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Demand and Technology Determinants of Structural Change and Tertiarisation:
An Input-Output Structural Decomposition Analysis for four OECD Countries*

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Abstract

The paper provides fresh empirical evidence on the relative role of changes in final and intermediate demand as affecting the changes in the sectoral structure of advanced economies. These latter have led, over the last three decades, to the massive growth of service sectors. The paper draws upon the recently released OECD Input-Output (I-O) tables. The empirical analysis is based on an I-O Structural Decomposition Analysis carried out on 13 manufacturing and service sectors, from the end of 1960s to the end of 1990s. Although heterogeneous sectoral patterns emerge, we find that the structural changes leading to the growth of services, particularly KIBS (Knowledge Intensive Business Services), are mainly (domestic) demand-led, whereas the role of foreign trade remains marginal even in the last decade. We infer that, even in the case of the most technologically advanced service sectors, (domestic) demand constraints affect the degree of exploitation of technological opportunities and the patterns of growth.

Keywords: Structural change, Growth of Services, Input–Output Structural Decomposition Analysis

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1 Introduction

A recent collection of contributions on the economics of services (ten Raa and Schettkat, 2001) has addressed the question of why advanced economies are still experiencing sustained growth rates of real output and employment of service industries despite trends of increasing input costs and prices. According to ten Raa and Schettkat, the solutions to the 'service paradox' are consistent with the identification of few methodological and empirical issues.

On the one hand, the mere problems of measurement of output of service activities are still at stake and behind the mystification of the real contribution of services to the aggregate growth. Among these, we might mention the definition of the production unit, the use of an appropriate price deflator to obtain real figures, the inclusion of quality effects to adjust price deflators, the difficulties of including total production factors - rather than labour only - to obtain productivity indicators for services. Yet, the potential mismeasurement of real output and productivity of services had already been raised in a comprehensive work by Griliches (1992) almost two decades ago, leaving the 'service paradox' unresolved since.

On the other hand, the growth of services' real output shares since the end of the 1960s has been mainly attributed to shifts in private domestic consumption, which is in turn claimed to be mainly sustained by a positive income effect, more than compensating a negative price effect. However, the demand for services has been overall steadily growing, whereas average real income growth rates have been slightly declining over time from mid-1970s onwards (ten Raa and Schettkat, 2001). Hence, it is likely that behind the whole paradox a 'change in demand conditions' dominates over the pure (final) income and price effects, as the authors claim in the conclusions.

However, the black box of the 'change in demand conditions' has been vaguely put forward but not properly unfolded. Further, we argue here, the 'service paradox' is likely to have been affected by major (ICT-driven) technological changes in services over the last two decades. These latter are crucial, as most likely they have a two-fold impact on service performance: a direct one on the productivity figures and an indirect one on output growth, via the changing composition of final and intermediate demand for services.

This work starts from the empirical stylised fact of the 'service paradox', as put forward by ten Raa and Schettkat (2001). Our conjecture can be summarised as follows. The 'service paradox', and particularly the black box of 'changing in demand conditions', is likely to be related to changes in the composition of intermediate demand for services. These latter follow changes in the inter-industry division of labour between services and the rest of the economy. Changes in intermediate links are argued here to complement -

and in some case dominate - the role of income- and price-led change of final demand in accounting for the structural change leading to the growth of services.

We aim to shed light on this issue by providing fresh empirical evidence on the relative role of (changes in) final and intermediate demand as affecting the changes in the sectoral structure of advanced economies. The paper draws upon the recently released OECD Input-Output (I-O) tables. The empirical analysis is based on an I-O Structural Decomposition Analysis (see Rose and Casler, 1996 and Milana, 2001 for a review and reassessment of the tool) carried out on 13 manufacturing and service sectors, from the end of 1960s to the end of 1990s. With respect to the existing literature, recalled in Sections 2 and 3, our empirical contribution is twofold: first, we put particular emphasis on the sectoral differences, particularly across selected branches of manufacturing and services, in terms of the relative contribution of final and intermediate demand to the (sectoral) output growth; secondly, we extend the analysis to the most recent dynamics of such contribution, covering the time-span from the end of the 1960s to the end of the 1990s. This allows us to shed light on whether the massive adoption of ICTs by service industries in the most recent decades has brought about a significant change of inter-industry linkages involving a major increase of service intermediate inputs for the rest of the economy.

The remainder of the paper is organised as follows. Next section briefly addresses the theoretical and empirical literature relevant to the case in analysis. In particular, we revert to the 'old' and 'new' debate on the determinants of tertiarisation processes, being it the most relevant case of structural change of sectoral composition of advanced economies since the First Industrial Revolution. We argue that the literature on the economics of services still suffers of a theoretical and methodological discontinuity as relating to the relative role of technology vis a vis demand determinants of sectoral growth. Section 3 describes the methodology of I-O SDA and the data source. Section 4 provides the results of the I-O SDA of the (intermediate vs final) sources of structural change over the last three decades, carried out on 13 manufacturing and service sector in four OECD countries (Germany, The Netherlands, UK and USA). The final section summarises the findings, draws the conclusions and highlights future directions of research.

2 The debate around tertiarisation

The age-old debate on the determinants of economic growth has been characterised by radical shifts of concern over time. The preoccupation of classical

economists with the problems of accumulation and division of labour as affecting countries' economic growth was at the core of the economic debate until the marginalist revolution in the end of the nineteenth century. The focus of the analysis then shifted toward the problem of the optimal allocation of scarce resources and became dominant for growth economists. Two main contributions emerge as outstanding responses to the neoclassical orthodoxy. These are the works of Schumpeter (1934) and Keynes (1936). The former called attention to the role of technological innovation for economic growth and development. The latter radically criticised the causal direction imposed by Say's Law - i.e. that supply always creates its own demand - and argued that the dynamics of demand might act as a constraint on the dynamics of macroeconomic growth, when resources are not fully employed.

The 'creative destruction' brought about by scientific discovery and the consequences of its economic applications have been at the core of Schumpeter's contribution (Schumpeter, 1934). The importance of technical change for growth and competitiveness of firms, sectors and countries has been emphasised and reprised within the neo-Schumpeterian stream of literature, starting from the seminal contribution by Nelson and Winter (1982) [1]. This stream of literature is however characterised by an almost exclusive focus on the nature and economic effects of technology adoption and diffusion at the micro-level of analysis, neglecting both the role of the demand-side determinants of firms' strategic behaviours and the consequences of macro-level demand constraints. On the other hand, the post-Keynesian stream of literature has tended by and large to overlook the role of technical change, especially at the micro-level of analysis (for a recent reassessment, see Llerena and Lorentz, 2004a). Yet, both technical change and demand might disrupt the steady path of macroeconomic growth, as well as the structural composition of the economy (Pasinetti, 1981).

Within the neo-Schumpeterian stream of literature, there are very few attempts to encompass both technology and demand as affecting economic growth (Fagerberg, 1994; Fagerberg, Verspagen et al., 1994; Montobbio, 2002; Verpagen, 2000, 2002a, 2002b; Llerena and Lorentz, 2004a, 2004b). Yet, the 'side effects' of both technical change and demand-constraints on the structural change of economies are not contemplated in depth by these studies, particularly at the meso-level of analysis. Nor, as a consequence, do they account for technology and demand as affecting the transmission of meso-level structural changes into aggregate outcomes. Further, the conceptualisation and empirical investigation of the nature of technical change

[1] See also, among others, Dosi, Freeman, et al. (1988); Cimoli and Dosi, 1995, for an exhaustive review

and its impact on economic growth has been mainly confined to the manufacturing industries, leaving the case of the growth of services relatively under-explored. This is even more puzzling as the processes of tertiarisation occurring in the advanced economies over the past decades represent, as a matter of fact, the most relevant case of structural change of the employment composition of the economy since the First Industrial Revolution.

Despite the renewed and increasing awareness of the importance of this domain of analysis (ten Raa and Schettkat, 2001; Yocarini and Schettkat, 2003), the literature on the economics of services is still characterised by very diverse and fragmented investigations with an absence of explicit theoretical affiliation. In our view, this literature has so far lacked provision for a unifying framework able to account for the effects of both technical change and the changing patterns of final and intermediate demand on the massive tertiarisation of advanced economies over the last few decades. Phrased it otherwise, the black box of the 'changing demand conditions' has still to be unfolded. This is even more so in the case of services. A peculiar feature of the literature on services is in fact something of a theoretical and methodological discontinuity in the main areas of investigation and, particularly, related to concerns about the effects of the growth of services. What we might now label as the 'old' debate on the growth of services mostly revolved around its main determinants, and its contribution to the overall productivity and growth performance of national economies. This latter aspect, though, has become rather controversial among economists over time. Since the end of the 1960s, Baumol's 'cost-disease' (Baumol and Bowen, 1966; Baumol, 1967, 2001; Baumol et al. 1985, 1989) as affecting the productivity performance of services has been the largely dominant view within the academic debate over the impact of the growth of services. Further, evidence on the various waves of 'productivity slowdown' has often been imputed to structural change in the employment composition of economies toward service activities. The concern about de-industrialisation of the advanced economies lies at the core of the economic debate up to the 1980s.

However, no formally rigorous or empirically grounded attempt, perhaps with the exception of the work of Fuchs (1968), has been made to identify the determinants of the processes of tertiarisation. None of the contributors to the 'old debate' to the economics of services has accounted for both supply and demand-side determinants of the growth of services at the macro-level of analysis. Only recently, buoyed by a wave of enthusiasm about the growth potential linked to the suggestive labels of the 'New Economy' and the 'ICT revolution' (OECD, 2000), has this attitude changed. A renewed and increasing interest in the economic performance of services as being positively affected by the new Information and Communication Technology

(ICT) paradigm has diffused among economists and scholars of technical change. The preoccupation with the de-industrialisation of economies and the productivity slowdown, which dominated the 'old' debate, seems to have turned into a new, hyper-optimistic view of the new growth potential linked to services. Concern about the loss of industrial leadership in terms of manufacturing shares of total national production seems to have been displaced by the view that services are the main engine for the creation of 'new' jobs. Furthermore, the argument of productivity slowdown being linked to the poor productivity performance of services also seems to have become outdated, as striking productivity performance in the 'Knowledge Intensive Business Services' (KIBS[2])is now viewed as offsetting poorer performance in the traditional branches. This is claimed as positively contributing to the increase of average national productivity levels and growth.

We argue here that a common feature of both the 'old' and the 'new' debate revolving around the growth and economic performance of services is the longstanding neglect of the role of demand and more specifically of changes in intermediate links between service sectors and the rest of the economy. Further, we believe that such neglect is a specific consequence of more a general fracture between neo-Schumpeterian and post-Keynesian theoretical approaches in tackling the issue of structural change and macroeconomic growth. This paper aims to provide a fresh empirical account of the relative role of changes in final and intermediate demand in determining sectoral output growth, so to give empirical dimensions to the supply and demand determinants of tertiarisation processes, covering the period from the end of 1960s to the end of the 1990s. The empirical analysis draws upon the use of I-O SDA, a fairly neutral tool from the theoretical point of view, which will be illustrated at length in the section below.

3 Methodology and data source

Much effort has been devoted to the identification of the sources of structural change in the empirical literature, particularly amongst the contributions in the I-O tradition, starting with Leontief (1951, 1953) seminal work. Within the I-O framework, and more generally in the economic literature (Pasinetti, 1973), the use of I-O is grounded in the difference between the industry and the vertically integrated sector (see also Milana, 2001 for a reassessment and Kox, 2001). This latter is an

[2]The term Knowledge Intensive Business Services (KIBS) was first coined by Miles (1994), Miles, Kastrinos et al. (1995) and variously reprised (among others, Gallouj, 2002a).

> 'accounting entity, to which are attributed the cost of primary inputs used directly (...) and indirectly to produce all the intermediate inputs that are supplied to the industry examined by other industries.'

(Milana 2001, p. 3). A full empirical account of structural economic change relies on the assessment of changes in sectoral interdependencies. In turn, such assessment adopts the notion of vertically integrated sectors and assumes the Leontief hypothesis of zero elasticity of price-induced input substitution.

A widely used technique to identify the relative contribution of different determinants of the (aggregate and sectoral - e.g. structural economic change) output growth is I-O Structural Decomposition Analysis (SDA). I-O SDA decomposes macro and industry output growth into the relative contribution of changes in technology coefficients and changes in patterns of final domestic and foreign demand.

The SDA is based on an accounting identity, the basic material balance equation, which decomposes the output growth Q between two points in time $(t,\, t-z)$ as follows:

$$\frac{Q_t - Q_{t-z}}{zQ_{t-z}} = \underbrace{\frac{(L_t - L_{t-z})FD_{t-z}}{zQ_{t-z}}}_{(i)} + \underbrace{\frac{L_t(C_t - C_{t-z})}{zQ_{t-z}}}_{(ii)} + \underbrace{\frac{L_t(I_t - I_{t-z})}{zQ_{t-z}}}_{(iii)} + \underbrace{\frac{L_t(TR_t - TR_{t-z})}{zQ_{t-z}}}_{(iv)} \tag{1}$$

where:
Q is the output at time t;
L is the Leontiev-inverse matrix of direct and indirect input coefficients A_t at time t;
FD is the final demand at time t, respectively composed of private and public consumption (C); investment and changes in stock (I); net exports (TR), all at time t.

All the components must be read as average annual growth rates expressed in terms of the average change in percentage points of output relative to the base year (i.e. weighted by z, the number of years considered). This allows cross-country comparisons, as z, the time-span between two subsequent I-O tables, is different across countries.

Equation 1 thus represents the basic identity for the decomposition of output growth into its constitutive components, namely:

(i) INTERMEDIATE DEMAND CHANGE or technological change, that is output growth due to changes in the intermediate demand per unit

of output, or alternatively changes in the Leontief-inverse matrix of technology coefficients (holding constant total final demand). In this context, this component captures changes in the organisation of production in the sectors, implying an increase in the intensity of demand for some intermediate inputs. The impact of technological innovation is therefore not directly captured here, but rather its effects on the changing organisation of production. It is likely that most of the changes in intermediate coefficients for services are attributable to the adoption of new technologies, which drives changes in the demand for intermediate service functions and in sectoral interdependences.

(ii) FINAL DEMAND CHANGE (CONSUMPTION), that is output changes directly imputable to changes in the levels of final (private and public) consumption (holding constant the matrix of intermediate coefficients). This component accounts therefore for the direct impact of increases in consumption, due to both general shifts in patterns of taste and preference as well as income elasticities of final demand and increasing levels of public procurement of the different sectors' output.

(iii) FINAL DEMAND CHANGE (CAPITAL STOCK), that is output changes due to shifts in the level of investment (holding constant the matrix of intermediate coefficients). This component explains the output growth due to an increasing demand for material and capital goods.

(iv) FINAL DEMAND CHANGE (NET EXPORTS), that is output growth mainly pulled by shifts in foreign final demand (net of imports), holding constant the matrix of intermediate coefficients. As far as services are concerned, this component accounts for positive shifts in international comparative advantage in favour of some of the service sectors, which are becoming increasingly tradable on the international market.

Since its early applications, the use of SDA as a tool has been extended and developed (for an exhaustive review see Rose and Casler, 1996). The most recent applications of I-O SDA mostly use single-country I-O tables. Driver and Dunne (1992) and Driver (1994) use UK tables, Korres (1996) Greek tables, and Andreosso-O'Callaghan et al. (2002) the Chinese I-O tables. Peneder et al. (2003) apply SDA to selected OECD countries. All these contributions, however, refer either to all the sectors provided by the I-O tables or to the macro-branches of the economy - i.e. primary, secondary and tertiary. However, as Driver (1994) points out, even the use of a simple index of structural change, mainly constructed in terms of variously weighted deviation measures of changes in sectoral proportions of economic activity,

presents a major drawback in being heavily influenced by the level of aggregation chosen. The choice of level of aggregation is not trivial, and this is also the case when using SDA. The I-O data are available at a high level of disaggregation, which allows different *levels* of structural change to be captured - i.e. from mechanicals to chemicals or from manufacturing to services.

Unlike in the existing literature, in this work we apply the SDA technique to 13 selected macro-branches of the economy. The service branches have been selected and re-aggregated on the basis of a general criterion of product and technological content homogeneity. This allows us both to cover the whole economy and at the same time to preserve a reasonable and readable degree of sectoral dimension of the analysis, in order to identify peculiarities of service vis--vis manufacturing industries. Table 1 in the Appendix provides a summary of the sectoral aggregation adopted for the I-O SDA carried out in this article.

We draw upon the OECD harmonised I-O tables. The database is designed to capture changes in the structure of the OECD economies since the late 1960s, before the 1973 oil shock, in the mid-1980s and up to the 1990s. I-O data for the 1990s have been recently released by OECD and have been included in this work to update the I–O SDA carried out on the previous ones and used in our previous work (Savona, 2004).The old I–O tables were available in current and constant national currencies in producers' prices, but for different base years. With the exception of Australia (1989), Canada (1986), Germany (1985), Japan (1985) and the USA (1982), most countries have 1980 as base year. Unfortunately, OECD did not provide the new I–O tables in constant prices. To allow for country and time comparability, therefore, in this work we have re-deflated all the (old and new) current price tables, on the basis of the market price index, this time using a common base-year (1985). Further, it should be noted that OECD provided the new tables in Basic Prices, whereas the old ones were expressed in Producer's Price figures. We therefore opted to use the Market Price deflator index, bearing in mind that a possible distortion in cross-country comparability might emerge, as the sectoral deflator for the new I–O tables was not available.We therefore carry out the empirical decomposition only on the basis of constant figures (in national currencies, base year 1985). [3]

We chose in this work to confine our analysis to only four of the OECD countries, namely Germany, The Netherlands, UK and USA, which present different patterns of sectoral output growth as well as different contributions

[3]See for more details, the OECD Report "The OECD Input Output Database" and "Country Notes for The Input–Output Tables, ISIC REV.3"at http://www.oecd.org/dsti/sti/stat-ana/index.htm.

of demand Vs. technology determinants of output growth, so that the cross-country comparison allows some interesting inferences.

4 Results

This section presents the results of the I-O SDA for each single country. Table 1 lists the sectoral aggregation used in the empirical I–O SDA. Tables 2, 3, 4, 5, 6, 7,8, 9, in the Appendix, report the results of the SDA respectively for Germany (Tables 2 and 3), The Netherlands (Tables 4 and 5), UK (Tables 6 and 7)and USA (Tables 8 and 9) for different points in time, according to the data availability for the four countries, and for the whole period covered.

The first column in the tables refers to the average annual growth of sectoral real output in percentage points. In all the countries considered in the analysis, and since the beginning of 1970s, real output growth has been positive in all service branches. Further, the rate of growth of real output in service branches in all the sub-periods and the countries considered has been higher than that experienced by manufacturing branches, even the most dynamic (and especially machinery and chemicals).

However, while in Germany and The Netherlands - and in the great majority of the remaining OECD countries (Savona, 2004) - manufacturing sectors (except the textile industry) have never shown negative output growth, only UK and in part also the USA have suffered, between the end of 1970s and mid-1980s, 'cycles' of de-industrialisation, both of the hard manufacturing industrial base (e.g. machinery, chemicals) and of the 'soft' industry, such as textiles. Hence, in most OECD countries, the (real) output gains of service branches have not displaced the manufacturing base of countries. This evidence challenges most of the debate concerning the risk of de-industrialisation as a direct consequence of tertiarisation processes starting in the 1970s, yet it does explain the fact that most of the concern about the shrink of the industrial base which had informed the 'Baumolian old' debate originated from UK and USA.

The most peculiar patterns emerge for KIBS, both in terms of figures and of counter-trends with respect to the sub-period considered. This branch shows in fact persistent and high growth figures across time and country. This finding is in line with the copious number of contributions flourished in the last decade [4], which show that not only KIBS are the recipient of most of the employment and output growth occurred in the advanced economies, but also that this trend has not been incompatible with high performance

[4]Among others, the work of Miles et al. (1995), Gallouj (2002), Cainelli, Evangelista and Savona (2005), OECD (2000)

in terms of technological innovation and productivity growth. We expect this evidence to be driven by both profound changes in the inter-sectoral linkages, with important increases in the demand for KIBS as intermediate inputs coming from the rest of the economy, and by high levels and sustained growth rate of final demand. In this respect, much more uncertain is the role of foreign demand. KIBS, and service activities more in general, are becoming increasingly internationally tradable only recently, and therefore have not been able to benefit from the propulsive role of foreign trade for growth. The I–O SDA analysis allows us to shed light both on the conjecture of the existence of a particularly favourable combination of positive intermediate and final (domestic) demand, and on whether the role of foreign trade has changed over time and might act nowadays as an engine for growth of services, the way it did and does for the most of the manufacturing branches.

Going to the relative contribution of intermediate and final demand to the sectoral output growth, the first observation emerging from the figures is that each country seems to show different characteristics.

As far as the domestic components are concerned, it emerges that final (public and private) consumption is steadily responsible for the sectoral patterns of output growth across the different sub-periods and for most of the branches considered.

The role of intermediate demand turns out to be more heterogeneous across countries, time and sectors. In particular, it seems to be negative or at best neutral for most manufacturing branches across all the countries and over time. For service branches, however, changes in intermediate coefficients represent a significant (but not the first) cause of real output growth. In other words, the structural change favouring service branches has to be imputed - in general - to the contribution of final consumption, but a significant (and for the KIBS case even a higher) contribution stems from intermediate demand. Instead, positive growth of manufacturing branches has mostly resulted from the final demand contribution, both domestic and foreign.

The role of foreign final demand (net exports) is in contrast quite homogeneous across countries for services compared to manufacturing branches. In particular, it makes no significant contribution to the output growth of service branches, confirming that the internationalisation of services is a still on-going process, that has started being underway only in the 1990s. Next section will deal with the most recent development of such pattern.

As argued above, the most interesting sectoral specificity relates to the branch of KIBS, for several reasons. First of all, we would expect that a particularly propulsive role - complementary to the role of final consumption - in the output growth of this branch has been increasingly played by the 'supply side', which in an I-O framework is regarded as being the changes in

technological coefficients. In fact, what emerges from the figures in the tables is that the changes in intermediate coefficients do play a significant role, not only as compared to the average figures for the technology components found for the other sectors, but also with respect to the magnitude of the final consumptions of KIBS themselves.

The contribution of the changes in intermediate coefficients to the average annual output growth of KIBS starts to become positive across the countries considered already after mid-1970s. This adds up to a highly positive contribution of final consumption. In the cases of Germany and UK, intermediate demand is the major source of output growth and, as a consequence, of structural change with respect to the manufacturing branches. This is not the case for the USA economy. Changes in the intermediate coefficients do not emerge to be the main source of output growth, neither for manufacturing - for which the sign is mostly negative across time - not for services, for which the role of intermediate demand is comparatively much smaller than that of final (domestic) consumption.

To sum up, the sources of structural change favouring the growth of KIBS, compared to both the whole service sector and the whole economy more generally, come from the intertwined contribution of changes in intermediate demand coefficients and the sustained role of final consumption. The role of final demand for investments and, overall, foreign final demand play a marginal role (when not negative) in sustaining the growth of KIBS up to 1990.

4.1 The 1990s and the role of international trade

The empirical findings related to the 1990s allow to go more in depth into the actual impact of the pervasive diffusion of the 'ICT paradigm' across all the branches of the economy, and particularly in the case of KIBS and financial services. We have seen that a significant boost of the intermediate demand component in affecting the producer services (KIBS *in primis*) has contributed to the output growth of these branches, as a consequence of the increased inter-sectoral division of labour and intermediate demand for ICT-related producer services. Further, we would expect more a significant role of the foreign demand component in affecting services' growth over the last decade, as a plausible outcome of the much-advocated policies of trade liberalisation of services and the remotion of trade barriers. As far as this last empirical stylised fact is concerned, policy actions aiming to increase services' trade liberalisation do not seem (yet) to have displayed any perceivable effect. The magnitude of the role of foreign demand remains marginal in affecting service sectors' growth also in this last decade, and this evidence holds

across the four countries considered. Further, the role of the intermediate component of demand emerges to be not particularly stronger than in the previous decades. Changes in the intermediate coefficients tend to replicate the same patterns of the previous sub-periods, turning out to be, even in the 1990s, a large responsible for the output growth of KIBS across European countries, but not for the USA.

The evidence emerged on the role of foreign demand in determining the sectoral output growth of services might be due to two possible explanations. Either the much advocated policies of trade liberalisation extended to services need a much longer time-span to display their effects, or, rather, they do not have (and possibly they will not have) any efficacy even in the long run. This second case might have crucial implications, both theoretical and in terms of policy implications. Namely, it raises the crucial issues of rethinking the models of international trade and economic growth when applied to services and, as a consequence, of assessing the actual effectiveness of trade liberalisation policies as growth-enhancing tools in the case of service industries. This latter issue seems to be a promising avenue of future research, particularly as the debate on globalisation of economic activities and its economic and development impact seems to be still virulent amongst economists as well as scholars of technical change.

5 Summary of the findings and conclusions

The paper empirically adds to the still on-going debate on the determinants of tertiarisation, by providing fresh empirical evidence on the relative contribution of final and intermediate demand to the output growth of selected manufacturing and service branches over the past three decades.

The empirical literature dealing with the sources of structural change within an Input-Output framework and recalled in Section 2, has tried to decompose the relative role of technology and demand on sectoral output growth, though confining the analysis to the macro-branches of primary, manufacturing and service sectors. The contribution of this paper is in line with this literature, but considers a more detailed sectoral breakdown, so to provide a more articulated picture of the structural change of output growth, involving 13 different service and manufacturing branches.

The results of the empirical evidence can be summarised as follows:

1. Real output growth since the beginning of the '70s has been positive for most of the service branches considered, and particularly for the KIBS; this holds for all the countries considered. Further, this seems not to have crowded out the manufacturing branches, except in the UK

and USA, between the end of the '70s and the beginning of the '80s. This is in fact the only sub-period for which there seems to emerge a phase of de-industrialisation, though confined to the cases of these two countries.

2. The role of changes in intermediate coefficients in real output growth is much higher for service branches than for manufacturing. The sources of structural change leading to services growth emerge as being linked to both intermediate and final demand, whereas the output growth of manufacturing branches is mainly due to final (private and public) consumption. Unlike in manufacturing, foreign demand seems to have played a marginal role in the output growth of services, and this trend is confirmed in the 1990s, for which empirical evidence has recently been made available by OECD.

3. As far as the branch of KIBS is concerned, it emerges that the strong dynamics of real output growth have been sustained not only by final demand, but also particularly by the dramatic changes in the coefficients of intermediate demand. This confirms that KIBS represent the most important case of structural change driven by intermediate demand.

   It is worth to bear in mind that the results presented here might be affected by the following factors, which we have not been able to take in due account:

   (a) The use of a GDP rather than a sectoral deflator might distort the inter-sectoral differences of output;

   (b) Further, inter-sectoral differences in terms of openness to international trade might also affect the results, by having a deflating effect on manufacturing prices, as the manufacturing sector has a higher export propensity than services.

   Overall, the empirical evidence presented in this work can be interpreted in the light of both the Keynesian and the neo-Schumpeterian streams of literature, as it implies the co-presence of (and most likely a virtuous circle between) a sustained growth of patterns of final demand, especially private and public domestic consumption, and strong increases in the share of KIBS as intermediate inputs, following changes in the production organisation of most branches of the economy. These latter are in turn most likely to be due to the indirect impact of the shift in the technological paradigm toward ICT-related technologies.

However, the empirical investigation carried out in this paper does not allow direct examination of the nature of the changes in intermediate demand and their relationship with the ICT paradigm. Nevertheless, the empirical findings summed up above allow to infer some general characteristics of the determinants of structural change, which we formulate as working hypotheses for future steps of our research agenda. In particular:

(a) The growth and composition of demand ultimately shape the structural changes of sectoral output growth in advanced economies. At the meso-macro level of analysis and within an input-output framework, we have seen that a predominant role in determining the growth of services has to be attributed to the increase of demand for services as intermediate inputs for the whole economy (services themselves included).

(b) Final demand and technology are self-reinforcing in determining the growth dynamics of service firms[5], whereas intermediate demand factors account for the transmission of micro behaviours into macro-level consequences in terms of structural change. At the micro level of analysis, we expect favourable demand conditions to represent a necessary incentive for firms to respond to technological shocks, innovate and grow. On the contrary, we argue that the exploitation of technological opportunities, especially those provided by the pervasive use of Information and Communication Technologies, is not a sufficient condition for (service) firms and sectors to experience positive growth rates of output and employment.

To conclude, it seems all the more crucial to devote more effort to integrating - especially in the domain of services - Keynesian and neo-Schumpeterian 'lines of thought' (Verspagen, 2002a). Drawing upon the evidence presented in this work, we devote future steps of research to the formalisation of a model of macro-economic growth with evolutionary micro-founded structural change[6]. The model will be simulated on the basis of the actual (initial year) I-O intermediate coefficients at the first time-step. The consistence between the emerging simulation

[5]This evidence has been found by Cainelli et al. (2005)

[6]Lorentz, A. and M. Savona (2005) 'Demand, Technology and Growth of Services: A Growth Model with Evolutionary Micro-Founded Structural Change' (Mimeo, BETA ULP).

scenarios and the empirical results presented in this work will be discussed.

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A Appendix

Table 1: *S*ectors Included in the analysis

ISIC Rev.3	**Acronym**	**Industry**
1-14	AGRI	Agriculture, hunting, forestry, fishing, mining, and quarrying
15-16	FOOD	Food products, beverage and tabacco
17-19	TEXTILE	Textiles, textile products, leather and footwear
20-22	WOOD	Wood, wood products, cork, pulp, paper, paper products, printing and publishing
23-26	CHEM	Chemical, rubber, plastic, fuel products, and other non-metallic mineral products
27-35	MACHINERY	Basic and fabricated metal prod., machinery and equipments
36-37	MANEC	Manufacturing n.e.c.
40-45	ELEC	Electricity, Gas, Water and Construction
50-55	TRADE	Wholesale and retail trade; Hotels and restaurants
60-64	TRACOM	Transports, storage and communications
65-67	FINANCE	Financial Intermediation
70-74	KIBS	Real estate; Renting of machinery and equipment; computer and related; R&D; business services**
75-99	SOCIAL	Community; social; personal and other government services

**Business services (74) includes: Legal and Accounting; Engineering; Technical Consultancy; Marketing; Training; Cleaning; Security

Table 2: *I*–O Structural Decomposition of Average Annual Output Growth (constant prices*) % - Germany (1978-1995)(I)

Sectors	Gross Output	Intermediate demand	Consumption	Investment	Net export
1978-1986					
AGRI	-1.01	-1.90	-0.12	0.10	0.91
FOOD	-0.65	-0.27	-0.50	-0.18	0.30
TEXTILE	-1.15	0.69	-1.57	-0.22	-0.04
WOOD	0.26	-0.54	0.55	-0.33	0.57
CHEM	1.34	-0.06	0.55	0.18	0.67
MACHINERY	1.84	-0.22	0.46	0.70	0.90
MANEC	0.95	-0.48	0.73	-0.37	1.07
ELEC	1.08	0.26	0.79	-0.10	0.13
TRADE	0.58	-0.18	0.37	-0.07	0.46
TRACOM	2.15	-0.05	1.45	0.06	0.70
FINANCE	5.09	2.36	2.19	0.11	0.43
KIBS	5.77	2.71	2.69	0.12	0.25
SOCIAL	2.51	0.17	2.21	0.04	0.09
1986-1988					
AGRI	-5.07	-11.47	-0.40	0.09	6.70
FOOD	-1.86	-2.33	0.03	-0.14	0.58
TEXTILE	-1.04	-1.73	-0.57	3.20	-1.94
WOOD	3.54	0.55	2.64	0.76	-0.41
CHEM	0.82	-1.84	-0.44	1.25	1.85
MACHINERY	1.76	-0.68	0.78	2.03	-0.37
MANEC	4.21	1.08	0.23	3.19	-0.29
ELEC	0.48	-0.53	-0.23	1.08	0.17
TRADE	3.31	0.56	2.59	0.53	-0.37
TRACOM	3.78	1.57	2.13	0.53	-0.44
FINANCE	0.93	-1.93	2.08	0.67	0.11
KIBS	7.51	4.04	2.92	0.62	-0.07
SOCIAL	3.13	0.36	2.53	0.05	0.20
1988-1990					
AGRI	-1.70	-5.75	4.60	2.36	-2.90
FOOD	2.54	-1.90	4.10	-0.94	1.28
TEXTILE	0.94	-2.30	3.93	2.23	-2.93
WOOD	5.82	0.68	3.51	1.97	-0.34
CHEM	4.12	1.49	3.32	0.58	-1.28
MACHINERY	5.26	-1.08	2.06	4.40	-0.11
MANEC	6.04	0.96	3.57	1.26	0.25
ELEC	5.23	-0.40	1.29	4.39	-0.06
TRADE	5.73	0.19	3.82	1.06	0.66
TRACOM	4.43	-0.88	3.61	0.96	0.74
FINANCE	4.72	-1.23	4.50	1.41	0.04
KIBS	9.25	3.70	4.02	1.38	0.15
SOCIAL	2.22	0.29	1.93	0.12	-0.13

Source: OECD Input Output Tables, own calculation

* The figures have been deflated using the market prices index (base year 1985)

Table 3: *I*–O Structural Decomposition of Average Annual Output Growth (constant prices*) % - Germany(1978-1995)(II)

Sectors	Gross Output	Intermediate demand	Consumption	Investment	Net export
1990-1995					
AGRI	0.79	-4.20	1.05	2.27	1.67
FOOD	-2.10	-1.10	-1.06	0.61	-0.54
TEXTILE	-6.13	-2.02	-1.49	-0.66	-1.97
WOOD	0.61	-0.60	1.13	0.26	-0.19
CHEM	-1.93	-2.73	-0.84	1.56	0.08
MACHINERY	-1.12	0.53	0.00	-0.33	-1.32
MANEC	-6.16	-6.10	2.92	0.69	-3.67
ELEC	7.83	0.94	0.82	6.42	-0.34
TRADE	6.24	0.61	4.84	0.54	0.25
TRACOM	8.82	2.63	6.01	1.39	-1.22
FINANCE	9.12	4.54	4.59	1.24	-1.25
KIBS	4.99	1.20	2.12	1.83	-0.16
SOCIAL	27.28	6.78	20.21	0.68	-0.39
1978-1995					
AGRI	-1.01	-3.32	0.47	0.72	1.12
FOOD	-0.83	-0.83	-0.13	-0.03	0.16
TEXTILE	-2.19	-0.56	-0.83	0.26	-1.05
WOOD	1.51	-0.28	1.33	0.33	0.13
CHEM	0.59	-0.84	0.24	0.84	0.36
MACHINERY	1.40	-0.13	0.61	1.09	-0.17
MANEC	-0.56	-1.86	1.80	0.47	-0.97
ELEC	4.04	0.27	0.87	2.95	-0.05
TRADE	3.72	0.21	2.80	0.34	0.36
TRACOM	5.75	0.81	4.16	0.85	-0.07
FINANCE	7.55	2.12	4.77	1.00	-0.34
KIBS	8.76	3.07	4.05	1.53	0.11
SOCIAL	12.65	2.22	10.12	0.36	-0.06

Source: OECD Input Output Tables, own calculation

* The figures have been deflated using the market prices index (base year 1985)

Table 4: *I*–O Structural Decomposition of Average Annual Output Growth (constant prices*) % - The Netherlands (1972-1998) (I)

Sectors	Gross Output	Intermediate demand	Consumption	Investment	Net export
1972-1977					
AGRI	7.17	5.27	1.73	0.19	-0.02
FOOD	1.36	0.70	0.65	0.02	-0.01
TEXTILE	-5.85	0.75	-1.82	-0.70	-4.09
WOOD	2.29	0.90	3.85	0.30	-2.75
CHEM	6.99	1.24	1.75	0.04	3.96
MACHINERY	1.57	-0.51	2.08	1.39	-1.39
MANEC	3.64	-2.20	10.30	0.64	-5.10
ELEC	2.30	1.09	1.54	-0.62	0.28
TRADE	3.24	-0.06	2.27	0.13	0.91
TRACOM	2.00	-0.49	1.80	0.10	0.59
FINANCE	7.27	2.95	3.47	0.21	0.63
KIBS	8.16	1.44	4.81	1.62	0.29
SOCIAL	5.99	-0.03	5.95	-0.06	0.13
1977-1981					
AGRI	6.99	6.92	1.48	-2.03	0.62
FOOD	1.52	0.07	0.03	-0.46	1.88
TEXTILE	-5.60	-1.22	-3.99	-0.44	0.04
WOOD	1.02	-0.21	0.45	-0.56	1.35
CHEM	6.98	4.99	1.86	-1.41	1.54
MACHINERY	0.54	0.56	-0.64	-1.72	2.34
MANEC	1.56	-5.39	-3.50	-1.62	12.07
ELEC	2.60	0.70	1.80	-0.18	0.28
TRADE	0.65	0.20	-0.13	-0.29	0.87
TRACOM	3.34	0.49	0.60	-0.11	2.37
FINANCE	5.30	3.05	1.75	-0.51	1.01
KIBS	5.05	1.13	3.80	-0.53	0.65
SOCIAL	2.38	0.19	2.04	0.05	0.10
1981-1986					
AGRI	-1.10	-6.11	0.32	0.03	4.66
FOOD	0.69	-1.69	0.49	0.20	1.69
TEXTILE	1.04	0.87	0.92	0.97	-1.73
WOOD	1.67	-0.13	0.68	0.38	0.73
CHEM	-3.15	-2.47	-0.23	-0.49	0.05
MACHINERY	2.59	0.55	1.07	5.90	-4.93
MANEC	-0.10	-2.15	-0.11	1.56	0.60
ELEC	-0.98	-0.65	0.61	-0.68	-0.26
TRADE	2.24	0.36	0.28	0.75	0.85
TRACOM	1.01	0.10	0.68	0.24	-0.02
FINANCE	3.49	1.20	1.60	0.55	0.13
KIBS	5.31	1.20	3.54	0.60	-0.02
SOCIAL	0.32	0.07	0.18	0.02	0.05

Source: OECD Input Output Tables, own calculation

* The figures have been deflated using the market prices index (base year 1985)

Table 5: *I*–O Structural Decomposition of Average Annual Output Growth (constant prices) % - The Netherlands (1972-1998) (II)

Sectors	Gross Output	Intermediate demand	Consumption	Investment	Net export
1986-1998					
AGRI	-0.95	-1.86	-0.67	0.87	0.71
FOOD	0.27	-0.38	-1.18	0.03	1.80
TEXTILE	-1.32	-0.91	-0.24	1.01	-1.18
WOOD	2.30	0.26	0.39	0.90	0.75
CHEM	1.31	-0.10	-0.19	1.46	0.15
MACHINERY	2.71	1.97	-0.12	1.55	-0.69
MANEC	83.14	17.41	60.43	31.03	-25.73
ELEC	4.39	1.68	-0.16	2.87	0.00
TRADE	7.86	2.32	2.68	0.88	1.98
TRACOM	5.56	0.23	3.59	0.52	1.23
FINANCE	7.19	0.72	5.38	1.24	-0.15
KIBS	18.00	9.66	6.08	3.40	-1.14
SOCIAL	6.23	1.93	4.70	0.46	-0.86
1972-1998					
AGRI	1.82	-0.59	0.01	0.47	1.93
FOOD	0.84	-0.36	-0.44	0.02	1.62
TEXTILE	-2.07	-0.57	-0.62	0.21	-1.09
WOOD	2.42	0.07	1.36	0.61	0.38
CHEM	2.74	0.35	0.54	0.56	1.29
MACHINERY	2.60	0.98	0.66	2.23	-1.27
MANEC	50.91	6.62	39.09	18.77	-13.58
ELEC	3.15	0.95	0.88	1.25	0.07
TRADE	6.31	1.22	2.45	0.77	1.86
TRACOM	4.74	0.05	3.04	0.37	1.29
FINANCE	10.47	1.96	6.96	1.28	0.28
KIBS	23.09	8.23	11.19	4.14	-0.47
SOCIAL	6.12	1.09	5.17	0.38	-0.53

Source: OECD Input Output Tables, own calculation

* The figures have been deflated using the market prices index (base year 1985)

Table 6: *I*–O Structural Decomposition of Average Annual Output Growth (constant prices*) % - UK (1968-1990) (I)

Sectors	Gross Output	Intermediate demand	Consumption	Investment	Net export
1968-1979					
AGRI	6.54	3.96	0.52	0.79	1.27
FOOD	4.02	1.11	2.50	0.27	0.15
TEXTILE	-1.25	-0.52	0.45	0.41	-1.59
WOOD	2.29	-0.38	2.21	0.87	-0.41
CHEM	4.82	1.29	2.69	1.09	-0.25
MACHINERY	0.85	-0.76	1.20	1.47	-1.06
MANEC	7.29	2.96	4.41	0.84	-0.93
ELEC	3.16	1.12	1.44	0.61	0.00
TRADE	4.18	0.68	2.54	0.71	0.26
TRACOM	3.04	0.10	2.27	0.69	-0.02
FINANCE	2.03	0.27	-0.21	1.34	0.64
KIBS	4.15	2.19	1.42	0.43	0.11
SOCIAL	6.00	1.22	4.51	0.22	0.04
1979-1984					
AGRI	3.85	-0.52	-1.20	-0.75	6.31
FOOD	-2.65	-0.48	-2.53	-0.36	0.72
TEXTILE	-5.75	-0.34	-2.01	-0.24	-3.17
WOOD	-1.57	0.31	-1.46	0.93	-1.36
CHEM	-1.34	0.90	-0.33	-0.87	-1.04
MACHINERY	-3.52	-0.24	-0.24	-1.29	-1.75
MANEC	-6.77	-1.49	-1.50	-0.63	-3.15
ELEC	0.72	-0.24	-0.24	1.29	-0.08
TRADE	-0.51	-2.02	2.01	-0.50	0.00
TRACOM	-2.22	-0.64	0.75	-0.38	-1.95
FINANCE	8.61	5.55	0.63	2.41	0.02
KIBS	12.95	12.87	0.03	-0.25	0.30
SOCIAL	1.53	-2.46	4.13	0.04	-0.17
1984-1990					
AGRI	-6.19	-4.81	0.69	0.83	-2.91
FOOD	-1.19	-0.17	-0.84	0.17	-0.34
TEXTILE	-1.07	0.05	1.65	-0.47	-2.31
WOOD	4.01	1.69	5.24	-1.03	-1.90
CHEM	-1.36	-2.77	1.06	0.96	-0.61
MACHINERY	2.72	0.19	2.00	1.75	-1.22
MANEC	1.99	-4.23	12.81	0.77	-7.37
ELEC	6.91	2.15	1.48	3.65	-0.37
TRADE	5.53	2.36	3.88	0.70	-1.42
TRACOM	7.86	3.69	4.81	-0.62	-0.02
FINANCE	9.85	10.70	7.90	-8.45	-0.30
KIBS	15.11	11.54	4.64	1.29	-2.37
SOCIAL	9.00	1.77	7.65	-0.02	-0.39

Source: OECD Input Output Tables, own calculation

* The figures have been deflated using the market prices index (base year 1985)

Table 7: *I*–O Structural Decomposition of Average Annual Output Growth (constant prices*) % - UK (1968-1990) (II)

Sectors	Gross Output	Intermediate demand	Consumption	Investment	Net export
1990-1998					
AGRI	-1.48	-2.92	1.24	0.42	-0.22
FOOD	3.98	-1.32	5.59	0.01	-0.31
TEXTILE	0.93	-3.08	3.90	0.43	-0.33
WOOD	-1.02	-2.96	0.36	-0.11	1.69
CHEM	2.89	-0.57	2.98	0.28	0.20
MACHINERY	0.68	0.08	0.14	1.12	-0.67
MANEC	35.33	8.22	14.63	13.64	-1.16
ELEC	-0.94	0.15	-0.62	-0.56	0.09
TRADE	5.11	-0.40	3.88	0.26	1.37
TRACOM	5.23	1.32	3.00	0.23	0.68
FINANCE	3.30	-0.47	2.44	0.19	1.13
KIBS	19.54	5.60	11.19	0.65	2.09
SOCIAL	4.40	1.62	2.42	0.17	0.20
1968-1998					
AGRI	0.46	-1.36	0.14	0.37	1.31
FOOD	1.77	-0.10	1.80	0.02	0.05
TEXTILE	-1.27	-0.80	0.61	0.09	-1.18
WOOD	1.05	-0.75	1.76	0.16	-0.12
CHEM	2.05	-0.37	2.35	0.39	-0.32
MACHINERY	0.35	-0.41	0.95	0.90	-1.10
MANEC	13.68	1.98	10.25	5.33	-3.88
ELEC	2.75	0.79	0.74	1.30	-0.07
TRADE	5.57	0.18	4.54	0.43	0.41
TRACOM	4.92	0.74	4.20	0.06	-0.07
FINANCE	8.40	3.37	5.56	-1.53	0.99
KIBS	35.74	11.35	20.91	2.34	1.14
SOCIAL	9.07	0.74	8.22	0.15	-0.04

Source: OECD Input Output Tables, own calculation

* The figures have been deflated using the market prices index (base year 1985)

Table 8: *I*–O Structural Decomposition of Average Annual Output Growth (constant prices*) % - USA (1972-1990)(I)

Sectors	Gross Output	Intermediate demand	Consumption	Investment	Net export
1972-1977					
AGRI	9.63	4.66	4.36	0.59	0.02
FOOD	2.57	0.09	1.97	0.15	0.35
TEXTILE	0.88	-1.15	1.38	0.97	-0.33
WOOD	4.40	0.54	2.95	0.84	0.07
CHEM	11.58	5.08	5.39	1.57	-0.46
MACHINERY	4.94	0.51	1.53	2.43	0.46
MANEC	3.41	-0.28	4.11	0.76	-1.18
ELEC	4.24	1.62	1.70	0.95	-0.02
TRADE	5.14	0.88	2.86	0.92	0.47
TRACOM	5.01	0.75	3.01	0.59	0.66
FINANCE	3.54	0.02	3.17	0.27	0.08
KIBS	2.32	-1.23	2.78	0.55	0.22
SOCIAL	5.01	0.72	3.92	-0.25	0.62
1977-1982					
AGRI	4.08	2.04	2.30	-0.39	0.13
FOOD	0.00	-0.44	0.62	-0.18	0.00
TEXTILE	-3.65	-1.66	0.34	-1.46	-0.87
WOOD	0.08	-1.12	1.30	-0.40	0.29
CHEM	2.33	0.11	2.78	-0.83	0.27
MACHINERY	-1.74	-1.41	0.46	-0.54	-0.25
MANEC	-0.45	-0.82	1.08	0.68	-1.39
ELEC	4.44	1.17	1.44	1.88	-0.06
TRADE	0.92	0.13	0.87	-0.20	0.12
TRACOM	2.15	0.38	1.56	-0.21	0.42
FINANCE	5.49	1.40	3.43	-0.03	0.69
KIBS	4.53	1.84	2.69	-0.06	0.06
SOCIAL	4.19	0.17	3.32	0.41	0.30
1982-1985					
AGRI	-5.01	-6.81	1.89	0.69	-0.78
FOOD	-1.01	-1.72	0.92	0.28	-0.49
TEXTILE	-0.22	1.17	2.60	0.91	-4.89
WOOD	3.99	0.43	4.12	0.99	-1.55
CHEM	-1.57	-2.27	1.05	1.12	-1.48
MACHINERY	4.32	-0.62	6.00	2.77	-3.83
MANEC	-4.97	-0.87	2.95	-2.55	-4.51
ELEC	0.68	-2.07	1.99	0.92	-0.16
TRADE	4.04	-0.91	4.54	0.77	-0.37
TRACOM	2.94	-1.33	4.73	0.43	-0.90
FINANCE	5.18	-0.41	5.45	0.29	-0.15
KIBS	7.94	1.98	5.90	0.46	-0.41
SOCIAL	6.54	1.75	3.98	0.58	0.23

Source: OECD Input Output Tables, own calculation

* The figures have been deflated using the market prices index (base year 1985)

Table 9: *I*–O Structural Decomposition of Average Annual Output Growth (constant prices*) % - USA (1972-1990)(II)

Sectors	Gross Output	Intermediate demand	Consumption	Investment	Net export
1985-1990					
AGRI	-0.82	-3.01	0.79	1.15	0.25
FOOD	1.48	-0.72	1.81	0.02	0.36
TEXTILE	-0.86	-0.86	1.51	0.65	-2.15
WOOD	5.26	0.77	2.68	0.51	1.30
CHEM	1.61	-0.72	1.58	0.45	0.29
MACHINERY	0.79	-0.02	-0.70	0.44	1.06
MANEC	5.83	0.56	6.44	1.49	-2.66
ELEC	0.48	-0.84	1.16	0.08	0.08
TRADE	5.86	0.73	4.63	0.15	0.35
TRACOM	2.81	-0.03	1.35	0.32	1.17
FINANCE	7.93	-0.34	7.77	0.08	0.42
KIBS	5.80	1.83	3.39	0.36	0.21
SOCIAL	2.88	-1.14	5.77	-0.26	-1.49
1990-1997					
AGRI	1.35	-0.70	0.45	1.79	-0.20
FOOD	1.33	-0.09	1.01	0.37	0.05
TEXTILE	0.43	-0.98	3.88	0.78	-3.25
WOOD	-0.37	-0.40	-0.04	0.76	-0.69
CHEM	1.37	-0.68	1.03	1.38	-0.37
MACHINERY	3.62	0.20	-0.04	4.46	-0.99
MANEC	23.36	5.38	12.41	11.80	-6.23
ELEC	2.11	-0.60	-0.69	3.39	0.00
TRADE	4.46	0.71	2.37	1.21	0.17
TRACOM	6.34	1.16	4.04	1.12	0.02
FINANCE	10.33	2.24	6.94	0.71	0.44
KIBS	7.34	0.60	4.06	2.39	0.29
SOCIAL	2.51	-0.90	2.49	0.26	0.66
1972-1997					
AGRI	2.26	-0.38	1.70	1.04	-0.10
FOOD	1.13	-0.39	1.29	0.14	0.09
TEXTILE	-0.65	-0.72	1.63	0.25	-1.82
WOOD	2.74	-0.09	2.23	0.71	-0.11
CHEM	3.94	0.25	3.00	1.07	-0.38
MACHINERY	2.70	-0.21	1.00	2.48	-0.58
MANEC	9.23	1.01	7.43	4.65	-3.87
ELEC	3.10	-0.03	0.89	2.25	-0.01
TRADE	6.00	0.51	4.24	1.00	0.25
TRACOM	5.91	0.39	4.26	0.79	0.47
FINANCE	12.63	0.99	10.35	0.68	0.61
KIBS	9.17	0.95	6.16	1.81	0.26
SOCIAL	5.73	-0.17	5.64	0.17	0.09

Source: OECD Input Output Tables, own calculation

* The figures have been deflated using the market prices index (base year 1985)

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