because it seems to be the best approximation to reality.

Hence, the next step would be to search potential sources of product specific margin ratios, both for wholesale and for retail trade. An easy way to estimate them would be to use the surveyed margin ratios of single trade branches as proxies. So, one could use the margin ratio of the retail trade branch with dairy products as the typical retail margin for dairy products. Of course, very detailed data would be needed. Having established the product specific margin ratios, it is only a matter of multiplication to obtain the trade margins matrix, assuming implicitly that each specific ratio is valid in all industries trading that product.

The last step would be to compare the above estimated trade margins by industries with the survey based trade margins by industries. There should be surely differences between them, which can be ascribed to errors in the assumptions made so far on the trade turnover matrix, the subdivision between wholesale and retail trading, the product margin ratios and the product technology assumption. Next, the corresponding compiler should check the data and the assumptions made accordingly.

It should be noticed that the supply-side method for constructing trade margins matrices has to deal with some uncertainties such as weak databases, changing forms of supply of tradable goods, e-commerce, etc. Nevertheless, some advantages should be recognized. The supply-side method allows checking trade sales and trade margins by products with the respective surveyed supply of these products; and the distributive channels, the product specific ratios as well as the size of total trade margins by products are taken into account.

In short, as stated by the ESA 95 Input-Output Manual (Eurostat, 2002), "this compilation method should thus be followed as much as possible depending on the data sources (...)".

Use-side trade margin matrices

From the use-side means that our main objective is to estimate the share of trade margins included in each cell of the use table at purchasers' prices. These shares depend mostly on the typical product margin ratio (as in the supply-side method) and on the distributive channel of each product-flow, which is rarely available by asking establishments and other users. Data availability seems to be again crucial. Particularly, from the use-side it seems to be even worse because of the ignorance of the buyer about the

trade margin incorporated and the previous distributive channels involved for each product before the final seller. Notwithstanding the difficult task of finding reliable data sources, plausible assumptions and the balance with estimated total supply of the trade margins should be made, as in the supply-side method.

According to the ESA 95 Input-Output Manual (Eurostat, 2002) the following information is needed: (1) for each single element of the use table at purchasers' prices, the distributive channel involved, if that exists; and (2) the relevant margin ratios of the products. Most of these data are usually unknown for statistical offices and therefore, plausible assumptions are required, particularly, on the distributive channel, on the different trade margin ratio of certain products between users, and on the distinction between wholesale and retail trade. For instance, intermediate consumption, capital formation and inventories usually involve mostly wholesale trade margins than private consumption, which is more likely connected with retail trade margins.

Once the above information is obtained, the resulting use-side trade margins matrix must be checked with the total supply of trade margins by products, as in the supply-side method. Having achieved final use-side trade margins matrices, they only have to be used for deducting margin values for each industry and final demand components from the use table at purchasers' prices, and then allocate them to the trade margin products according to the corresponding classification. Checking overall plausibility is advisable.

3 The Andalusian experience

The high availability of data sources from surveyed trade establishments allows the Institute of Statistics of Andalusia (IEA) to construct a use-side trade margins matrix. The IEA's trade survey collected information about 4,858 trade establishments; 2,999 retailers, 1,207 wholesalers, and 652 both wholesalers and retailers of motor vehicles and motorcycles and retailers of automotive fuel. The aim of this section will be to explain the whole procedure that has been carried out with that purpose.

Estimating specific trade margins ratios

Surveyed trade establishments were divided into three groups according to the Classification of Products Activity (CPA) division 50, 51 and 52, that is, both wholesale and retail trade of motor vehicles and motorcycles as well as retail trade for automotive fuel, wholesalers, and retailers, respectively. They were asked for trade sales and costs of goods for resale by products as well as changes in stocks. Consequently, specific trade margins ratios for each CPA division were available. They were derived by dividing the difference between trade turnover and costs of goods purchased by the total trade sales for each product and for each surveyed establishment. Of course, some adjustments were needed to ensure full coverage of trade margins supply because of underreporting, sampling, hidden economy and other additional information. Notice that these estimated trade margins ratios are assumed to be the same for the trade secondary activities of the rest of the economy, that is, the specific trade margin ratio for i.e. shoes is fixed irrespective what kind of establishment may sell them. That seems to be

TABLE 1
SPECIFIC TRADE MARGINS RATIOS (PERCENTAGES)

Product	Description	CPA Division 50	CPA Division 51	CPA Division 52
		r_i	w_i	r_i
1	Fruits and vegetables	–	16.23	24.37
2	Olive and vine	–	–	–
3	Other agriculture and related services	–	19.69	24.71
4	Livestock and hunting	–	16.08	15.89
5	Forestry and related services	–	22.77	14.44
6	Fish and fishing products	–	15.63	20.02
7	Coal mining	–	34.80	16.60
8	Metallic minerals	–	25.45	–
9	Non–metallic and non–enegetic minerals	–	3.30	–
10	Meat and meat products	–	16.76	24.79
11	Canned and preserved fish	–	13.72	26.05
12	Canned and preserved fruits and vegetables	–	13.97	22.49
13	Fats and oils	–	21.85	17.85
14	Milk and dairy products	–	14.70	20.45
15	Grain mills, bakery, sugar mills, ...	–	18.91	17.34
16	Pet food	–	18.74	12.12
17	Miscellaneous food products. Tobacco products.	–	12.00	39.64
18	Wines and alcoholic beverages	–	21.93	16.54
19	Beer and soft drinks	–	18.14	21.65
20	Textile mill products	–	25.22	33.49
21	Clothing products	–	21.15	49.53
22	Leather tanning, leather products and footwear	–	33.71	35.70
23	Cork and wood products	–	21.17	29.72
24	Paper and allied products	–	22.69	28.30
25	Printing, publishing and editing services	–	20.56	28.96
26	Petroleum refining products	12.00	–	–
27	Basic chemical products	–	13.55	22.48
28	Other chemical products	–	6.72	26.79
29	Rubber and plastic products	–	23.87	42.75
30	Cement, lime and allied products	–	21.57	19.14
31	Ceramics, clay, bricks and other products for building	–	17.80	24.43
32	Stone and glass products	–	26.83	35.00
33	Primary metal products	–	13.65	21.85
34	Fabricated metal products	–	22.19	25.15
35	Machinery and mechanic equipment	–	19.46	33.34
36	Computers and office equipments	–	15.74	20.55
37	Electrical and electronic machinery	–	15.57	21.12
38	Electronic materials, radio and television equipments	–	15.69	18.70
39	Professional and scientific instruments	–	22.39	56.60
40	Motor vehicles transportation equipment	19.28	36.24	–
41	Naval transportation and repairing services	–	–	–
42	Miscellaneous transportation equipment	–	–	24.50
43	Furniture	–	25.25	29.91
44	Miscellaneous manufactured products	–	20.40	32.40
45	Recycling products	–	25.32	–

Source: own elaboration

a plausible assumption. Table 1 shows the results for the Andalusian economy in percentages.

Distributive channels

The distributive channels are clearly the unknown component of the required information for constructing a use-side trade margins matrix. Usually, buyers do not know whether a product has been sold through retailers, wholesalers or none of them. However, this lack of available information is solved by an exhaustive study for the Spanish region Castilla y Leōn (CEH, 1990), where for each element of the use table at purchasers' prices, the most frequent type of distributive channel is identified. Nevertheless, Rueda-Cantuche (2005) is proposing in collaboration with the Institute of Statistics of Andalusia a new procedure to improve future identifications of distributive channels using survey-based information.

TABLE 2
DISTRIBUTIVE CHANNELS

	Description
1	Imports/Producers → Consumer/Exports
2	Imports/Producers → Retailer → Consumer/Exports
3	Imports/Producers → Wh. on supply → Wh. on demand → Retailer → Consumer/Exports
4	Imports/Producers → Wholes. on supply → Wholes. on demand → Consumer/Exports
5	Imports/Producers → Wholesaler on demand → Retailer → Consumer/Exports
6	Imports/Producers → Wholesaler on demand → Consumer/Exports

Source: own elaboration.

Then, we distinguish six different distributive channels (see Table 2). Notice that channel 1 does not imply trade margins at all, since no trade activities are involved. On the contrary, channel 3 implies three steps before the product is purchased by the consumer. Notice that we distinguish specifically two types of wholesalers only in agricultural products. For instance, fruits and vegetables may be gathered and sold by a wholesaler situated next to producers (on supply) and be delivered later on by another wholesaler located next to final consumers (on demand). This is the main reason to include channels 3 and 4. Channels 4 and 5 involve two steps and channels 2 and 6, only one step. The Castilla y León's study (CEH, 1990) provides us with the most frequent kind of channel involved in each element of the use table at purchasers' prices. Hence, the total share of trade margins for each one of the elements can be estimated as follows.

Estimating total share of trade margins

Let us denote u_{ij}^{p} as the use of product i by industry j at purchasers' prices; and r_i and w_i as the specific retail and wholesale trade margin ratios for product i, respectively. Since trade margins are included in purchasers' values accumulatively, in the case of three-step distributive channels, we have that:

$$u_{ij}^{p} - u_{ij}^{p} r_i = u_{ij}^{p} (1 - r_i) \tag{1}$$

would correspond to the price paid by retailers to those wholesalers situated next to final consumers. Analogously,

$$u_{ij}^{p}\,(1 - r_i) - u_{ij}^{p}\,(1 - r_i)\,w_i = u_{ij}^{p}\,(1 - r_i)(1 - w_i) \tag{2}$$

would represent the price paid by the wholesaler placed on demand to the wholesaler situated next to producers. And lastly, $u_{ij}^{p}\,(1 - r_i)(1 - w_i)^2$ will stand for the price paid by the wholesaler on supply to the producers. Moreover, if this expression is operated mathematically, we can obtain that:

$$\begin{aligned} u_{ij}^{p}\,(1 - r_i)(1 - w_i)^2 &= u_{ij}^{p}\,(1 - r_i)(1 - (2w_i - w_i^2)) = \\ &= u_{ij}^{p}\,(1 - r_i)(1 - w_i\,(2 - w_i)) = \\ &= u_{ij}^{p}\,(1 - (r_i + w_i\,(2 - w_i) - w_i\,r_i\,(2 - w_i))) = \\ &= u_{ij}^{p}\,(1 - (r_i + (1 - r_i)\,(2 - w_i)\,w_i)). \end{aligned} \tag{3}$$

Hence, the total share of trade margins for the use of a product that has been delivered through channel 3 would be $r_i + w_i\,(1 - r_i)(2 - w_i)$. From this total, r_i would be ascribed to retail trade and the rest $w_i(1 - r_i)(2 - w_i)$ to wholesale trade.

The case of two-step distributive channels admits two different types. Channel 4 is basically a particular case of the three-step procedure but with $r_i = 0$. Therefore, the resulting formula would be $w_i\,(2 - w_i)$. In case channel 5, it can be obtained that $u_{ij}^{p}\,(1 - r_i)$ is the price paid by retailers to wholesalers and furthermore, $u_{ij}^{p}\,(1 - r_i)(1 - w_i)$ stands for the price paid by wholesalers to producers. Let us operate with this last expression, it yields:

$$u_{ij}^{p}\,(1 - r_i)(1 - w_i) = u_{ij}^{p}\,(1 - (r_i + w_i - r_i w_i)) \tag{4}$$

which accounts for the total share of trade margins of a product that has been delivered by channel 5. That is, $r_i + w_i - r_i w_i$, where r_i would be ascribed to retail trade and the rest $w_i - r_i w_i$ to wholesale trade.

One-step distributive channels can be considered particular cases of the two-step procedure. Channel 2 can be derived just when $r_i = 0$, and analogously, channel 6 can be obtained when $w_i = 0$. In the first case, all trade margins must be ascribed to retail trade and in the second, to wholesale trade exclusively. A brief summary of the results presented so far can be seen in Table 3.

TABLE 3
VALUES FOR COMBINED AND SINGLE TRADE MARGINS RATIOS

Channel	Type	Total share of trade margins (m_{ij}^{c} or m_{ij}^{s})	Retail	Wholesale
1	No trade	0	0	0
2	Single	r_i	r_i	0
3	Combined	$r_i+w_i(1-r_i)(2-w_i)$	r_i	$w_i(1-r_i)(2-w_i)$
4	Single	$w_i(2-w_i)$	0	$w_i(2-w_i)$
5	Combined	$r_i+w_i-r_i\,w_i$	r_i	$w_i-r_i w_i$
6	Single	w_i	0	w_i

Source: own elaboration.

Adjusted estimated shares of trade margins

However, intermediate uses rarely involve retail trade activities and it would be too rigorous to admit no retail trade sales at all in such product flows. With respect to final consumption, it would be the opposite way. A product would be rarely delivered to final consumption through exclusively wholesale trade activities. With the purpose of solving this issue, we have designed the following adjustment procedure to add retail trade margins to each element of the use table and to deduct retail trade margins to each element of the final consumption vector. Recall that in intermediate consumption, capital formation, inventories and exports, wholesale margins can be involved but not retail sale margins[§§] and that private consumption performs the other way round.

Hence, let us divide our six distributive channels into two different groups: those which combine wholesale and retail trade margins (combined channels); and those, which do not combine them (single channels) but they should be. If we denote α_c as the share of u_{ij}^p which is delivered through combined channels; and α_s as the share of u_{ij}^p which is delivered through single channels, such that $\alpha_c + \alpha_s = 1$, then the total single channel share of trade margin flows would be $\alpha_s m_{ij}^s u_{ij}^p$, with m_{ij}^s as the total share of trade margins included in the use flow (u_{ij}^p) in the case of single channels, i.e. regarding channel 4, it yields $m_{ij}^s = w_i\,(2 - w_i)$ and, $m_{ij}^s = r_i$ and $m_{ij}^s = w_i$ in the cases of channels 2 and 6, respectively. Notice that the value of m_{ij}^s will depend on the corresponding single channel involved (see Table 3).

Regarding combined channels, the total share of trade margins included in intermediate uses, $\alpha_c m_{ij}^c u_{ij}^p$ can be expressed as[***]:

$$\alpha_c m_{ij}^c u_{ij}^p = (m_{ij}^c - m_{ij}^s)\,\alpha_c u_{ij}^p + m_{ij}^s \alpha_c u_{ij}^p, \tag{5}$$

with m_{ij}^c as the total share of trade margins included in u_{ij}^p, in the case of combined channels. This time, $m_{ij}^c = r_i + w_i\,(1 - r_i)(2 - w_i)$ for channel 3 and $m_{ij}^c = r_i + w_i - r_i w_i$ for channel 5. Notice also that m_{ij}^c will depend on the particular case of combined channel involved for each element of the use table (see Table 3).

If, for instance, we assign single channels to wholesale trade, as mostly for intermediate uses, the total of wholesale trade margins flows of u_{ij}^p would be:

$$\alpha_s m_{ij}^s u_{ij}^p + \alpha_c m_{ij}^s u_{ij}^p = (\alpha_s + \alpha_c)\, m_{ij}^s u_{ij}^p = m_{ij}^s u_{ij}^p, \tag{6}$$

since $\alpha_c + \alpha_s = 1$. And the total of retail trade margins flows of u_{ij}^p would be then $(m_{ij}^c - m_{ij}^s)\,\alpha_c u_{ij}^p$.

Finally, the total trade margins incorporated to each element of the use table would be the sum of retail and wholesale totals of trade margins flows, that is, $m_{ij}^s u_{ij}^p + (m_{ij}^c - m_{ij}^s)\,\alpha_c u_{ij}^p$.

Consequently, by choosing a proper α_c some additional retail trade margins will be included in the corresponding use flow and therefore, in the total use-side estimated supply of trade margins. Our starting point would be the case where $\alpha_c = 0$ and $\alpha_s = 1$. Notice that the total amount of wholesale trade margins won't change because, though we have assumed a new step further on the distributive channel, wholesale trade activi-

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[§§] There could be exceptions like petroleum refining products, where retailers can play an important role.

[***] Notice that for all i and j, it is verified that $m_{ij}^c > m_{ij}^s$.

ties are always present for every element of the use table.

In case of intermediate uses (see Table 4), combined channels remain unchanged because they indeed include retailers and not only wholesalers within the transactions. The single retailer distributive channel (channel 2) and the one with no trade margin incorporated (channel 1) also has no variation at all. Hence, only in the cases of channels 4 and 6, we find that the $(r_i - r_i w_i\ (2 - w_i))\ \alpha_c$ and $(r_i - r_i w_i)\ \alpha_c$ elements, respectively, would stand for the additional retail trade margin that has been incorporated to the corresponding distributive channel as a result of the adjustment procedure. For detailed formulation see Table 4[†††].

TABLE 4
ADJUSTED VALUES FOR COMBINED AND SINGLE TRADE MARGINS RATIOS (INTERMEDIATE USES)

Channel	Type	Total adjusted share of trade margins	Retail	Wholesale
1	No trade	0	0	0
2	Single	r_i	r_i	0
3	Combined	$r_i+w_i(1-r_i)(2-w_i)$	r_i	$w_i(1-r_i)(2-w_i)$
4	Single	$(r_i - r_i w_i(2-w_i))\alpha_c + w_i(2-w_i)$	$(r_i - r_i w_i(2-w_i))\alpha_c$	$w_i(2-w_i)$
5	Combined	$r_i + w_i - r_i w_i$	r_i	$w_i - r_i w_i$
6	Single	$(r_i - r_i w_i) d_c + w_i$	$(r_i - r_i w_i)\alpha_c$	w_i

Source: own elaboration.

Final consumption admits no such results (see Table 5). In this case, a combined channel is the point of departure because it is generally assumed that households mostly buy to retailers and not directly to wholesalers, as in intermediate uses. Then, by choosing a proper α_s we will deduct some retail trade margins by removing the last step of the corresponding distributive channel and consequently, the initial use–side estimated total supply of trade margins will be reduced as well.

Let us define $\alpha_c m_{ij}^c u_{ij}^p$ as the total share of trade margins included in each of the element of the final consumption element, in the case of combined channels. Notice also that the total share of trade margins included in single channels would be $\alpha_s m_{ij}^s u_{ij}^p$ for final consumption. Hence, the total trade margins to be incorporated in each element of the final consumption vector would yield: $\alpha_c m_{ij}^c u_{ij}^p + \alpha_s m_{ij}^s u_{ij}^p$, where the second term can be expressed as: $\alpha_s m_{ij}^c u_{ij}^p - (m_{ij}^c - m_{ij}^s)\ \alpha_s u_{ij}^p$, and consequently,

$$\alpha_s m_{ij}^c u_{ij}^p + \alpha_s m_{ij}^c u_{ij}^p - (m_{ij}^c - m_{ij}^s)\ \alpha_s u_{ij}^p = m_{ij}^c u_{ij}^p - (m_{ij}^c - m_{ij}^s)\ \alpha_s u_{ij}^p \tag{7}$$

For combined and single distributive channels, the total adjusted shares of wholesale and retail trade margins of u_{ij}^p can be seen in Table 5. In the case of final consumption, single channels remain unchanged because the adjustment procedure only aims to deduct retail trade margins from combined channels. Channel 1, where no trade mar-

[†††] For interpretation purposes, we have dropped m_{jc}^i and m_{js}^i symbols from Tables 4 and 5.

gins are included, also has no change at all. However, in case of channels 3 and 5, the $r_i(1 - \alpha_s)$ element would represent a lower value for the corresponding retail trade margin.

Furthermore, an additional result can be derived from our approach. That is, the total trade margins associated to each element of the use table (intermediate uses and

TABLE 5
ADJUSTED VALUES FOR COMBINED AND SINGLE TRADE MARGINS RATIOS (FINAL CONSUMPTION)

Channel	Type	Total adjusted share of trade margins	Retail	Wholesale
1	No trade	0	0	0
2	Single	r_i	r_i	0
3	Combined	$r_i(1-\alpha_s)+w_i(1-r_i)(2-w_i)$	$r_i(1-\alpha_s)$	$w_i(1-r_i)(2-w_i)$
4	Single	$w_i(2-w_i)$	0	$w_i(2-w_i)$
5	Combined	$r_i(1-\alpha_s)+w_i-r_iw_i$	$r_i(1-\alpha_s)$	$w_i-r_iw_i$
6	Single	w_i	0	w_i

Source: own elaboration.

final consumption) can be expressed as a weighted average of the corresponding trade margins of both single and combined channels, respectively. The proofs can be seen in Appendix 1.

Constructing a use-side trade margins matrix

Once specific retail and wholesale trade margins ratios are estimated by products and once distributive channels are identified for each element of the use table at purchasers' prices, a use-side trade margins matrix thus can be estimated by multiplying each corresponding share[‡‡‡] of either retail or wholesale trade margins by their respective uses. The final results consist of two different trade margins matrices; one for retail trade margins and other for wholesale trade margins, both by products and industries (see Appendix 2 for a non–adjusted numerical example).

4 Conclusions

The main purpose of our work has been to develop a more detailed procedure to construct a trade margins matrix, particularly for the Andalusian economy, and which is based on the use side method proposed by the ESA 95 Input-Output Manual (Eurostat, 2002). Solving the data availability problem stated in Eurostat (2002) and assuming usual errors involved in trade databases (e–commerce, changing forms of supply, etc.),

[‡‡‡] For the Andalusian Input-Output Framework 2000, the final adjustment procedure assumed 1% of retail deliveries in case of intermediate uses and 1% of exclusively wholesale deliveries in the final consumption vector, except for petroleum and refining products.

the Institute of Statistics of Andalusia has constructed a use-side trade margins matrix. Perhaps, it could have been interesting to compare the results with the supply-side approach but, in any case, this may be a matter for future research.

Finally, the resulting use-side trade margins matrix will be used to transform the use table from purchasers' prices to basic values within the Andalusian Input-Output Framework 2000. Input-output compilers may profit from reading this work.

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Appendix 1

Total trade margins associated to each element of the use table (intermediate uses and final consumption) can be expressed as a weighted average of the corresponding trade margins of both single and combined channels, respectively.

Proof

Intermediate uses

Let us define the total trade margins incorporated to each element of the use table as: $m_{ij}^s u_{ij}^p + (m_{ij}^c - m_{ij}^s)\ \alpha_c u_{ij}^p$, then it is straightforward that:

$$\begin{aligned} m_{ij}^s u_{ij}^p + (m_{ij}^c - m_{ij}^s)\ \alpha_c u_{ij}^p &= m_{ij}^s u_{ij}^p + m_{ij}^c \alpha_c u_{ij}^p - m_{ij}^s \alpha_c u_{ij}^p \\ &= m_{ij}^c \alpha_c u_{ij}^p + (1 - \alpha_c)\ m_{ij}^s u_{ij}^p \\ &= (m_{ij}^c \alpha_c + m_{ij}^s \alpha_s)\ u_{ij}^p \end{aligned} \tag{8}$$

□

Final consumption

The total trade margins incorporated to each element of the final consumption vector is: $m_{ij}^c u_{ij}^p - (m_{ij}^c - m_{ij}^s)\ \alpha_s u_{ij}^p$, and then:

$$\begin{aligned} m_{ij}^c u_{ij}^p - (m_{ij}^c - m_{ij}^s)\ \alpha_s u_{ij}^p &= m_{ij}^c u_{ij}^p - m_{ij}^c \alpha_s u_{ij}^p + m_{ij}^s \alpha_s u_{ij}^p \\ &= m_{ij}^s \alpha_s u_{ij}^p + (1 - \alpha_s)\ m_{ij}^c u_{ij}^p \\ &= (m_{ij}^s \alpha_s + m_{ij}^c \alpha_c)\ u_{ij}^p \end{aligned} \tag{9}$$

□

Appendix 2

Non-adjusted Numerical Example for the Estimation of a Trade Margins Matrix

Let us suppose a fictitious economy with two industries and three tradable commodities. Intermediate uses (u_{ij}^p), specific trade margins ratios (r_i and w_i) and the corresponding distributive channels are shown in the following tables:

TABLE 6
Use Table at Purchasers' Prices

	Industry A	Industry B
Commodity 1	10	20
Commodity 2	5	15
Commodity 3	15	5

TABLE 7
Specific Trade Margins Ratios

	Retail	Wholesale
Commodity 1	0.2	0.1
Commodity 2	0.5	0.3
Commodity 3	0.1	0.2

TABLE 8
Distributive channels

	Industry A	Industry B
Commodity 1	1	5
Commodity 2	3	6
Commodity 3	4	2

Hence, if industry A buys commodity 1 through channel 1, no trade margins would be involved. On the contrary, the purchases of commodity 2 by industry A are made through channel 3, which includes two wholesalers and one retailer. Then, the total trade margins incorporated within this transaction would be, according to Table 3: $0.5 + 0.3\ (1 - 0.5)(2 - 0.3) = 0.755$, where 0.5 corresponds to wholesale and 0.255 to retail.

Another example would be the consumption of commodity 3 by industry B through channel 2. There, only retail trade margins are included (0.1). In case of transactions of commodity 2 by industry B, only wholesale trade margins are involved (0.3) and therefore, no retail trade margins are taken into account. Lastly, the purchases of commodity 1 by industry B and of commodity 3 by industry A, are analogous. Bearing these results in mind, the resulting total, wholesale and retail trade margins ratios would yield:

TABLE 9
Total Trade Margins Ratios (m_{ij})

	Industry A	Industry B
Commodity 1	0	0.28
Commodity 2	0.755	0.3
Commodity 3	0.36	0.1

TABLE 10
Retail Trade Margins Ratios

	Industry A	Industry B
Commodity 1	0	0.2
Commodity 2	0.5	0
Commodity 3	0	0.1

TABLE 11
Wholesale Trade Margins Ratios

	Industry A	Industry B
Commodity 1	0	0.08
Commodity 2	0.255	0.3
Commodity 3	0.36	0

And finally in absolute terms,

TABLE 12
Total Trade Margins (absolute values)

	Industry A	Industry B
Commodity 1	0	5.6
Commodity 2	3.775	4.5
Commodity 3	5.4	0.5

TABLE 13
Retail Trade Margins (absolute values)

	Industry A	Industry B
Commodity 1	0	4
Commodity 2	2.5	0
Commodity 3	0	0.5

TABLE 14
Wholesale Trade Margins Ratios (absolute values)

	Industry A	Industry B
Commodity 1	0	1.6
Commodity 2	1.275	4.5
Commodity 3	5.4	0

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