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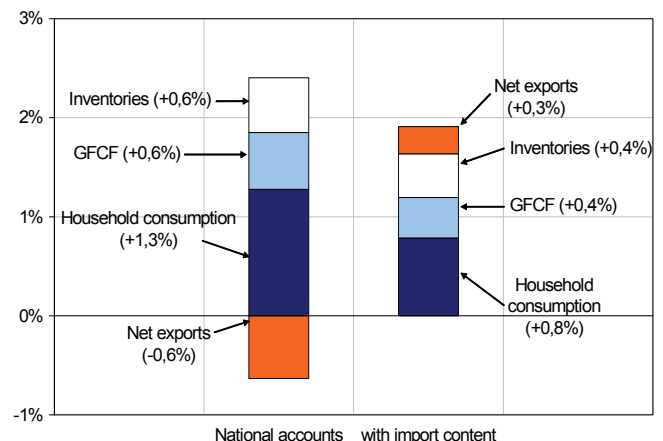
TRÉSOR-ECONOMICS

Reinterpreting the contribution of foreign trade to growth

- The impact of foreign trade on economic activity is usually analyzed by computing the "contribution of foreign to growth". Such an analysis carried on for France emphasises that over the three years from 2003 to 2005, the contribution of foreign trade to growth has been sharply negative.
- However, the contribution of foreign trade to growth seems too crude an indicator to yield proper insight into the role of foreign trade in the French economy. It is usually computed as the sum of the contributions of exports and imports. This accounting approach can however prove economically deceptive.
- This study describes a method for recalculating the contributions to growth of each component of demand in order to identify more precisely the role played by foreign trade: we calculate the contribution of foreign trade as that of exports less their import content. Similarly the contribution of each of the components of domestic demand is calculated by subtracting their respective import contents.
- The resulting picture does not always match the one usual one. For instance in years of booming global trade, such as in 2000 or 2004, one could expect to have identified a large positive contribution to growth. By contrast, the conventional computation method used in national accounts usually does not allow such an identification.
- In 2004 global demand grew by 9.4% whereas foreign trade is thought to have had a negative 0.6 percentage point impact on GDP growth. Under the method proposed here, exports net of their import content would in fact have contributed a positive 0.3 percentage point to growth.

This study was prepared under the authority of the Treasury and Economic Policy General Directorate and does not necessarily reflect the position of the Ministry of the Economy, Finance and Industry.

Contributions to GDP growth in 2004



Source: INSEE, DGTPE calculations

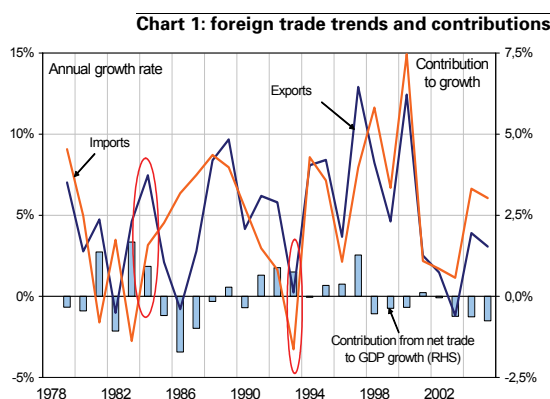
The usual method of calculating contributions to growth can prove economically deceptive. Indeed, the contribution of imports is subtracted to that of exports to compute the "external contribution" while the method fails to split out the components of demand that lie behind imports. In

Part 1 of this paper we propose an alternative and complementary method of calculating contributions that allows us to attribute imports to each component of demand. Then in part 2 we study the implications of this for a reinterpretation of growth and its sources.

1. Calculating the contributions net from the import content sheds new light on the role played by each component of demand in GDP

1.1 The usual method based on traditional contributions to growth can prove economically deceptive

The usual method consists in calculating the contribution of each item of demand to DGP growth and that of imports (as a negative) and then, generally, in combining the contributions of exports and imports under the heading "net contribution of foreign trade". Starting from a situation close to equilibrium, we can say that foreign trade weighed on growth when imports were more buoyant than exports. As a result, a given external contribution may correspond to very different export trends: for example, the external contributions were very close to each other in 1984 and 1993-0.9 and 0.7 percentage points of GDP respectively-whereas exports rose 7.5% in 1984 against just 0.2 % in 1993 (see chart 1).



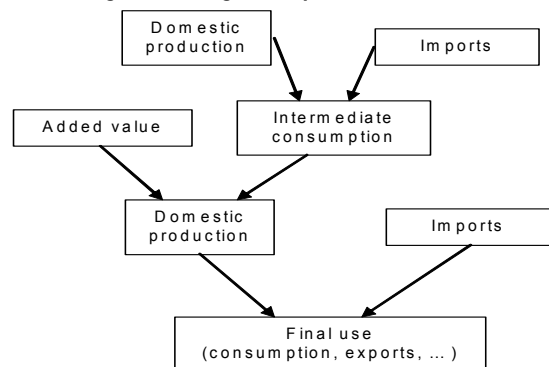
Source: INSEE.

Observing the external contribution to growth alone may therefore be economically deceptive, because it ignores the link between the different components of demand and imports. For example, in the hypothetical case where consumption rises but where this increase in consumption consists solely of imported goods, this therefore has no impact on activity. Yet the traditional method would indicate an increase in the contribution of consumption (and an equivalent decline in the external contribution). For a more accurate reflection of economic reality, in these circumstances, it would be preferable to attribute this rise in imports to consumption, since that is what gave rise to it. In that case the contribution of consumption and exports to growth would be seen to be unchanged, better reflecting the economic reality of the relative contribution of each of the components of demand to output trends.

1.2 Here we propose to calculate these contributions by attributing imports to each of the components of demand that gave rise to them

To calculate the contribution to growth of consumption net of its import content, one would have to subtract from household consumption those goods consumed that are of imported origin, since they generate no activity in France. However this would clearly underestimate the import content of consumption. That is because import content can be integrated at any step in the production process, via intermediate consumption. We will therefore take into account imports generated both directly and indirectly by the various items of final demand (see Chart 2).

Chart 2: diagram showing how import content is accounted for

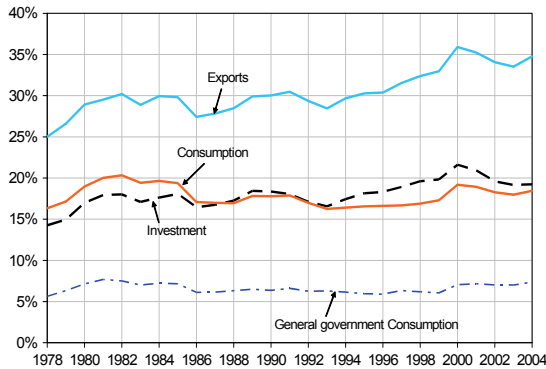


Import content is calculated using data from the input-output tables in the national accounts. These tables describe operations concerning goods and services, by product and by industry. Products are shown in rows, and industries in columns. The rows in the input-output table describe the balance of resources and uses for each product. The table is divided into two main frames: a table describing resources, for each product, based on their origin, whether produced domestically or imported; and a second table that describes the various uses to which products are put, with on the one hand the intermediate consumption of the different industries and, on the other, final uses (final consumption and GFCF by institutional sector, exports, etc.). We proceed in two stages: first we calculate the import content of the resource in each of the products; then, based on these results and on the composition by product of each of the final uses, we determine the import content (see Box 1).

For each item of final demand we are thus able to calculate its import content, which then allows us

to determine its contribution to growth, net of its import content. We have performed this analysis for the period 1979-2004, the requisite data for 2005 not being available yet.

Chart 3: import contents, at current prices

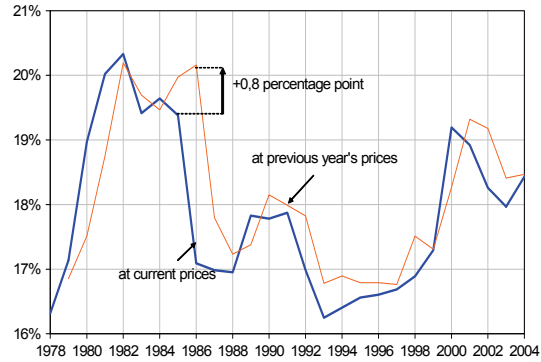


Source: INSEE, DGTPE calculations.

A study of import contents at current prices reveals a number of salient features (see chart 3). To

begin with, exports have a large import content. Conversely, the import content of government consumption and the consumption of non-profit organisations is very low. Next, the import content of exports and investment is rising, especially since 1993, whereas the import content of other demand components, notably household consumption, turns out to be more stable.

Chart 4: import content of household consumption



Source: INSEE, DGTPE calculations.

Box 1: calculating the import content of demand items

Step one: the import content of resources, by product

Practical difficulties arise when attempting to calculate the import content of each product:

- It is not possible, based on the input-output table in the national accounts, to ascertain for each use the imported share of a given product. On the resource side, the only available data are for national output, imports and total resources in the economics of the product concerned. We are therefore obliged to assume that the imported share of the different items of demand for a given product is equal to the share of imports in the resources that go into the product concerned^a.
- Similarly, since the input-output table does not indicate the origin (national or imported) of the intermediate consumption used, we will consider that the import content of intermediate consumption, for a given product, is the same as for the resource as a whole.
- Next, we are led to equate product with industry in the table of intermediate inputs. That is because the latter gives us, not the intermediate consumption used in the production of the good, but those used by the industry in which that good is the main part. But an industry may produce goods that lie outside its main activity, and a good may be produced as a sideline by an industry other than its own. But we will not consider these transfers.
- Finally, we consider the production function as being the same for an industry as a whole. Consequently, regardless of whether the sector's output is exported, consumed, invested or used as an intermediate consumption, we consider that it requires the same quantities of intermediate consumption derived from each of the sectors.

The following calculations are performed: the fraction of imported goods in product i is written α_i , which is the same (see above) for a given product throughout the economy as a whole. α_i is therefore calculated as the ratio of imports M_i of the product i to resources R_i in the economy as a whole: $\alpha_i = M_i/R_i$

Further, the goods i manufactured locally use a certain amount of intermediate consumption in product j , in quantities $\tilde{\beta}_{ij}$ by unit of i produced: $\beta_{ij} = CI_{ij}/P_i$, where CI_{ij} is the intermediate consumption of product j necessary to produce product i , and P_i is the national output of product i .

We start from the equilibrium of resources and uses for product i : $EF_i + \sum_j CI_{ij} = M_i + P_i = R_i$

Where VA_i is the value added incorporated into the production of product i , and EF_i the final uses in product i .

Here we assume (see point 2) that the import content is the same for all uses, including intermediate uses, i.e. α_k per unit of product k . From which we obtain the relationship:

$$\alpha_i \cdot EF_i = M_i + \sum_j \alpha_j CI_{ij} - \alpha_i \sum_l CI_{il}$$

The imports contained in the final uses in products i are therefore imports in products i , plus the imports contained in the intermediate consumption needs to produce product i minus the import content of goods i used as intermediate consumption. From which we obtain the relationship

a. At this step the question notably arises of re-exports and how to treat them, which is decisive for the hypothesis we formulate here. This question is discussed in the appendix.

$$a_i \cdot R_i = M_i + \sum_j a_j CI_{ij}$$

Dividing this relationship by R_i , we obtain:

$$a_i = \frac{M_i}{R_i} + \sum_j a_j \frac{CI_{ij}}{P_i} \cdot \frac{P_i}{R_i} = \alpha_i + (1 - \alpha_i) \sum_j a_j \tilde{\beta}_{ij}$$

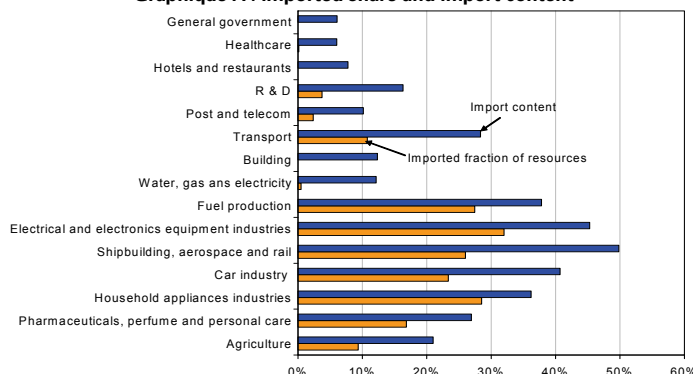
If we define the ratio $\tilde{\beta}_{ij}$ between the intermediate consumption of product j needed to produce product i and the resources in product i , we obtain the following relationship:

$a_i = \alpha_i + \sum_j \tilde{\beta}_{ij} a_j$. Writing $a = \begin{pmatrix} a_i \\ a_n \end{pmatrix}$, $\alpha = \begin{pmatrix} \alpha_i \\ \alpha_n \end{pmatrix}$ and $\beta = \begin{pmatrix} \beta_{11} & \beta_{1n} \\ \beta_{n1} & \beta_{nn} \end{pmatrix}$, these relationships can be rewritten simply in matrix form: $a = \alpha + \beta a$

$$\text{Therefore: } a = (I_n - \beta)^{-1} \alpha$$

Which thus allows us to calculate the import content of each of the products from the resources-uses equilibrium. By construction these import contents are greater than the simple share of imports in the resource, since they also take account of the imports that are incorporated at all stages in the production process (see Chart A).

Graphique A : imported share and import content



Step two: import content by end use and contributions

We then reconstitute the import content of each item of final demand depending on its structure by product. To obtain contributions to growth we perform these calculations for a given year at the previous year's prices, and for the previous year at current prices. We then deduct from each of the items of final demand its import content and calculate in the conventional manner the contributions to growth from the resulting GDP details.

Calculations of contributions are impacted by the inclusion of import content but also by trends in this content. We then compare the import content of an item of demand in year N at prices for year $N-1$ with its content for year $N-1$ also at $N-1$ prices. These year-on-year changes cannot be summed because they are calculated according to different price systems.

Chart 4 on the previous page illustrates this difficulty: that is because, for a given item of demand (consumption here), import content can differ greatly depending on whether one is looking at current prices or at previous-year prices. The arrow represents the relevant change within the framework of the calculation of the contribution of consumption to growth in 1986, i.e. that between 1985 and 1986 at 1985 prices. This is the 0.8 percentage point increase we find in Chart 3 (whereas we find a decline if we consider changes at current prices, and virtual stability at previous year's prices).

To verify the impact of the assumptions used in these calculations, we have performed calculations at level E (16 industries) and at level F (41 industries) of the classification. This is because these simplifying assumptions must have an even greater impact for being performed at the aggregate level. The impact of the change of level of disaggregation is an indirect measure of the impact of these choices. We thus find that changes in the results are limited, with an impact of less than 0.05 percentage point of GDP on contributions. The results presented are those derived from calculations performed at the most detailed level*, i.e. level F.

2. Attributing to each item of demand the imports to which it gave rise substantially modifies our picture of growth

2.1 Import contents differ widely from one component of demand to another and may change distinctly

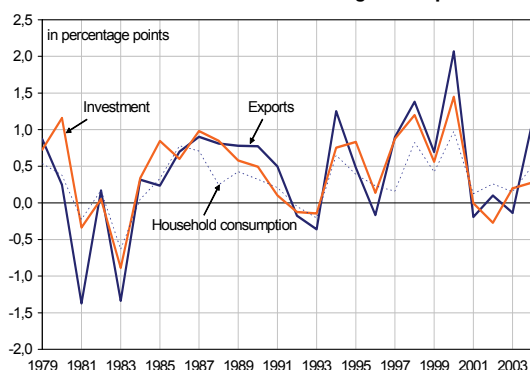
The method used to calculate contributions may modify them in two ways, in relation to national accounting methods:

- Because imports are split among the various demand headings, the size of the contribution of the components of domestic demand (consumption and investment)

is smaller while that of exports is greater.

- Import content can change from one year to the next (see Chart 3). For example an increase in the import content of household consumption will tend to reduce this item's contribution to growth. At 1999 prices, for instance, the import content of household consumption increased from 17.3% in 1999 to 18.3% (+1 percentage point, see Chart 5) in 2000, thereby reducing the contribution of household consumption to growth by 0.6 percentage point.

Chart 5: Changes in import contents



Source: DGTPE calculations. NB: because these changes are calculated on the basis of different price systems they cannot be summed together to determine the change over a given period (see end of box for additional details).

Chart 5 presents changes in the import content of the main components of demand between a given year at current prices and the following year at previous year's prices. It is this variation that is important in calculating contributions to growth, since it compares the components of GDP for one year at the previous year's prices with those for the previous year at current prices (e.g. we can compare the year 2000 at 1999 prices with the year 1999 at 1999

prices). As a result these changes may differ from those deducible from Chart 3, where import contents are shown at current prices.

Changes in an item's import content can be very uneven. For example the import content of the main demand items underwent their steepest rise since 1978 in 2000, then rose only very slightly, or even declined, in the following year. Certain trends do emerge, however. Import contents declined in the period 1981-1983 (no doubt due to the weaker franc). Then between 1985 and 1991 we see a steady rise in the import content of the main components of demand. Following that, from 1993 to 2000 there was a pronounced tendency for the import content to accelerate, before slowing sharply in 2001.

Moreover, import content trends are highly correlated with the components of demand, as is clearly visible in Chart 5. However this linkage is weaker where household consumption is concerned, which may be connected with the relative stability in the nominal value of the import content of consumption, whereas that of investment and exports tended to rise (see Chart 2).

Table 1: contributions to growth

	Import content	1999	2000	2001	2002	2003	2004	2005(*)
GDP		3,2%	4,0%	1,9%	1,0%	1,1%	2,3%	1,2%
Main contributions								
Household consumption	without	1,9%	2,0%	1,4%	1,2%	1,2%	1,3%	1,2%
	with	1,3%	1,0%	1,1%	0,8%	0,9%	0,8%	0,7%
Investment	without	1,5%	1,4%	0,5%	-0,3%	0,4%	0,6%	0,7%
	with	1,1%	0,8%	0,4%	-0,2%	0,3%	0,4%	0,4%
Inventories	without	-0,1%	0,6%	-0,4%	-0,3%	-0,3%	0,6%	-0,1%
	with	-0,2%	0,4%	-0,3%	-0,2%	-0,2%	0,4%	-0,1%
Net exports	without	-0,4%	-0,3%	0,1%	0,0%	-0,6%	-0,6%	-0,8%
	with	0,7%	1,6%	0,5%	0,2%	-0,2%	0,3%	0,2%

(*) : The year 2005 was calculated with the help of currently available information, supplemented notably on the assumption that the intermediate consumption of the various industries would have the same structure by product as in the 2004 accounts at current prices. These figures are therefore highly uncertain.

2.2 The new interpretation of growth in the light of contributions is significantly modified and is more in line with what one would expect intuitively

The observed changes in contributions are substantial (see Table 1). These modifications are particularly pronounced as far as net exports, household consumption and investment are concerned, whereas the contribution of public consumption is only little affected owing to its low import content.

The year 2000 was distinctly affected by these modifications. According to the usual method of calculating contributions, half of the strong growth observed in that year (4.0%) stemmed from household consumption, whose contribution again rose relative to the previous year. Conversely, foreign trade appears to have had a negative impact on growth, which is highly counter-intuitive given that global trade was very buoyant in 2000. However the picture is very different if one takes account of the import content of each of the components of

demand. In this case we find that exports sustained activity very distinctly (accounting for 1.6 percentage point), whereas household consumption made a more limited contribution, not as strong as in the previous year (+1.0 percentage point, coming after +1.3 percentage point in 1999). This result is more closely in line with what one would expect intuitively, since we find that net exports did in fact sustain activity in France in this record year for global trade.

In 2004, the last year for which the full range of calculations is possible, the picture of foreign trade changes very distinctly also, shifting from a sharply negative contribution (-0.6 percentage point) to a slightly positive contribution of +0.3 percentage point, and the contribution of household consumption is revised sharply downwards, from +1.3 percentage point to +0.8 percentage point. The contributions of investment and inventories also fell by 0.2 percentage point in each case.

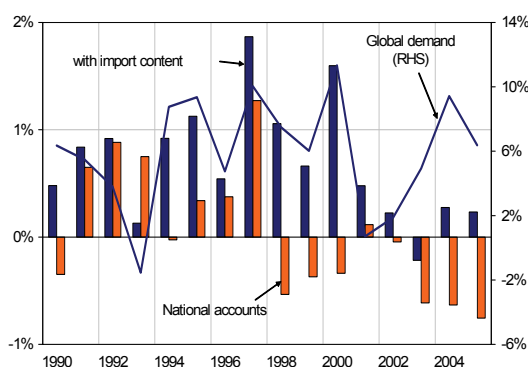
Table 2: contributions à la croissance en 2004

	comptabilité nationale	Impact de l'intégration du contenu en imports, structure de 2003	Impact de l'évolution du contenu en importations entre 2003 et 2004	En tenant compte du contenu en imports
PIB	2,3%			2,3%
Consommation des ménages	1,3%	-0,2%	-0,3%	0,8%
Consommation des APU	0,5%	0,0%	-0,1%	0,4%
Consommation des ISBLM	0,0%	0,0%	0,0%	0,0%
FBCF	0,6%	-0,1%	-0,1%	0,4%
Stocks	0,6%	-0,1%	0,0%	0,4%
Exportations nettes	-0,6%	+1,2%	-0,3%	0,3%

Sources: INSEE, calculs DGTPE.

More generally, the picture of the contribution of net exports to growth changes distinctly (see Chart 6). Along with import content, it appears more in line with global demand, which is more natural. For example in the national accounting data for 1993 we find that the external contribution is distinctly positive (+0.6 percentage point). This result in fact corresponds to the actual economic situation, when a simultaneous contraction occurred both in France and abroad. More naturally, this contribution is distinctly lower when we take import content into account. On the other hand the message remains that France did not really profit from the sharp upturn in global trade over the period 2003-2005.

Chart 6: net exports contribution to growth



Source: INSEE, DGTPE.

Table 2 allows us to allocate the variations in contributions arising from our methodology between the impact of including import contents and the effect of changes in this content between 2003 and 2004 (the last year for which this calculation is possible). Column 1 shows the contributions as they appear in the national accounts. Column 2 shows how these contributions would have been modified if the import content of each of the components of demand

had been taken into account while fixing these contents at their 2003 level at current prices. Next, column 3 shows how these contributions are modified by the changes in import content between 2003 at current prices and 2004 at the previous year's prices. Finally, column 4 shows the outcome of these effects, i.e. the contributions to growth of the different components of demand taking their respective import contents into account.

In 2004 we see that the contribution of net exports is, quite naturally, powerfully modified by the fact that imports are split between the different items of demand rather than attributed in full to foreign trade. Moreover, the increase in the import content of all components of demand, inventories excepted, has significant effects.

Overall, using national accounting data this method allows us to attribute imports not in an aggregated manner to foreign trade but to each of the components of final demand, based on the import flows to which they gave rise. The resulting calculations of contributions to growth fit the economic facts more accurately.

In particular the years of strong global trade correspond to positive contributions by trade, contrary to what is sometimes found using the customary method of calculating contributions. When interpreting the results obtained, however, it is necessary to bear in mind that several approximations were required in order to perform these calculations.

In the final analysis, these calculations provide better insight into the way imports relate to the different components of demand. Their explanatory power and capacity to forecast trends in imports based on final demand is therefore greater.

Benoît HEITZ, Gilbert RINI

Appendix: the direct import content of exports, the problem of re-exports

In the French national accounts, theoretically, a product that is imported and then later re-exported unmodified is not recorded as an import followed by an export, but simply as a transport margin. The reality behind the figures is more complex however: owing to the absence of statistical sources needed to measure this phenomenon, products treated as exports in the national accounts are in fact re-exports.

That raises the question of how to deal with these unmeasured flows when calculating import content. Here we have chosen to consider that the direct import content is the same for a given product regardless of its subsequent use. It is therefore equal to the proportion of imports in the resource used to produce this product. Since the proportion of products re-exported unchanged is probably less than that, for example, of products imported for direct consumption, this choice leads us to overestimate the import content of exports in the method used.

INSEE^a makes a very different choice, since the authors consider that imports supply only domestic uses and not exports. By neglecting the phenomenon of re-exports, this approach diminishes the import content of exports and results in an import content of manufactured goods in exports barely greater than that of household demand. This result strikes us as counter-intuitive, since exports are by definition comprised of tradeable goods (two-thirds of them are manufactured goods), whereas a fair proportion of household consumption consists of nontradeable goods that cannot be supplied through direct imports (manufactured products represent only a quarter of household demand). Conversely, our assumption implies that the import content of exports is significantly greater than that of household consumption. To evaluate the relevance or otherwise of the results that flow from our hypothesis, we can compare the results obtained with those produced by Statistics Canada in the case of Canada^b. The latter's treatment of re-exports differs both from our own and from that of INSEE and is more precise. This is because re-exports are calculated on the basis of customs declarations and are shown explicitly in the Canadian national accounts.

For Canada, the import content of exports in the late-1990s was one-third. In the case of France, we obtain approximately 33%, which is very close, whereas INSEE's calculations show an import content in manufactured goods of around 15%. However the French and Canadian results are not directly comparable, since the share of imports in Canadian GDP is close to 40% whereas it is only 25% in France. One would therefore expect the import content of exports to be lower in France. In addition to the upward bias implied by our treatment of re-exports, this comparable import content of exports-despite the lower share of imports in GDP-could also stem from differences in the makeup of the different industries. If we compare the import content of exports by industry for Canada and France, we find a certain degree of coherence in the hierarchy of industries and in the orders of magnitude obtained, including when we compare France for 1999 with Canada for 1989, arriving at comparable GDP/import ratios for the two (24% for France and 26% for Canada).

- a. See E. Berger et V. Passeron, "Les importations françaises : le rôle de la demande des entreprises et des exportations", note de conjoncture (Economic survey), June 2002.
- b. See P. Cross, "Implications cycliques de la hausse du contenu importé des exportations", Canada Economic Development Observatory, December 2002, Statistics Canada.

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