ANALYSIS OF THE IMPORT ACTIVITY OF EUROPEAN FIRMS

The authors of this article are Cristina Fernández, Coral García, Antonio Rodríguez and Patry Tello, of the Directorate General Economics, Statistics and Research.

Introduction

The growing internationalisation of the world economy in recent decades has placed firms under strong competitive pressures, but has also handed them new opportunities to improve their productivity by exploiting, for example, the cost advantages and technological progress available to those which import intermediate goods and services for use in their production. Despite the strong development of this type of imports in world trade and the differences in import dependency across countries with a similar level of development, few studies have analysed the factors that determine whether a firm will import. In this respect, the EFIGE database[1] (which contains European firm data obtained through a survey conducted in 2008), enables not only the factors that make it more likely that a firm will import intermediate inputs for its production to be analysed, but also, since it has been implemented homogeneously across the four large euro area countries (Germany, France, Italy and Spain), the source of the differences between them to be investigated.

First of all, this article briefly reviews the evidence available on the different reasons that lead a firm to import intermediate goods and services for its production, and the expected impact of importing on its productivity according to the type of good imported. It then goes on to describe the database used in this article and to identify the variables which, according to the preceding analysis, affect firms' import decisions in the four main euro area countries. Although EFIGE does not allow researchers to take into account the impact that the crisis dating from 2008 has had on the imports and characteristics of firms, it can be expected that changes in strategic decisions and in business structure will take place gradually. Next, a probit model is estimated to assess the extent to which the decision to import is determined by the specific characteristics of the firm, of its sector and of the country in which it is situated. Then the article analyses whether there are differences between the variables which determine a firm's decision to import different types of goods and, finally, the main conclusions are summarised.

Why do firms import?: a review of the evidence available

In recent decades, imports of goods and services have grown at a much higher rate than world GDP (see Chart 1). Undoubtedly contributing to this increase has been the international fragmentation of production, which allows firms to harness the cost advantages offered by the new emerging countries, outsourcing the most labour intensive parts of the productive process and maintaining under their control those in which they are more productive or in which they have a comparative advantage (e.g. R+D, design, etc).[2] Hence the intensity with which the firms of a country participate in this process affects the aggregate behaviour of its imports. That said, other factors, which have to do with the specific characteristics of a country, also determine its propensity to import. They include size, geographical location and availability of natural resources, which affect, for example, its dependence on raw materials. Moreover, institutional factors (such as the level of competition in certain sectors) or economic policy decisions (such as the promotion of innovation or
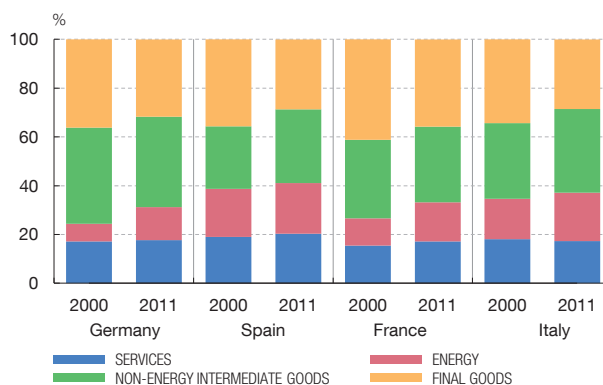

IMPORTS/GDP RATIO

1991 = 100
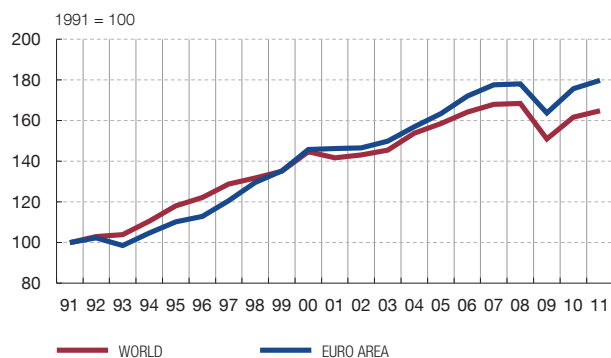
STRUCTURE OF IMPORTS
Nominal terms

%

SOURCES: IMF and Eurostat.

the energy policy) affect the behaviour of imports. All these factors contribute to explaining the different positions of firms in the production value chain and the types of goods or services imported by them.

Input-output tables (which provide information on imported inputs) confirm that there are notable differences in the import content of manufacturing output in the four large euro area countries. Chart 2 shows that in 2007 (the last year for which input-output information is available) the import content of Spanish production was significantly higher than in other countries and that the difference was concentrated in the higher technological intensity sectors. These data suggest that Spain's greater import dependency is explained not only by its well-known energy dependence, but also by the need to import goods with a high technological content which are not produced domestically.[3] Although the euro area countries are not being affected equally by the current financial and economic crisis, a country's productive structure changes slowly, so significant changes cannot be expected to have occurred in the last few years in the import dependency of the countries analysed in this article. Therefore a high volume of imports may indicate structural problems in an economy (e.g. lack of technological capital or skilled human capital or an inefficient energy system), but also the ability of firms to exploit the cost advantages offered by new markets (which would reduce their production costs) and the access to more varied and higher quality inputs and the acquisition of leading-edge technology.[4] In the latter cases, imports seem to have a positive effect on firms' productivity and, therefore, on their competitiveness.[5]

As in the case of exporters, the percentage of firms which purchase goods abroad is small. This may be explained by the costs which importers have to bear (including the cost of obtaining information on foreign suppliers, establishing distribution channels or adapting the product to the firm's needs) and which only the more productive firms are able to

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3 See Cabrero and Tiana (2012).

4 Augier et al. (2009), using data drawn from Spain's Encuesta de Estrategias Empresariales (Business Strategy Survey), concluded that intermediate goods imports in Spain have a positive effect on productivity through the dissemination of technology. Along these same lines, Keller (2002) showed that trade in differentiated intermediate goods acts as a channel of technology transmission.

5 Amiti and Konings (2007) and Kasahara and Rodríguez (2008) found that importing increases firms' productivity. See also Altomonte and Békés (2009) and Halpern et al. (2005). This latter study reports evidence that importing affects firms' productivity by raising the variety and quality of imported inputs. According to Broda et al (2006), the increase in a country's imports with respect to GDP is explained mainly by the import of new varieties of a good.

ECONOMIC SECTORS
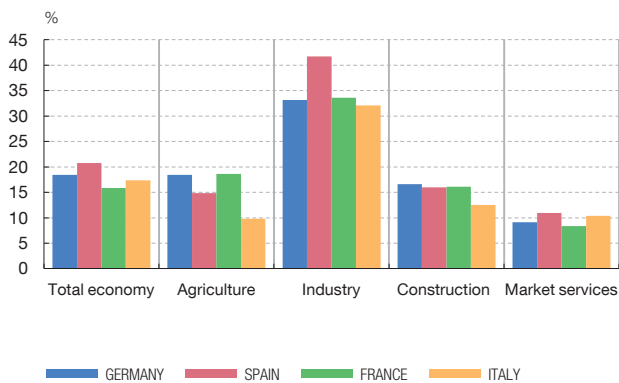
MANUFACTURING SECTOR BREAKDOWN BY TECHNOLOGICAL INTENSITY

GERMANY   SPAIN   FRANCE   ITALY

GERMANY   SPAIN   FRANCE   ITALY
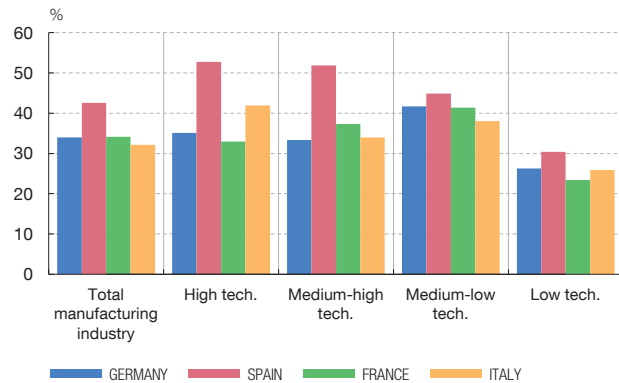
SOURCE: Cabrero and Tiana (2012).

a Information based on 2007 input-output tables (IOT) for Germany, Spain and France, and on the 2005 IOT for Italy.

defray.[6] Also, to be able to internalise the benefits of importing, a firm has to have the technical and human resources which allow it to assimilate the inputs purchased abroad into its productive process. It may thus be expected that the probability that a firm will import depends on its ability to bear those costs and, in addition, on its ability to internalise its benefits.

With respect to costs, all the characteristics of firms which make them better able to access the funds needed for imports (e.g. firm size, firm age or availability of different sources of financing) or which reduce the information problems associated with the search for suitable suppliers (e.g. belonging to a multinational group) will increase the probability that a firm will import. Further, the fact that a portion of these costs are sunk explains why there is a certain hysteresis in the behaviour of imports, such that a firm which imports in a given year is more likely to import in the following year (according to EFIGE, around 64% of the firms that imported in 2008 also imported regularly in previous years). An additional aspect which is addressed in this article is how the probability that a firm will import is affected by whether other firms in the same region and/or sector also purchase intermediate goods and services abroad, thereby facilitating access to information on foreign suppliers, the quality of the purchased good or the level of performance of contracts.

The variables affecting the probability that a firm will import also have a bearing on the type of goods they purchase abroad. This is important because the impact of imports on a firm's productivity is closely related to the characteristics of the imported product. Empirical studies using firm-level data generally find a positive relationship between productivity and the level of development of the country of origin of the imports.[7] Further, imports of differentiated or of higher quality goods have a positive effect on a firm's productivity. In view of this evidence, it is of interest to investigate not only whether there are differences in the propensity to import between the large euro area countries, but also whether there are differences in the type of goods imported (raw materials, standard

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6   Muuls and Pisu (2007), for Belgian firms, Altomonte and Békés (2009), for Hungarian firms, Vogel and Wagner (2008), for French firms, and Aristei et al. (2011), for eastern European and central Asian firms, find that importing firms have a higher level of productivity than those which do not trade internationally.

7   Lööf and Andersson (2010) find that imports from developed countries, specifically the G7, have a more positive impact on the productivity of Swedish firms than on that of firms from other countries.

goods, i.e. components routinely available in the market, or customised goods, i.e. components manufactured and adapted specifically for each firm) and which variables determine the type of imports.

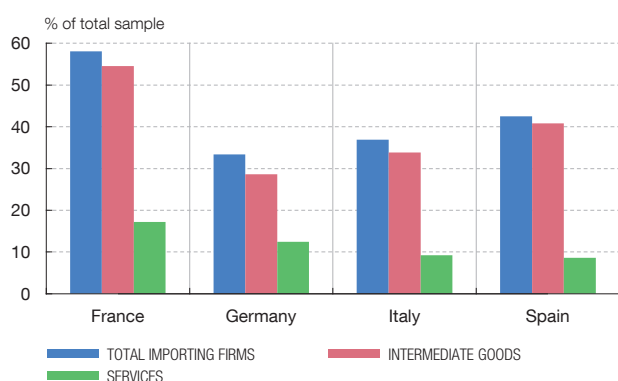| Description of the database and stylised facts	The database used in this article is that of the EU-EFIGE/Bruegel-UniCredit survey conducted within the framework of the project "EFIGE: European firms in a global economy: internal policies for external competitiveness". This database contains homogeneous information on a large number of variables (around 150) used to characterise the manufacturing firms of seven EU countries.[8] EFIGE has resolved some of the problems constraining the cross-country comparative studies of the recent process of firm internationalisation: different survey execution periods, different definition and/or selection of variables, and different sample selection methodologies, among others. Nevertheless, this survey has some limitations. First, it is limited in scope to firms in the manufacturing sector, and thus does not cover the services sector, an area which has a growing weight in international trade. Also, the sample only includes firms with more than ten employees, so the larger firms are overrepresented in the corporate sector. This bias is larger in the countries in which smaller firms are more frequent, such as Italy and Spain. Moreover, so far only the first wave of the survey has been completed, which limits the richness of the exercises that can be carried out (the variables are only available for 2008 and in some cases, with the aim of measuring the effects of the crisis, for 2009). Despite these limitations, the EFIGE survey contains information which enables a deeper analysis of the factors explaining the differing import behaviour of euro area countries.

This article considers importing firms to be those which state in the survey that they purchased abroad intermediate goods and/or services in 2008 or regularly in previous years.[9] Chart 3 shows the percentage of importing firms in the four large euro area countries, distinguishing between intermediate goods and services, and giving the related import intensity. The data show that in Germany both the relative weight of importing firms and their import intensity are lower than in the other countries considered, while French firms not only have a higher propensity to import, but are also more numerous. Italian and Spanish firms have similar percentages in number and import intensity, and in both cases they are slightly higher than those of German firms and significantly lower than those of French firms. Depending on the country, there are also differences both in the geographical origin of imports and in the type of product purchased. Notable regarding the country of origin of purchases is the high percentage of firms which import from the EU and, to a lesser extent, from areas which are culturally and geographically close (the rest of the EU) or offer cost advantages (India and China). French and German firms generally exhibit greater geographical diversification in their purchases abroad than Spanish and Italian ones. There are notable differences between countries in the type of product imported. Thus Italy and Spain stand out for the high percentage of firms which import raw materials, whereas in Germany and France the proportion of firms which also import intermediate goods, whether they be standard or customised, is much higher.

Tables 1 and 2 summarise the main variables available in the EFIGE survey which, according to the theoretical and empirical evidence reviewed in the preceding section, influence

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8 The sample comprises 15,000 firms: 3,000 in each of France, Germany, Italy and Spain, 2,200 in the United Kingdom, and around 500 in each of Austria and Hungary. The survey variables have been supplemented with accounting information provided by AMADEUS. For more information, see www.efige.org.

9 This broad definition of an importing firm is intended to mitigate the extent to which the population of importing firms is impacted by the 2008 collapse in world trade, in that it does not exclude for this reason firms which regularly imported.

RELATIVE WEIGHT OF IMPORTING FIRMS (a)

% of total sample

IMPORT INTENSITY (b)

%

- TOTAL IMPORTING FIRMS
- INTERMEDIATE GOODS
- SERVICES
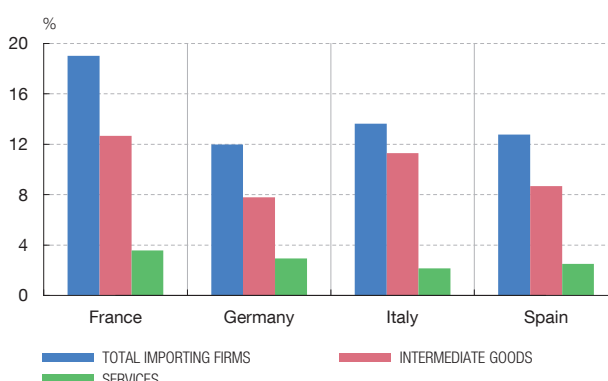
GEOGRAPHICAL BREAKDOWN OF IMPORTED INTERMEDIATE GOODS (c)

% of total intermediate goods importing firms

- EU15
- REST OF EUROPE
- REST OF ASIA
- CENTRAL AND SOUTH AMERICA
- REST OF EU
- INDIA AND CHINA
- USA AND CANADA
- REST OF THE WORLD

BREAKDOWN OF IMPORTED INTERMEDIATE GOODS BY COMPONENT (c)

% of total intermediate goods importing firms

- RAW MATERIALS
- STANDARD INTERMEDIATE GOODS (d)
- CUSTOMISED INTERMEDIATE GOODS (e)

SOURCE: EU-EFIGE/Bruegel-UniCredit dataset.

a   It should be taken into account that a single firm may import both intermediate goods and services. An importing firm is defined as a firm which imported intermediate goods and/or services in 2008 and/or regularly in previous years.
b   Calculated as the ratio of purchases abroad of intermediate goods and/or services to net turnover. Average figures relative to 2008.
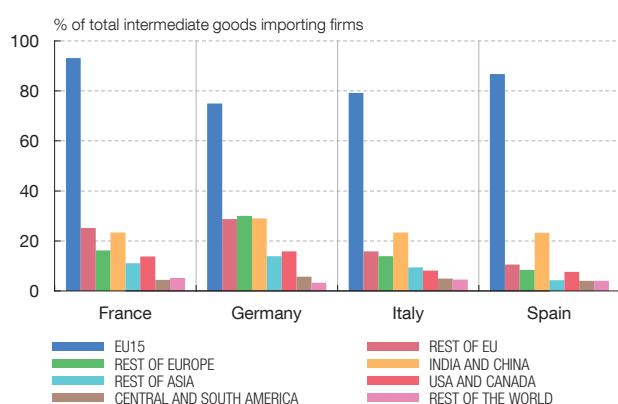c   Information relating solely to 2008.
d   Defined as those components available routinely in the market (e.g. standard steel screws).
e   Defined as those components manufactured exclusively for each firm (e.g. steel screws adapted to a specific design).

a firm's propensity to import.[10] The data reveal that importing firms are larger, older, more productive and have more human and technological capital (the former proxied by the percentage of university graduates and the latter by process or product innovation). These results are common to all the countries analysed, although some distinguishing features may be mentioned, such as the greater relative size of importing firms in France and Spain or the greater productivity of Italian importers. Examination of the variables used to proxy firms' participation in the internationalisation process shows that importers have a greater tendency to belong to foreign corporate groups and a higher propensity to delocalise a part of their production to other countries, whether in the form of foreign direct investment (FDI) or international outsourcing.[11] Firms which import are more likely to also be export-ers. These results suggest that internationalised firms, with a greater knowledge of the markets and, therefore, lower entry costs, are potentially more likely to import intermediate

10   Table A1 of the annex sets out mean equality tests calculated for the sample total and the variables analysed in Table 2. The differences between importing firms and non-importing firms were significant in all cases.
11   In FDI, production is outsourced to a group company at least 10% owned by the outsourcer, while in interna-tional outsourcing production is sub-contracted to a third-party company.

TABLE 1

	Description	Expected impact
Workforce	Number of employees	+
Productivity	Sales per employee in 2008 (sales from AMADEUS)	+
Fixed capital ratio	Percentage of tangible fixed assets to total assets (AMADEUS, 2008)	+
Firm age	Age of the firm (2009-year of creation)	+
University graduate ratio	Percentage of employees with university qualifications	+
Product innovation	Dummy which takes a value of 1 if the firm carried out product innovation in the period 2007-2009	+
Process innovation	Dummy which takes a value of 1 if the firm carried out process innovation in the period 2007-2009	+
Group membership	Dummy which takes a value of 1 if the firm forms part of a corporate group	+
Foreign group membership	Dummy which takes a value of 1 if the firm forms part of a foreign corporate group	+
FDI	Dummy which takes a value of 1 if the firm carries out part of its production through FDI	+
International outsourcing	Dummy which takes a value of 1 if the firm carries out part of its production through contracts or agreements ("arm's length agreements")	+
Exporter	Dummy which takes a value of 1 if the firm exported intermediate goods and/or services in 2008 and/or regularly in previous years	+
Listed on stock exchange	Dummy which takes a value of 1 if the firm is listed on a stock exchange	+
Sector-region spillovers	Same industry-region spillover ((Number of importers in the same industry and region – 1)/(Number of firms in the same industry and region – 1))	+
Sector spillovers	Spillover in the same industry but different region ((Number of importers in the same industry but different region – 1)/(Number of firms in the same industry but different region – 1))	+
Region spillovers	Spillover in a different industry but the same region ((Number of importers in the same region but different industry – 1)/(Number of firms in the same region but different industry – 1))	+
Import hysteresis	Dummy which takes a value of 1 if the firm imported intermediate goods before 2008	+

SOURCES: In-house calculation from the EU-EFIGE/Bruegel-UniCredit dataset and AMADEUS.

goods and services than other firms. Similarly, access to different sources of financing, proxied by whether a firm is listed or not on the stock exchange, is more common among importing firms, especially in France and Germany. Finally, firms which import intermediate goods and services seem to be located in geographical areas where there are firms of the same sector which also purchase a portion of their inputs abroad.

Firm-level analysis of the EFIGE survey data generally confirms the evidence obtained from the aggregate macroeconomic figures and presented in the preceding section, i.e. that the import intensity of firms differs depending on whether they are located in one country or another. However, the messages obtained from analysis of the information sources available at different levels of aggregation are not always easy to reconcile and there are some discrepancies. For example, as noted in the preceding section, the import content of manufacturing production is, according to the input-output tables, higher in Spain than in the other large countries of the euro area, while in the sample analysed the highest import ratios are those of French firms. There are many factors which could explain this discrepancy, such as the sample design, which, since it excludes firms with fewer than ten employees, would bias downwards the import content of those countries where the

TABLE 2

	Total sample		Spain		Italy		France		Germany	
	Importer (b)	Non-importer	Importer (b)	Non-importer	Importer (b)	Non-importer	Importer (b)	Non-importer	Importer (b)	Non-importer
Workforce	89.4	40.3	67.3	30.2	63.3	30.4	107.4	35.0	112.6	60.4
Productivity	209.6	164.8	173.4	131.1	281.9	183.4	176.4	145.0	222.9	192.6
Fixed capital ratio	29.5	32.5	36.9	37.4	31.1	32.2	23.6	27.4	29.9	32.8
Firm age	36.9	33.4	28.9	24.5	30.2	28.0	40.3	36.2	47.1	43.3
University graduate ratio	10.4	7.7	12.0	9.0	7.8	5.2	9.8	6.2	12.6	10.2
Product innovation (c)	57.8	39.1	56.7	37.3	59.5	40.6	55.0	35.2	61.9	41.3
Process innovation (c)	47.5	37.9	58.3	46.1	49.0	40.3	40.6	29.6	45.9	34.9
Group membership (c)	25.7	12.1	20.9	10.1	20.0	10.5	36.3	22.5	19.4	8.7
Foreign group membership (c)	9.8	2.4	8.1	1.4	5.4	1.4	14.4	3.5	8.7	3.4
FDI (c)	6.9	1.3	5.4	0.8	4.5	1.2	6.2	0.3	12.2	2.4
International outsourcing (c)	6.8	1.6	2.8	1.1	7.7	2.1	8.5	1.0	7.4	1.7
Exporter (c) (d)	76.8	43.8	77.3	41.1	85.9	57.4	68.4	33.0	80.0	39.1
Listed on stock exchange (c)	1.9	0.7	1.7	0.5	0.6	0.4	2.7	0.8	2.4	1.0
Sector-region spillovers (c)	45.1	29.3	43.4	30.9	39.6	27.1	57.8	41.9	31.7	22.6
Sector spillovers (c)	44.7	40.3	41.8	41.3	38.1	37.2	58.7	57.2	31.7	32.1
Region spillovers (c)	42.5	39.7	43.1	39.0	37.8	35.4	59.0	53.5	32.3	29.5
MEMORANDUM ITEM										
Number of firms	4,904	6,048	1,061	1,329	1,167	1,804	1,622	1,078	1,054	1,837

SOURCES: EFIGE/Bruegel-UniCredit dataset and AMADEUS.

a The definition of the variables and their expected impact on the probability that a firm will import can be found in Table 1. Data coverage is, in general, good (above 80% of the sample), being lower in the case of Germany's productivity (around 55%).
b An importing firm is defined as a firm which imported intermediate goods and/or services in 2008 and/or regularly in previous years.
c The value of this variable indicates the percentage of firms having the characteristic in question.
d An exporting firm is defined as a firm which sold abroad intermediate goods and/or services in 2008 and/or regularly in previous years.

average size of the companies is smaller, such as Spain and Italy. Moreover, in Spain, given its marked energy dependence, the non-inclusion in the sample of the large energy firms reduces its import dependency. Further, other factors relating to differences in firms' internationalisation models may also be skewing the results of the survey. In this respect, it should be noted that the process of production delocalisation in German and Spanish firms in the sample takes place mainly through FDI, while French and Italian firms basically utilise international outsourcing. The latter practice generally entails re-importing most of the outsourced production to the home country, and therefore the survey would be expected to yield higher import dependency ratios in France and Italy. All these factors, along with the differing distribution of firms' characteristics in the industrial base, explain the differences between firm-level data and aggregate data.[12]

Determinants of the decision to import

Once the variables that may affect the probability of whether a firm will import intermediate goods and/or services for production purposes have been identified, the next step is to assess whether the differences between countries at aggregate level are due to different

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12 See Navaretti et al. (2011).

firm characteristics or to idiosyncratic factors of the country concerned (such as natural resource wealth or institutional factors). For this purpose, a probit is estimated:

$$\text{Pr}\,(M_{isc} = 1) = \phi\,(\alpha + \beta X_{isc} + \Upsilon_s + \delta_1 fra_{is} + \delta_2 ita_{is} + \delta_3 esp_{is} + \varepsilon_{isc}\,)$$

where M_{isc} takes a value of one if the firm imports intermediate goods and/or services and takes a value of zero if it does not; X_{isc} denotes the characteristics of firm i operating in sector s and located in country c[13]; Υ_s denotes the dummies which identify the 14 manufacturing sectors considered; and fra_{is}, ita_{is} and esp_{is}, are the dummies which take a value of one if the firm is French, Italian or Spanish, respectively. Thus, the country of reference for the purpose of interpreting the coefficients associated with the variables of each economy is Germany.[14]

The results of the estimation are set out in Table 3. In column 1 the explanatory variables include only the country dummies. These results suggest that French, Italian and Spanish firms are more likely to import intermediate goods and/or services for production than German firms. That greater import dependency can be clearly appreciated for the case of Spanish manufacturing firms in Chart 2. Variables characterising firms are successively included in the following columns (2 to 6) in order to identify whether any of them is determinant in explaining the differences observed between countries.[15] The purpose of the last column is to identify whether there is a hysteresis effect, for which purpose a dependent variable was constructed which identifies as importing firms only those firms that imported intermediate goods and services in 2008.

The effects which the various control variables have on the probability of importing are in line with the evidence in the empirical literature. Thus, the firms that are larger, that have greater market knowledge (because they are older), that engage in activities abroad, that possess more human capital or that invest in technological development are more likely to decide to import intermediate goods and services to carry out their production.

However, after taking into account those firm characteristics,[16] differences between countries persist. Thus, firms located in France and Spain are around 24% and 11%, respectively, more likely to import intermediate goods and services than those located in Germany (see column 5 of Table 3). In the case of Italy, this percentage is much lower, at

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13   The items included in the firm characteristics vector are: size, measured by the logarithm of the number of employees; age, also expressed as a logarithm; the percentage of employees with university qualifications; two dummies which reflect whether the firm engages in process and product innovation; two dummies which indicate, respectively, whether the firm belongs to a corporate group, and whether that group is Spanish or foreign; two dummies which have a value of one if the firm engages in foreign direct investment or has engaged in international outsourcing; a variable which takes a value of one if the firm is an exporter; and a dummy indicating whether the firm is listed on the stock exchange. In addition, as in López and Yadav (2010), three sectoral dummies have been constructed to measure any positive externalities derived from operating in a region and sector in which other firms also import intermediate goods and services.

14   A significant positive (negative) coefficient, for example in the dummy esp_{is} means that Spanish firms have a higher (lower) probability of importing intermediate goods and/or services than German firms.

15   The analysis presented here should be interpreted with some caution, since, as there is only a single data wave, econometric tools cannot be used to adjust possible endogeneities or characteristics unobservable at firm level. Nevertheless, if the probit is estimated for a set of Spanish firms in the Central Balance Sheet Data Office survey, for which information is available in the period 2001-2011, the estimated coefficients are similar regardless of whether the variables are contemporaneous or lagged by one period.

16   Among the estimate made, we have also controlled for firm productivity and for physical capital per employee. Neither variable comes directly from the EFIGE database, but rather from the database formed by merging it with AMADEUS. The effects of these two variables are in line with those expected by the literature and do not alter the results of the other variables. However, it was decided not to include them in the final estimate because of measurement problems in some countries and because the checks performed on common variables showed that the AMADEUS information does not always agree with that gathered through EFIGE.

Dependent variable	Importing firm											
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12] (b)
France (c)	0.238***	0.239***	0.254***	0.256***	0.263***	0.262***	0.248***	0.248***	0.243***	0.243***	0.092***	0.042***
	(0.015)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.017)	(0.012)
Italy (c)	0.039***	0.022	0.056***	0.060***	0.074***	0.065***	0.061***	0.066***	0.022*	0.022*	-0.011	-0.001
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.009)
Spain (c)	0.104***	0.104***	0.134***	0.141***	0.139***	0.131***	0.127***	0.135***	0.114***	0.114***	0.043***	0.019*
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.013)	(0.013)	(0.014)	(0.011)
Workforce (d)			0.124***	0.120***	0.119***	0.107***	0.094***	0.084***	0.063***	0.063***	0.060***	0.018***
			(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.004)
Firm age (d)			0.023***	0.026***	0.024***	0.026***	0.024***	0.011*	0.011*	0.006	-0.014***	
			(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	
University graduate ratio					0.360***	0.283***	0.244***	0.210***	0.107***	0.108***	0.100**	-0.055*
					(0.042)	(0.042)	(0.042)	(0.041)	(0.040)	(0.040)	(0.039)	(0.028)
Process innovation						0.050***	0.052***	0.054***	0.046***	0.045***	0.040***	0.017**
						(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.009)	(0.007)
Product innovation						0.120***	0.120***	0.113***	0.074***	0.074***	0.074***	0.036***
						(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.007)
Group membership							0.036**	0.032**	0.024	0.024*	0.027*	-0.005
							(0.015)	(0.015)	(0.014)	(0.014)	(0.014)	(0.010)
Foreign group membership							0.137***	0.130***	0.099***	0.101***	0.079***	0.039***
							(0.024)	(0.024)	(0.023)	(0.023)	(0.023)	(0.015)
FDI								0.190***	0.146***	0.146***	0.136***	0.020
								(0.027)	(0.025)	(0.025)	(0.024)	(0.016)
International outsourcing								0.240***	0.199***	0.199***	0.195***	0.050***
								(0.028)	(0.026)	(0.026)	(0.025)	(0.016)
Exporter									0.236***	0.236***	0.216***	0.039***
									(0.009)	(0.009)	(0.010)	(0.008)
Listed on stock exchange										-0.029	-0.021	-0.008
										(0.040)	(0.039)	(0.026)
Sector-region spillovers											0.582***	0.346***
											(0.033)	(0.024)
Import hysteresis												0.409***
												(0.004)
Sector dummies	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Likelihood function	-7,349.1	-7,143.0	-6,873.3	-6,864.0	-6,817.7	-6,697.3	-6,663.2	-6,581.8	-6,253.5	-6,253.3	-5,969.6	-3,728.2
Number of observations	10,934	10,934	10,934	10,934	10,934	10,934	10,934	10,934	10,934	10,934	10,934	10,934

SOURCE: EU-EFIGE/Bruegel-UniCredit dataset.

a The definition of the variables and their expected impact on the probability that a firm will import can be found in Table 1. The dependent variable "importing firm" is defined as firms which imported intermediate goods and/or services in 2008 and/or regularly in previous years. Average marginal effects are reported. Standard deviations are in brackets. *, **, *** denote statistical significance at 10%, 5% and 1%, respectively.
b In this case the dependent variable is defined as those firms which imported intermediate goods and/or services in 2008.
c For interpreting coefficients, the reference taken is Germany.
d As natural logarithm.

around 2%. Moreover, these differences remain fairly steady as the various firm characteristics are added. Only when it is taken into account that a firm is surrounded in its sector and region by firms which also import intermediate goods and/or services, it is found that the probability gap separating French and Spanish firms from German ones shrinks to half and, in the case of Italian firms, it becomes negative, suggesting that these regional effects are country specific.

Determinants of the type of imports

It can also be analysed whether there are differences in the type of goods imported by the firms of each country, i.e. whether there are countries whose firms' import activity centres solely on the raw materials needed for their production or whether they import other intermediate goods, be they standard or customised. To this end, an estimate was made of the probability of importing only raw materials,[17,18] and of the probability of importing only standard or customised intermediate goods (see Table 4).

These results show that the variables characterising firms have different effects on the import of the various types of goods. Thus the characteristics which, according to the foregoing analysis, tend to increase the probability that a firm will import have, in aggregate terms, a negative effect on raw material imports. Specifically, firms that are older, have more human capital or engage in other internationalisation activities have a lower probability of importing only raw materials. By contrast, these variables tend to have a positive impact on the import of both standard and customised intermediate goods.

In this respect, the import of raw materials seems to be dictated more by limitations in a country's productive geography or by a firm's less favourable position in the production value chain.[19] After taking into account their characteristics, Spanish and Italian firms still show a 20% and 30%, respectively, higher probability than German firms that their imports will be solely raw materials. In the case of other intermediate goods, this difference is negative, albeit only slightly so. This result suggests that Spanish and Italian firms are probably at a lower level in the value chain than German ones and that their degree of technological development prevents them from fully exploiting the advantages of international trade.

Meanwhile, French firms, although Table 3 shows them to be more likely than German ones to import intermediate goods and services for production, are at the same time more likely to focus solely on the import of a single type of intermediate good. That greater combination of imports of different types of goods by French firms may relate to their production delocalisation model being different from that of Germany. Chart 4 shows that firms opting for international outsourcing (main option used by French firms) seem to have a greater propensity to incorporate their delocalised production into their productive process.

Conclusions

Over the last few decades, international trade in intermediate goods and services has grown steadily at a faster rate than GDP. This growing specialisation of production has been associated with efficiency gains and many studies have sought to identify the characteris-

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17   The dependent variable takes a value of 1 if the firm imports only raw materials and a value of 0 if it does not import raw materials or, in addition to importing them, it also imports standard or customised intermediate goods.

18   To adjust for possible selection bias, (the type of intermediate goods imported by the firm is only observed in those firms that do actually import), an estimate is made in two stages following Heckman (1976).

19   In principle, this latter factor should be covered by the variables which control for the sector in which the firm operates. However, given the wide range of sectors considered, it is likely that a large part of this effect is reflected in the country dummies.

TABLE 4

Dependent variable	Only raw materials	Only standard intermediate goods	Only customised intermediate goods
	[1]	[2]	[3]
France (b)	-0.054**	-0.107***	-0.046***
	(0.027)	(0.025)	(0.016)
Italy (b)	0.301***	-0.051***	-0.015*
	(0.04)	(0.014)	(0.008)
Spain (b)	0.187***	-0.014	-0.038***
	(0.038)	(0.010)	(0.014)
Firm age (c)	-0.009	-0.003	-0.002
	(0.009)	(0.004)	(0.003)
University graduate ratio	-0.010	0.061**	0.037*
	(0.065)	(0.030)	(0.022)
Process innovation	-0.041***	-0.004	0.002
	(0.014)	(0.007)	(0.005)
Product innovation	-0.085***	0.002	0.009
	(0.015)	(0.008)	(0.005)
Group membership	-0.029	-0.021*	-0.002
	(0.019)	(0.012)	(0.008)
Foreign group membership	-0.026	0.013	0.017*
	(0.028)	(0.014)	(0.010)
FDI	-0.097***	-0.019	0.000
	(0.029)	(0.015)	(0.011)
International outsourcing	-0.194***	-0.011	0.028***
	(0.033)	(0.017)	(0.010)
Exporter	-0.096***	-0.010	0.011
	(0.026)	(0.013)	(0.008)
Listed on stock exchange	0.014	-0.010	-0.011
	(0.048)	(0.026)	(0.016)
Sector-region spillovers	-0.156**	0.065***	0.025
	(0.074)	(0.021)	(0.018)
Sector dummies	Yes	Yes	Yes
Likelihood function	-8,479.0	-7,384.5	-7,192.2
Number of observations	11,419	11,419	11,419

SOURCE: EU-EFIGE/Bruegel-UniCredit dataset.

a The definition of the variables and their expected impact on the probability that a firm will import can be found in Table 1. Average marginal effects are reported
*, **, *** denote statistical significance at 10%, 5% and 1%, respectively.
b For interpreting coefficients, the reference taken is Germany.
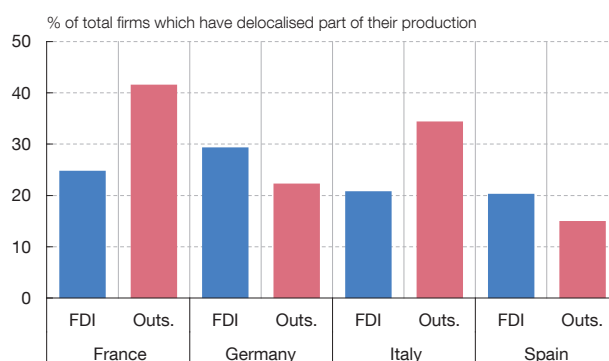**c** As natural logarithm.

tics which lead firms to decide to internationalise their production. This article uses the EFIGE dataset to compare the propensity to import of manufacturing firms from the four largest euro area economies. As a first approximation, French firms are more likely than Italian, Spanish and, particularly, German firms to import intermediate goods and services for production purposes. Moreover, once firm characteristics have been taken into account, the probability that a French firm will import is still higher than in the case of German ones.

However, when the reason for importing is analysed, the results give a different picture. Thus, Spanish and Italian import dependence seems to stem more from the need to purchase

DELOCALISATION MODEL: FDI VERSUS INTERNATIONAL OUTSOURCING
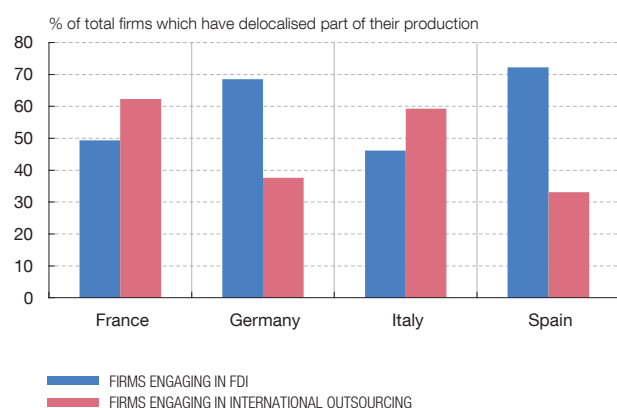
% OF FIRMS WHICH USE DELOCALISED PRODUCTION FOR
INTERMEDIATE CONSUMPTION IN DOMESTIC PRODUCTION

% of total firms which have delocalised part of their production

% of total firms which have delocalised part of their production

FIRMS ENGAGING IN FDI

FIRMS ENGAGING IN INTERNATIONAL OUTSOURCING

FUENTE: Base de datos EU-EFIGE/Bruegel-UniCredit.

raw materials for production or from the fact that, comparatively speaking, their firms are a step lower in the value chain. For their part, German firms seem to have a greater propensity to import solely intermediate goods, be they standard or customised, whereas the French import dependence is relatively more diversified.

The cost advantages offered by the international markets and the access they provide to higher greater quality and more varied intermediate goods represent an opportunity for firms insofar as they allow them not only to reduce costs, but also to improve production quality and add greater value during the production process. Accordingly, importation can be considered an additional channel for improving the competitiveness of an economy. The microeconomic analysis reported in this article shows that the Spanish economy still has to make additional efforts so that its firms internationalise themselves in this respect. Thus, a higher endowment of human and technological capital at firms would allow them to enhance their capacity to internalise the benefits of importing goods and so increase their productivity and improve their position in the value chain.

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REFERENCES

ALTOMONTE, C. and G. BÉKÉS (2009). *Trade complexity and productivity.* IEHAS Discussion papers 0914, Institute of Economics, Hungarian Academy of Sciences.

AMADOR, J. and S. CABRAL (2009). "Vertical specialization across the world: a relative measure". North American Journal of Economics and Finance.

AMITI and KONINGS (2007). "Trade liberalization, Intermediate inputs, and productivity: Evidence from Indonesia". *American Economic Review,* 97, 5, 1611-38.

ARISTEI, D., D. CASTELLANI and C. FRANCO (2011). Firms' exporting and importing activities: is there a two-way relationship? Mimeo.

AUGIER, P., O. CADOT and M. DOVIS (2009). *Imports and TFP at the firm level: the role of Absorptive capacity.* Discussion Papers 7218, CEPR.

BRODA, C., J. GREENFIELD and D. WEINSTEIN (2006). *From groundnuts to globalization: a structural estimate of trade and growth.* NBER Working paper series, No. 12512.

CABRERO, A. and M. TIANA (2012): "El contenido importador de las ramas de actividad en España". *Boletín Económico,* February, Banco de España.

HALPERN, L., M. KOREN and A. SZEIDL (2005). *Imports and productivity.* Discussion Paper Series No. 5139, CEPR.

HECKMAN, J. J. (1976), "The Common Structure of Statistical Models of Truncation, Sample Selection and Limited Dependent Variable, and a Simple Estimator for Such Models", *Annals of Economic Social Measurement,* 5, 4, pp. 475-492.

KASAHARA, H. and J. RODRÍGUEZ (2008) "Does the use of imported intermediaries increase productivity? Plant-level evidence". *Journal of development economics,* 87, 1, pp. 106-118.

KELLER, W. (2002). "Trade and the transmission of technology". Journal of Economic Growth, 7, 1, pp. 5-24.

LÖÖF, H. and M. ANDERSSON (2010). *Imports, productivity and origin markets: the role of knowledge-intensive economies,* The World Economy.

LOPEZ, R. A. and N. YADAV (2010). "Imports of intermediate inputs and spillover effects: Evidence from Chilean plants". *Journal of Development Studies,* 46(8): 1385–1403.

MUULS, M. and M. PISU (2007). *Imports and Exports at the level firms: Evidence from Belgium.* Discussion paper No. 801, CEP.

NAVARETTI, G., M. BUGAMELLI, F. SCHIVARDI, C. ALTOMONTE, D. HORGOS and D. MAGGIONI (2011). *The global operations of European firms. The second Efige policy report.* Bruegel Blueprint Series, vol XII.

VOGEL, A. and J. WAGNER (2008). *Higher productivity in importing German manufacturing firms: self-selection, learning from importing, or both?* Working paper series in Economics 106, Institute of Economics University of Lüneburg.

ANNEX

MEAN DIFFERENCE TESTS ON IMPORTING FIRM CHARACTERISTICS (a)

		Workforce	Productivity	Fixed capital ratio	Firm age	University graduate ratio	Product innovation	Process innovation	Group membership
Importers versus non-importers	Coefficient	-9.9	-7.0	4.6	-7.2	-12.0	-17.7	-9.7	-18.9
	p-value	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*

		Foreign goup membership	FDI	International outsourcing	Exporter	Listed on stock exchange	Sector-region spillovers	Sector spillovers	Region spillovers
Importers versus non-importers	Coefficient	-17.2	-15.1	-12.6	-32.2	-7.1	-34.0	-16.2	-15.7
	p-value	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*

SOURCES: EFIGE/Bruegel-UniCredit dataset and AMADEUS.

a In all cases the t-test of equality of means (the test statistic is a student t) was calculated.

CORRELATION MATRIX OF THE DETERMINANTS OF THE DECISION TO IMPORT

TABLE A.2

	Importer	Workforce	Productivity	Fixed capital ratio	Firm age	University graduate ratio	Product innovation	Process innovation	Group membership	Foreign goup membership	FDI	International outsourcing	Exporter	Listed on stock exchange	Sector-region spillovers	Sector spillovers	Region spillovers
Importer	1.000																
Workforce	0.105	1.000															
Productivity	0.074	0.038	1.000														
Fixed capital ratio	-0.050	0.045	-0.023	1.000													
Firm age	0.076	0.122	0.014	-0.022	1.000												
University graduate ratio	0.125	0.076	0.104	-0.015	0.013	1.000											
Product innovation	0.183	0.063	-0.003	0.022	0.046	0.165	1.000										
Process innovation	0.102	0.046	0.006	0.097	0.001	0.075	0.225	1.000									
Group membership	0.196	0.185	0.126	-0.002	0.046	0.159	0.065	0.043	1.000								
Foreign group membership	0.179	0.147	0.119	-0.002	0.050	0.144	0.071	0.029	0.535	1.000							
FDI	0.158	0.242	0.043	0.000	0.112	0.104	0.106	0.025	0.155	0.107	1.000						
International outsourcing	0.132	0.068	0.017	-0.070	0.032	0.065	0.065	-0.013	0.043	0.044	0.114	1.000					
Exporter	0.321	0.081	0.074	-0.032	0.103	0.141	0.242	0.102	0.143	0.146	0.142	0.099	1.000				
Listed on stock exchange	0.075	0.249	0.065	0.019	0.068	0.082	0.029	0.012	0.184	0.194	0.116	0.030	0.066	1.000			
Sector-region spillovers	0.338	0.038	0.011	-0.140	0.074	0.066	0.081	0.014	0.145	0.148	0.073	0.070	0.154	0.045	1.000		
Sector spillovers	0.169	0.012	-0.039	-0.167	0.071	-0.027	-0.057	-0.043	0.159	0.099	-0.019	0.018	0.001	0.039	0.454	1.000	
Region spillovers	0.163	0.051	0.028	-0.099	-0.018	0.124	0.159	-0.002	0.087	0.114	0.107	0.098	0.194	0.047	0.319	-0.112	1.000

SOURCES: EFIGE/Bruegel-UniCredit dataset and AMADEUS.