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MEASURES OF THE EXTERNAL TRADE IMPULSE TO ECONOMIC GROWTH: HOW RELEVANT IS THE INTERNATIONALIZATION OF PRODUCTION?

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Abstract

The growing number of manufacturing firms recurring to the delocalization abroad of production stages as well as to the purchase of intermediate inputs from foreign suppliers determines an increase of the import content of exports. On the basis of input-output tables we estimated the Italian exports net of their import content by sector. On one hand, these estimates can be interpreted as synthetic indicators of the degree of internationalization of production; on the other, we used them to measure more accurately the external trade impulse to the economic growth. Over the period 1995 to 2000 the import intensity of Italian exports grew mainly reflecting the upward trend of energy prices. In the same period Italy showed both a lower degree of internationalization and a slower development of this process with respect to other EU countries.

Key words: external trade, vertical specialization, import content, input-output analysis.

JEL Codes: F1, C67.

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1. Introduction[1]

One of the consequences of the integration of global market is the international fragmentation of production, i.e. the localization abroad of phases of production which previously took place inside the firm.[2]

The literature on international trade considers the different cost of factors among countries as the main reason for this phenomenon. Vertical fragmentation of production, that takes place through two main ways – foreign direct investments or acquisition of the intermediate products abroad – is an organisational solution aimed at reducing costs and increasing productivity on international markets (Antràs and Helpman, 2003; Helpman, 2006). Whatever way of internationalization is chosen by the firm, the nature of imports in advanced economies turns to be changed, more oriented towards the acquisition of goods and services used as inputs. Moreover, the share of imported goods and services embodied in production and, in particular, in exports turns to be higher.

Many empirical works, although non homogeneous in terms of definitions, measures adopted and kind of data utilized, find evidence of a growing importance of the phenomenon in the main industrialized countries. Feenstra and Hanson (1996), by using input-output tables, estimate that in the United States the share of imported inputs on the total purchase of intermediate products grew from 5.5 per cent in 1972 to 11.6 in 1990. Hummels *et al.* (1998, 2001) find evidence of an increasing share of imported goods and services content in exports for some OECD countries during the 1980's. European Central Bank (2005a) estimates an increase of the import content of exports from 1995 to 2000 in the main economies of the euro area. For Italy, ISAE (2005) finds

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[2] Many different terms have been used in the literature for this phenomenon: international fragmentation of production (Jones and Kierzkoski, 2001), vertical specialization (Hummels *et al*., 2001; Goh and Olivier, 2004), delocalization (Leamer, 1998), vertical production networks (Hanson *et. al.*, 2005), production sharing (Feenstra, 1998).

evidence of a reduction of the import content of exports between 1990 and 2000. Other empirical works have focused instead on the effects of internalization of production on the labour market (Feenstra and Hanson, 1996 and 1999; Amiti and Wei, 2004; Hijzen *et al.*, 2004) on output and value added volatility (Bergin *et al.*, 2006).

This paper aims at measuring the value of imported good and service content in Italian exports by sector. On one hand, these measures can be interpreted as synthetic indicators of the degree of internationalization of production, including imports of intermediate inputs from both foreign affiliates and foreign suppliers. On the other, through these indicators it is possible to obtain a measure of the external trade impulse to the economic growth more accurate than those obtained using the standard national account indicators (gross exports and net exports).

The import content of exports is estimated from the information on production processes provided by the intersectoral tables (input-output tables) at current prices recently published by the National Statistical Institute (Istat) for years 1995 and 2000 (see Istat (2006)). The results obtained for Italy have been also compared with those for some European countries.

The terms ‘internationalization’ and ‘vertical specialization’ have been here used interchangeably to indicate all the different kinds of delocalization of production abroad which imply inflows of goods and services for the country.

The paper is organized as follows. In the next section the measure of import content of exports is defined and the methodology for its estimate is introduced. Results for Italy are presented in section 3 and compared with those for some European countries in section 4. Finally, the import content of Italian exports has been used to elaborate an alternative measure of external trade impulse to growth.

2. The import content of export: concepts and measures

There are two main ways chosen by firms to internationalize their production process: foreign direct investments and outsourcing, i.e. purchase of intermediate inputs

from foreign firms[3]. In this paper we use a measure of *vertical specialization* (Hummels *et al*., 2001) that for a certain country keeps into account all imports of goods and services that are embodied in a country's exports, irrespective of the relationship the domestic firm has established with the foreign supplier.

As an indicator of vertical specialization we choose the import content (*IC*) of exports, calculated on the basis of the input-output tables[4]. Using these tables helps avoiding an arbitrary classification between intermediate inputs and other categories of goods: in fact, the tables consent to disentangle the output of each sector into two parts, the first as an input to the other sectors, the second as a final good. Although providing an exhaustive measure of vertical specialization, the input-output tables do not allow distinguishing among the different channels of internationalization chosen by firms. Moreover, they do not account for the international outsourcing to foreign subsidiaries of the whole production and distribution processes (*export platform*), as this case does not imply flows of goods and services across borders.

As in Hummels *et al.* (2001), in order to calculate the value of imports *directly* contained in the Italian exports we resort to the following formula, here reported using matrix notation:

$$\textit{direct IC of exports} = \quad IC\_dir = u\,{}_{M}A \cdot EXP$$

where u is a unit vector of dimension n, ${}_{M}A$ is an n-dimensional square matrix containing the production coefficients for imported inputs, *EXP* is the n-vector of exports, with n indicating the number of sectors. Each element a_{iJ}^{M} of the matrix ${}_{M}A$ measures the value of imported intermediate goods and services classified in the branch *i* and used to produce one unit of output in sector *j* (see the section *Methodological appendix*).

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[3] Piscitello and Tajoli (2005) show that for Italy there exists a positive relationship between different kinds of internationalization in a certain sector on a certain market; they are not substitutes and they tend to mutually strengthen.

[4] For each product in the economy the tables indicate the intermediate inputs involved in its production (classified according to their origin, either foreign or domestic), the imports of the product itself as well as the uses of the product to satisfy the different components of the final demand (private and public consumption, investment, exports).

Using the input-output tables enables us to calculate also the value of inputs which are *indirectly* used in the production of an exported good. In fact, an imported input can be used in a sector, whose output is in turn employed in another sector, then possibly in a third sector and so on, up to being finally included in a good sold abroad. In this case the measure of the import content of exports includes both directly and indirectly imported inputs, the latter defined as those contained in the domestic inputs. The measure for the whole import content is the following:

$$IC \text{ of exports} = \quad IC = u_M A(I - {}_D A)^{-1} EXP$$

where ${}_D A$ is the matrix of the input coefficients for domestic intermediate goods and $(I - {}_D A)^{-1}$ is the term capturing imported inputs embodied in the domestic output in the first, second, third, etc. stages of production before being used to produce the good that will be eventually exported.

For the empirical analysis on the Italian economy we use the symmetric input-output tables at current prices referred to years 1995 and 2000. Tables at current prices, the only ones currently available, do not allow to tell apart the effects due to a variation in the technical coefficients for domestic and imported inputs from the effects due to a change in the relative prices. We have chosen, however, not to deflate the aggregates derived from the tables since data on export and import prices are not available.

3. The results for Italy

Between 1995 and 2000 the whole (direct and indirect) import content of Italian exports at current prices climbed from 54 to 79 billions of euro (tab. 1)[5]. In 2000 it amounted to 27.2 as a percentage of the Italian exports; it was equal to 24.4 in 1995 (tab. 2). This corresponds to an increase by 11.5 per cent of the share of imports included in the Italian exports[6].

[5] The dynamics is similar to that estimated for Italy in European Central Bank (2005a), though in that paper the import content was higher due to a different underlying methodology.

[6] Our estimate of the import content of exports for 2000 corresponds to the one obtained by Isae (2005) on the basis of the previous release of input-output tables at current prices. In that study a one

The process of vertical fragmentation of the production has been more intense in the manufacturing sector: in 2000 the import content was equal to 30.6 as a percentage of the exports of manufactured goods; it was 27.5 in 1995[7] (tab. 2).

One possible explanation for the increase in IC can be searched in the development of the oil price, grown by more than 110 per cent in the period under exam. This rise implied an increase of the import content of production and exports at current prices for Italy, a country that is highly dependent on imports of energy commodities. To quantify this effect, the IC of exports has been calculated assuming that the imports of energy minerals were equal to zero, i.e. that all inputs coming from this sector were domestic. By excluding energy minerals from imports we get an attenuation in the IC growth (from 23.6 to 25.4, a rise by 7.6 per cent; tab. 3). Hence, the increase in the import content of Italian exports can be mainly attributed to the energy product price rise.

As a complementary exercise we calculated the IC by assuming the input of energy was absent both in its domestic and imported components. In other words, energy was omitted as a factor in our production technology, irrespective of the origin of the energy products. The extent by which the internationalization of production grows is comparable with that obtained in the previous exercise (tab. 3bis).

Between 1995 and 2000 the value of total exports, as a share of the gross production (at base prices) remained broadly stable at 12.5 per cent. As we have estimated the value of exports net of their import content, we can identify which component has driven the increase in that share. In fact the latter can be decomposed into two parts, the growth of the IC of exports and the growth of the exports net of their IC, as in the formula below:

$$\Delta \frac{EXP}{{}_{D}X} = \Delta \frac{IC}{{}_{D}X} + \Delta \frac{(EXP - IC)}{{}_{D}X}.$$

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percentage point reduction in the import content emerged with respect to 1990; this reduction was more pronounced as the estimates have been obtained after deflating the aggregates within the tables (from 35 to 24 per cent between 1990 and 2000).

Between 1995 and 2000 the two components diverged, basically offsetting each other: the part of exports including imported inputs rose from 3.0 to 3.4 per cent as a share of production; the share of the remaining part of exports reduced from 9.4 to 9.1 per cent. Thus, in our five-year period the export component that provides an actual impulse to the domestic output growth diminished.

A decrease of the value added produced by exports (from 76.3 to 73.9 per cent) is associated with the increase of the import content of export between 1995 and 2000; at the same time, a slight increase of exports as a percentage of GDP in real terms has occurred (from 26.5 to 27.1 per cent). The net effect of a one percentage point increase of exports on GDP growth, net of second round effects, remained constant as a whole, and equal to 0.2 points; the same impact has been estimated for the euro area in European Central Bank (2005a).

A growing propensity in the use of imported goods and services to produce goods addressed to satisfy the external demand between 1995 and 2000 characterizes all manufacturing branches (fig. 1). In 2000 the IC of exports was particularly high in the chemical sector (42 per cent; tab. 2) and in the rubber, transport equipment and electrical equipment industries (above 34 per cent). The IC for the “mechanical machinery and equipment” sector, the leading one in Italy in terms of export, was in the same year below the average for the whole manufacturing industry. The IC of exports for low-tech sectors (such as “leather and leather products”, “textile products and clothing”) was respectively equal and lower if compared with the average; nevertheless, the “leather and leather products” sector exhibited the strongest acceleration of the process of internationalization in the period under exam, with an increase of 4.5 percentage points.

According to the standard shift and share analysis, the variation of the import requirement has been decomposed into two parts: the first accounting for the change in the intensity of the IC within each sector; the second for the change in the sectoral composition of exports. The increase in the intensity of the import content explains the

[7] In order to get a more comprehensive view of the phenomenon under exam here we consider both imported goods and imported services involved in the production of manufactured goods.

81 per cent of the whole variation; the industries providing the higher contribution to the growth of the IC of exports are “refined petroleum products”, “chemical products and man-made fibres”, “transport equipment” and “electrical equipment”. The change in the sectoral composition plays only a marginal role (tab. 4).

4. The international comparison

The international comparison will be limited to EU countries that produce input-output tables with a comparable classification by sector of economic activity[8]. The two main indicators we have already presented before for Italy, i.e. the IC of exports of goods and services and the IC of exports of manufactured goods, will be complemented with a broader measure of internationalization, including also the transit trade, i.e. the goods that are imported in the declaring country and thereafter directly re-exported without any transformation.

Transit trade is negligible for Italy and Spain. Instead, it is very relevant for the Netherlands and Belgium. With or without considering the transit trade, the IC of the exports of Belgium and the Netherlands are the higher among sample countries. In 1995 the IC of German exports started from the lower level, but experienced the stronger growth. The developments for manufacturing sectors are quite similar to the ones referred to total exports (tab. 5).

In the second half of the 1990’s we can therefore observe not only a minor degree of internationalization, but also a less strong development of this process for Italian economy. The international comparison of the ratios between the stock of outward FDI and GDP indirectly confirms the previous statement. Between the beginning of 1995 and the end of 2000, in Italy this indicator rose only from 9.0 to 16.4 per cent; in the other European countries the same indicator started from a significantly higher level (with the only exception of Germany) and more than doubled during the period: from 10.8 to 29.0 per cent in Germany, from 26.5 to 62.4 per cent in the United Kingdom,

[8] The international comparison is obviously more reliable if input-output tables with the same sectoral disaggregation are available. Feenstra and Hanson (2000) show that the measure of the IC of exports may be affected by the methodology used for aggregating the data.

from 27.8 to 72.5 per cent in Belgium (including Luxemburg) and, finally, from 41.1 to 82.4 per cent in the Netherlands.[9]

5. A measure of the export impulse to the growth of Italian GDP

Changes in the intensity of the IC of exports reduce the significance of gross exports as well as of net exports (i.e. gross exports less gross imports, included those activated by final demand) as measures of the external trade impulse to GDP growth.

The gross value of goods exported by a sector comprises also the value of imported intermediate goods: the higher the degree of international fragmentation of production, the smaller the domestic production triggered by external demand. Using this aggregate, therefore, we over-estimate the value added created by the external sector. On the contrary, using net exports we under-estimate the contribution of the external sector: gross imports, that are subtracted to gross exports, include also goods (and services) that satisfy the final domestic demand, either as consumer or investment goods, either as raw materials and parts used in the production of final goods sold in the domestic market.

In the light of these issues, to estimate more properly the external trade impulse to economic growth we use a definition of net exports that excludes only the IC of exports from gross exports.

In the first three years of the period under exam the Italian lira strongly appreciated, following the huge depreciation due to the 1992 and 1995 currency crises; in 1998-99 the world demand deeply slowed down because of the Asian and Russian crises; finally, in 2000 the international trade growth was exceptionally strong. In the same years, moreover, the internationalization of the production of Italian firms was probably only at its beginning: the 1992 and 1995 lira's devaluations had temporarily boosted the price competitiveness of Italian goods, making the re-organization of production processes plausibly less urgent.

[9] See UNCTAD (2005); for Italy, own calculations on Banca d'Italia – UIC and Istat data.

Given this background, between 1996 and 2000 Italian exports of goods and services grew in real terms in every year, except in 1999 (fig. 2 and tab. 6). Nevertheless, the net export contribution to GDP growth, the measure that is normally used to evaluate the external sector impulse to growth, was positive only in 1996 and 2000. In the other two years in which exports rose (1997 and 1998), imports growth was stronger and the external sector impulse was therefore negative. Moreover, in 2000 gross exports contribution to the growth of GDP was three times that provided by net exports (respectively, 2.4 and 0.8 per cent). On the contrary, in 1996 imports fell and in this way net exports contribution was higher than that from gross exports (respectively, 0.4 and 0.0 per cent). So, in the light of previous evidence, it is possible to say that the two measures of growth impulse may deliver discordant results and support different interpretations.

Considering the whole period, we observe that Italian real GDP grew by 1.9 per cent per year, while gross exports average was equal to 0.7 percentage points and net exports average impulse to growth was equal to -0.6; the impulse to growth given by exports net of their IC results relatively small but positive (0.3 percentage points; tab. 6).[10] We obtain analogous results if we consider exports of goods or exports of manufactured goods.[11]

Analyzing the gross exports impulse to growth by industry, we observe that during the period 1996-2000 transport equipment, chemical products and, to a lesser extent, food products, “Basic metals and metal products” and “Rubber and plastic products” industries gave the highest average impulse to Italian GDP growth (fig. 3a). On the contrary, if we take into account net exports transport equipment gives the highest negative impulse to growth; also electrical equipment, metal products and mechanical machinery exhibit a negative contribution. Only “Refined petroleum

[10] For every Ateco (the Italian version of Nace classification) subsection, we linearly interpolated the values of IC derived from 1995 and 2000 input-output tables in order to obtain the corresponding values in the years from 1996 to 1999. We estimated real exports net of their IC by deflating gross exports and their import content with the corresponding national account deflators.

[11] In nominal terms, average yearly GDP growth equalled 4.7 per cent and the impulse to growth equalled 1.5, -0.4 and 1.0 percentage points on the basis of, respectively, gross exports, net exports and exports net of their IC.

products" give a barely positive impulse (fig. 3b). Finally, considering exports net of their IC, we confirm the results based on net exports: in particular, transport equipment gives again the highest positive impulse[12] (fig. 3c). Among the low-tech sectors, in which Italian exports are relatively specialized, textile products and clothing give a negative impulse to growth, while the other sectors' contribution is negligible; the impulse produced by mechanical machinery is negative as well.

6. Conclusions

Between 1995 and 2000 the import content of the Italian exports grew by 2.8 percentage points, rising from 24.4 to 27.2 per cent. This growth, however, is mainly due to the rise of the price of the imported energy products; excluding the latter, the increase of the import intensity is less pronounced (from 23.6 to 25.4). In the same period the degree of internationalization of the Italian economy is lower with respect to a panel of EU countries; Italy also shows a slower development of this process in this five-year period. It is likely that Italian firms, temporarily less exposed to the international competition thanks to the depreciation of the Italian lira at the beginning of the 1990's, had minor incentives to reduce costs through the internationalization of their production process.

Between 1995 and 2000 the average contribution per annum to GDP growth in real terms of the exports net of their import content was equal to 0.3 percentage points, a value lying between those calculated on the basis of gross exports (0.7 points) and of net exports (-0.6 points).

Our agenda for future research includes the application of methodologies able to estimate the input-output tables for most recent years, with the objective of getting a more updated understanding of the process of vertical specialization in Italy.

[12] Transport equipment imports, leading to the negative impulse to growth registered in this sector, are mainly addressed to final demand (consumption and investment); therefore they play a little role in determining the value of exports net of their IC for the same sector. Moreover, mainly owing to government incentives for the purchase of motor vehicles, in 1997 the consumption component of transportation equipment imports grew at an exceptionally high rate.

Methodological appendix

An input-output framework provides the sectoral transactions of goods and services from the industries of origin (represented by the rows of the matrix) to the industries of use (in the sense of columns). These transactions are reported in two different tables which represent respectively the flows of goods (and services) nationally produced (the matrix DOM) and those imported (the matrix IMP) utilized as intermediary inputs in the production process of every industry. By using data from both tables, two different matrices reporting the expenditure coefficients for the flows of domestic and imported inputs have been constructed[13].

The first one is the *matrix of the direct requirement coefficients of the domestically produced inputs* [${}_{D}A$] whose generic element

$$ {}_{D}a_{ij} = \frac{{}_{D}x_{ij}}{{}_{D}X_{j}} \qquad i, j = 1, 2, .., 51, $$

represents the intermediary consumption (in value) of good *i* of domestic origin needed to produce one unit value of good *j*, where ${}_{D}x_{ij}$ is the good produced domestically in sector *i* and utilized as intermediate input in sector *j* and ${}_{D}X_{j}$ is the production of sector *j*. Therefore, every column indicates the overall amount of goods and services of domestic origin used directly for the production of one unit value of goods classified in the *j* sector.

The second one is the *matrix of the direct requirement coefficients of the imported inputs* [${}_{M}A$] whose generic element

$$ {}_{M}a_{ij} = \frac{{}_{M}x_{ij}}{{}_{D}X_{j}} \qquad i, j = 1, 2, .., 51, $$

[13] The tables are broken down into 59 industries from the Ateco classification. However, since for some industries the sectoral flows is very small, we aggregated some of them. In particular, the sectors of uranium, Public administration, household services and other services have been aggregated.

represents the intermediary consumption (in value) of the imported good *i* utilized to produce one unit value of good *j*, where ${}_M x_{ij}$ is the imported good in sector *i* and utilized as intermediate input in sector *j*. So, every column indicates the direct requirement of imported goods and services for the production of every unit value of goods classified in the *j* sector.

In order to evaluate the import content of the final demand and, in particular, of the export component, we use the equilibrium equation which distinguishes the flows of domestically produced goods according to the respective uses:

$$\sum_j {}_D a_{ij}\, {}_D X_j + {}_D Z_i = {}_D X_i \qquad i = 1, 2,.., 51. \qquad (1)$$

The first term represents the amount of domestic production of good *i* used as intermediate input in every sector, the second term indicates the amount of production utilized to satisfy the final demand (${}_D Z$) in its components: consumption, investments, exports (*EXP*).

The matrix formulation is:

$${}_D A_D X + {}_D Z = {}_D X \ . \qquad (2)$$

Solving this equation, we calculate the overall production required to satisfy the demand ${}_D Z$:

$${}_D X = (I - {}_D A)^{-1}\, {}_D Z \qquad (3)$$

where $(I - {}_D A)$ is called the Leontief matrix.

Symmetrically, the equation (1) holds for the imported goods and services:

$$\sum_j {}_M a_{ij}\, {}_D X_j + {}_M Z_i = {}_M X_i \qquad i = 1, 2,\ldots 51 \qquad (4)$$

In matrix formulation:

$${}_M A_D X + {}_M Z = {}_M X \qquad (5)$$

where $_M X$ represents the vector of overall flows of imports and $_M Z$ the vector of final demand for imported goods[14].

In order to evaluate the intermediate inputs in the final demand $_D Z$ we substituted to $_D X$ in the equation (5) its expression in (3); with some manipulations we have:

$$_M X - _M Z = A_D Z \qquad (6)$$

where $A = _M A(I - _D A)^{-1}$ is defined as the *matrix of direct and indirect requirement of imported inputs.* It is obtained as the product of the *matrix of the direct requirement coefficients of imported inputs* and the inverse of Leontief matrix; the estimate of the import content of the different components of final demand is obtained by simply substituting in (6) the vector $_D Z$ with the vector of the export component EXP.

[14] In this case the component exports refers to the 'transit trade'.

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Table 1

Import content of Italian exports by sector

(millions of euro at current prices)

	Direct import content of exports		Direct and indirect import content of exports		Total exports (1)	
	1995	2000	1995	2000	1995	2000
Products of agriculture, forestry and fishing	65	74	256	320	3,475	3,878
Energy minerals	0	1	0	1	2	4
Non-energy minerals	22	29	52	75	377	457
Manufactures	***30,420***	***46,697***	***49,278***	***72,744***	***178,984***	***237,520***
Food products, beverages and tobacco	*1,025*	*1,256*	*1,794*	*2,355*	*9,411*	*11,870*
Textile products and clothing	*2,781*	*3,954*	*5,007*	*6,839*	*20,421*	*24,389*
Leather and leather products	*1,333*	*2,053*	*2,532*	*3,672*	*9,833*	*12,168*
Wood and wood products	*132*	*190*	*231*	*346*	*1,023*	*1,386*
Paper and paper products, printing and publishing	*755*	*945*	*1,158*	*1,515*	*4,341*	*5,437*
Refined petroleum products	*485*	*2,561*	*526*	*2,663*	*1,058*	*3,819*
Chemical products and man-made fibres	*4,451*	*7,554*	*5,870*	*9,841*	*15,091*	*23,449*
Rubber and plastic products	*1,517*	*2,070*	*2,301*	*3,150*	*7,067*	*9,163*
Non-metallic mineral products	*682*	*841*	*1,341*	*1,805*	*7,460*	*8,978*
Basic metals and metal products	*3,092*	*3,937*	*4,954*	*6,180*	*17,397*	*20,676*
Mechanical machinery and equipment	*4,362*	*6,316*	*8,896*	*12,320*	*37,675*	*49,331*
Electrical equipment and precision	*4,167*	*6,499*	*5,590*	*8,411*	*17,650*	*24,527*
Transport equipment	*3,512*	*5,739*	*5,745*	*9,032*	*18,394*	*26,226*
Other manufactures	*2,127*	*2,782*	*3,333*	*4,615*	*12,161*	*16,101*
Electricity, gas and water	18	28	23	37	94	114
Construction	11	5	54	29	442	218
Wholesale and retail trade	455	767	1,484	2,365	14,462	19,731
Hotels and restaurant	0	0	1	1	9	13
Transport and communication	677	956	1,698	2,248	12,705	14,258
Financial intermediation	44	53	107	147	2,078	2,635
Real estate, renting and business activities, consulting	267	433	564	961	6,451	10,551
Public administration and services to households	5	11	16	35	345	651
Total	**31,983**	**49,055**	**53,533**	**78,963**	**219,423**	**290,031**

Source: own calculations on Istat data.
(1) Net of transit trade.

Table 2

Import content of Italian exports by sector

(as a percentage of the sector exports)

	Direct import content of exports		Direct and indirect import content of exports	
	1995	2000	1995	2000
Products of agriculture, forestry and fishing	1.9	1.9	7.4	8.3
Energy minerals	6.8	18.9	10.7	23.2
Non-energy minerals	5.8	6.4	13.9	16.4
Manufactures	***17.0***	***19.7***	***27.5***	***30.6***
Food products, beverages and tobacco	*10.9*	*10.6*	*19.1*	*19.8*
Textile products and clothing	*13.6*	*16.2*	*24.5*	*28.0*
Leather and leather products	*13.6*	*16.9*	*25.7*	*30.2*
Wood and wood products	*12.9*	*13.7*	*22.5*	*24.9*
Paper and paper products, printing and publishing	*17.4*	*17.4*	*26.7*	*27.9*
Refined petroleum products	*45.9*	*67.1*	*49.7*	*69.7*
Chemical products and man-made fibres	*29.5*	*32.2*	*38.9*	*42.0*
Rubber and plastic products	*21.5*	*22.6*	*32.6*	*34.4*
Non-metallic mineral products	*9.1*	*9.4*	*18.0*	*20.1*
Basic metals and metal products	*17.8*	*19.0*	*28.5*	*29.9*
Mechanical machinery and equipment	*11.6*	*12.8*	*23.6*	*25.0*
Electrical equipment and precision instruments	*23.6*	*26.5*	*31.7*	*34.3*
Transport equipment	*19.1*	*21.9*	*31.2*	*34.4*
Other manufactures	*17.5*	*17.3*	*27.4*	*28.7*
Electricity, gas and water	18.8	24.6	24.4	*32.5*
Construction	2.4	2.4	12.2	*13.1*
Wholesale and retail trade	3.1	3.9	10.3	*12.0*
Hotels and restaurant	4.4	3.8	11.8	*11.2*
Transport and communication	5.3	6.7	13.4	15.8
Financial intermediation	2.1	2.0	5.1	5.6
Real estate, renting and business activities, consulting	4.1	4.1	8.7	9.1
Public administration and services to households	1.4	1.7	4.7	5.4
Total	**14.6**	**16.9**	**24.4**	**27.2**

Source: own calculations on Istat data.

Table 3

Import content of Italian exports by sector (net of imported energetic minerals)

(millions of euro; in percentage of the sector exports)

	Direct and indirect import content of exports		As a percentage of sector exports	
	1995	2000	1995	2000
Products of agriculture, forestry and fishing	221	259	6.4	6.7
Energy minerals	0	1	9.4	20.3
Non-energy minerals	48	64	12.7	14.0
Manufactures	***47,787***	***68,162***	***26.7***	***28.7***
Food products, beverages and tobacco	*1,724*	*2,196*	*18.3*	*18.5*
Textile products and clothing	*4,871*	*6,548*	*23.9*	*26.8*
Leather and leather products	*2,482*	*3,568*	*25.2*	*29.3*
Wood and wood products	*225*	*330*	*22.0*	*23.8*
Paper and paper products, printing and publishing	*1,129*	*1,436*	*26.0*	*26.4*
Refined petroleum products	*145*	*598*	*13.7*	*15.7*
Chemical products and man-made fibres	*5,770*	*9,595*	*38.2*	*40.9*
Rubber and plastic products	*2,258*	*3,044*	*31.9*	*33.2*
Non-metallic mineral products	*1,260*	*1,598*	*16.9*	*17.8*
Basic metals and metal products	*4,815*	*5,917*	*27.7*	*28.6*
Mechanical machinery and equipment	*8,685*	*11,845*	*23.1*	*24.0*
Electrical equipment and precision	*5,507*	*8,214*	*31.2*	*33.5*
Transport equipment	*5,645*	*8,804*	*30.7*	*33.6*
Other manufactures	*3,272*	*4,470*	*26.9*	*27.8*
Electricity, gas and water	13	17	14.1	15.3
Construction	51	26	11.6	11.9
Wholesale and retail trade	1,371	2,119	9.5	10.7
Hotels and restaurant	1	1	11.1	10.2
Transport and communication	1,618	2,081	12.7	14.6
Financial intermediation	100	137	4.8	5.2
Real estate, renting and business activities, consulting	531	885	8.2	8.4
Public administration and services to households	15	32	4.4	4.9
Total	**51,758**	**73,785**	**23.6**	**25.4**

Source: own calculations on Istat data.

Table 3 bis

Import content of Italian exports by sector (net of energetic sectors)

(millions of euro; in percentage of the sector exports)

	Direct and indirect import content of exports		As a percentage of sector exports	
	1995	2000	1995	2000
Products of agriculture, forestry and fishing	195	226	5.6	5.8
Manufactures	***45,281***	***64,104***	***25.4***	***27.4***
Food products, beverages and tobacco	*1,648*	*2,077*	*17.5*	*17.5*
Textile products and clothing	*4,703*	*6,312*	*23.0*	*25.9*
Leather and leather products	*2,424*	*3,483*	*24.6*	*28.6*
Wood and wood products	*216*	*317*	*21.2*	*22.9*
Paper and paper products, printing and publishing	*1,081*	*1,358*	*24.9*	*25.0*
Refined petroleum products				
Chemical products and man-made fibres	*5,410*	*8,986*	*35.8*	*38.3*
Rubber and plastic products	*2,183*	*2,933*	*30.9*	*32.0*
Non-metallic mineral products	*923*	*1,157*	*12.4*	*12.9*
Basic metals and metal products	*4,391*	*5,368*	*25.2*	*26.0*
Mechanical machinery and equipment	*8,300*	*11,276*	*22.0*	*22.9*
Electrical equipment and precision	*5,364*	*7,980*	*30.4*	*32.5*
Transport equipment	*5,456*	*8,523*	*29.7*	*32.5*
Other manufactures	*3,182*	*4,334*	*26.2*	*26.9*
Construction	-	-	20.2	22.1
Wholesale and retail trade	1,291	1,948	8.9	10.0
Hotels and restaurant	24	32	6.8	8.1
Transport and communication	1,463	1,691	11.8	13.2
Financial intermediation	114	297	5.2	7.8
Real estate, renting and business activities, consulting	504	843	7.6	7.8
Public administration and services to households	14	29	11.4	4.5
Total	**48,886**	**69,169**	**22.4**	**24.2**

Source: own calculations on Istat data.

Table 4

Decomposition of the growth of the import content of exports

(percentage values)

	Contribution to the growth of IC of total exports	Change in the intensity of IC within each sector	Change in the sectoral composition of exports
Products of agriculture, forestry and fishing	-0.01	0.01	-0.02
Energy minerals	0.00	0.00	0.00
Non-energy minerals	0.00	0.00	0.00
Manufactures	***2.62***	***2.01***	***0.61***
Food products, beverages and tobacco	*-0.01*	*0.03*	*-0.04*
Textile products and clothing	*0.08*	*0.31*	*-0.24*
Leather and leather products	*0.11*	*0.19*	*-0.08*
Wood and wood products	*0.01*	*0.01*	*0.00*
Paper and paper products, printing and publishing	*-0.01*	*0.02*	*-0.03*
Refined petroleum products	*0.68*	*0.18*	*0.50*
Chemical products and man-made fibres	*0.72*	*0.23*	*0.49*
Rubber and plastic products	*0.04*	*0.06*	*-0.02*
Non-metallic mineral products	*0.01*	*0.07*	*-0.06*
Basic metals and metal products	*-0.13*	*0.11*	*-0.23*
Mechanical machinery and equipment	*0.19*	*0.23*	*-0.04*
Electrical equipment and precision instruments	*0.35*	*0.22*	*0.14*
Transport equipment	*0.50*	*0.28*	*0.22*
Other manufactures	*0.07*	*0.07*	*0.00*
Electricity, gas and water	0.00	0.00	0.00
Construction	-0.01	0.00	-0.02
Wholesale and retail trade	0.14	0.12	0.02
Hotels and restaurant	0.00	0.00	0.00
Transport and communication	0.00	0.13	-0.13
Financial intermediation	0.00	0.00	0.00
Real estate, renting and business activities, consulting	0.07	0.01	0.06
Public administration and services to households	0.00	0.00	0.00
Total	**2.83**	**2.30**	**0.53**

Source: own calculations on Istat data.

Table 5

Import content of exports of the main European economies

(percentage values)

Country	Year	Manufacturing	Total	Total including transit trade
Italy	1995	27.5	24.4	24.7
	2000	30.6	27.2	27.8
Germany	1995	23.9	21.5	29.4
	2000	31.0	27.9	37.9
Netherlands	1995	42.6	33.8	50.0
	2000	48.1	37.3	56.6
Belgium	1995	49.9	41.5	55.2
	2000	54.3	46.6	60.4
United Kingdom	1995	28.4	23.0	26.1
	2000	-	-	-
Spain	1995	33.5	27.5	27.5
	2000	-	-	-

Source: own calculations on Eurostat and Istat data.

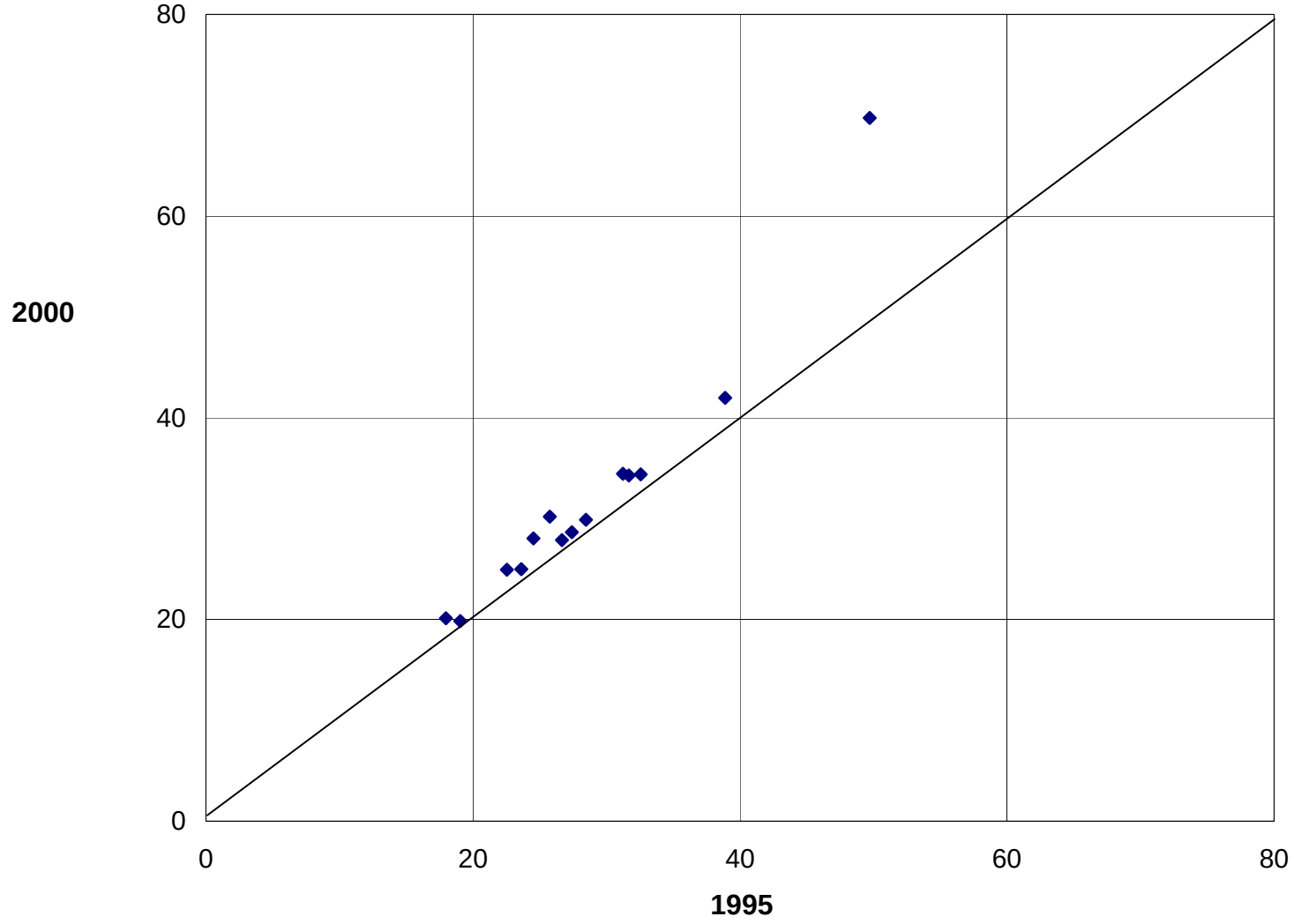
Table 6

GDP and exports - gross, net, net of the import content; growth rates and contributions to GDP growth
(in real terms; percentage variations and points)

	GDP growth	**Export growth**	*Export of goods growth*	**Growth of exports net of IC**	*Growth of exports of goods net of IC*	**Contribution of exports**	*Contribution of exports of goods*	**Contribution of net exports**	*Contribution of net exports of good*	**Contribution of exports net of IC**	*Contribution of exports of goods net of IC*
1996	0.7	0.1	*0.8*	-1.8	*-1.0*	0.0	*0.2*	0.4	*0.8*	-0.4	*-0.2*
1997	1.9	3.6	*2.0*	2.6	*0.4*	1.0	*0.5*	-1.1	*-1.4*	0.5	*0.1*
1998	1.4	1.1	*1.2*	-1.1	*-1.7*	0.3	*0.3*	-1.8	*-1.3*	-0.2	*-0.3*
1999	1.9	-1.7	*-1.7*	-2.4	*-2.5*	-0.5	*-0.4*	-1.3	*-1.2*	-0.5	*-0.4*
2000	3.6	9.0	*8.5*	11.2	*11.1*	2.4	*1.8*	0.8	*0.3*	2.1	*1.6*
Average 1996-2000	**1.9**	**2.4**	*2.1*	**1.6**	*1.1*	**0.7**	*0.5*	**-0.6**	*-0.6*	**0.3**	*0.2*

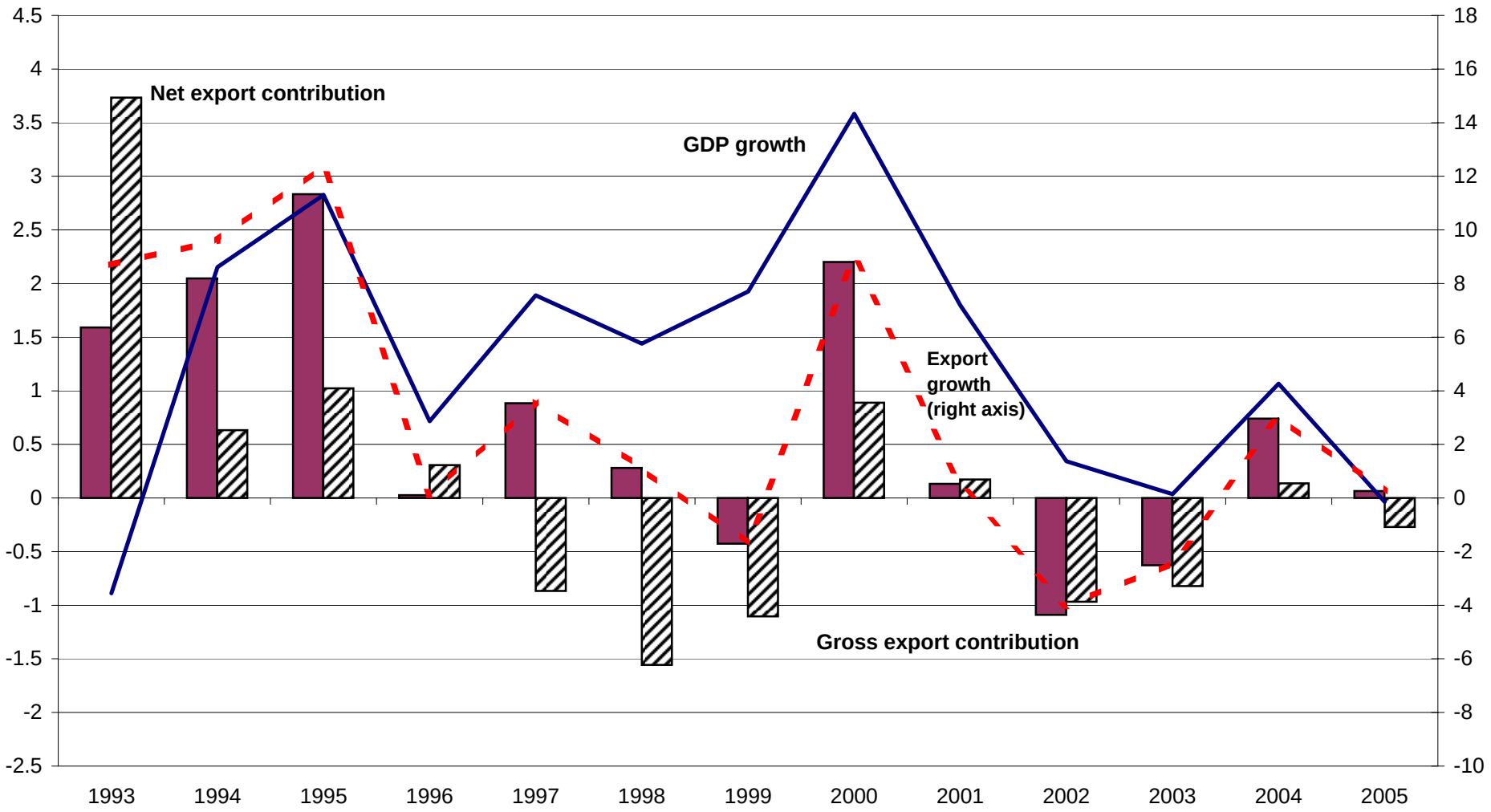
Source: own calculations on Istat data.

Import content of Italian production of goods: 1995-2000
(percentage values)



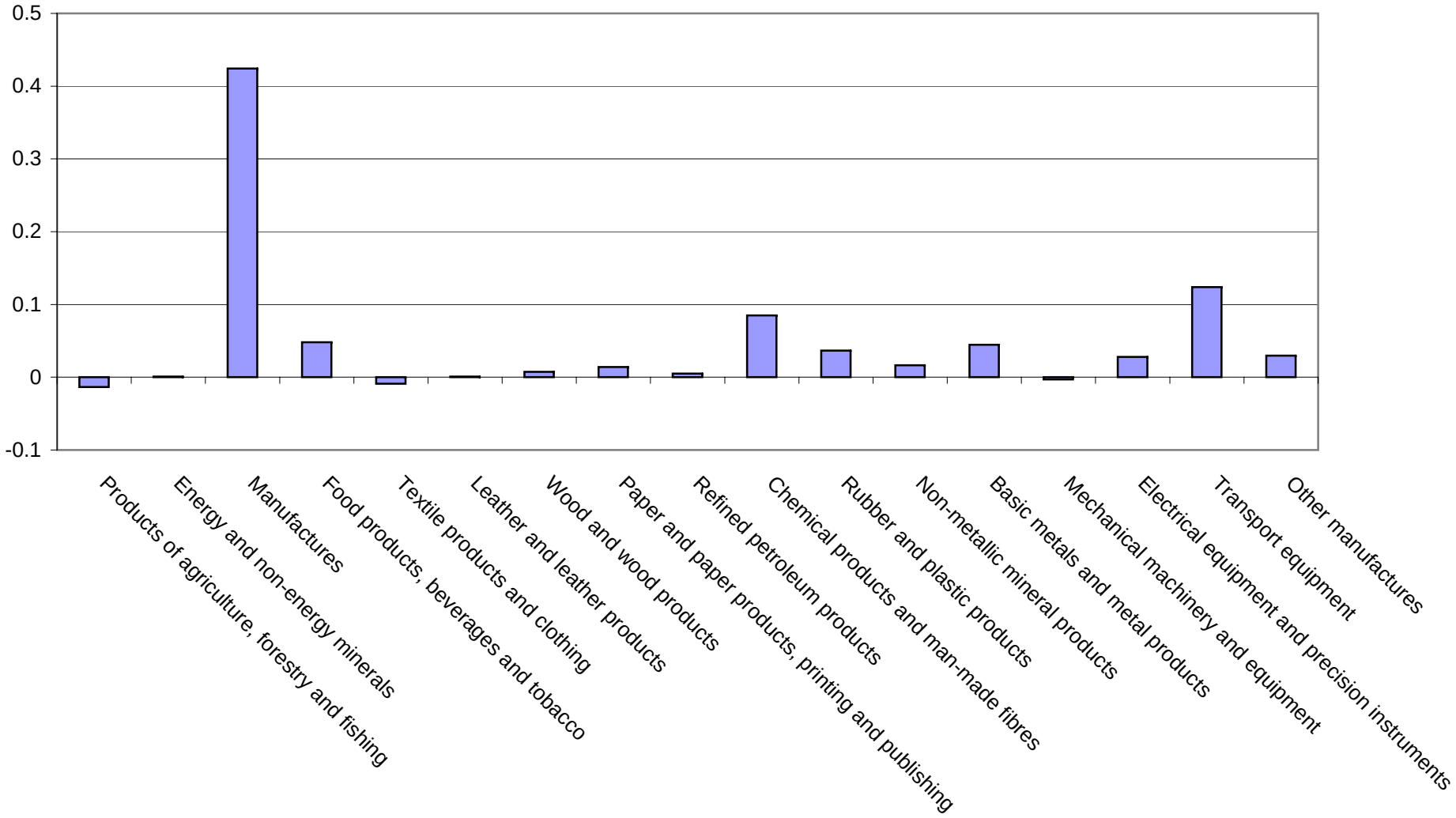
Source: own calculations on Istat data.

Growth of GDP and of exports; gross and net export contributions to GDP growth
(in real terms; percentage variations and points)



Source: own calculations on Istat data.

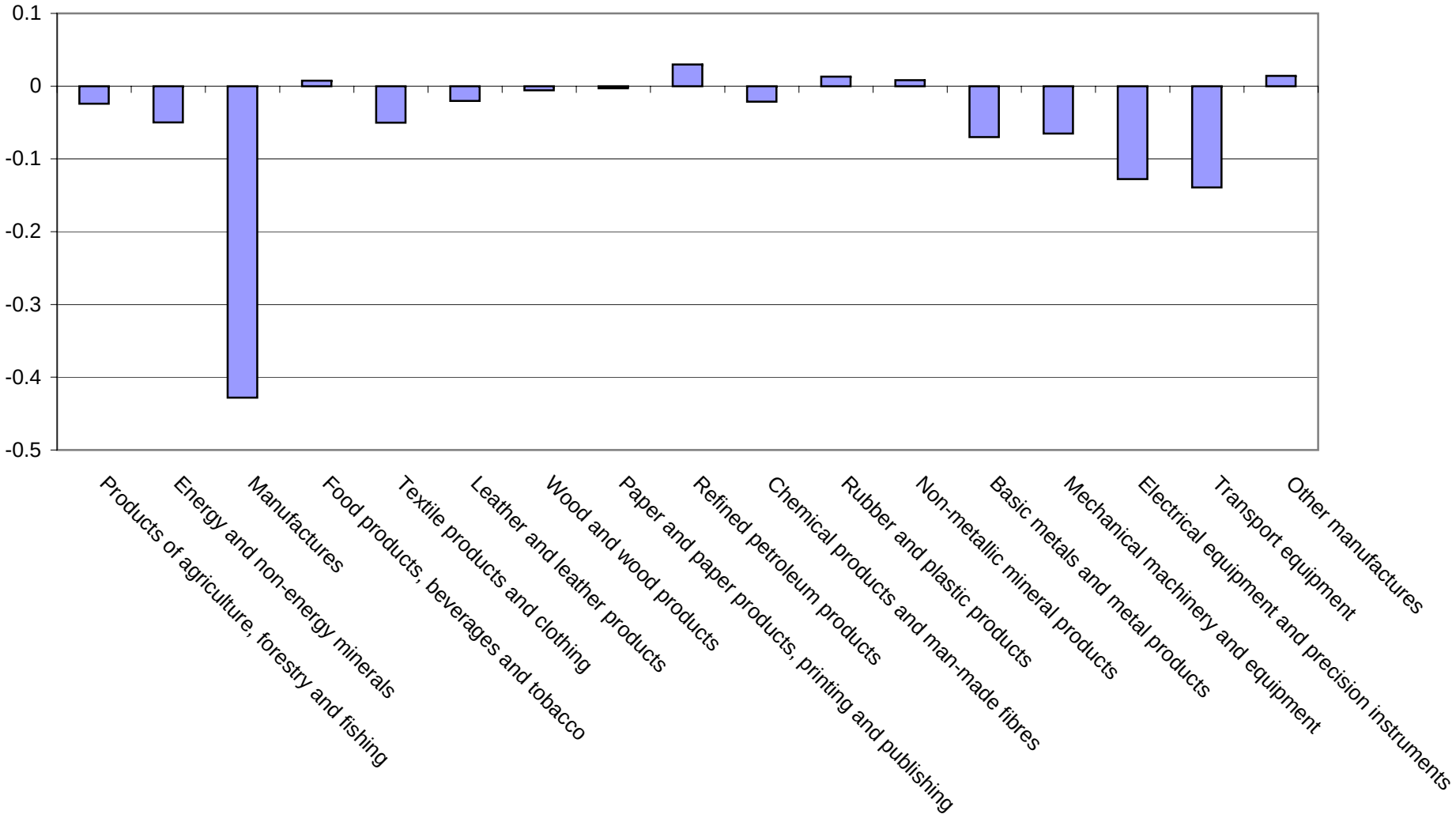
Contributions to GDP growth in real terms of gross exports of goods
(average 1996-2000; percentage points)



Source: own calculations on Istat data.

Fig. 3b

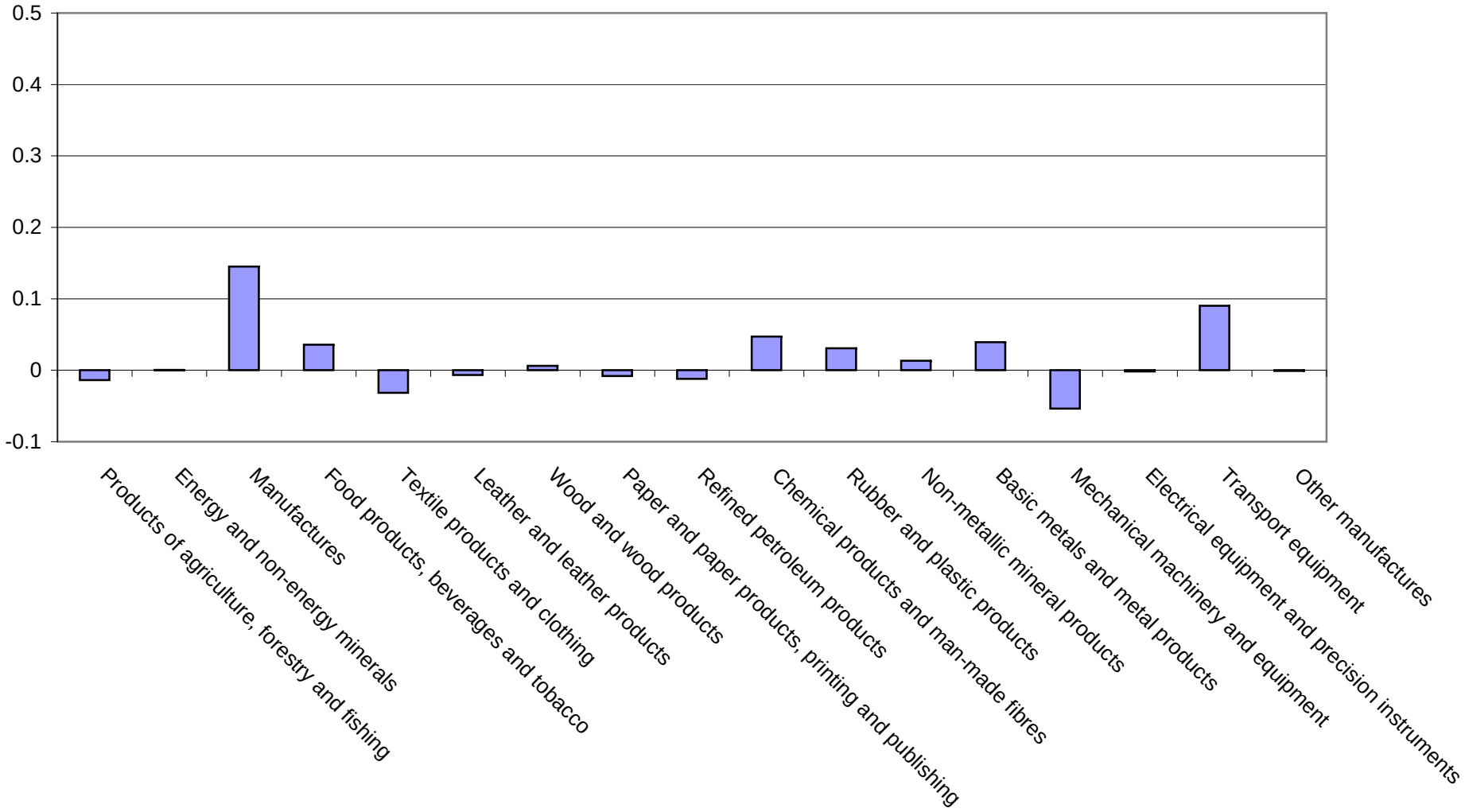
Contributions to GDP growth in real terms of net exports of goods
(average 1996-2000; percentage points)



Source: own calculations on Istat data.

Fig. 3c

Contributions to GDP growth in real terms of exports net of their import content
(average 1996-2000; percentage points)



Source: own calculations on Istat data.