The import content of final demand in Portugal: Nominal and real evolution

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Abstract
The aim of this article is to assess the import content of final demand components in Portugal since the beginning of the euro area. Besides documenting the heterogeneity across the main aggregates of final demand, we also distinguish the evolution in nominal terms from the corresponding behavior in real terms. Despite the relative stability of the import content of final demand in nominal terms, the results suggest an upward trend in real terms, most notably in investment and exports. (JEL: C67, D57, F15)

Introduction

With the development of international trade, the interdependence among the economies has been growing significantly. Naturally, the deepening of trade relations has implications on the analysis of the evolution of a given economy. In particular, the heterogeneity regarding the import penetration across final demand components translates into differentiated impacts on the domestic economy.

Therefore, it becomes crucial to determine the import content of the various final demand components. Such an assessment is key for understanding the evolution of imports and corresponding econometric modelling (see, for example, Laxton *et al.* (1998), Herzberg *et al.* (2002), Cardoso *et al.* (2013), Bussière *et al.* (2013)). In particular, Bussière *et al.* (2013) highlight the role played by the composition of final demand in explaining the trade collapse observed in 2009. In fact, although world real GDP decreased less than 1 per cent, world trade declined by more than 10 per cent. Such a behavior can be justified by the fact that the final demand components that decreased the most were precisely the ones that have highest import content.

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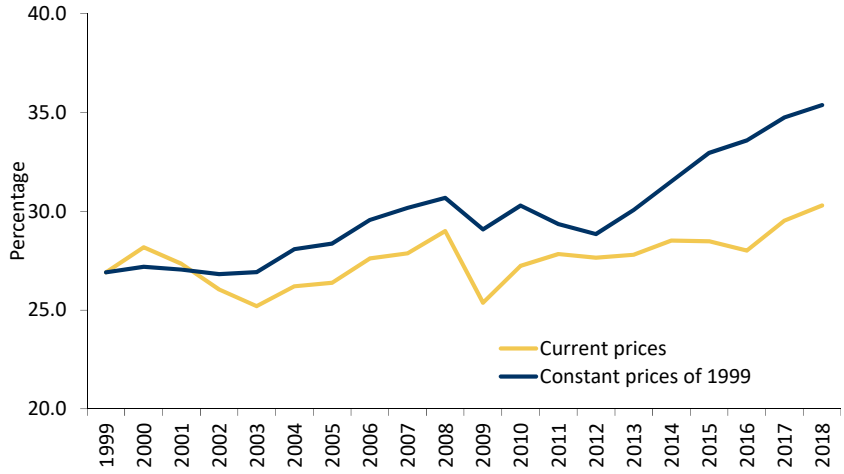

FIGURE 1: The import content of final demand in Portugal

The distinction between the external and domestic content also plays a key role in the literature regarding global value chains (see, for example, Koopman *et al.* (2010) and Johnson and Noguera (2012)). In particular, the level of integration in the global value chains is associated with the import content of exports.

Furthermore, particular attention has been given to this topic in the development of dynamic stochastic general equilibrium (DSGE) models. In order to capture more adequately the interconnections with the rest of the world and to describe more properly the transmission of shocks in open economies, the theoretical underpinning of DSGE models has been modified to take into account the import content of exports. For instance, within the Eurosystem, Coenen and Vetlov (2009) extended the NAWM model developed by Christoffel *et al.* (2008) and Brzoza-Brzezina *et al.* (2014) modified the EAGLE model proposed by Gomes *et al.* (2012).

For Portugal, the import penetration on exports has been studied by Amador and Cabral (2008) for the period 1980-2002 and by Amador and Stehrer (2014) for the period 1995-2011. See Cardoso *et al.* (2013) for the analysis of the import content of the various final demand components covering the period 1980-2008.

In this article, we intend to assess the evolution of the import penetration in the different final demand components in Portugal since the beginning of the euro area. However, in contrast with previous literature, besides determining the import content in nominal terms, we also quantify the import content at constant prices. The importance of such distinction is highlighted in

Figure 1.[1] In fact, while the import content of final demand in nominal terms has been relatively stable, there has been a noteworthy increase of import penetration in volume terms. Besides analyzing final demand as a whole, it is important to assess to what extent such dichotomy holds for the several final demand components.

The article is organized as follows. In the subsequent sections, a description of the data is provided, the methodology is outlined and the results are discussed. Finally, we end with some concluding remarks.

Data

The analysis of the import content of the final demand in the last two decades was based, firstly, on the information available at current prices that allows to compute the import content in nominal terms. Subsequently, drawing on some assumptions for the evolution of the deflators, the import content for each component of final demand at constant prices has been computed using a level of disaggregation identical to the one used for the analysis in nominal terms. As the aim is to analyze developments since the start of the euro area, the import content in volume terms has been calculated considering 1999 as the reference price year.

Current prices data

The analysis at current prices is based on the input-output matrices, which convey information on the intermediate consumption and final uses by product in the economic territory, coming from both imports and domestic production. These matrices, also called symmetric input-output matrices, include the domestic output matrix at basic prices, the matrix of imports, the matrix of distribution margins, and the matrix of taxes less subsidies. This information corresponds to a breakdown of the supply and use tables of annual national accounts but is not available with the same frequency. The data considered corresponds to the years for which symmetric input-output matrices are available in the period under study, namely 1999, 2005, 2008, 2013 and 2015. For the most recent period, in particular 2013 and 2015, data has been compiled and published by Statistics Portugal (see INE (2016, 2018)), whereas for the previous period its compilation was under the responsibility of the *Departamento de Prospetiva e Planeamento* (see Martins (2004), Dias (2008) and Dias and Domingos (2011)). With such detailed information it is possible

1. The import content of final demand as a whole can be computed as the ratio between total imports and total final demand using the national accounts data regularly released by INE. For the components of final demand, one has to resort to more detailed information as mentioned in the next section.

to compute the import content per unit of final demand (see methodology in the next section). It should be noted that the non-import content corresponds to the impact on GDP and includes taxes less subsidies.

The level of disaggregation of the symmetric matrices released has changed throughout the period considered from about 60 products/branches of activity in 1999 and 2005 to more than 80 in the following years. In addition, there have been changes in the product nomenclature of the national accounts. Thus, to ensure comparability over time, the matrices were aggregated, keeping as much detail as possible, resulting in 49 products/branches of activity. In this way, we obtained intermediate consumption and imports matrices with 49 products/branches of activity, as well as the corresponding final uses for each final demand component, coming directly from imports and from domestic production.

It should be noted that for the main aggregates, the import content at current prices may differ slightly from those previously reported by INE and DPP (see INE (2016, 2018) and Dias (2010, 2016)) due to the above-mentioned aggregation of products. However, the differences between the import content of the main aggregates of final demand reported in this article and those obtained with the highest detail available are negligible.

Constant prices estimates

As previously mentioned, the information available and officially released only allows to compute the import content in nominal terms. However, in this article we intend to analyze its behavior and composition in volume terms, given the different nominal and real evolution observed for final demand as a whole (Figure 1). To accomplish this, it is necessary to obtain estimates of the import content at constant prices for the same years for which figures are available at current prices. Thus, the import content of the various components of final demand have been calculated with the previously mentioned detail of 49 products at both current and constant prices.

The quantification of the import content at constant prices resorts to the same methodology that is used at current prices, with all the data, namely intermediate consumption matrices both imported and produced domestically, previously deflated and converted into values at constant prices of the reference year. Thus, it has been necessary to compute deflators, with a disaggregation level of 49 products, for the following set of input-output matrices: matrix of imported intermediate consumptions; matrix of domestic output used as intermediate consumption; vectors for each component of the final demand directly imported; vectors for each component of the final demand directly coming from domestic production; final demand vectors at purchasers' prices; vectors of trade margins implicit in the final demand at purchasers' prices.

To obtain deflators for such detail it has been necessary to make some assumptions. All deflators have been obtained from the annual national accounts, taking into account for each year the deflators implicit in comparable national accounts data at current prices and at prices of the previous year. In order to ensure the degree of disaggregation considered, it was necessary to resort to several annual national accounts bases. In this way, the cumulative price change, starting in 1999, has been obtained for each year under analysis allowing to calculate estimates at constant prices of 1999.

For the final demand vectors at purchasers' prices, the deflators have been obtained directly from the annual national accounts (supply and use tables), by accumulating the annual price changes over the periods in consideration (from 1999 up to 2005, 1999 up to 2008 and so on).

The remaining deflators have been obtained assuming the following hypotheses. In the case of imports (i.e. imported intermediate consumption matrices and vectors of final demand directly imported), we assumed, for each product, the import price variation of the corresponding product in national accounts. Hence, it is assumed that the import price evolution of each product is identical regardless of the type of use. Equivalently, in the case of intermediate consumption matrices and final demand vectors of domestic production, it is assumed, for each product, the price change of production at basic prices of each product implicit in the annual national accounts. The deflator of the trade margins by product for each component of the final demand corresponds to the total deflator of the trade margins per product implicit in the national accounts, being assumed as in the case of production and imports that are identical, regardless of the type of use.[2]

Naturally, the estimates at constant prices are conditional, on the one hand, on the assumptions regarding the deflators and, on the other hand, on the relative price structure of the reference year. It should also be noted that the total values at constant prices (imports, domestic production and final demand components) have been obtained by summing up the values by product, so the aggregate deflators may differ from those resulting from the accumulation of the price changes for the corresponding aggregates implicit in annual national accounts, which are based on the values at the previous year prices.

In order to assess the sensitivity to the reference year, the main aggregates have been calculated at constant prices of 2015, which are reported in the Annex. Although the level of the import content in volume terms depends naturally on the reference year, the evolution is not qualitatively different from

2. An alternative approach to obtain input-output matrices at constant prices would consist of estimating complete symmetric matrices using the RAS method, which would imply assuming additional assumptions and constraints on aggregates (see, for example, Hoen (2002)). However, given the specific goal of this study, it has been decided to deflate only the components required to compute the import content.

the one obtained with 1999 as the reference year. Thus, in the analysis of the import content in volume, the focus is on the behavior over time and not on the respective level. We now proceed to the description of the methodology used to calculate the import content both at current and constant prices.

Methodology

Let us consider N products and K final demand components. The domestic ouput of each product can be used as intermediate consumption in the production of other products or to satisfy final demand, that is,

$$x_i = \sum_{j=1}^{N} z_{ij}^d + \sum_{k=1}^{K} y_{ik}^d \tag{1}$$

where x_i corresponds to domestic output of product i $(i = 1, ..., N)$, z_{ij}^d denotes the domestic output of product i used as intermediate consumption by branch of activity j $(j = 1, ..., N)$ and y_{ik}^d corresponds to the domestic output of product i used to satisfy the k final demand component $(k = 1, ..., K)$. The final demand encompasses private consumption, public consumption, investment and exports. Defining $a_{ij}^d = \frac{z_{ij}^d}{x_j}$, one obtains for the N products, in matrix terms,

$$X = A^d X + Y^d 1 \tag{2}$$

where

$$X = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_N \end{bmatrix} \quad A^d = \begin{bmatrix} a_{11}^d & a_{12}^d & \cdots & a_{1N}^d \\ a_{21}^d & a_{22}^d & \cdots & a_{2N}^d \\ \vdots & \vdots & & \vdots \\ a_{N1}^d & a_{N2}^d & \cdots & a_{NN}^d \end{bmatrix} \quad Y^d = \begin{bmatrix} y_{11}^d & y_{12}^d & \cdots & y_{1K}^d \\ y_{21}^d & y_{22}^d & \cdots & y_{2K}^d \\ \vdots & \vdots & & \vdots \\ y_{N1}^d & y_{N2}^d & \cdots & y_{NK}^d \end{bmatrix} \tag{3}$$

and 1 is column vector $K \times 1$ with all elements equal to 1. Solving (2) for X one obtains

$$X = \left(I - A^d\right)^{-1} Y^d 1 \tag{4}$$

where I is an identity matrix $N \times N$ and $\left(I - A^d\right)^{-1}$ is the well-known inverse Leontief matrix.

In a similar fashion, imports of each product may be used as intermediate consumption in the production of other products or used to satisfy final demand, that is,

$$m_i = \sum_{j=1}^{N} z_{ij}^m + \sum_{k=1}^{K} y_{ik}^m \tag{5}$$

where m_i corresponds to the imports of product i, z_{ij}^m denotes the imports of product i used as intermediate consumption by branch of activity j and y_{ik}^m corresponds to the imports of product i used to satisfy directly the k final demand component. Defining $a_{ij}^m = \frac{z_{ij}^m}{x_j}$, one can write in matrix form, for the N products,

$$M = A^m X + Y^m 1 \tag{6}$$

where

$$M = \begin{bmatrix} m_1 \\ m_2 \\ \vdots \\ m_N \end{bmatrix} \quad A^m = \begin{bmatrix} a_{11}^m & a_{12}^m & \cdots & a_{1N}^m \\ a_{21}^m & a_{22}^m & \cdots & a_{2N}^m \\ \vdots & \vdots & & \vdots \\ a_{N1}^m & a_{N2}^m & \cdots & a_{NN}^m \end{bmatrix} \quad Y^m = \begin{bmatrix} y_{11}^m & y_{12}^m & \cdots & y_{1K}^m \\ y_{21}^m & y_{22}^m & \cdots & y_{2K}^m \\ \vdots & \vdots & & \vdots \\ y_{N1}^m & y_{N2}^m & \cdots & y_{NK}^m \end{bmatrix} \tag{7}$$

Substituting (4) in (6) one obtains

$$M = A^m \left(I - A^d\right)^{-1} Y^d 1 + Y^m 1 \tag{8}$$

Therefore, total imports can be decomposed into indirect imports, $M^{ind} = A^m \left(I - A^d\right)^{-1} Y^d$ and direct imports, $M^{dir} = Y^m$. Hence, the direct import content of the k final demand component is given by

$$C_k^{dir} = \frac{\sum_{i=1}^{N} m_{ik}^{dir}}{\sum_{i=1}^{N} y_{ik}} \tag{9}$$

and the indirect import content of the k final demand component can be expressed as

$$C_k^{ind} = \frac{\sum_{i=1}^{N} m_{ik}^{ind}}{\sum_{i=1}^{N} y_{ik}} \tag{10}$$

where m_{ik}^{dir} and m_{ik}^{ind} denote the i,k element of M^{dir} and M^{ind}, respectively, and $y_{ik} = y_{ik}^d + y_{ik}^m$. The direct import content reflects the imports used to satisfy directly the k final demand component whereas the indirect import content reflects the imported intermediate consumption required for domestic production used to satisfy the k final demand component.

The total import content of the k final demand component is the sum of the direct and indirect import content, that is, $C_k = C_k^{dir} + C_k^{ind}$. It represents the amount of imports, both direct and indirect, needed to satisfy a unit of the k final demand.

Results

In Table 1 we report the import content of final demand, as a percentage of final demand, at current prices and constant prices of 1999. It is also presented the corresponding decomposition in direct and indirect import content. It should be noted that, in spite of the national accounts revisions and the above-mentioned issues related with the disaggregation level and deflators, the values and evolution of the import content of the final demand, both at current and constant prices, are similar to those displayed in Figure 1, which are based on the latest vintage of the national accounts.

From Table 1 it can be seen that, in nominal terms, the total import content of the final demand remained relatively stable in the period as whole, from 1999 to 2015, although it has increased between 2005 and 2008 followed by a decrease in the period between 2008 and 2013. Concerning the decomposition of the import content in direct and indirect, the indirect import content is higher than the direct one throughout the whole period.

	1999	2005	2008	2013	2015
Current prices					
Total	27.7	26.7	29.4	27.2	27.8
Direct	11.5	9.4	10.2	8.6	9.9
Indirect	16.2	17.2	19.2	18.5	17.9
Constant prices of 1999					
Total	27.7	28.5	31.5	29.5	32.0
Direct	11.5	11.0	12.7	11.5	13.0
Indirect	16.2	17.5	18.8	18.0	19.0

TABLE 1. The import content of final demand (percentage)

Regarding the components of final demand, those with the highest import penetration are Gross Fixed Capital Formation (GFCF) and exports while public consumption presents the lowest figure (Figure 2). Despite the relative stability of the import content in the period between 1999 and 2015, it should be mentioned the increase in exports and the slight decrease in private consumption and GFCF. It should also be noted that, behind the relatively stable import content of final demand in nominal terms over the period as a whole, it is visible an increase in volume, most notably in exports and GFCF.

Figure 3 displays the decomposition of the change in the import content of final demand in nominal terms (i.e. the change of the percentage of the import content of final demand between two years) in a volume effect (measured by the change in the import content at constant prices) and a price effect (measured as the difference between the change at current prices and the change at constant prices). In the period under analysis, the volume effect contributed to an increase in the import content, with the exception of the

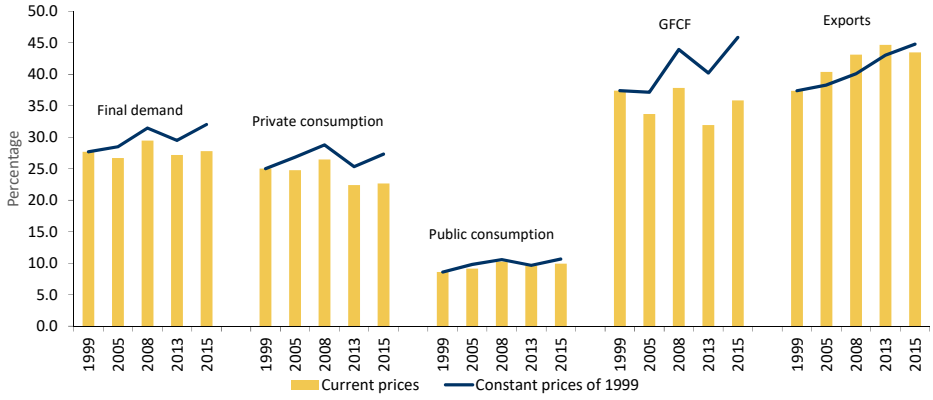

FIGURE 2: The import content of final demand components

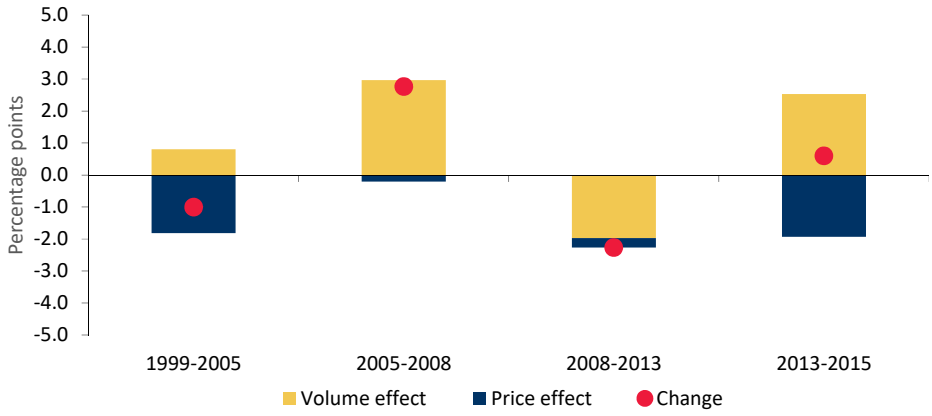

FIGURE 3: Decomposition of the change in the import content of final demand

period between 2008 and 2013, where it was observed a negative contribution. In fact, during this period, marked by the economic and financial crisis, imports decreased more substantially than final demand in accumulated terms, reflecting the fact that the components of demand with higher import content were the ones that recorded the most pronounced declines given the higher sensitivity to the economic cycle. Underlying the relative stability of the import content in nominal terms, there was a negative contribution of the price effect, of variable magnitude, reflecting the fact that the change in the import deflator has been lower than that of final demand.

In order to better understand the evolution of the import content of final demand, the import content of its main components is now analyzed.

Final consumption

In Table 2 we present the import content (total, direct and indirect), both at current and constant prices, for private consumption and its main aggregates and for public consumption.

In the case of total private consumption, the import content in nominal terms stood at around 25 per cent in the period under analysis, with similar importance of direct and indirect import content. Considering the main aggregates of private consumption, import content is higher in the consumption of durable goods than in non-durable consumption [3]. Furthermore, in the case of durable goods, the direct import content is clearly dominant while for non-durable consumption, the indirect is more important, in particular for the non-food non-durable consumption where services have a larger weight.

Figure 4 displays the contribution of the main components to the import content of private consumption, reflecting not only the import content of each component but also the structure of private consumption expenditure. Although the import content of durable consumption is higher, it is non-food non-durable consumption that, given its large weight in consumer spending, contributes the most to the import content of private consumption.

In nominal terms, after a slight increase until 2008, it has been observed a decline in the import content of private consumption between 2008 and 2013, while recovering in 2015. For the period as a whole, there has been a decrease in the import penetration in private consumption in nominal terms, in contrast with the increase observed in volume terms.

Figure 5 conveys, analogously to Figure 2 but for the case of private consumption, the decomposition of change of the import content in its volume and price effects. In this case the volume effect reflects the change of the import content of private consumption at constant prices and the price effect captures the relative behavior between the deflator of the imports driven by consumption, directly or indirectly, and the change of private consumption deflator.

3. Recall that the import content is as percentage of expenditure at purchasers' prices, which also includes margins and taxes on products. In this respect, the case of autos should be highlighted, where the amount of taxes, included in the value of consumption expenditure but not in the respective value of imports, has a significant weight, which translates into a lower import content than one would expect.

	Total					Direct					Indirect				
	1999	2005	2008	2013	2015	1999	2005	2008	2013	2015	1999	2005	2008	2013	2015
Current prices															
Private consumption	25.0	24.8	26.5	22.4	22.6	13.3	12.2	12.5	10.5	11.6	11.7	12.6	14.0	11.8	11.0
Durable consumption	60.0	54.6	56.4	52.3	55.1	56.0	50.1	51.3	47.7	51.2	4.0	4.5	5.1	4.6	3.9
Autos	58.3	55.4	59.2	56.0	58.2	55.6	53.5	56.6	53.8	56.2	2.7	2.0	2.7	2.2	2.0
Other durables	63.9	53.2	52.1	48.4	50.3	57.0	44.5	43.2	41.4	43.4	6.9	8.7	8.9	7.1	6.8
Non-durable consumption	20.8	22.1	23.9	20.8	20.5	8.1	8.8	9.2	8.6	8.9	12.7	13.3	14.7	12.2	11.5
Food	31.7	33.1	38.3	34.3	34.1	14.1	16.8	19.1	17.3	17.9	17.7	16.2	19.1	17.0	16.3
Non-food non-durable consumption	17.7	19.6	20.5	17.4	17.1	6.4	7.0	6.8	6.4	6.7	11.3	12.6	13.7	11.0	10.4
Public consumption	8.6	9.2	10.3	9.6	9.9	1.5	1.6	1.5	1.8	1.9	7.1	7.6	8.7	7.8	8.0
Constant prices of 1999															
Private consumption	25.0	26.8	28.8	25.3	27.3	13.3	14.3	15.5	13.6	15.2	11.7	12.6	13.3	11.7	12.1
Durable consumption	60.0	58.6	60.5	55.3	56.1	56.0	53.7	54.9	50.5	51.7	4.0	4.9	5.6	4.8	4.3
Autos	58.3	59.6	61.1	59.9	61.4	55.6	57.4	58.3	57.3	58.8	2.7	2.2	2.8	2.7	2.5
Other durables	63.9	57.3	59.7	52.2	51.3	57.0	48.5	50.5	46.1	45.3	6.9	8.8	9.2	6.1	6.0
Non-durable consumption	20.8	23.7	25.3	23.0	24.4	8.1	10.3	11.2	10.8	11.5	12.7	13.3	14.1	12.2	12.9
Food	31.7	34.8	38.3	35.9	36.7	14.1	18.4	20.2	19.0	19.7	17.7	16.4	18.1	16.9	17.0
Non-food non-durable consumption	17.7	20.8	21.9	19.3	21.1	6.4	8.3	8.8	8.4	9.3	11.3	12.5	13.0	10.9	11.8
Public consumption	8.6	9.8	10.6	9.7	10.7	1.5	1.8	1.7	2.0	2.2	7.1	8.0	8.8	7.7	8.5

TABLE 2. The import content of final consumption (percentage)

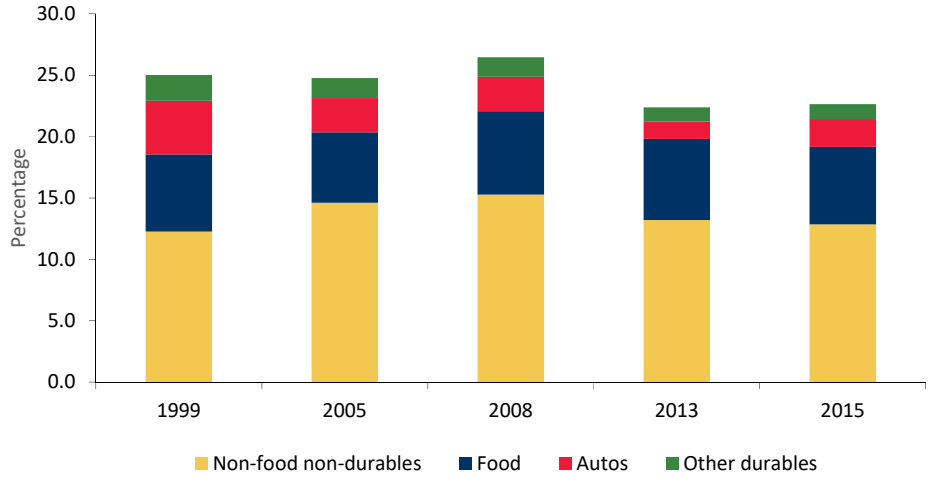

FIGURE 4: Decomposition of the import content of private consumption

In general, a positive volume effect is observed along with a negative price effect over the period. It should be noted that this price effect reflects not only a different composition between imports for consumption and consumption expenditure but also an import prices rate of change lower than the one recorded for private consumption deflator. The positive contribution in volume reflects the increase in the import content of non-durable consumption at constant prices, both food and non-food, in particular the direct content. The negative contribution in real terms between 2008 and 2013 reflects, to some extent, a composition effect given that the weight of consumption of

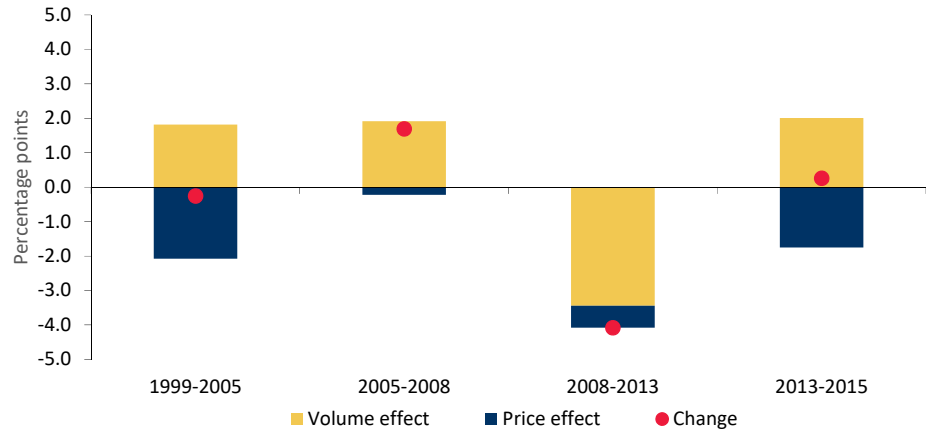

FIGURE 5: Decomposition of the change in the import content of private consumption

durable goods, especially that of autos, decreased significantly as a result of the financial and economic crisis, due to its more procyclical behavior. However, the reduction of the import content in volume during this period was observed in both durable and non-durable consumption.

Public consumption, on the other hand, has a relatively low import content, of around 10 per cent, which is related to the predominance of services in this type of expenditure, particularly non-tradables,. The import content is essentially indirect, through the goods and services used as intermediate consumption in the production of these services. In terms of evolution, the import content of public consumption has remained relatively stable over time both in nominal and real terms.

Gross Fixed Capital Formation

GFCF is one of the demand components with higher import content, being the one in which the direct import content is more relevant (Table 3). However, the level of external dependence is heterogeneous by type of investment.

Machinery and equipment and transport equipment are the items with the highest import content at around 70 per cent. In contrast, construction and other products have much smaller values. The direct import content is dominant in the cases of machinery and equipment and transport equipment in sharp contrast with construction, where the import content is only indirect.

Such heterogeneity is reflected in the contributions of the components to the import content of GFCF. In fact, although the GFCF of machinery and equipment and transport equipment accounts for only a third of the total GFCF, these components largely determine the import content of GFCF since they account for two-thirds of GFCF imports (Figure 6).

Although the GFCF import content in nominal terms has not substantially changed between 1999 and 2015 (despite some fluctuations over the period), there has been an upward trend in real terms, particularly in the case of the direct content.

The increase in the import penetration in real terms is relatively broadly based across the main components of GFCF, reinforced by the fact that construction has been losing weight in GFCF compared to the other components. Given that construction is one of the components of GFCF with lower import content, such a weight reduction translates into an increase in the ratio between imports for GFCF and the total amount of GFCF.

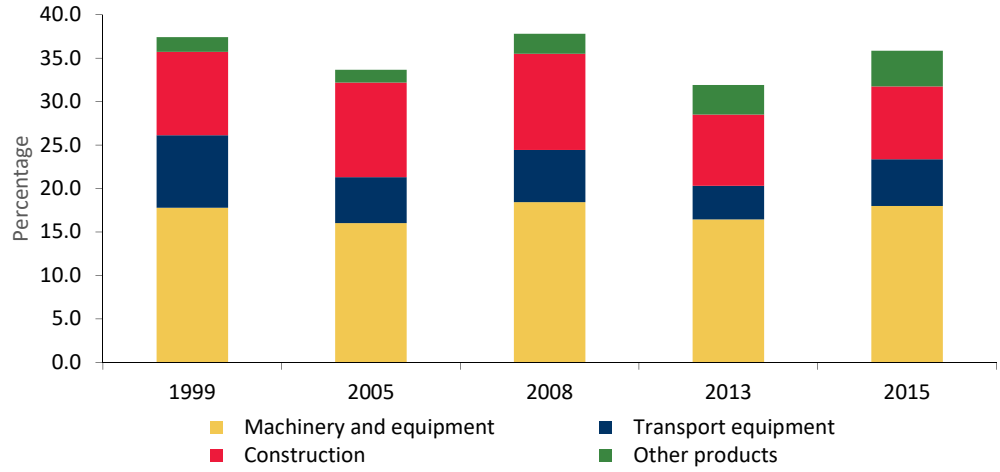

FIGURE 6: Decomposition of the import content of GFCF

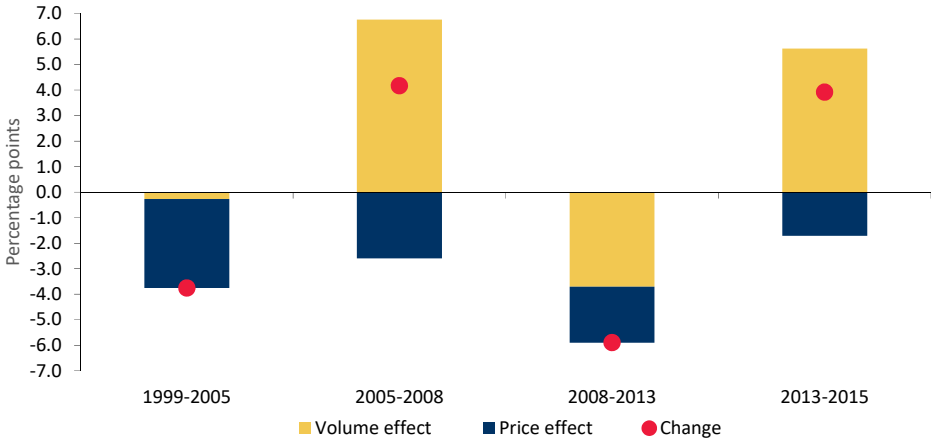

FIGURE 7: Decomposition of the change in the import content of GFCF

	Total					Direct					Indirect				
	1999	2005	2008	2013	2015	1999	2005	2008	2013	2015	1999	2005	2008	2013	2015
Current prices															
GFCF	37.4	33.7	37.8	31.9	35.8	24.0	17.8	21.6	19.5	22.9	13.4	15.8	16.3	12.4	12.9
Machinery and equipment	71.6	68.4	68.4	72.7	73.2	62.3	54.7	54.9	63.7	64.8	9.3	13.7	13.5	9.0	8.5
Transport equipment	74.1	68.2	78.2	73.2	72.8	67.5	57.2	72.8	68.6	70.6	6.6	11.0	5.4	4.6	2.2
Construction	17.6	18.6	20.3	16.5	18.1	0.0	0.0	0.0	0.0	0.0	17.5	18.6	20.2	16.5	18.1
Other products	18.4	14.1	21.6	15.3	19.0	10.2	5.7	10.9	6.6	8.4	8.2	8.5	10.7	8.8	10.6
Constant prices of 1999															
GFCF	37.4	37.2	43.9	40.2	45.8	24.0	21.5	28.2	27.8	32.1	13.4	15.6	15.7	12.4	13.7
Machinery and equipment	71.6	69.2	71.1	74.8	77.0	62.3	56.4	59.4	67.4	69.8	9.3	12.8	11.6	7.4	7.2
Transport equipment	74.1	71.5	81.6	78.8	77.7	67.5	60.1	76.2	73.7	75.0	6.6	11.3	5.4	5.1	2.7
Construction	17.6	19.0	21.4	18.5	22.7	0.0	0.0	0.0	0.0	0.0	17.5	19.0	21.4	18.5	22.7
Other products	18.4	15.0	23.8	17.3	21.5	10.2	6.2	12.6	7.5	9.3	8.2	8.8	11.2	9.9	12.3

TABLE 3. The import content of GFCF (percentage)

Regarding the decomposition of the change of the GFCF import content, similar to what is observed for private consumption, there is a negative price effect (Figure 7). This effect reflects not only a different composition between GFCF imports and GFCF expenditure but also a change of import prices over the period lower than the change in GFCF deflator. It should be noted that the component of machinery and equipment presented price changes substantially lower than the other components and even negative ones, that together with its different weight in GFCF and in the imports oriented towards GFCF, contributed significantly to a negative price effect. This price effect is offset by the aforementioned volume increase in the period as a whole. It should be noted that the negative contribution of the volume effect to the change of the import content in the period between 2008 and 2013 partially reflects the change in the European System of Accounts, with the entry into force of the ESA 2010, which led to the inclusion of R&D activities in GFCF (in particular, GFCF other products) that have a much lower import content than the remaining GFCF components.

Exports

Exports correspond to the final demand component with the highest import content, reaching over 40 per cent in most of the years under analysis, reflecting almost totally indirect imports (Table 4).[4]. Furthermore, exports of goods present a higher import content than exports of services, reflecting naturally a greater integration in international trade.

Figure 8 displays the import content of exports by main product groups in 1999 and 2015. The highest values are attained by fuels with an import content of around 90 percent followed by the transport equipment with about 70 percent in 2015.

In terms of evolution, one can see that there has been an increase in the import content of exports in nominal terms between 1999 and 2015, both in goods and services. One should note that excluding fuels the finding is qualitatively similar. In the case of goods, the increase is visible in most goods, signaling a greater integration in global value chains. In services, there has been also an increase in the import content, largely reflecting the behavior of transport services, notably air transport, suggesting an increasing international integration of this type of services. It should be noted that air transport services are the component of services with the highest import content (49 per cent in 2015, which is well above the average in exports of services, which is around 20 per cent).

4. The direct import content is of little importance in the case of exports and corresponds to re-exports and to the so-called triangular trade.

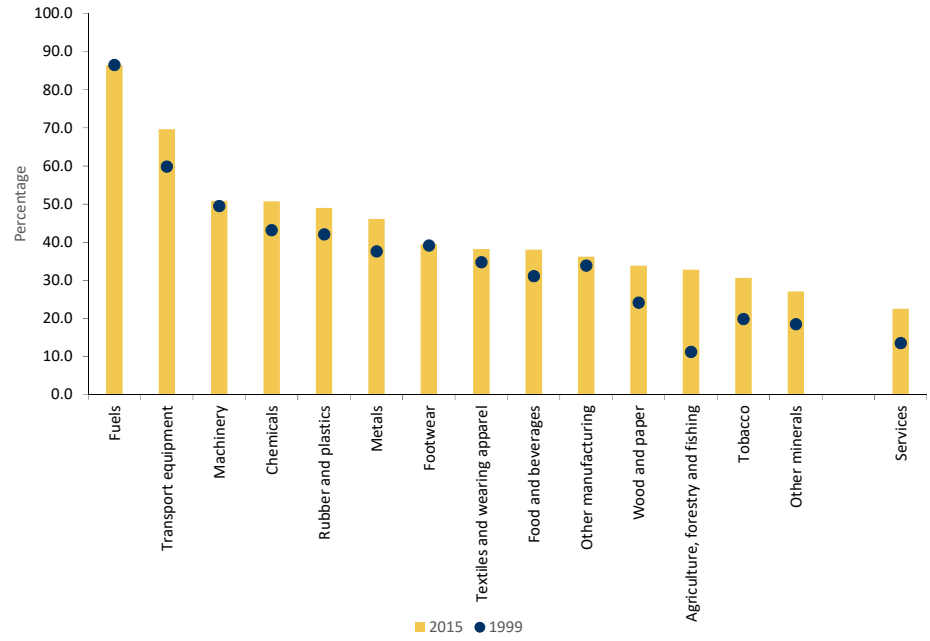

FIGURE 8: The import content of exports by products in nominal terms

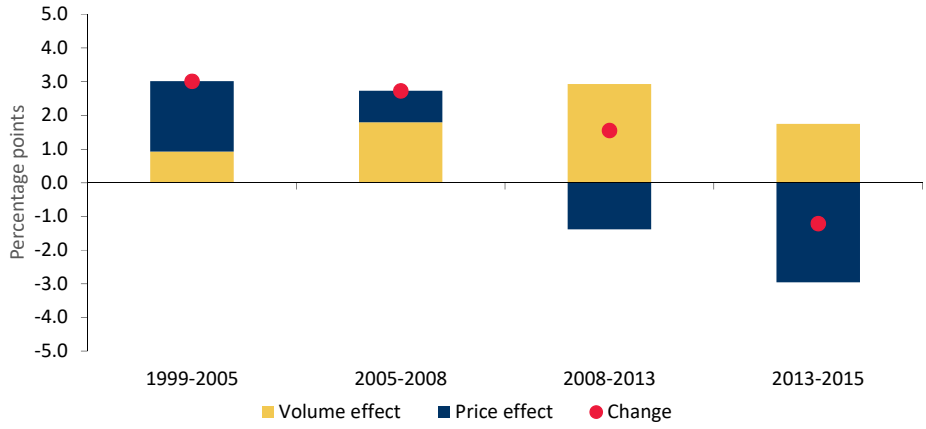

FIGURE 9: Decomposition of the change in the import content of exports

	Total					Direct					Indirect				
	1999	2005	2008	2013	2015	1999	2005	2008	2013	2015	1999	2005	2008	2013	2015
Current prices															
Exports	37.4	40.4	43.1	44.7	43.5	0.0	1.0	1.7	4.2	4.1	37.4	39.4	41.4	40.5	39.3
Goods	41.5	44.8	48.5	50.6	49.0	0.0	1.2	2.2	5.2	5.2	41.5	43.7	46.3	45.4	43.8
Fuels	86.5	95.7	87.6	93.1	86.5	0.0	0.1	0.0	2.2	1.5	86.5	95.5	87.5	90.9	85.0
Goods excluding fuels	40.6	42.9	46.5	46.0	46.0	0.0	1.2	2.3	5.6	5.5	40.6	41.7	44.2	40.4	40.5
Services	13.6	18.9	23.8	21.7	22.5	0.0	0.0	0.0	0.1	0.1	13.6	18.9	23.8	21.6	22.5
Constant prices of 1999															
Exports	37.4	38.3	40.1	43.0	44.8	0.0	0.8	1.6	5.2	5.2	37.4	37.5	38.5	37.8	39.5
Goods	41.5	42.4	45.2	49.5	50.8	0.0	1.0	2.0	6.5	6.5	41.5	41.4	43.2	42.9	44.3
Fuels	86.5	99.0	90.5	99.6	92.1	0.0	0.1	0.0	2.4	1.6	86.5	98.9	90.4	97.1	90.5
Goods excluding fuels	40.6	41.4	44.5	48.0	49.4	0.0	1.0	2.0	6.7	6.7	40.6	40.5	42.5	41.3	42.7
Services	13.6	16.4	19.2	17.1	20.4	0.0	0.0	0.0	0.0	0.1	13.6	16.4	19.2	17.1	20.4

TABLE 4. The import content of exports (percentage)

The import content of exports in real terms recorded an upward trend throughout the period, which translates into a positive contribution of the volume effect to the change in the import content of exports in nominal terms (Figure 9).

Between 2008 and 2013, the increase of the import content of exports, in volume, partly reflects the increasing importance of fuel exports. In fact, as a result of the expansion in the capacity of Portuguese refineries, fuel exports registered a very strong real growth in 2012 and 2013. The larger volume effect observed in the most recent period, between 2013 and 2015, reflects, to a large extent, the increase in the weight of exports of transport equipment (which have a high import content), and, to a lesser extent, the increase in the import content of air transport services.

In contrast with the volume effect, the sign of the contribution of the price effect to the change in the nominal import content has changed over the period. Between 1999 and 2005, there was a significant positive price effect largely due to the increase in fuel prices along with the fact that this product weighs more on imports oriented towards exports than on exports. The fuel price effect is usually associated with the different relative weight of fuels in exports and in the corresponding imports and not with price differentials given that Portugal is a price-taker in this market. In the period between 2013 and 2015, the opposite was observed, i.e. a negative contribution given the significant drop in fuel prices.

Concluding remarks

In this article, we analyzed the import content of the main components of final demand in Portugal since the beginning of the euro area. Besides the evolution in nominal terms, we complemented the analysis with volume estimates for the import content.

The results point to a notable heterogeneity of the import content across final demand components. Exports and investment are the components with the highest import content and public consumption has a relatively low external content.

In nominal terms, the import content of the final demand has not changed substantially between 1999 and 2015, although there was an increase in the import penetration in the case of exports and a slight decrease in the other main components of domestic demand.

However, behind the relative stability in nominal terms, the analysis at constant prices reveals a clearly upward trend in the import content of final demand. Even though it is broadly based across final demand components, it is more pronounced in investment and exports. In the case of GFCF, some important composition effects are observed, namely the effect of the decrease in the relative weight of GFCF in construction over the period under analysis.

On the other hand, the higher import content of exports seems to reflect a generalized increase of the import content by products, suggesting an increasingly integration in global value chains.

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Appendix

	1999	2005	2008	2013	2015
Private consumption	21.1	22.8	23.9	20.8	22.6
Durable consumption	57.0	55.8	57.6	53.8	55.1
Autos	55.6	56.7	58.1	56.8	58.2
Other durables	62.2	54.0	56.7	50.4	50.3
Non-durable consumption	17.9	20.4	21.3	19.1	20.5
Food	31.0	33.1	36.1	33.3	34.1
Non-food non-durable consumption	14.8	17.6	17.9	15.6	17.1
Public consumption	8.7	9.4	9.8	9.0	9.9
GFCF	30.7	29.7	35.1	30.8	35.8
Machinery and equipment	67.8	67.5	67.8	71.7	73.2
Transport equipment	70.6	67.8	76.9	73.9	72.8
Construction	16.5	16.9	17.8	15.0	18.1
Other products	16.5	13.8	21.9	15.2	19.0
Exports	36.8	37.8	38.7	41.5	43.5
Goods	41.3	42.0	43.8	47.9	49.0
Fuels	86.5	94.9	87.5	95.1	86.5
Goods excluding fuels	39.4	39.8	42.1	44.7	46.0
Services	15.0	18.4	20.8	18.3	22.5
Final demand	23.9	24.3	27.0	25.3	27.8

TABLE A.1. Total import content at constant prices of 2015 (percentage)