

Symmetric Input-Output Matrices

2015

One additional euro of exports generates additional 44 cents of imports and 56 cents of GDP

This press release presents the Symmetric Input-Output Matrices for the Portuguese economy regarding 2015.

According to the results of this system, each additional euro of expenditure on final demand aggregates generates the following impacts:

- Final Consumption Expenditure of Households: 23 cents of imports and 77 cents of GDP;
- Final Consumption Expenditure of General Government: 10 cents of imports and 90 cents of GDP;
- Gross Fixed Capital Formation: 36 cents of imports and 64 cents of GDP;
- Exports: 44 cents of imports and 56 cents of GDP.

Also, considering the same Input-Output model, a hypothetical uniform 10% decrease, of exports to the United Kingdom, due to Brexit, has a negative impact of 0.26 p.p. on Portuguese GDP, not considering effects on the Portuguese economy due to impacts on other economies, who are also relevant commercial partners of Portugal.

Introduction

Statistics Portugal releases the Symmetric Input-Output Matrices for 2015. The produced information is available in the file attached to the current press release, and is also available in the National Accounts section of the Statistics Portugal website. In addition to the standard matrices – domestic production, imports and total flows, at basic prices – matrices for total flows at purchaser's prices, technical coefficients, Leontief's inverse matrix (known as the table of production multipliers) and primary input multipliers have also been made available. Finally, information on primary input contents, both direct and indirect, of final demand, by product and at purchaser's prices is also released.

Symmetric Input-Output Matrices for 2015

The input-output system allows for the analysis of the interaction between the different domestic economic activities and from these with the exterior, in terms of transactions of goods and services. Essentially, the system reveals how each homogeneous branch is simultaneously a supplier and a client. As a supplier, products are made available for consumption by other branches and for final demand. As a client, products from other branches, imports and acquires services from productive factors are purchased. Through the established interactions, which are reflected in the several different types of multipliers, the system enables the user to evaluate the effect of economic shocks, also expressed by changes of components of final demand, on economic activity.

As such, and even if under a set of assumptions that underlie the Leontief¹ approach of this system, Statistics Portugal releases this work instrument that is a part of the National Accounts System and contributes to a deeper understanding of the Portuguese economy. As shown in the box presented further on, which aims to exemplify the type of use of the input-output model, an exercise was carried out regarding the impact of the exit of the United Kingdom from the European Union (BREXIT) on the Portuguese GDP.

Figure 1 – Summary of the Final Demand Multipliers*, 2015

Gross Domestic Product		Final Consumption Expenditure of Households	Final Consumption Expenditure of General Government	Gross Fixed Capital Formation	Exports	Final Demand	Internal Demand	
GDP, expenditure approach	Total final consumption expenditure	1.00	1.00	1.00	1.00	1.00	1.00	
	Imports	Direct ³	0.12	0.02	0.23	0.04	0.10	0.12
		Indirect ⁴	0.11	0.08	0.13	0.39	0.18	0.11
			0.23	0.10	0.36	0.44	0.28	0.22
		0.77	0.90	0.64	0.56	0.72	0.78	
GDP, production approach	Output at basic prices	1.14	1.31	1.24	1.55	1.28	1.19	
	Intermediate Consumption	Domestic origin	0.39	0.33	0.51	0.59	0.45	0.40
		Imported	0.11	0.08	0.13	0.39	0.18	0.11
		Taxes less subsidies ⁴	0.02	0.04	0.03	0.02	0.02	0.02
			0.52	0.45	0.67	1.00	0.65	0.53
	Gross value added	0.62	0.86	0.57	0.55	0.63	0.66	
	Taxes less subsidies on products	Direct ¹	0.13	0.00	0.05	0.00	0.07	0.09
Indirect ²		0.02	0.04	0.03	0.02	0.02	0.02	
		0.15	0.04	0.07	0.02	0.09	0.12	
		0.77	0.90	0.64	0.56	0.72	0.78	
GDP, income approach	Compensation of employees	0.25	0.62	0.30	0.28	0.32	0.33	
	Other net taxes on production	0.16	0.03	0.08	0.02	0.10	0.12	
	Operating surplus, gross	0.36	0.25	0.27	0.26	0.31	0.33	
		0.77	0.90	0.64	0.56	0.72	0.78	

* - The total may not equal the sum of the parts due to rounding.

1 - Taxes less subsidies, applied directly on the respective aggregate of final demand

2 - Taxes less subsidies, applied on intermediate consumption required for national production

3 - Direct imports for their respective final use

4 - Indirect imports, for intermediate consumption on the national production process

¹ Among these assumptions, we highlight: constant technical coefficients, no economies of scale, inexistence of changes in relative prices and no substitution effects, unlimited productive capacity; homogeneous goods and absence of financial restrictions.

Among the components of final demand, exports have the smallest impact on GDP changes (56 cents for each euro exported) and the largest impact on imports (44 cents)

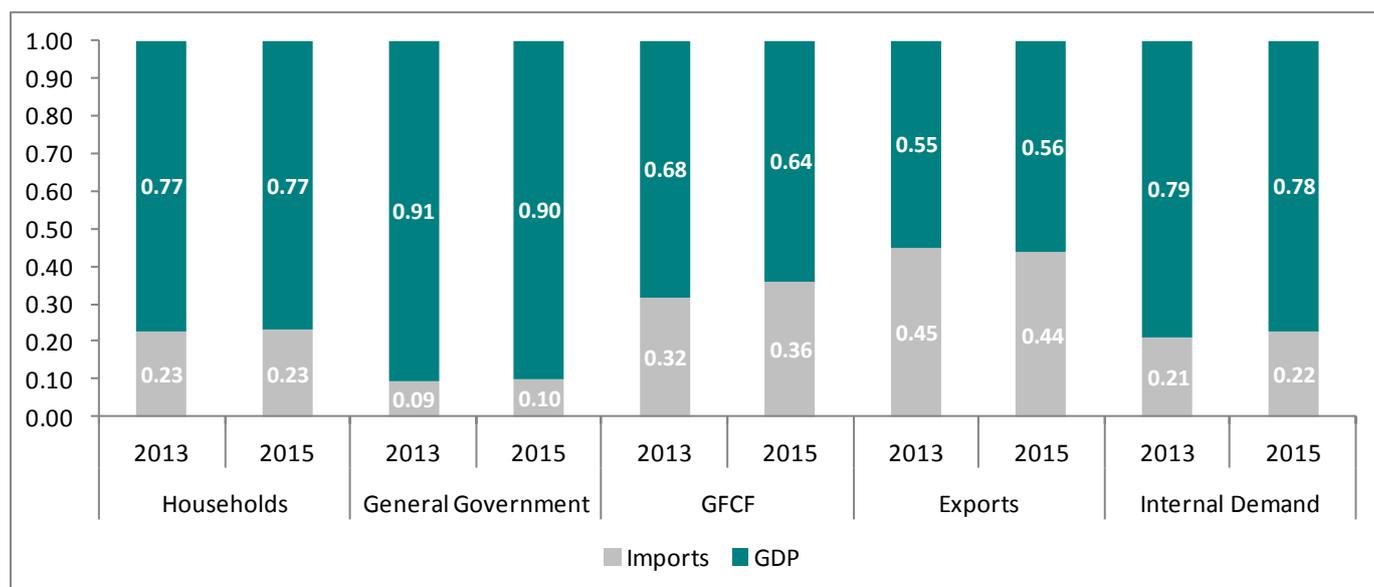
Picture 1 summarizes the multipliers of final demand for the several demand aggregates, for the three methods of GDP calculation. The results show, under certain conditions², the impact that the increase (or decrease) of one euro on the expenditure of any aggregate of final demand will have on the economy. As such, each additional euro of exports will result in a 44 cents increase on imports and 56 cents on GDP (54,5 cents on GVA and 1,5 cents on net taxes). The Final Consumption Expenditure of General Government has the most significant impact on GDP, that increases by 90 cents per each additional euro of expenditure, and the smallest impact on imports (10 cents). A one euro change in the Final Expenditure of Households and on Gross Fixed Capital Formation (GFCF) has an impact on GDP of 77 and 64 cents, respectively, and of 23 and 36 cents on imports, in the same order. It is however noteworthy that 15 cents on household's expenditure refer to net taxes, which decreases to 7 cents on GFCF and to just 2 cents on Exports.

Imported content on GFCF increased 4 percentage points (p.p.) between 2013 and 2015

Relatively to the Input-Output system of 2013, published by Statistics Portugal in September 2017, it is worth noting the stability of results for the main components.

Overall it was registered, between 2013 and 2015, an increase of 1 p.p. on import content of internal demand and, as a result, a 1 p.p. decrease on the contribution to GDP. On GFCF, a significant change was verified between the two periods, with the import content increasing by 4 p.p. (from 32% to 36%), with a symmetric impact on GDP. However, this increase was caused by structural changes in Investment, since GFCF on construction, with small import content, grew significantly below GFCF in machinery, equipment and transport material, which has a large import content and not by an increase in import content by product.

Figure 2 – Import Content and GDP, 2013 and 2015



² It is assumed that global variations on any final demand aggregate are proportionally distributed amongst the several goods and services and not concentrated on specific groups. However, the model allows for very different scenarios including the concentration of changes of demand in a single product (good or service).

Contents of primary inputs on final demand, by product and at purchaser's prices

The input-output system does not allow for an impact evaluation of the primary inputs on final demand aggregates by product nor at purchaser's prices. To overcome this limitation, the former Department for Prospect and Planning developed a specific methodology, named Content of Primary Inputs on Final Demand. Generically, this methodology aims to distribute margins, taxes and subsidies to the products that generate these flows. This transformation allows obtaining contents of primary inputs by product, at purchaser's prices, which is in fact the information known by economic agents. The next figure exemplifies the type of information produced.

From it, for example, one can read that each additional euro consumed by households on food products generates 36 cents of imports (20 cents of which are of finished products for "direct" consumption and 17 cents of raw materials), 12 cents of taxes on products, 52 cents of GVA and 64 cents of GDP.

Figure 3 – Contents of primary inputs by unit of expenditure, by product and at purchaser's prices, 2015

P82	Products	Final Expenditure of Households								
		Imports CIF			Taxes less subsidies on products			GVA _{bp}	GDP _{pp}	Total
		Direct	Indirect	Total	Direct	Indirect	Total			
01	Products of agriculture, hunting and related services	0.18	0.13	0.31	0.06	0.03	0.09	0.59	0.69	1.00
02	Products of forestry, logging and related services	0.00	0.05	0.06	0.12	0.03	0.15	0.79	0.94	1.00
03	Fish and other fishing products; aquaculture products; support services to fishing	0.17	0.08	0.25	0.05	0.02	0.07	0.68	0.75	1.00
04	Mining and quarrying products	0.22	0.08	0.30	0.19	0.02	0.21	0.49	0.70	1.00
10	Food products	0.20	0.17	0.36	0.10	0.01	0.12	0.52	0.64	1.00
11	Beverages	0.07	0.14	0.21	0.18	0.02	0.20	0.60	0.79	1.00
12	Tobacco products	0.05	0.02	0.07	0.86	0.00	0.86	0.07	0.93	1.00
13	Textiles	0.16	0.14	0.30	0.17	0.01	0.18	0.52	0.70	1.00
14	Wearing apparel	0.26	0.10	0.35	0.15	0.01	0.16	0.49	0.65	1.00
15	Leather and related products	0.24	0.12	0.37	0.16	0.01	0.17	0.46	0.63	1.00
16	Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials	0.06	0.14	0.20	0.19	0.02	0.20	0.60	0.80	1.00
17	Paper and paper products	0.15	0.17	0.32	0.16	0.01	0.17	0.51	0.68	1.00
...
	Total	0.12	0.11	0.23	0.13	0.02	0.15	0.62	0.77	1.00

A 10% decrease on exports to the United Kingdom leads to a 0.3 percentage points decrease on Portuguese GDP

In the context of the United Kingdom leaving the European Union, its impact on the Portuguese economy has been a matter of interest, mainly due to the potential decrease on the exports of goods and services, since this is a relevant client of Portugal, particularly in Tourism.

There are several analytical instruments to estimate this impact. The input-output model is one of them since, considering its assumptions and limitations, it allows for quantitative results. As an example, and using the multipliers obtained, a 10% uniform decrease on exports of goods and services to the United Kingdom results in a 0.26% decrease on Portuguese GDP.

This estimate is based on the contents of primary inputs for 2015 and on Exports of Goods and Services for 2016. The exports of goods are from the information of International Trade, compiled by Statistics Portugal and integrated on the National Accounts of 2016; the exports of services are extracted from the Balance of Payments (Bank of Portugal) and include Travelling and Tourism. The results contain direct and indirect domestic effects, from the interdependence of economic activities. This does not include, however, indirect effects on the national economy resulting from the impacts of Brexit on Portugal's main commercial partners.