PRELIMINARY AND INCOMPLETE
PLEASE DO NOT QUOTE

Does the interaction between service and manufacturing explain the recent trends in export specialisation? A look at the evidence from the EU

Novella Bottini[*] and Lucia Tajoli[#]

August 2010

Abstract

In the context of globalization, the interdependence between services (and in particular knowledge-intensive business services, KIBS) and manufacturing has sharply increased. In this paper, we examine whether the use and availability of business services played a role in the EU export specialisation in the last decades. The hypothesis that we want to test is that export specialization in high-quality and high-technology products is facilitated if adequate services are available, simplifying the production and distribution coordination issues.
From the Input-Output tables at the country level, we build indices on the utilisation of business service in each sector, to compare the sectors' KIBS content and their dynamic. From the export specialisation index computed at the country level using the 'Balassa index of Revealed Comparative Advantage (RCA)', we identify the country's export specialisation pattern, and we examine how this is related to the KIBS content of different sectors. Through an econometric exercise, we test whether the KIBS utilisation helps to explain the export specialisation pattern.

Keywords: RCA, services, export

JEL Codes: F10, F14

[*] LIUC University and OECD
[#] Politecnico di Milano and KITeS Bocconi. Financial support from KITeS research grants is gratefully acknowledged.

1. Introduction

In the last decades many European countries moved towards a deindustrialisation of their economies that results in an increasing importance of the service sector: the share of services (as defined by NACE Sections G to P) in EU-25 GDP rose between 1995 and 2005 from 60.5 % to 63.8 % (Eurostat, 2006). The extent of the phenomenon is quite differentiated between countries, and it can have different motivations. It has been argued that the demand for services as intermediate goods from the manufacturing sector is one of the major determinants of growth in services (Bhagwati, 1984). Indeed, the growing complexity in the organisation of manufacturing production and distribution resulting from the relocation abroad of different production stages, and the significant increase in coordination problems has increased the service content of many manufacturing goods (Guerrieri and Meliciani, 2005). In this context the interdependence between service (and in particular knowledge-intensive business services, KIBS) and manufacturing has sharply increased (OECD, 2005). On average across countries, about 45% of gross output produced by business-related services industries is used as intermediate input by other industries (Woelf, 2003). Within the EU-25, transport, logistics and postal services account for approximately 25 % of all purchases of services, followed by renting and operational leasing, marketing and sales, and ICT, which also accounted for double-digit shares (Eurostat, 2006).

Some theoretical models suggest that especially exported goods and goods produced through international fragmentation of production are likely to be very service-intensive. Marrewijk et al. (1997) present a model where comparative advantage in goods is not only determined by relative factor intensities, but also by the number and technology of services available. Jones and Kierzkowski (1990, 2001) show that international fragmentation of production requires service inputs to connect the different production phases across countries. New forms of internationalization are generally service intensive, because of the need to coordinate production and commercialization processes taking place across many countries (Deardorff, 2001). Therefore, as the degree of "internationalization" of many goods has increased, either because the relevance of exports increased or because the use of international fragmentation of production has become widespread, we expect services to play an increasing role as inputs, and as determinants of countries' comparative advantages.

In this paper, we examine the export specialisation of a number of EU countries and whether the availability of business services played a role in this process. The focus on these countries is because services can play a key role in exports especially for high-income countries, as suggested by Francois and Reinert (1996). The existing evidence seems to indicate that for firms using business services, the proximity of the service provider matters. According to Eurostat (2006), in 2003 the main external service provider of a firm was located in the same region of the firm in more than 70% of the cases. Similar percentages held also for the provision of KIBS.[1] The hypothesis that we want to test is whether service availability and abundance (in particular of KIBS) is a source of comparative advantage in service-intensive sectors and in service-intensive forms of internationalization. In particular, the move towards more high-quality and high-technology

[1] A strong local and regional characterization of KIBS in Europe is confirmed also by Corrocher and Cusmano (2010).

products could be facilitated if adequate services are available, as this would also simplify the production and distribution coordination issues.

2. Stylized facts on the use of KIBS

In order to assess the service intensity of different industries in EU countries, we use the information provided by the Input-Output (I-O) tables, displaying the nominal value of the service inputs used in each industry. From the Input-Output tables provided by the OECD for the year 2005 at the country level we build indices on the utilisation of business service in each sector, by computing the value of service inputs from sector 72 (Computer and related activities), sector 73 (Research and development) and sector 74 (Other business activities) over gross output or value added, producing two measures of KIBS intensity.[2]

In what follows, we will use the following definitions:

$(KIBS/VA)_{ij}$ = value of KIBS inputs from sector 72, 73, 74 in sector i / value added in sector i

$(KIBS/OUT)_{ij}$ = value of KIBS inputs from sector 72, 73, 74 in sector i / gross output of sector i

with j referring to the country examined.

The first general observation is that there is quite some variation across sectors and across countries in terms of the use of KIBS. There are also a few differences emerging according to the indicator used, even if the correlation between the two measure is quite high (Table 1). In terms of both service intensity indices, the KIBS sectors themselves are the ones absorbing more KIBS. But not all service sectors are KIBS-intensive, and there are quite a few manufacturing sectors that are highly KIBS intensive on average (see Figure 1). In particular, in terms of the weight over value added, Communication equipment (code 32), Office and accounting machinery (code 30), Fuels (code 23), Other transport equipment (code 35), Food and beverages (code 15-16) and Chemicals (code 24) display a high average KIBS intensity, which is confirmed also looking at the data at the individual country level for most countries. Supporting the view that the use of KIBS is strongly related to the process of internationalization, it can be observed that according to WTO calculations (also based on the OECD I-O Tables), the sectors with the higher index of international fragmentation of production are Office and accounting machinery, Communication equipment, Medical and precision instruments, Electrical Machinery and Chemicals (see WTO, World Trade Report 2008). Indeed, as the theoretical models suggest, there seem to be a strong correlation between IFP and use of KIBS.

At the sector level, there is also a positive correlation between export values and KIBS intensity. When regressing both measures of KIBS intensity on the value exported at the country and sector level, and controlling for sectors' characteristics, the amount of exports is positively and

[2] From the I-O tables of the OECD it is possible to compute both the value of domestic KIBS used in the different sectors and the total value of KIBS inputs. The correlation between the two measures of KIBS utilization is very high, 0.87. In most of the paper we use the measure referring to domestic KIBS, as we want to stress the role of local availability of these services.

significantly correlated to the use of KIBS (Table 2). In other words, the most traded goods display a use of KIBS higher than average. In the same regression, when introducing a measure of the degree of the so-called vertical specialization, computed as the import content of exports (OECD, 2007), to explain the KIBS/VA ratio, this also displays a positive and significant coefficient, showing that more internationalized goods tend to be more KIBS intensive.

Considering differences among countries, in terms of KIBS/VA, in Belgium, Germany, Denmark, France, Ireland, Netherlands, and Sweden on average industries tend to be more KIBS intensive than in the rest of the EU, and this is true also for UK and Italy when we consider the KIBS/OUT indicator (see Figure 2). Unsurprisingly, these are the countries where the service sector is more developed in terms of overall employment and share over GDP.

[FIGURE 1 and 2 ABOUT HERE]

TO BE COMPLETED

3. Hypothesis and empirical tests

Is the pattern described above on the use and availability of KIBS related with the export performance of countries? If indeed the need of services to compete on the international markets and to set up an international network of production for some goods is more and more crucial, as suggested by some of theoretical models mentioned earlier, the availability of the appropriate services should convey an advantage especially to the sectors that are using them more intensively. This is the hypothesis that we are going to test for our sample of EU countries.

The empirical test is based on the theoretical framework proposed by Marrewijk et al. (1997). In their model, the production function of each final good is described by the following expression:

$$Z = K_z^{\alpha z} \; L_z^{\beta z} \; [(\Sigma_1^n \; S_{iz}^{\gamma} \;)^{1/\gamma}] \; _z^{\delta z}$$

where Z is one of the goods produced, K and L are capital and labor inputs in production, respectively, and the expression in parenthesis $(\Sigma_1^n \; S_{iz}^{\gamma} \;)^{1/\gamma}$ measures a variety of differentiated producer services S_i (which are imperfect substitutes for each other) used in the production of good Z. In the model, the hypothesis is that $\alpha_z + \beta_z + \delta_z = 1$, and α_z , β_z , and $\delta_z > 0$. Service production instead is characterized by increasing returns to scale and requires the use of labor only. The model reduces to the usual Heckscher-Ohlin framework if neither final goods sector uses services as production inputs. Completing the description of the economy with the factor endowments constraints and Cobb-Douglas preferences, the model shows that the production levels of the final goods depend on national factor endowments of K and L (as in the standard Heckscher-Ohlin model), but also on the cost and availability of production services. The autarky price expression includes factors' endowment, factors' intensities and parameters of the production of services, as well as on other parameters of the model. Therefore, in this model, the comparative advantages of a country depend on a complex combination in the use of factors and services.

3.1 The relationship between KIBS and revealed comparative advantages

From the above theoretical framework, we derive the expression that we test empirically: we regress an index of comparative advantage on sectors' intensity in the use of labor, capital and services, controlling for the country's characteristics in terms of endowment of production factors and services. In our sample we include 19 European countries and 19 manufacturing sectors. We focus on manufacturing sectors only as measures of comparative advantage for services present a number of problems,[3] and furthermore the interaction between service availability and performance in exports of manufacturing is the main issue we want to observe. The level of disaggregation is

[3] Traditional export flows represent only one of the modes of internationalization of services, and possibly not the main one. Therefore, measures of comparative advantage based on export values are generally not adequate for services, and these measures are poorly comparable for manufacture and service sectors.

constrained by the manufacturing sectors included in the I-O tables, which is 2-digit of ISIC Rev.3. In fact, we use I-O tables to compute the capital intensity and the labor intensity of production in each sector and in each country, as well as the intensity in the use of KIBS, computed as described in section 2 (see the Appendix for an exact definition of the variables and sources).

The measure of comparative advantage used is the Balassa index of revealed comparative advantage (RCA), computed at the sector and country level as follows:

$$RCA_{ij} = (x_{ij}/x_{iw})/(X_j/X_w)$$

where (x_{ij}/x_{iw}) is the country's share of exports in sector i over world exports in the same sector, and (X_j/X_w) is the country's share of total exports on world total exports. It is well known that there are many problems in using this index as a dependent variable in a regression, as this measure is asymmetric and not normally distributed. Therefore, as a robustness check of our results, we also use a transformation of the RCA index (as suggested by De Benedictis, 2005), that makes the index symmetric, and that we call symmetric comparative advantage (SCA) index:

$$SCA_{ij} = (RCA_{ij} - 1)/(RCA_{ij} + 1)$$

Also measuring the "endowment" or the availability of KIBS for a given country is not an obvious task. We tested some different measures, referring to the employment in the KIBS sectors, to its output and to the number of firms operating in these sectors.[4] These measures appear all quite correlated, but we preferred to use the employment in the KIBS sectors over total active population ($KIBSrelempl_j$), as this is the one most in line with the theoretical model, where the use of labor in the service sector is affecting the final equilibrium result.

In introducing both sectors' technological characteristics and countries' characteristics, we followed the suggestion by Romalis (2004) to interact the sector intensity of use of a given production factor with the relative abundance of that factor in the exporting country, to estimate correctly the interaction presented in the theory between factor endowments and intensities. Unfortunately, data on factors' endowment are scarce, especially with respect to the capital stock, and the measure of K/L that we built presents measurement problems and missing data. Furthermore, the European countries in out sample exhibit a relatively low variance in terms of factor endowment. Therefore, we also used the GDP per capita of the countries in our sample as a proxy of differences in relative factor endowment. In addition, to avoid measurement problems with some of the control variables, we also made estimates controlling for sectors and countries' characteristics using sector and country dummies.

[4] For example, Debaere et al. (2009) use the number of service firms located in a region to measure the service market thickness in Ireland.

The results of our estimates are reported in Tables 4 and 5. Estimate results are very similar when using KIBS/VA or KIBS/OUT to measure the intensity in the use of KIBS, and for both specifications of our dependent variable, the measure of comparative advantage. In all cases, KIBS intensity is negatively and significantly associated with the RCA index. It seems that in general for European countries, when production of a good requires a relatively large amount of KIBS inputs, it is more difficult to export it successfully. But when interacting the KIBS intensity with the availability of KIBS in the country, the result is clearly reversed: if a manufactured good is KIBS intensive and the country has a large share of the population employed in the KIBS sectors, it will tend to display a comparative advantage in those goods, as the positive and significant coefficient of the interacted terms shows. This result is robust to the introduction of sector and country dummies, which increase remarkably the explanatory power of the regression, but do not reduce the role of KIBS in influencing countries' comparative advantages. Furthermore, the same result holds when running the regression only on sectors that are relatively KIBS intensive (in our case, sectors displaying a KIBS/VA higher than average) and when running the regression only on sectors that display a comparative advantage (with RCA > 1). Overall, the use of KIBS seems indeed to play a significant role in determining the comparative advantage of the European countries, with a positive effect for the countries with a large production of these inputs.

3.2 Imports of KIBS inputs

Of course, services are not production factors, and the assumption that they are immobile across countries is a very strong one, especially within the highly integrated European market. Therefore, measuring the availability of KIBS in a country considering only their domestic production can underestimate them quite sensibly. The OECD I-O tables allow to measure the amount of KIBS imported as inputs in each sector and in each country. On average, imported KIBS inputs amount to about 0.22 of total use of KIBS as inputs, with a large variability across sectors, and even more across countries. A few European small countries import about half of the KIBS inputs they use (this is the case for Ireland, Luxemburg and Slovakia). Instead, countries with a share of imported KIBS inputs much lower than the average are either large one (such as Germany, France and UK), or are probably specialized in goods not absorbing many KIBS (such as Greece, Portugal, Poland).[5] At the sector level, the sectors absorbing more imported KIBS are also the most KIBS-intensive sectors in general.

In any case, given that the amount of imported KIBS inputs is not negligible, we added in our regression a measure of the imported KIBS in addition to the measure of domestic KIBS production, to control for the overall KIBS availability in the country. In these regressions, the measure of KIBS intensity is computed using the total use of KIBS (domestic and imported). The results are reported in Table 6. We observe that imports of KIBS inputs always have a positive and significant effect of the countries' comparative advantage. Also in this case the positive and

[5] The evidence on large countries importing relatively less KIBS is in line with the results of the theoretical model presented in section 3, that suggests that as the service sector absorbs part of the labor force, the size of the population matters in determining the country's specialization through the interaction between manufacturing and services.

significant result of imported KIBS is robust to different specifications and estimation techniques. Therefore, it is confirmed that even if the KIBS intensity *per se* makes exports more difficult, the availability of KIBS, even if imported, can foster export competitiveness.

4. Conclusion

The empirical evidence provided supports the idea that knowledge-intensive business services are important in influencing countries' performance in exporting manufactured goods. In international markets, many goods absorb a large amount of service inputs, and countries that are able to provide efficiently these services are better off as exporters. This seems to be the case for European manufactures, for whom the service content of goods appear as a key variable of comparative advantage.

If the availability of KIBS is not sufficiently large domestically, the option of importing such service inputs seems important to enhance the export performance of a country. For many small countries, importing KIBS is not even an option, but a necessity if they want to perform as manufacturers. The share of imported KIBS inputs for some small EU countries appear indeed very high. In this respect, the European process of integration of the business service market, expanding the availability of KIBS also for those countries not specialized in their production, could bring about a significant improvement in the EU overall international competitiveness in the world markets.

References

Bhagwati J.N. (1984), Splintering and disembodiment of services and developing nations. The World Economy, 7, 133-143.

Corrocher N. and L. Cusmano (2010), The "KIBS engine" of regional innovation systems: empirical evidence from European regions, mimeo.

Deardorff A.V. (2001), International provision of trade services, trade and fragmentation, Journal of International Economics, 9, 233-248.

Debaere P., H. Görg and H. Raff (2009), Greasing the wheels of international commerce: service market thickness and firms international sourcing, mimeo.

De Benedictis L. (2005), "Three decades of Italian comparative advantages", *The World Economy*, 28 (11), 1679-1709.

Eurostat (2006), The demand for services: external but local provision, Statistics in focus 26/2006.

Francois J.F. and K.A. Reinert (1996), The role of services in the structure of production and trade: stylized facts from a cross-country analysis, Asia-Pacific Economic Review 2.

Guerrieri P. and, V. Meliciani, Technology and international competitiveness: The interdependence between manufacturing and producer services, Structural Change and Economic Dynamics 16, 489–502.

Jones**,** R. W. and Kierzkowski, H. (1990), The role of services in production and international trade: A theoretical framework, in R. W. Jones and A. Krueger

Markusen J.R. (1989), Trade in producer services and in other specialized intermediate inputs, American Economic Review 79, 85-95.

Marrewijk C., J. Stiborab, A. de Vaal', J.-M. Viaene (1997), Producer services, comparative advantage, and international trade patterns, Journal of International Economics, 42, 195-220

Romalis J. (2004), Factor proportions and the structure of commodity trade, American Economic Review, 94, 1, 67-97.

Appendix 1 – Variables definitions and sources

Kibs/va $_{ij}$: value of domestic KIBS inputs from sector 72, 73, 74 in sector i/value added in sector i, computed from OECD Input-Output tables.

totKIBS/va $_{ij}$: value of total KIBS inputs from sector 72, 73, 74 in sector i/value added in sector i, computed from OECD Input-Output tables.

Kibs/out $_{ij}$: value of domestic KIBS inputs from sector 72, 73, 74 in sector i/gross output in sector i, computed from OECD Input-Output tables.

totKIBS/out $_{ij}$: value of total KIBS inputs from sector 72, 73, 74 in sector i/gross output in sector i, computed from OECD Input-Output tables.

impKIBS/va $_{ij}$: value of imported KIBS inputs from sector 72, 73, 74 in sector i/value added in sector i, computed from OECD Input-Output tables.

impKIBS/out $_{ij}$: value of imported KIBS inputs from sector 72, 73, 74 in sector i/gross output in sector i, computed from OECD Input-Output tables.

Labor share $_{ij}$: total labor compensation /value added, computed from OECD Input-Output tables.

Capital share $_{ij}$: 1 – labor share

Exp_{ij} or x_{ij} : value of exports of country j in sector i

$GDPpc_j$: GDP per capita in purchasing power standards of country j, from Eurostat

emplKIBS/emplManuf $_j$: number of people employed in the KIBS sectors / number of people employed in manufacturing, from Eurostat.

emplKIBS/activepop $_j$ or KIBSrelempl $_j$: : number of people employed in the KIBS sectors / number of people in the active population, from Eurostat.

fimsKIBS/firmManuf $_j$: number of firms in the KIBS sectors / number of firms in manufacturing sectors, from Eurostat.

VAKIBS/VAManuf $_j$: value added in the KIBS sectors / value added in manufacturing sectors, from Eurostat.

The letter i represent a manufacturing sector and the letter j represents the country. The countries included in our sample are Belgium, Czech Republic, Denmark, Germany, Ireland, Greece, Spain, France, Italy, Luxembourg, Hungary, Netherlands, Austria, Poland, Portugal, Slovakia, Finland, Sweden, United Kingdom.
Unless otherwise indicated, all figures are for the year 2005.

I-O table Sector code (isic Rev 3)	I-O table sector description
1500	C01T05 Agriculture, hunting, forestry and fishing
1014	C10T14 Mining and quarrying
1516	C15T16 Food products, beverages and tobacco
1719	C17T19 Textiles, textile products, leather and footwear
20	C20 Wood and products of wood and cork
2122	C21T22 Pulp, paper, paper products, printing and publishing
23	C23 Coke, refined petroleum products and nuclear fuel
24	C24 Chemicals and chemical products
25	C25 Rubber and plastics products
26	C26 Other non-metallic mineral products
27	C27 Basic metals
28	C28 Fabricated metal products except machinery and equipment
29	C29 Machinery and equipment n.e.c
30	C30 Office, accounting and computing machinery
31	C31 Electrical machinery and apparatus n.e.c
32	C32 Radio, television and communication equipment
33	C33 Medical, precision and optical instruments
34	C34 Motor vehicles, trailers and semi-trailers
35	C35 Other transport equipment
3637	C36T37 Manufacturing n.e.c; recycling
4041	C40T41 Electricity, gas and water supply
45	C45 Construction
5052	C50T52 Wholesale and retail trade; repairs
55	C55 Hotels and restaurants
6063	C60T63 Transport and storage
64	C64 Post and telecommunications
6567	C65T67 Finance and insurance
70	C70 Real estate activities
71	C71 Renting of machinery and equipment
72	C72 Computer and related activities
73	C73 Research and development
74	C74 Other Business Activities
75	C75 Public admin. and defence; compulsory social security
80	C80 Education
85	C85 Health and social work
9093	C90T93 Other community, social and personal services
95	C95 Private households with employed persons

Table 1 – Correlations of the KIBS intensity measures
(manufacturing sectors in 19 countries, 357 observations)

	Kibs/va(ij)	Kibs/out(ij)	Labor share(ij)	Capital share(ij)	Exp(ij)
Kibs/va(ij)	1				
Kibs/out(ij)	0.7127	1			
Labor share(ij)	0.2124	0.2834	1		
Capital share(ij)	-0.2069	-0.2829	-0.9590	1	
Exp(ij)	0.2395	0.2624	0.0672	-0.0596	1

Table 2 – KIBS intensity and exports

Dependent variable: KIBS/VA(ij)		**Dependent variable: KIBS/OUT(ij)**	
Independent variables		**Independent variables**	
Exp(ij)	1.24e-12*** (3.23e-13)	Exp(ij)	3.39e-13*** (7.99e-14)
Kshare(ij)	-0.0459 (0.0318)	Kshare(ij)	-0.0097 (0.0082)
Lshare(ij)	0.10114*** (0.0323)	Lshare(ij)	0.0195** (0.0084)
GDPpc(j)	-5.27e-07 (4.18e-07)	GDPpc(j)	-3.04e-08 (1.09e-07)
Sector dummies	yes	Sector dummies	yes
R-squared	0.2355	R-squared	0.2539
No. observations	357	No. observations	357

Note: OLS estimates with robust standard errors (in parenthesis). *** significant at 99%, ** significant at 95%, * significant at 90%.

Table 3 – Correlation between KIBS availability measures

	emplKIBS/emplManuf	emplKIBS/activepop	fimsKIBS/firmManuf	VAKIBS/VAManuf
emplKIBS/emplManuf	1			
emplKIBS/activepop	0.7959	1		
fimsKIBS/firmManuf	0.6044	0.7368	1	
VAKIBS/VAManuf	0.8764	0.7998	0.5625	1

Table 4 - Regression results for RCA

	Dependent variable: RCA(ij)			
Independent variables				
Kshare(ij)	0.7099** (0.3189)	0.7900** (0.3510)	0.9735** (0.3825)	1.2277*** (0.4385)
Lshare(ij)	0.2885 (0.2269)	0.4212* (0.2499)	0.4128 (0.3413)	0.6536* (0.3756)
(KIBS/VA)ij	-2.5494** (1.1750)		-3.8033** (1.6906)	
(KIBS/VA)ij * KIBSrelempl(j)	20.4399* (10.9688)		34.6516** (16.0310)	
(KIBS/OUT)ij		-11.9067*** (4.5259)		-27.3852*** (7.6626)
(KIBS/OUT)ij* KIBSrelempl(j)		88.25065* (49.5134)		243.3415*** (82.7634)
GDPpc(j)	-4.07e-06 (6.65e-06)	-5.95e-06 (6.93e-06)		
constant	0.8391** (0.3700)	0.8283** (0.3788)		
Sector dummies			yes	yes
Country dummies			yes	yes
R-squared	0.0205	0.0295	0.2358	0.2556
No. observations	357	357	357	357

Note: OLS estimates with robust standard errors (in parenthesis). *** significant at 99%, ** significant at 95%, * significant at 90%.

Table 5 - Regression results for the symmetric comparative advantage index (SCA)

	Dependent variable: SCA(ij)			
Independent variables				
Kshare(ij)	0.0705 (0.1224)	0.1611 (0.1263)	0.3710** (0.1535)	0.4443*** (0.1516)
Lshare(ij)	-0.0448 (0.0889)	0.0523 (0.0916)	0.0086 (0.1254)	0.1003 (0.1253)
(KIBS/VA)ij	-1.2860** (0.6210)		-1.1209 (0.7059)	
(KIBS/VA)ij * KIBSrelempl(j)	11.8978** (6.0867)		10.7518** (5.5996)	
(KIBS/OUT)ij		-7.5471*** (2.2559)		-10.1100*** (3.2684)
(KIBS/OUT)ij* KIBSrelempl(j)		68.0666*** (22.3911)		83.5787*** (31.2449)
GDPpc(j)	-5.73e-06* (3.22e-06)	-8.62e-06*** (3.34e-06)		
constant	0.0803 (0.1516)	0.0781 (0.1434)		
Sector dummies			yes	yes
Country dummies			yes	yes
Log pseudolikelihood	-136.0965	-132.3311	-45.6506	-39.773
No. observations	357	357	357	357

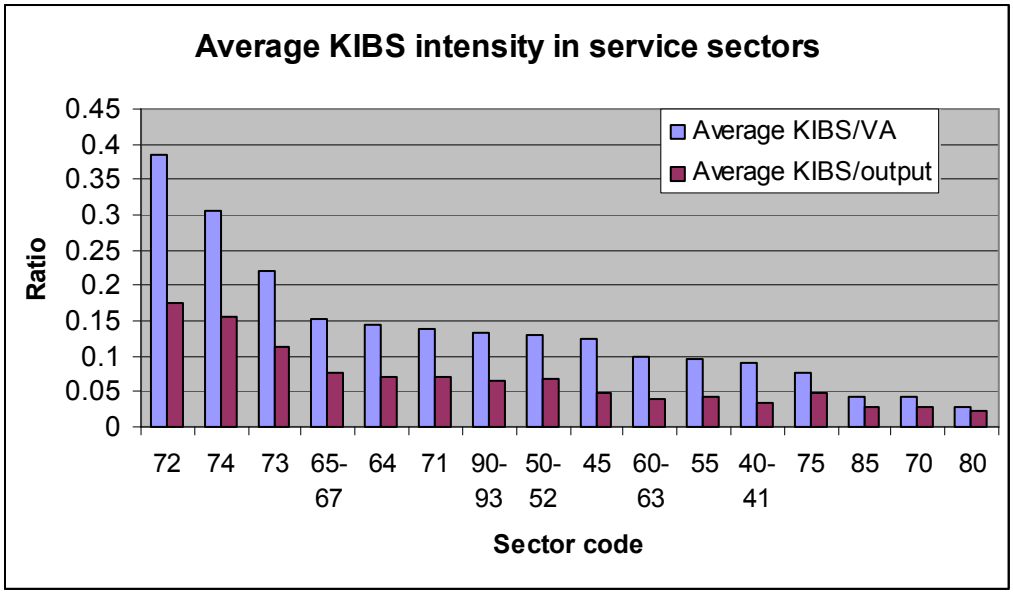
Note: Maximum-likelihood estimates for truncated regressions with robust standard errors (in parenthesis). *** significant at 99%, ** significant at 95%, * significant at 90%.

Table 6 - Regression results for RCA and imports of KIBS

	Dependent variable: RCA(ij)			
Independent variables				
Kshare(ij)	0.6110** (0.3127)	0.5876 * (0.3100)	0.8404** (0.3785)	0.8301** (0.3738)
Lshare(ij)	|0.3621 (0.2379)	0.4670* (0.2436)	0.4898 (0.3425)	0.5661* (0.3414)
(totKIBS/VA)ij	-1.0707 ** (0.4718)		-1.2798* (0.7224)	
(impKIBS/VA)ij	1.9852*** (0.6760)		2.6723*** (0.9620)	
(totKIBS/OUT)ij		-4.7637*** (1.5890)		-6.0204** (2.6630)
(impKIBS/OUT)ij		9.7709*** (2.4298)		13.5843*** (3.4652)
KIBSrelempl(j)	1.0832 (2.3365)	1.3291 (2.3627)		
GDPpc(j)	-4.39e-06 (0.00001)	-7.31e-06 (0.00001)		
constant	0.7497* (0.4068)	0.7632* (0.4083)		
Sector dummies			yes	yes
Country dummies			yes	yes
R-squared	0.0391	0.0568	0.2707	0.2935
No. observations	357	357	357	357

Note: OLS estimates with robust standard errors (in parenthesis). *** significant at 99%, ** significant at 95%, * significant at 90%.

Figure 1 – Average KIBS intensity across sectors



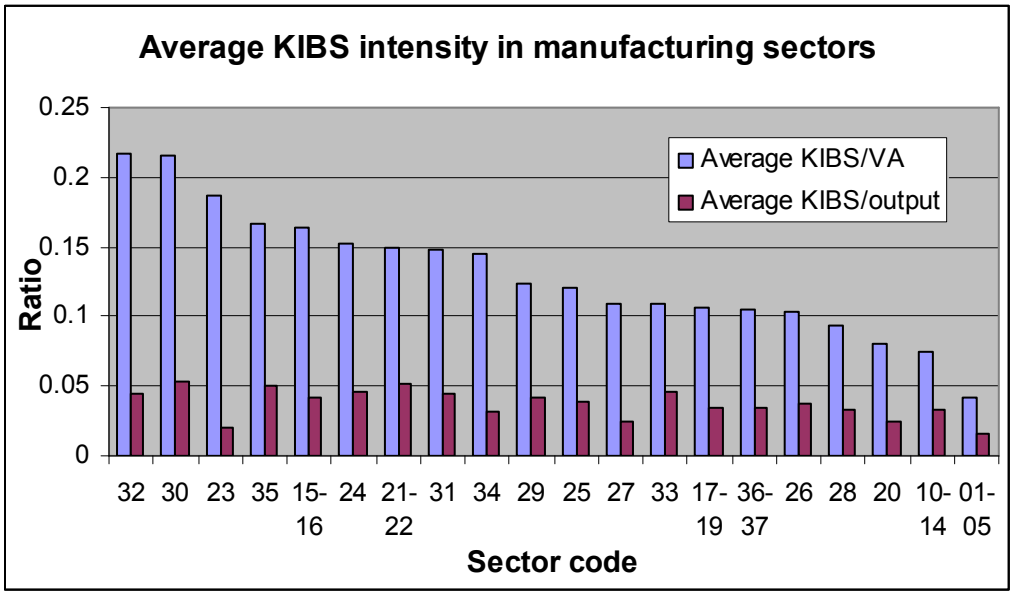
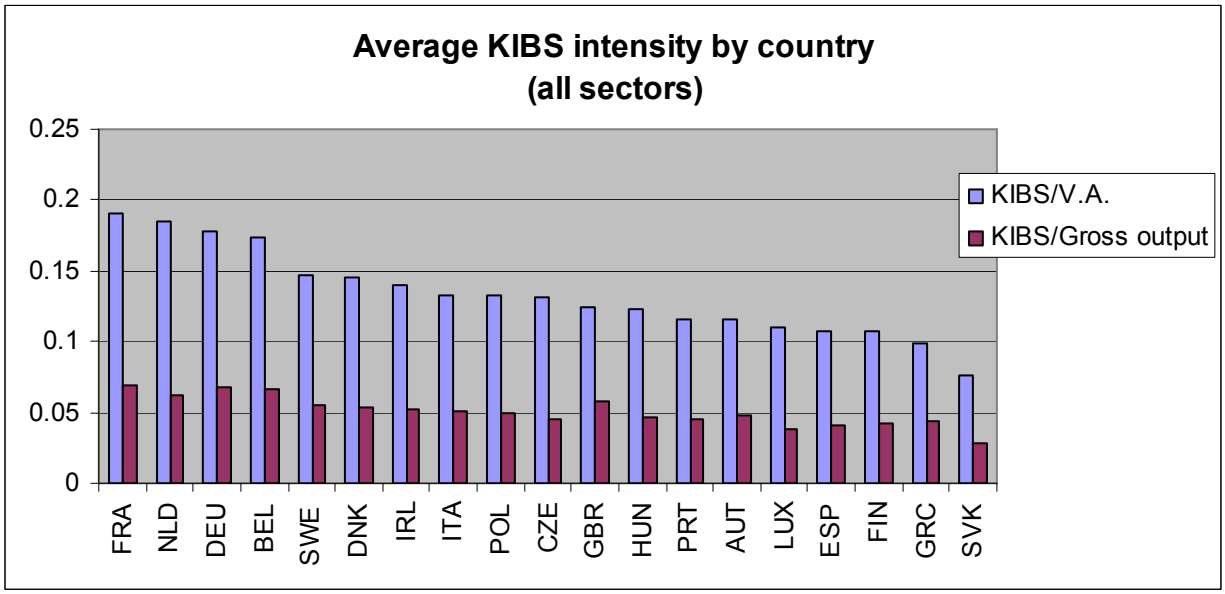
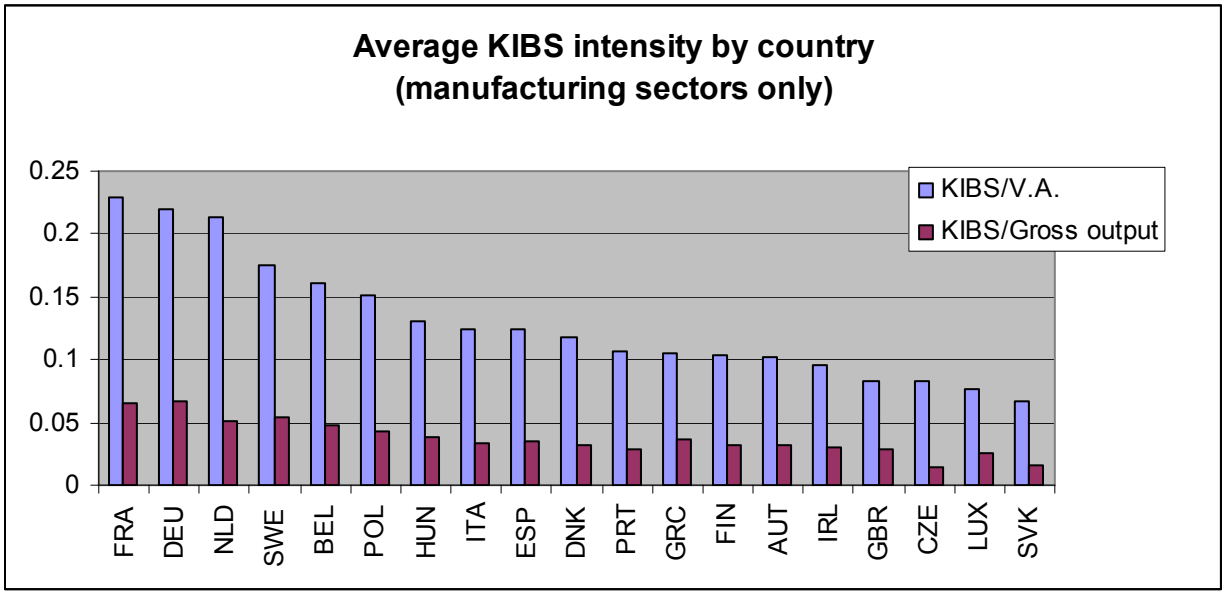
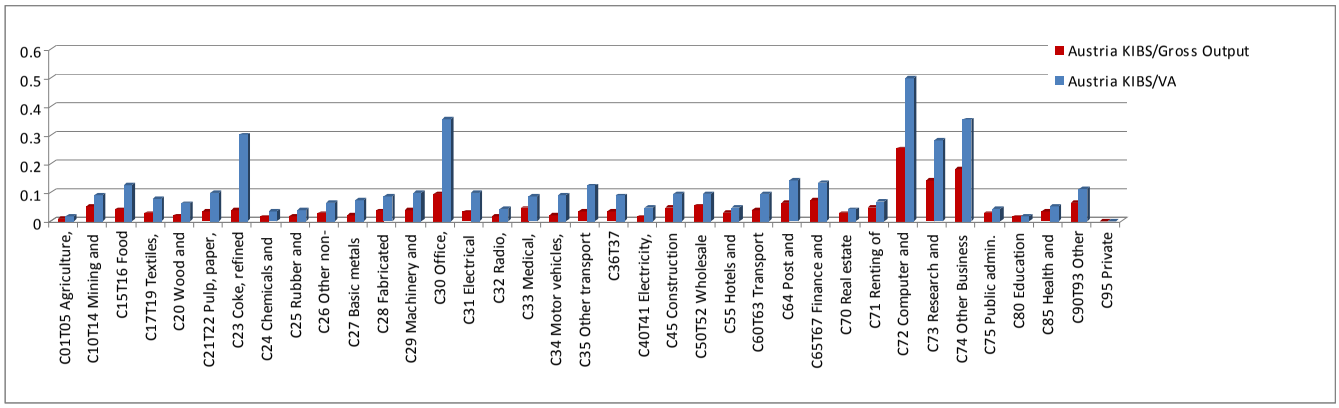


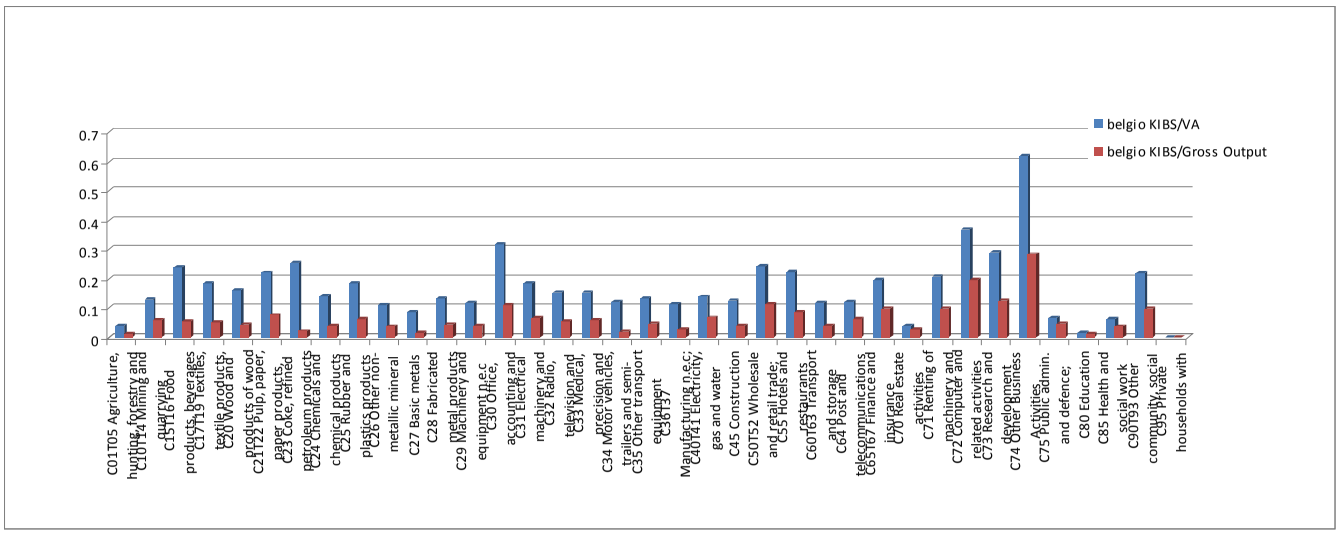
Figure 2 – Average KIBS intensity across countries

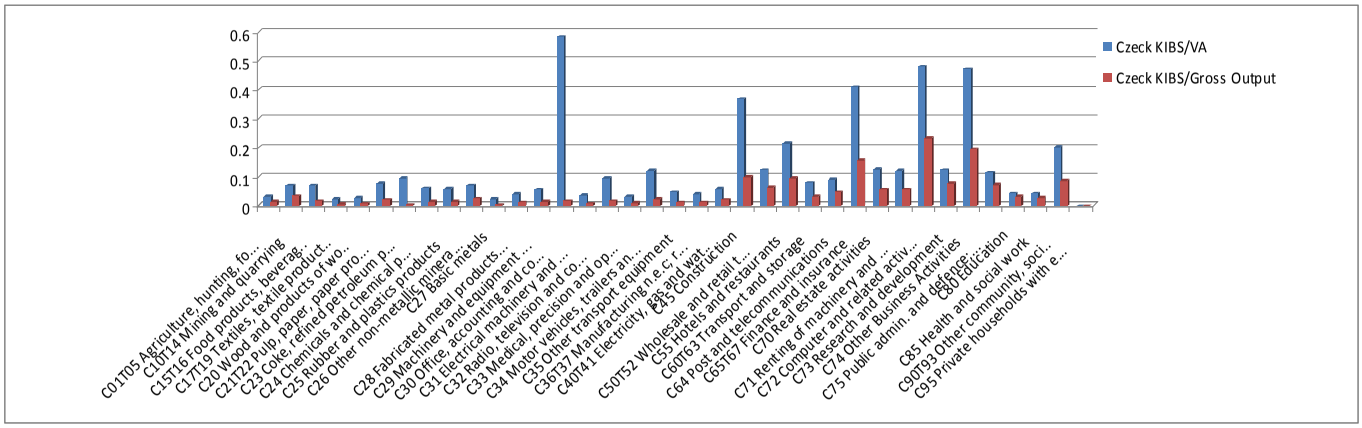


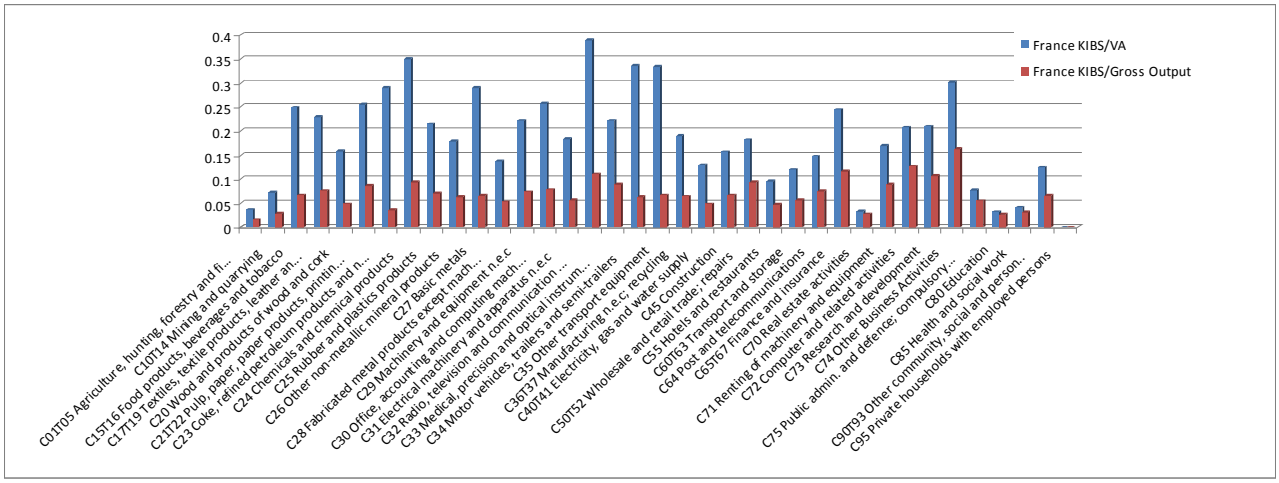


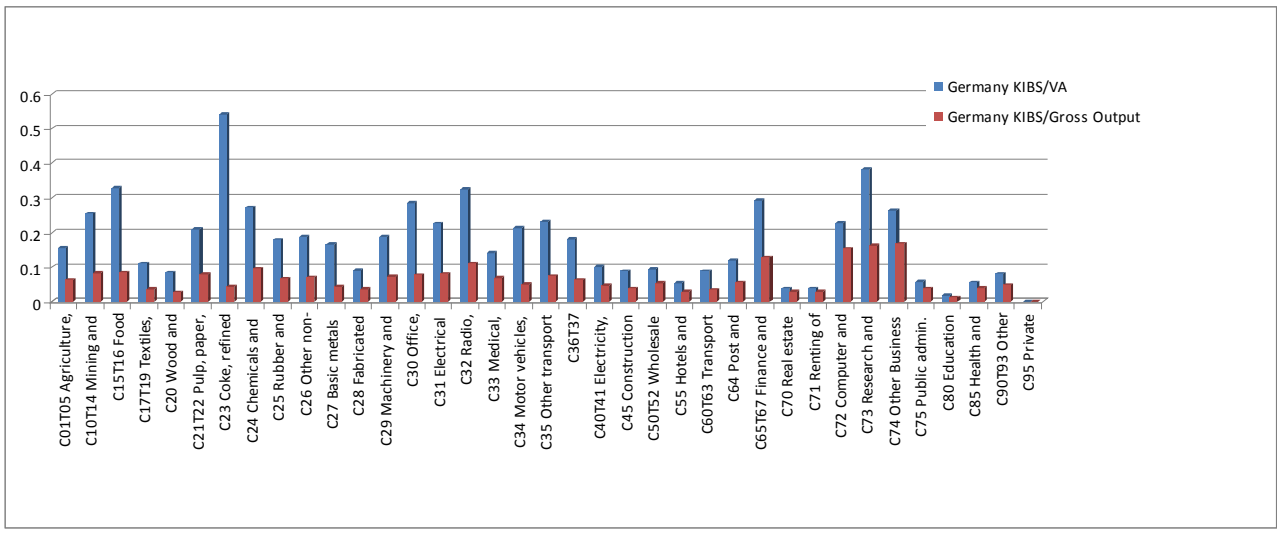
Appendix 2 – KIBS intensity at the sector level in selected countries

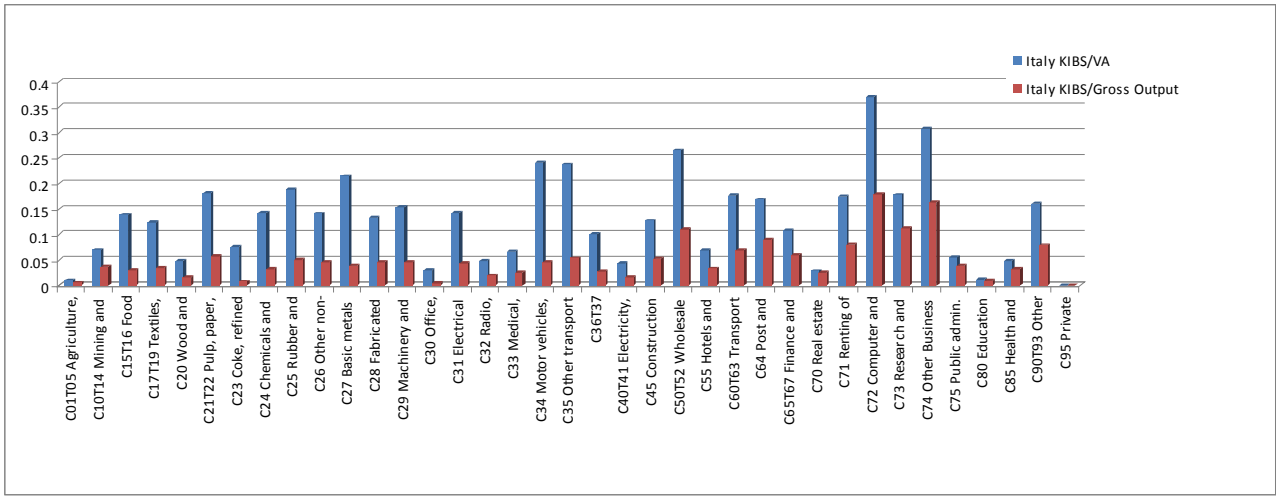


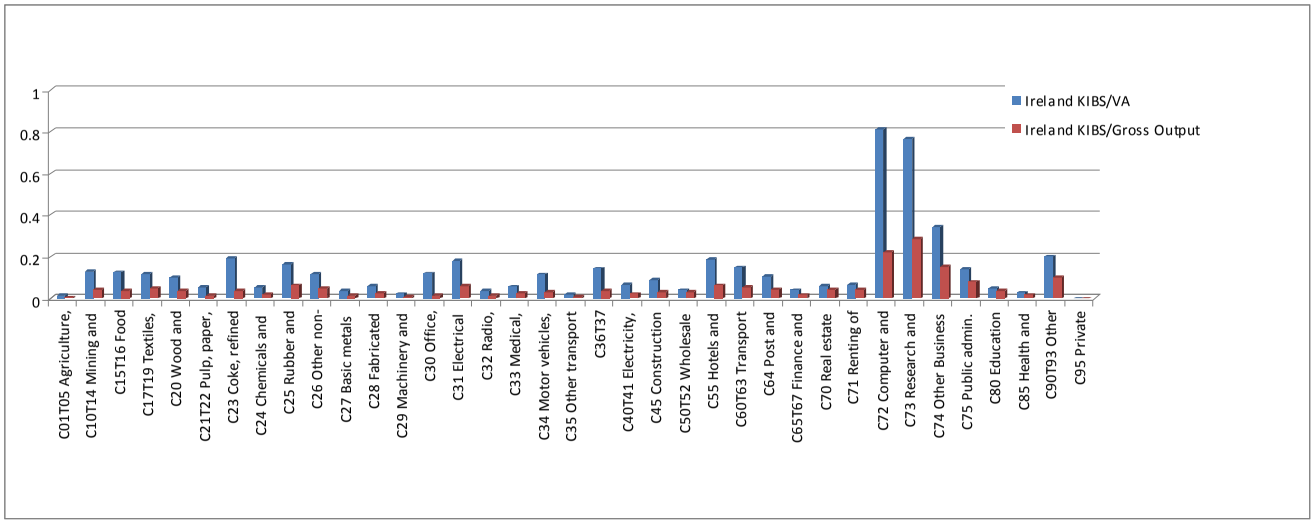


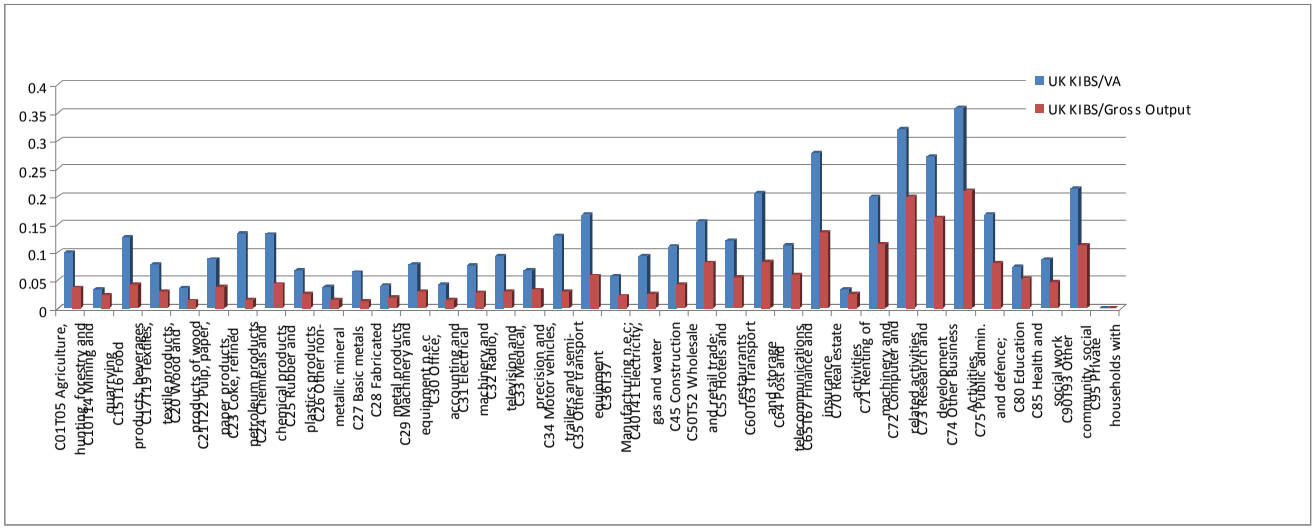


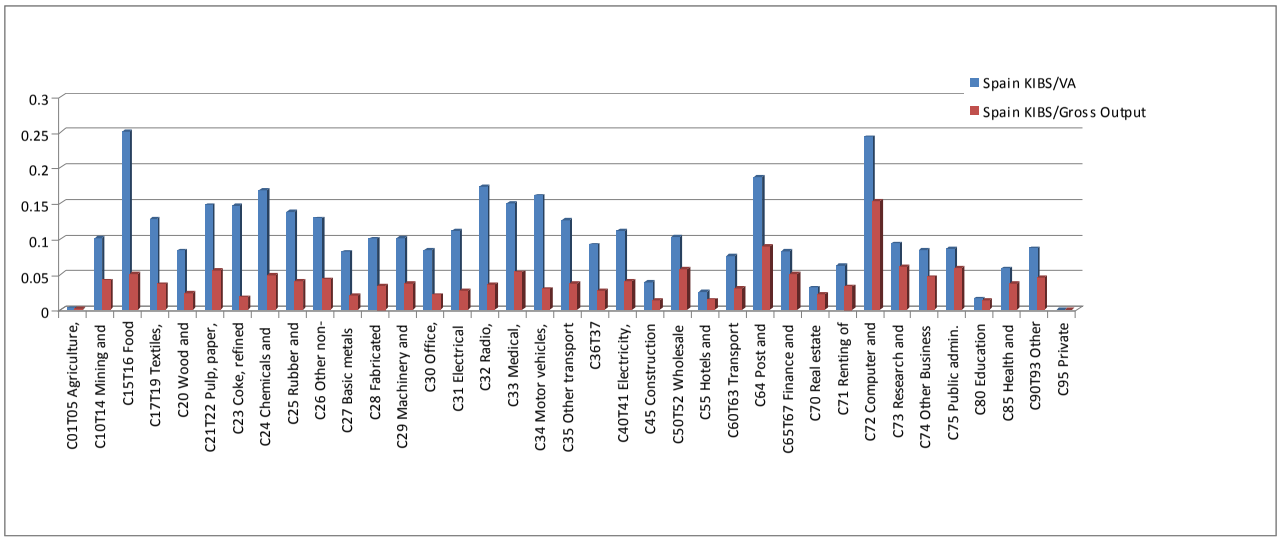

France KIBS/VA
France KIBS/Gross Output
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
C01T05 Agriculture, hunting, forestry and fi...
C10T14 Mining and quarrying
C15T16 Food products, beverages and tobacco
C17T19 Textiles, textile products, leather an...
C20 Wood and products of wood and cork
C21T22 Pulp, paper, paper products, printin...
C23 Coke, refined petroleum products and n...
C24 Chemicals and chemical products
C25 Rubber and plastics products
C26 Other non-metallic mineral products
C27 Basic metals
C28 Fabricated metal products except mach...
C29 Machinery and equipment n.e.c
C30 Office, accounting and computing mach...
C31 Electrical machinery and apparatus n.e.c
C32 Radio, television and communication ...
C33 Medical, precision and optical instrum...
C34 Motor vehicles, trailers and semi-trailers
C35 Other transport equipment
C36T37 Manufacturing n.e.c; recycling
C40T41 Electricity, gas and water supply
C45 Construction
C50T52 Wholesale and retail trade; repairs
C55 Hotels and restaurants
C60T63 Transport and storage
C64 Post and telecommunications
C65T67 Finance and insurance
C70 Real estate activities
C71 Renting of machinery and equipment
C72 Computer and related activities
C73 Research and development
C74 Other Business Activities
C75 Public admin. and defence; compulsory...
C80 Education
C85 Health and social work
C90T93 Other community, social and person...
C95 Private households with employed persons


Germany KIBS/VA
Germany KIBS/Gross Output
0.6
0.5
0.4
0.3
0.2
0.1
0
C01T05 Agriculture,
C10T14 Mining and
C15T16 Food
C17T19 Textiles,
C20 Wood and
C21T22 Pulp, paper,
C23 Coke, refined
C24 Chemicals and
C25 Rubber and
C26 Other non-
C27 Basic metals
C28 Fabricated
C29 Machinery and
C30 Office,
C31 Electrical
C32 Radio,
C33 Medical,
C34 Motor vehicles,
C35 Other transport
C36T37
C40T41 Electricity,
C45 Construction
C50T52 Wholesale
C55 Hotels and
C60T63 Transport
C64 Post and
C65T67 Finance and
C70 Real estate
C71 Renting of
C72 Computer and
C73 Research and
C74 Other Business
C75 Public admin.
C80 Education
C85 Health and
C90T93 Other
C95 Private


Italy KIBS/VA
Italy KIBS/Gross Output
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
C01T05 Agriculture,
C10T14 Mining and
C15T16 Food
C17T19 Textiles,
C20 Wood and
C21T22 Pulp, paper,
C23 Coke, refined
C24 Chemicals and
C25 Rubber and
C26 Other non-
C27 Basic metals
C28 Fabricated
C29 Machinery and
C30 Office,
C31 Electrical
C32 Radio,
C33 Medical,
C34 Motor vehicles,
C35 Other transport
C36T37
C40T41 Electricity,
C45 Construction
C50T52 Wholesale
C55 Hotels and
C60T63 Transport
C64 Post and
C65T67 Finance and
C70 Real estate
C71 Renting of
C72 Computer and
C73 Research and
C74 Other Business
C75 Public admin.
C80 Education
C85 Health and
C90T93 Other
C95 Private


Ireland KIBS/VA
Ireland KIBS/Gross Output
1
0.8
0.6
0.4
0.2
0
C01T05 Agriculture,
C10T14 Mining and
C15T16 Food
C17T19 Textiles,
C20 Wood and
C21T22 Pulp, paper,
C23 Coke, refined
C24 Chemicals and
C25 Rubber and
C26 Other non-
C27 Basic metals
C28 Fabricated
C29 Machinery and
C30 Office,
C31 Electrical
C32 Radio,
C33 Medical,
C34 Motor vehicles,
C35 Other transport
C36T37
C40T41 Electricity,
C45 Construction
C50T52 Wholesale
C55 Hotels and
C60T63 Transport
C64 Post and
C65T67 Finance and
C70 Real estate
C71 Renting of
C72 Computer and
C73 Research and
C74 Other Business
C75 Public admin.
C80 Education
C85 Health and
C90T93 Other
C95 Private


UK KIBS/VA
UK KIBS/Gross Output
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0


Spain KIBS/VA
Spain KIBS/Gross Output
0.3
0.25
0.2
0.15
0.1
0.05
0
C01T05 Agriculture,
C10T14 Mining and
C15T16 Food
C17T19 Textiles,
C20 Wood and
C21T22 Pulp, paper,
C23 Coke, refined
C24 Chemicals and
C25 Rubber and
C26 Other non-
C27 Basic metals
C28 Fabricated
C29 Machinery and
C30 Office,
C31 Electrical
C32 Radio,
C33 Medical,
C34 Motor vehicles,
C35 Other transport
C36T37
C40T41 Electricity,
C45 Construction
C50T52 Wholesale
C55 Hotels and
C60T63 Transport
C64 Post and
C65T67 Finance and
C70 Real estate
C71 Renting of
C72 Computer and
C73 Research and
C74 Other Business
C75 Public admin.
C80 Education
C85 Health and
C90T93 Other
C95 Private