Exports and Services:
An Input-Output Analysis for Austria

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Introduction

It is the purpose of this paper to shed light on the role of foreign exports in the Austrian economy. Specifically, the following three questions are to be addressed:

1. How important are exports for the growth performance of the Austrian economy? Globalization entails that an increasing share of inputs in the production of exports is imported; the contribution of export growth to the growth of domestic value added is therefore expected to decrease over time.

2. Taking the growth contribution of exports as benchmark, are exports of services different from exports of manufacturing products?

3. To which extent do exports spur the growth of the production of services, which are responsible for an increasing share of value added in most developed economies?

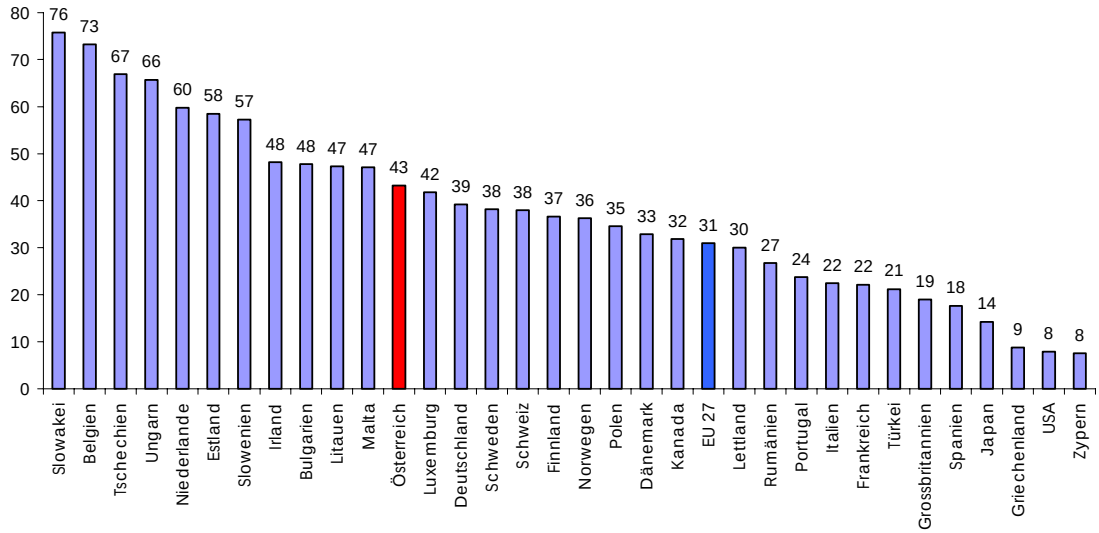
The paper uses the input-output tables for the years 1995, 2000 und 2003 released by Statistics Austria as tool of analysis. At this preliminary stage, we concentrated on a multiplier analysis: First, the level of production and value added that is associated with exports on the one hand and other final demand (i.e. private and public consumption, investment) on the other is calculated and compared. Secondly the respective multipliers are computed. They express the value of production / value added per Euro of exports. The change in multipliers over time, i.e. between 1995 and 2003, is of particular interest. We also distinguish between groups of commodities both for exports and for the induced production / value added in order to understand the sectoral dimension of export growth.

The course of the paper is as follows: After this short introduction some stylized facts about Austrian foreign exports are presented. Then the input-output tables used are described. Finally we turn to the results of the analysis and draw some first conclusions.

Some stylized facts

For Austria as a small and open economy exports are of significant economic importance. The share of exports in GDP is 43% and thus much higher than the average for the EU-27 which stands at 31% (Figure 1).

Figure 1: Share of exports in GDP by countries in %
2006 current prices



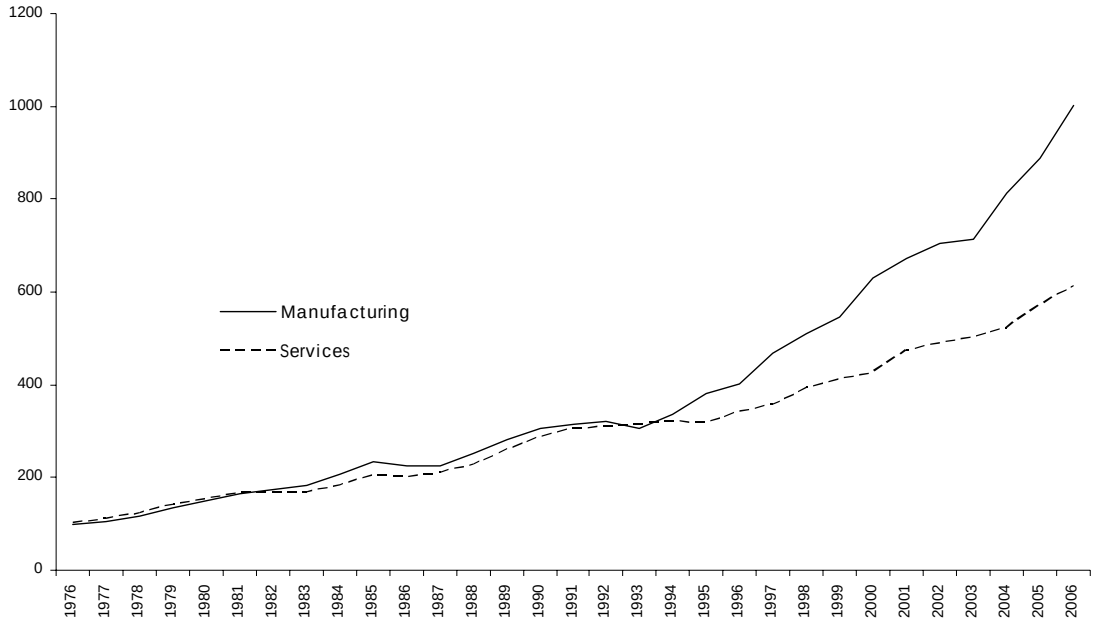
Source: own calculations.

Looking at the changes in exports over time one can observe a steady growth which accelerated in the mid of the 1990s, possibly as a result of Austria's accession to the European Union and its larger market area and the economic integration of Central and East European countries (Figures 2 and 3). While in nominal terms exports of manufacturing products grew faster than those of services, when adjusting for price changes the growth of service exports exceeded that of manufacturing.

The increasing openness of the Austrian economy is best seen when looking at the change in the share of exports in GDP. While in 1976 exports accounted for about 24% of GDP (in real terms), this share increased to almost 58% in 2006. The share of imports evolved in a similar manner: It increased from 27 to 52%. The shares of private and public consumption as well as investments, on the other hand, fell during the same time period.

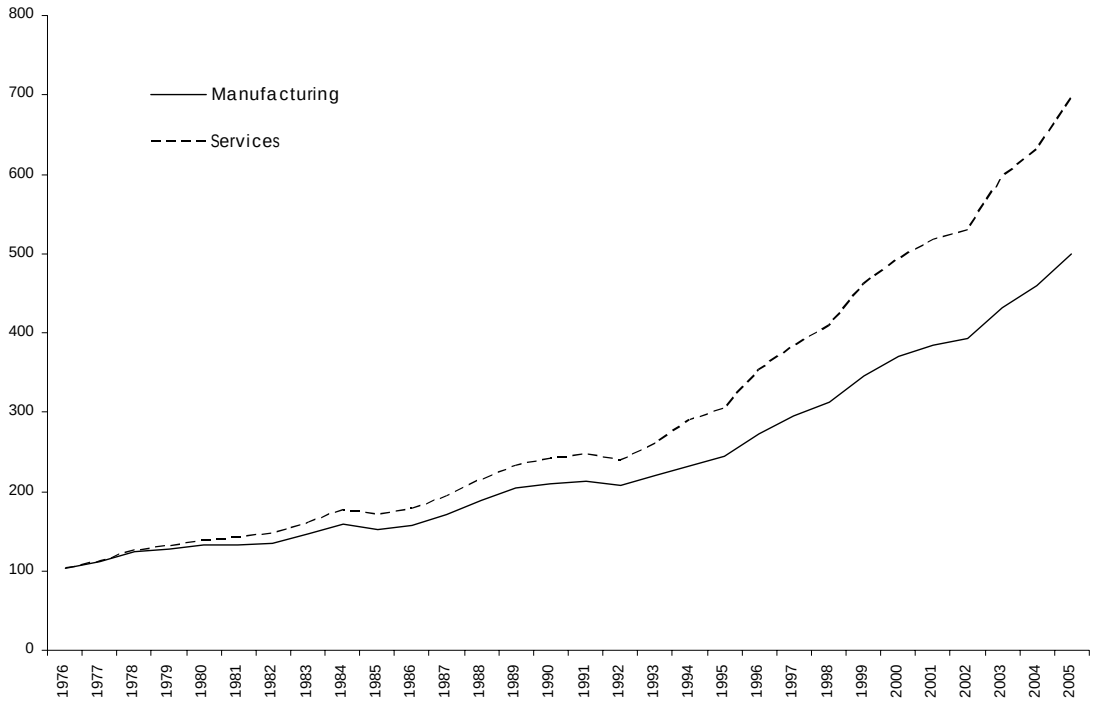
It is still to be seen, however, if exports, while growing very rapidly in volumes and in their share in GDP, also increasingly contribute to the growth in value added and thus in GDP.

Figure 2: Nominal growth of exports in manufacturing products and services (1976=100)



Source: own calculations.

Figure 3: Real growth of exports in manufacturing products and services (1976=100)



Source: own calculations.

Data and method of analysis

For measuring the contribution of a specific sector or final demand to total production or valued added in an economy, input-output analysis is an appropriate tool. The compilation of input-output tables, however, is a very data-intensive and thus time-consuming endeavor. Therefore, in most countries such tables have not been released on an annual basis. For Austria tables were usually compiled for those years for which full industry surveys were available: 1976, 1983, 1988 and 1995. Another table was published for 1990. The analysis of structural changes over time by the use of input-output tables was therefore hampered by the lack of a consistent time series of such tables. The situation improved considerably when Eurostat required statistical offices of the countries of the European Union to compile tables on an annual basis. For Austria such annual tables are now available starting in 1999, the latest table was released for 2003.

For the analysis of the economic impact of Austrian foreign exports the tables for 1995, 2000 and 2003 as published by Statistics Austria were used. All tables are in nominal terms; changes in relative prices may therefore influence the results and have to be taken into account when drawing any conclusions.

Statistics Austria constructs a complete make-use-system of tables. This system (Figure 1) comprises the production of commodities by activities (sectors) on the make side and the use of domestically produced or imported commodities either as intermediate inputs by activities or by final demand categories. In addition, value added by activities is included as well. For 1995 and 2000 these tables were then transformed into commodity-by-commodity tables, based on the commodity-technology assumption.[1]) The application of this technology assumption usually results in a certain number of negative input-output coefficients which require additional interventions by the compilers. For lack of information about these interventions it is not possible for mere users to derive consistent commodity-by-commodity tables for the other years. Therefore, in order to avoid the problem of negative coefficients and to obtain a consistent set of commodity-by-commodity tables for 1995, 2000 and 2003 the industry-technology assumption was applied. The resulting input-output tables used for the analysis comprise of 57 commodities (55 for the 1995 table) and 12 final demand categories.

Another problem that frequently occurs when input-output tables for different points in time are used in a comparative analysis concerns changes in compilation methods and conceptual principles. The analyst must always be careful not to argue for structural changes when differences in simulation results are actually due to conceptual changes or changes in compilation methods.

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[1]) For the transformation of make and use tables into an activity-by-activity table or a commodity-by-commodity table either an industry-technology, a commodity-technology or a combination of these two technology assumptions have to be applied.

In the case of the Austrian tables the most prominent conceptual change is related to the imputed use of banking services. In 1995 and 2000 only total use of such services was estimated. In 2003 total use was allocated among activities (intermediate use) and final demand categories (final use of imputed banking services). Therefore the total use of imputed banking services for 1995 and 2000 was allocated among activities, but not final demand categories. The allocation was based on the use of banking services other than imputed ones by the various activities.

Results

For total exports, including re-exported imports, the multipliers for both production and value added were decreasing over time (Tables 1 and 2). However, looking at which groups of commodities were stimulated by exports, we observe a rather striking difference between manufacturing commodities and services. While especially production, but also value added associated with manufacturing commodities declined, the respective multipliers for services went up slightly. This implies that export growth between 1995 and 2003 has had increasingly less impact on domestic production and value added in manufacturing, but gradually more impact on services.

Table 1: Output multipliers of total exports by commodity groups

	1995	2000	2003
Total	1.53	1.46	1.39
Agriculture	0.04	0.03	0.03
Manufacturing	0.96	0.88	0.79
Energy	0.04	0.03	0.05
Construction	0.02	0.02	0.02
Services	0.48	0.50	0.49

Source: own calculations.

Table 2: Value added multipliers of total exports by commodity groups

	1995	2000	2003
Total	0.68	0.61	0.60
Agriculture	0.03	0.02	0.02
Manufacturing	0.36	0.32	0.27
Energy	0.02	0.01	0.02
Construction	0.01	0.01	0.01
Services	0.25	0.25	0.28

Source: own calculations.

Taking into account only domestic exports, i.e. deducting direct imports or the so-called re-exported imports from total exports, the picture changes quite a bit (Tables 3 and 4). The change in production and value added multipliers between 1995 and 2003 are now only moderate. The total multipliers decreased from 1995 to 2000 and then increased again afterwards, the 2003 multipliers remaining slightly below their 1995 levels. The difference between manufacturing commodities and services remains: While the multiplier for the first group of commodities declined, it increased for the latter.

This leads to the conclusion that the impact of exported commodities that were produced domestically did not change much in the time period under consideration. Their impulse to the economy came more from the production of services and less from the production of manufacturing commodities. Since at the same time the impact of total exports declined, the share of re-exports in total exports must have gone up. This fact is shown in Figure 4: While in 1995 re-exports accounted for only 4% of manufacturing exports, this share increased to 15% in 2003. To put it differently: While domestic exports grew by only 3.1% annually between 2000 and 2003, re-exports grew by 30%. A bit less than half of the growth of total exports (5.2%) in this time period was due to an increase in re-exports. However, a bit of caution is advisable: After 2000 Statistics Austria changed the method for estimating re-exports so part of the increase may be due to statistical reasons.

Table 3: Output multipliers of domestic exports by commodity groups

	1995	2000	2003
Total	1.58	1.55	1.57
Agriculture	0.04	0.03	0.04
Manufacturing	0.99	0.93	0.90
Energy	0.04	0.03	0.06
Construction	0.02	0.02	0.03
Services	0.49	0.53	0.55

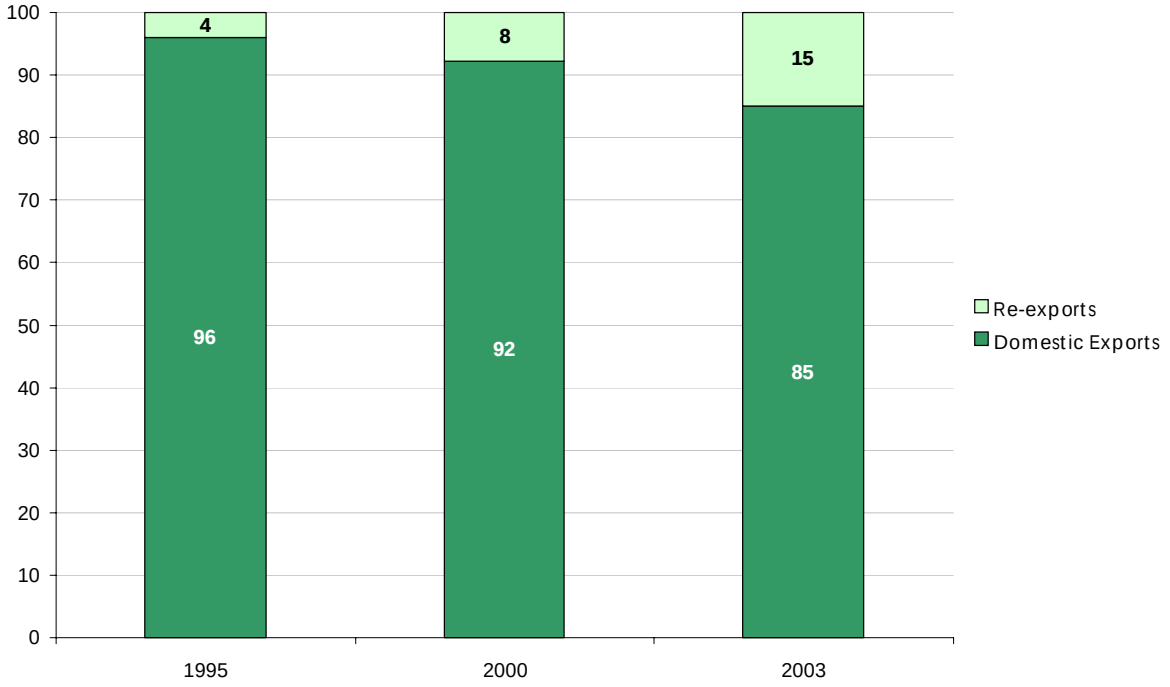
Source: own calculations.

Table 4: Value added multipliers of domestic exports by commodity groups

	1995	2000	2003
Total	0.70	0.65	0.68
Agriculture	0.03	0.02	0.02
Manufacturing	0.38	0.34	0.31
Energy	0.02	0.01	0.02
Construction	0.01	0.02	0.02
Services	0.26	0.26	0.31

Source: own calculations.

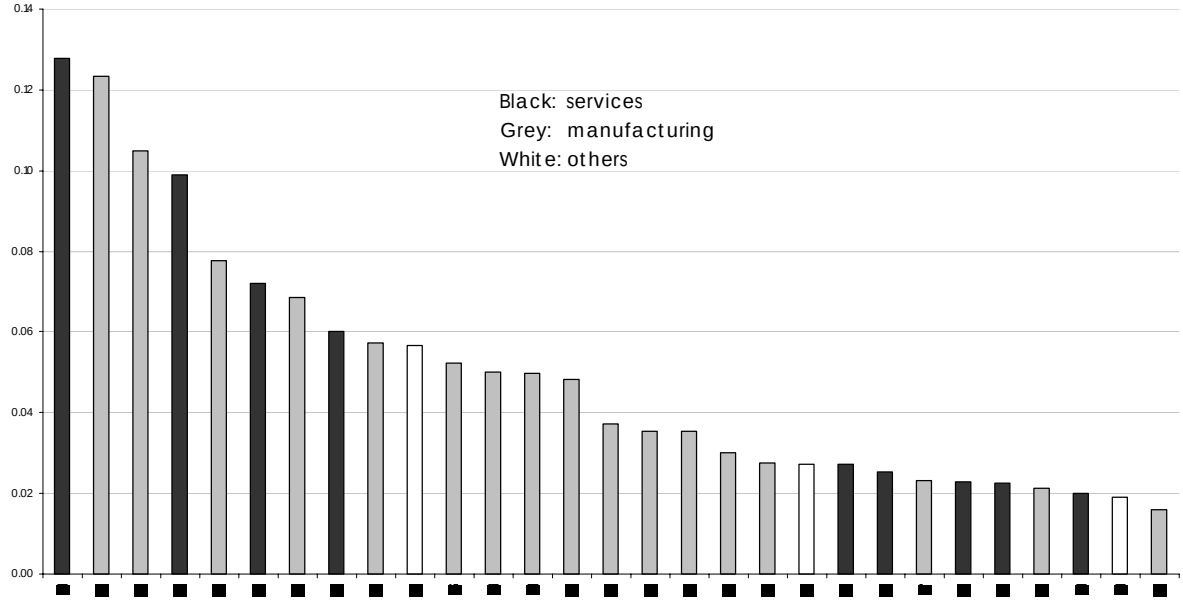
Figure 4: Nominal shares of domestic exports and re-exports in total exports of manufacturing commodities in %



Source: own calculations.

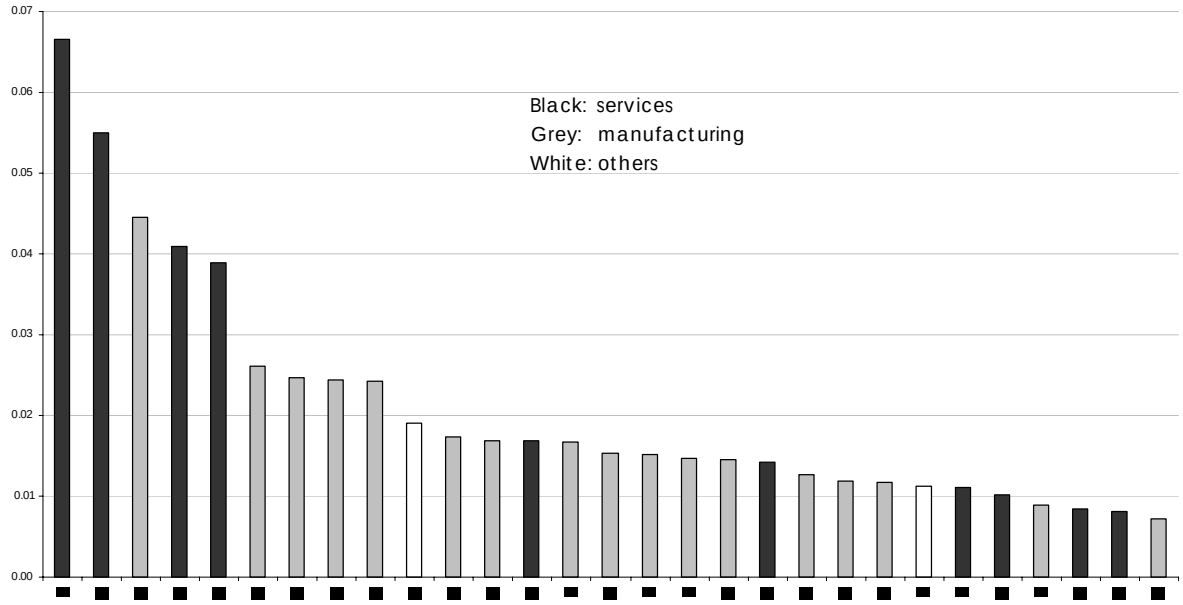
Figures 5 and 6 show output and value added multipliers for different commodities. Among services wholesale trade, business services, transportation and banking benefit the most from total export activities; among manufacturing commodities it is machinery, automobiles, metals and chemicals. All these commodities account for the largest shares in exports as well, so the direct effects seem to dominate. Taking out these direct effects the ranking of commodities with respect to the size of the multipliers changes somewhat (Figures 7 and 8): For services, the commodities with high total multipliers are also the ones with high indirect effects. In general, services benefit much more strongly from export activities than manufacturing commodities if the direct effects are eliminated. Out of manufacturing commodities only metals, machinery, printing and publishing and wood products show significant indirect effects. Energy, construction and products from agriculture and forestry also rank among the commodities for which indirect effects are highest.

Figure 5: Output multipliers of domestic exports by commodities



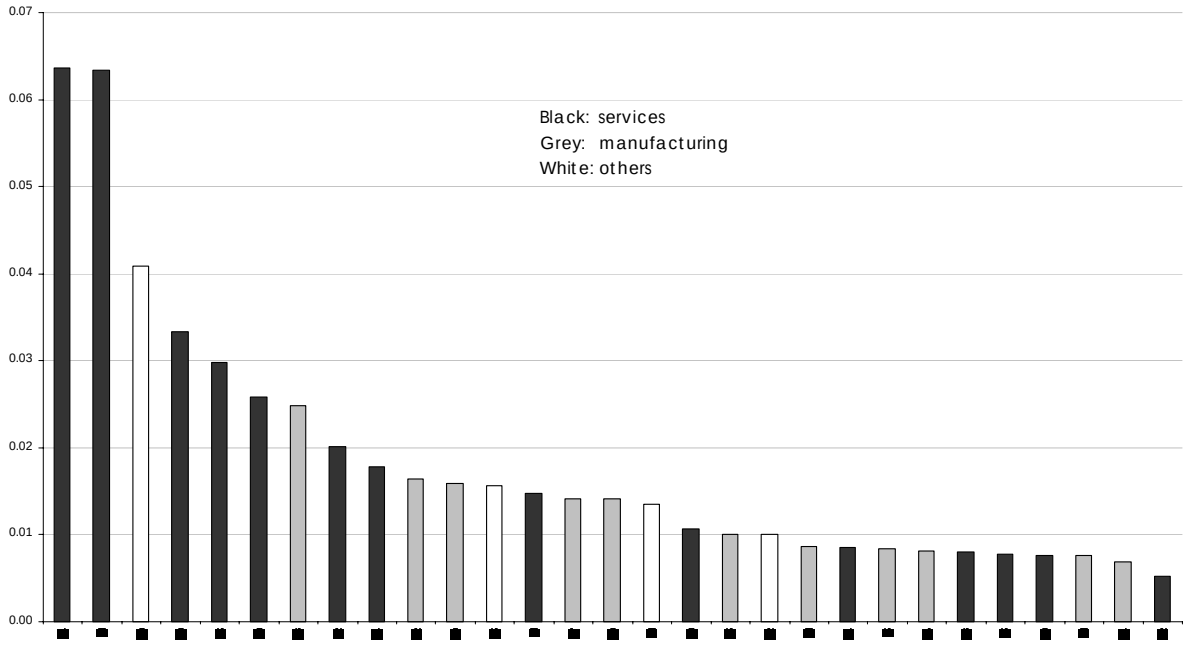
Source: own calculations.

Figure 6: Value added multipliers of domestic exports by commodities



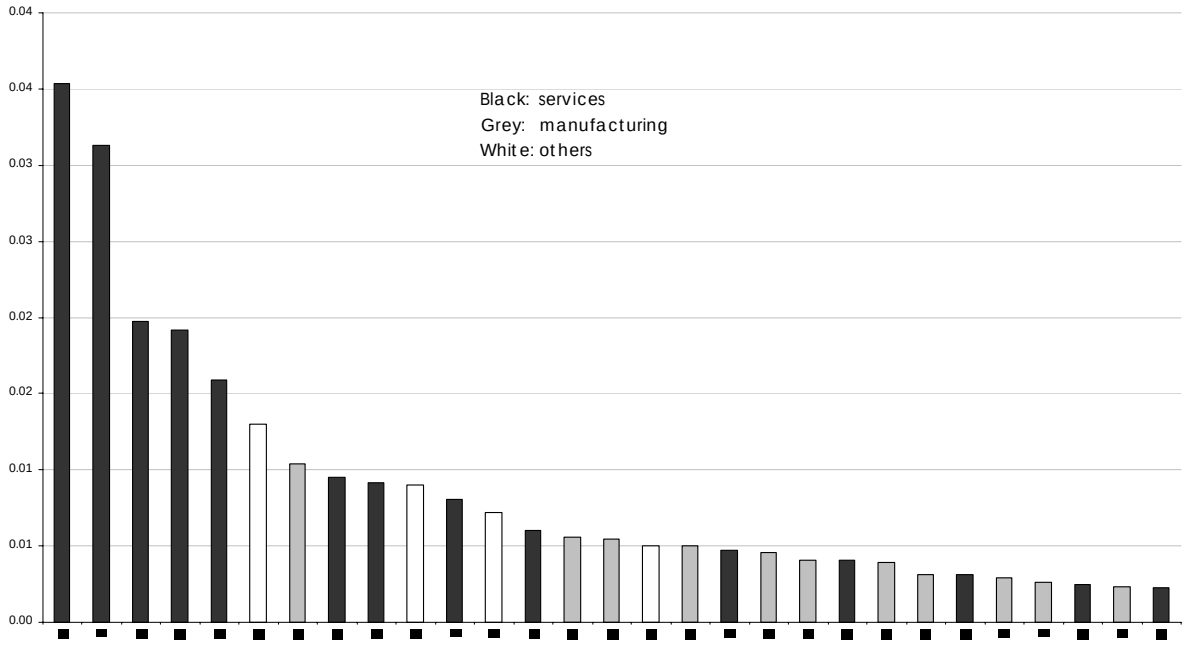
Source: own calculations.

Figure 7: Output multipliers of domestic exports by commodities – without direct effects



Source: own calculations.

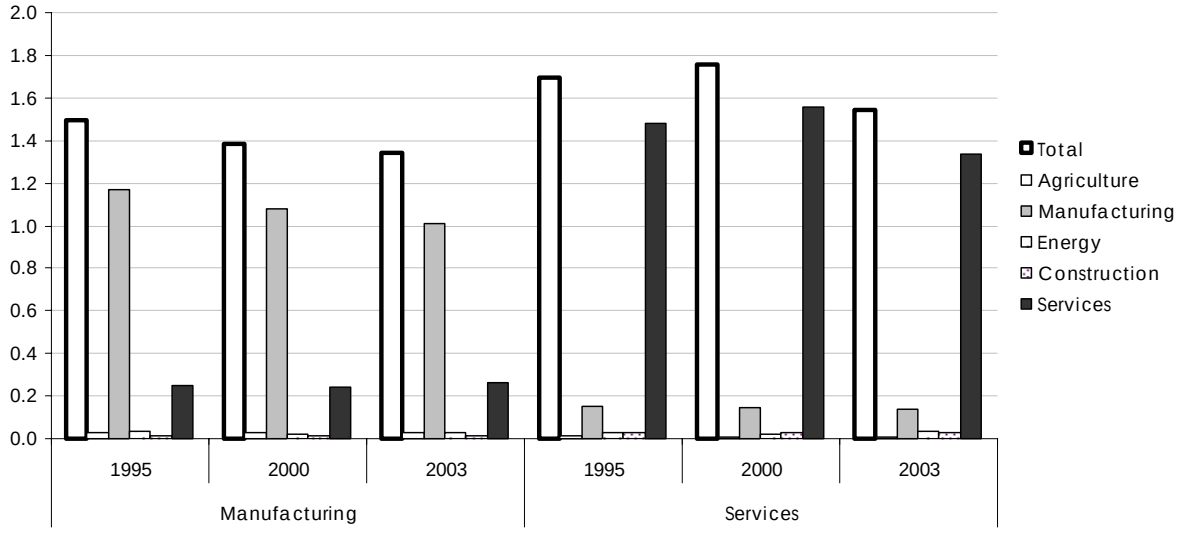
Figure 8: Value added multipliers of domestic exports by commodities – without direct effects



Source: own calculations.

We now turn to the question, if manufacturing exports differ in their domestic production and value added content from service exports, which, as could be seen earlier, are becoming increasingly important. For this purpose output and value added multipliers were calculated for manufacturing exports and service exports separately. Figures 9 and 10 show output and value added multipliers for total manufacturing and service exports, respectively.

Figure 9: Output multipliers of manufacturing and service exports by commodity groups

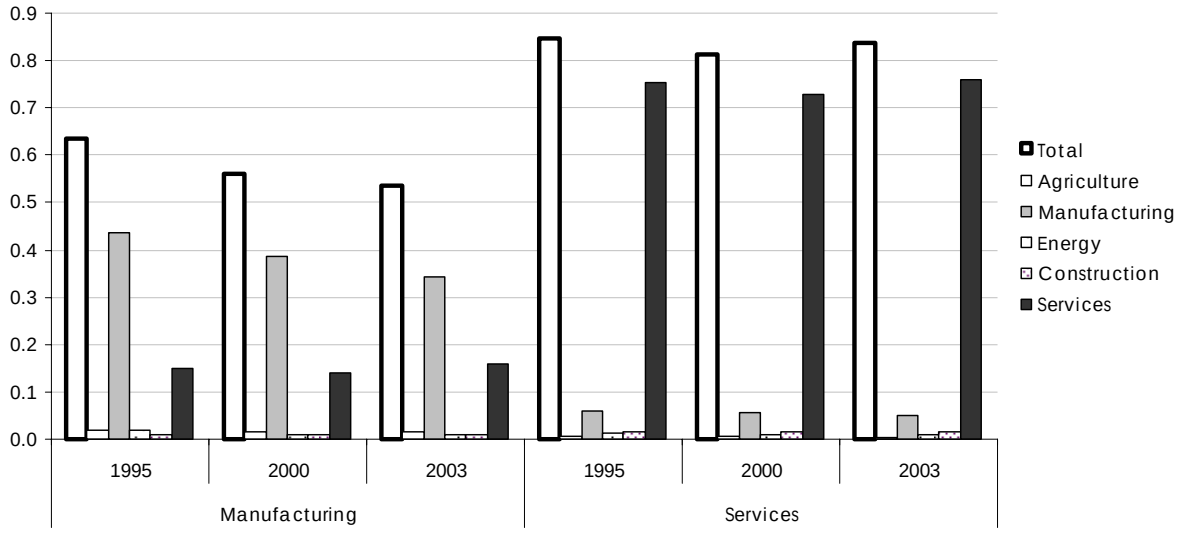


Source: own calculations.

Not surprisingly, the multipliers of manufacturing exports are declining over time, both for output and value added. The output multiplier for services, on the other hand, is increasing from 1995 to 2000; afterwards it is going down quite significantly. For value added no such downward trend after 2000 is visible. However, the decline in the output multiplier for services is very likely due to the fact that in 2003 imputed banking services were allocated among intermediate inputs and final demand by Statistics Austria while for the years before the allocation was done by the authors and concerned only the intermediated inputs. Future work may be able to deal with this statistical problem in a different manner.

The decline in the manufacturing multipliers can be traced back to the manufacturing commodities that are used up in the process of producing the exports. Service multipliers remain more or less unchanged.

Figure 10: Value added multipliers of manufacturing and service exports by commodity groups



Source: own calculations.

Turning the attention to domestic manufacturing exports the picture changes again. The total output multiplier is rather stable over time, while the value added multiplier is slightly decreasing. Again, as for total exports, domestically produced exports have not lost much of their impact on the national economy; the lower effects of total exports are greatly due to the increase in re-exports.

Finally, the multiplier effects of exports are compared to those of the other final demand categories, i.e. private and public consumption as well as investment (Figures 11 and 12). The multipliers turn out to be rather stable over time. The output multiplier is lower than that of exports for the years 1995 and 2000 and at a similar level for 2003; the value added multiplier is significantly higher. For both multipliers other final demand exerts a much greater influence on domestic service production than do total exports. This goes back, however, to the still large share of manufacturing commodities in total exports. Comparing the effects of other final demand with those of service exports, the multipliers of latter are higher because they induce more impact on domestic services. The results do not change too much if only domestic exports are considered: the gap between is somewhat larger for output multipliers and a bit smaller for value added multipliers.

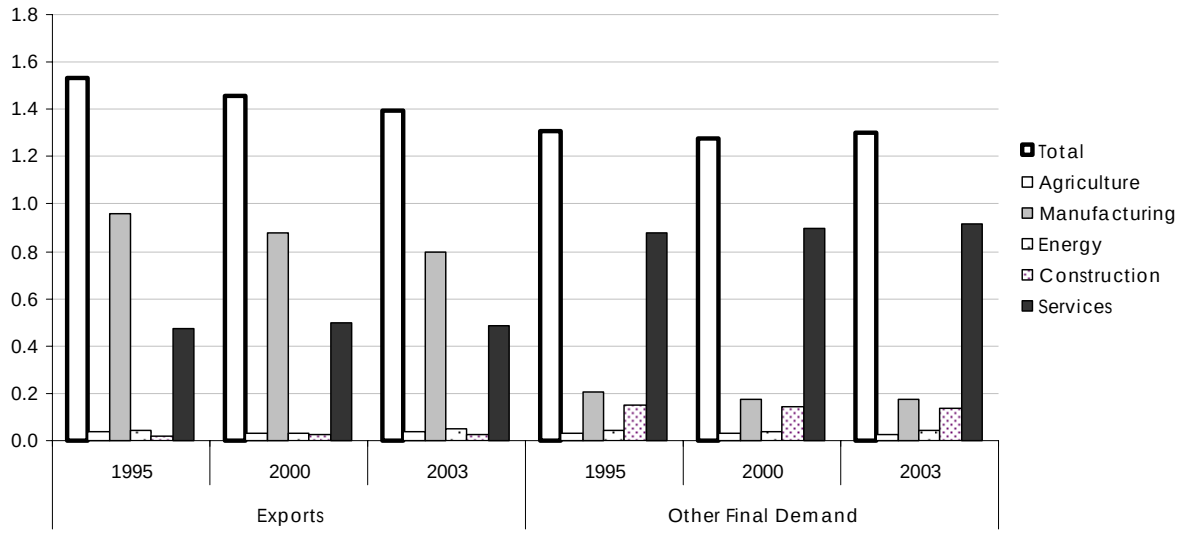
Summary, conclusions and further research

Globalization implies that an increasing share of exports is made up of imported commodities, reflecting an ongoing process of international division of production. Based on the preliminary empirical findings of an input-output analysis for the years 1995, 2000 and 2003 for Austria this hypothesis is supported by decreasing multipliers of total exports, both in terms of production and value added. On the other hand, the decrease in impacts on the national economy stems largely from growing shares of re-exports – even though it remains to be seen if part of this growth is just a statistical artefact. Domestic exports show rather stable multipliers, implying that their trickle down effects on the national economy has not been restrained much by the internationalization of the economy.

These stable impacts go back to the production of services, which have an increasing part in the total multiplier effects. In addition, service exports make up for an increasing share in total exports, but only in real terms – since the input-output analysis is confined to nominal tables, this effect stays unaccounted for.

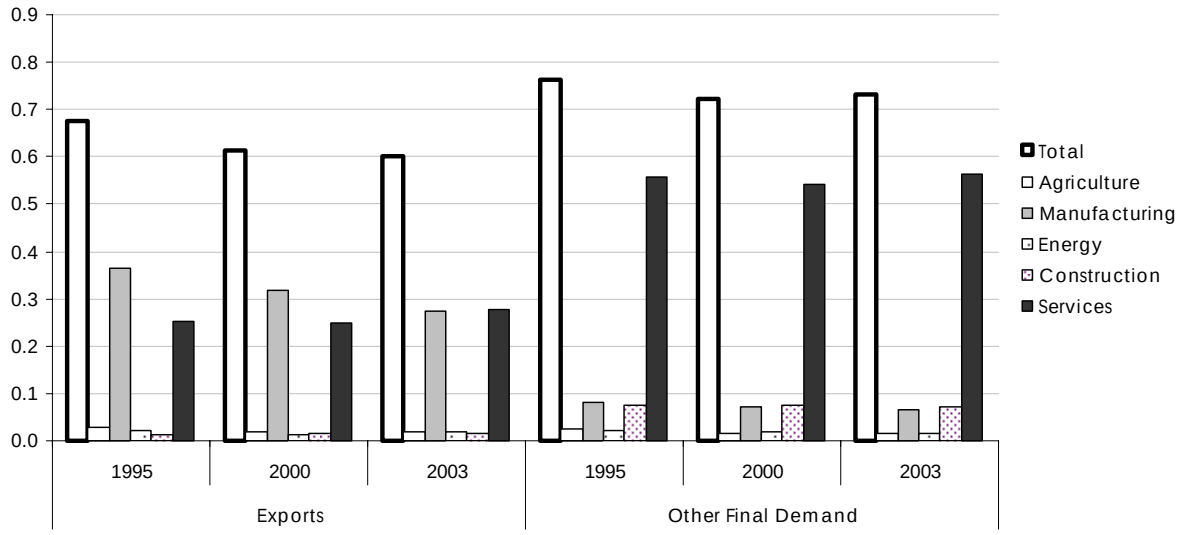
Further research will concentrate on an international comparison of these results, based on the input-output table data base of the OECD. From this analysis it will become clear to what extent the Austrian export economy differs from those of other developed countries. Furthermore, applying regional tables for the year 2000, we may be able to draw some conclusions as to how the expected changes in exports influence regional growth. And finally the employment effects by skill groups are to be examined as well.

Figure 11: Output multipliers of exports and other final demand by commodity groups



Source: own calculations.

Figure 12: Value added multipliers of exports and other final demand by commodity groups



Source: own calculations.