

INTERNATIONAL SPECIALIZATION IN SERVICES : INSIGHTS FROM A NEW THEORETICAL TAXONOMY

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***Abstract** - The persistent assumption of nontradability of service activities led to a general lack of understanding of the role of services in country specialization and performance, in particular in the developed economies. Yet, the share of services in international trade is ever growing, proving their *de facto* tradability, and questioning about their potential for relocation, or rather relocatability. Relocatability of a service will in turn depend on its degree of territorial anchoring. This paper proposes a new taxonomy of the service activities according to their degree of territorial anchoring, based on the location determinants. Then, for a sample of developed countries, the international specialization is measured for each service activity. It ensues, by crossing results obtained, an inventory of the volatility of services in which countries of the sample are specialized, that can be used as a useful tool for the design of fiscal, social, employment or trade policies.*

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1. INTRODUCTION

Globalization does no longer affect the traditional area of economic activity (goods production and trade in goods) alone, but indeed both merchandise and service trade and production processes. It has been way too long that country and territory specialization and performance have been approached only through industry, and more precisely through what it is commonly called location-free goods. Country or territory specialization revealed by such means has been missing the lion's share of wealth produced in countries, in particular in the developed ones. Indeed, in these countries, the service sector represents nowadays more than two thirds of Gross Domestic Product (GDP) and Foreign Direct Investment (FDI), and about a quarter of total foreign trade⁴. The tertiary sector also accounts for a predominant share of employment. Besides, the recent economic recession that hit the entire planet has affected both the international trade in goods and services, but not to the same extent though. According to the World Trade Organization (WTO), the value of world merchandise trade shrank by 23 percent in 2009, whereas trade in services declined by only 13percent during the same period. An explanation of the stronger resilience of services to the economic crisis lies in the more direct relations between suppliers and consumers of services.

In spite of these trends, services have too often been considered as marginal by policymakers, especially when it has come to the design of trade policy, where the focus has usually been on agriculture and manufacturing goods. The role of services in foreign trade has been underestimated and misunderstood for several reasons, the main one being that they would be nontradable by nature and heavily dependent on good-producing sector. However, while for a long time considered as nontradable or nonrelocatable by nature, services not only have in fact been enjoying growing international trade, but they also have been enjoying, thanks to the steady development of Information and Communication Technologies (ICT), a fragmentation of their production processes comparable to the one the goods industry already experienced a long time ago, and giving ground to the appearance of international comparative advantages. Actually, and in opposition to the predictions of the Werner Sombart (1902) law formulated at the eve of the XX^e century, international trade has not collapsed with the rise of the weight of the service sector in national economies. It is because services, yet traditionnally considered as nontradable, have indeed been the subject of not only a growing international trade, but also a relocation of their production. In this context, relocatability, in other words the potential for relocation, of service activities or bits of them (call centers, accounting, computing, information...) needs to be better documented. It is in particular essential to reconsider the way services do shape country and region specialization, in order to take into account the entirety of country and region performances and vulnerabilities.

⁴ All studies agree on a figure in the region of 20 to 25 percent of international trade (van Welsum & Reif, 2006). For an analysis of the service sector in the economy, see Gadrey (2003).

However, to truly understand the nature of services, their specificities as far as territorial anchoring or, on the contrary, volatility, is concerned, it becomes necessary to reach beyond the usual split of service activities between, on one side, household services that would follow by essence the location of households and, on the other side, business services that would instead concentrate spatially, and be traded and relocated internationally. The new empirical approach developed here consists in starting off with the location determinants of tertiary activities. By isolating the main criteria of location of service industries, we define six groups of service activities which differ by their degree of territorial anchoring, from the most anchored to the most volatile. We then break down the different service categories into different activities as per the international trade in services classification and apply the usual international specialization indicators.

The rest of the paper gives an overview of the recent literature proposing instruments to measure location of service activities (section 2). Next, it proposes an adaptation of a semi-endogeneous typology of service activities to the classification of international trade in services (section 3), before measuring the international specialization of a sample of countries in these different groups of services (section 4) and concluding on strengths and weaknesses of these countries as far as service industries are concerned (section 5).

2. TRADE, TRADABILITY AND RELOCATABILITY OF SERVICE ACTIVITIES: A SURVEY

Tertiarisation of economies is observed in all industrialized countries, in terms of both employment and value added. Besides, services are not anymore only carried along by industry, and show more and more frequently higher productivity gains. Indeed, many studies showed that favorite ground for innovation are now service activities, of course most of the times in response to demand coming from industry (OCDE, 1996 ; Hertog & Bilderbeek, 1999) ; and, even if a general productivity gap between services and industry remains, taking into account the high heterogeneity of the service sector allows to identify service activities where productivity gains are particularly steady.

Furthermore, these studies put forward four main characteristics to take into account when it comes to define theoretically the location determinants of service activities:

- a very large proportion of intermediate production towards industry (Jennequin, 2007) ;
- a production with increasing returns to scale (Markusen, 1989), likely to speed up the agglomeration process of these activities, as it is the case in the manufacturing industry ;
- a high level of qualification of the workforce (Jennequin, 2007) with a jobs transfer from industry to information and communication sciences ;

- more and more tradable services, with a growing weight in the total international trade (Markusen, 1989 ; Muller & Zenken, 2001, van Welsum & Reif, 2006) and a direct influence on the level of international competitiveness (Bensidoun & Unal-Kesenci, 2007).

With the tools of economic geography, and in particular the analysis of spatial discontinuities (polarization and center-periphery relations) which has essentially been applied to manufacturing industry, it is possible to answer questions related to the spatial location of service activities. Are they concentrated or dispersed ? Which are, therefore, the mobile and relocatable activities and, *a contrario*, which are the activities that would instead stay and grow on developed country territories ? What does the recent empirical literature say about it (2.1.) ? Next, how is the international trade in services organized and what are the links between activity relocation and the international trade in services, as described through the four modes of supply negotiated at the WTO (GATS - General Agreement on Trade in Services) ? What are, subsequently, the effects of liberalization of trade in services ? (2.2.) Finally, it is necessary to analyze, in a more thoroughly way than superficial analyzes have done so far, the extent and the determinants of relocation (2.3).

2.1. Economic geography applied to service activities : concentration or dispersion ?

Relying on the mainstreaming of the lessons learned from economic geography, is emerging a new conception of country development and country planning all around the world, based upon territorial specialization and geographic concentration, source of economies of agglomeration (areas of excellence, clusters, etc.). Economic geography concepts, applied to industry, allow therefore to distinguish between mobile, hence tradable, activities, and activities that on the contrary would rather stay and develop on a given country territory. Economic geography also allows to analyze country specialization. But how, given the immaterial nature of services, to apply these techniques to service activities in order to deduce their tradability and relocatability?

There exists a very abundant economic geography literature trying to verify the degree of spatial concentration of economic activities. Focusing most of the times on manufacturing, results converge towards the observation of a tendency to acceleration of the geographic polarization of activities as countries become globalized or integrated within a regional area such as the European Union. Houdebine (1999) for instance notes a relative dispersion of activities of industrial production in the French territory (as opposed to technological innovation-related activities). On services specifically, results are less clear though. Hallet (2000) observes a great concentration of tradable services in Europe and a dispersion of all other services, whereas the analysis of Gaulier (2003) concludes to the dispersion of all service activities at the European level, at similar levels as for industrial activities. Finally, Midelfart & alii (2002) observe that in Europe, business services have a tendency to concentrating, as opposed to

household services. These studies are however characterized by a very limited breakdown of services activities (five branches of activity at best).

That being said, these studies enable however to draw an initial review of the situation of service location. At the national level, it appears for instance that business services activities (consulting, investment banking...) and activities known as knowledge-intensive activities such as research and development concentrate spatially relatively more than manufacturing activities (Paci & Usai, 2000). This high level of concentration can be explained by the need for geographical proximity for knowledge transmission, given the tacit nature of knowledge and the localized nature of the knowledge externalities dissemination.

However, one of the overall limits of these econometric studies, besides the fact they almost never isolate innovation in service activities, is that they do not explain the knowledge dissemination process. In other words, the sole geographical proximity would suffice to benefit from positive externalities, from knowledge gains that would mechanically spill over the community. Furthermore, if innovation is relatively concentrated within the territory, the question of the location determinants of innovation in services needs to be gone into more closely. Is innovation a factor of territorial attraction likely to contribute to the development of tertiary areas of activity, which would help structure economic activity and enhance, in turn, the territorial attractiveness ?

Krugman's approach

The assumption made by Paul Krugman (1991) is that nontradable services are distributed proportionally to the demand at the elementary territory level (dispersion) whereas tradable services are characterized by a possible disjunction of their location that can be concentrated while serving demand distantly ; proximity to demand is therefore not necessary in the case of tradable services.

The empirical application of this theoretical approach consists in verifying whether territories hosting concentrated service activities (mobile or tradable services) are vulnerable to jobs relocation, whilst territories hosting non or less mobile services (nontradable and per assumption dispersed) would be more shielded from relocation. This being said, facts show that concentration criterion should be manipulated with caution. Concentration does not imply necessarily vulnerability : it can constitute an asset, like for example in financial- and innovation-related activities, and a certain degree of territorial attractiveness that contributes to the setting up of multinational firms. Concentration allows for instance tradable services to enjoy economies of agglomeration.

Applications by Jensen & Kletzer (2005)

Jensen & Kletzer (2005) modify Gini and Ellison & Glaeser indices (see Box 1) to test Krugman's assumption. They propose a new measure allowing to compare the region's share of employment in one of the various good and ser-

vice industries (s_i) relatively to the same industry demand share ($IDS_{i,p}$). When the region's share in the total employment in a given industry is significantly higher than the industry demand share of the region, there is concentration or specialization in this industry. Moreover, such an activity is tradable if local employment exceeds local demand in the region, for the difference in supply is supposed to be traded outside the region.

The results obtained by Jensen & Kletzer on the complete set of 92 industries of the classification used are not much surprising : goods-producing sectors of agriculture, mining and manufacturing are as usual classified in Gini concentration class 2 and 3, therefore tradable. Retail trade services are found nontradable. Industries in the transportation sector are tradable. Public administration activities are all classified as nontradable, except for the military and public finance. As shown in Table 1, financial services, consulting services, advertising, management and operational leasing services appear to be highly concentrated, therefore tradable. This being said, high concentration of research and development activities should not blindly lead us to conclude, just because of this high level of concentration, that there is a risk of relocation of these activities. Information services too appear tradable as expected, with the noticeable exception, surprisingly, of radio, TV, newspapers, and advertising.

This empirical approach of the degree of tradability of goods and services is then compared to jobs that can be displaced or relocated given the nature more or less mobile of these activities. Employment in agriculture and mining is classified as tradable (classes 2 et 3). Most of the industrial occupations are classified as tradable. Conversely, jobs in construction services are not tradable according to this methodology.

The authors find nonetheless that employment growth is weaker in tradable services than in nontradable services. However, this weaker growth affects in fact the least qualified jobs of the tradable services. Besides, given the fact that employment in services, be they tradable or not, is higher than employment in industry, risks of job destruction in tradable services due to international competition, to productivity gains or to relocation to countries enjoying lower salary costs, are mechanically higher.

Activities showing a high share of relocable or tradable jobs are linked to financial operations (68 %) ; computer and mathematical occupations (100 %) ; architecture and engineering (63 %) ; legal services (96 %) ; life, physical, and social sciences (83 %). Nontradable jobs are linked to education and library (99 % nontradable) ; healthcare practitioners (86 %) ; healthcare support (97 %) and food preparation (96 %). As far as nonqualified jobs are concerned, 90 percent of employment in installation, maintenance, and repair, as well as 80 percent of transportation and 89 percent of material moving jobs are classified by the authors as nontradable. All in all, services jobs vulnerability to relocation to countries enjoying lower salary costs appears, according to these results, to be relatively important.

Box 1. A measure of tradability of services activities : method of Jensen & Kletzer (2005)

The authors construct an indicator to measure the occupation-region specific demand for each industry of the American economy, using BEA input-output data.

The measure of industry demand share ($IDS_{i,p}$) represents the degree of geographic concentration of demand for a good or service i in a particular region p at the elementary level of location (*Work Metro Area*) :

$$(1) IDS_{i,p} = \sum_j (Y_{i,j}/Y_i * InEMP_{j,p}/InEMP_j)$$

where $Y_{i,j}$ = the output of industry i used by industry j (including government and private households as “industries”); Y_i = total output of industry i ; $InEMP_{j,p}$ = industry j employment in region p ; $InEMP_j$ = total employment in industry j .

To construct the occupation-region specific demand measures, the authors use the industry-region specific demand measures (1) and weight those by the share of occupation employment in an industry :

$$(2) ODS_{o,p} = \sum_j (IDS_{j,p} * OcEMP_{o,j}/OcEMP_o)$$

where $IDS_{j,p}$ = industry demand share for industry j in region p ; $OcEMP_{o,j}$ = occupation o employment in industry j ; $OcEMP_o$ = total employment in occupation o .

For the measure of geographic concentration, the Ellison & Glaeser (1997) indicator is used :

$$(3) EC_i = \sum_p (s_{i,p} - xp)^2$$

The indicator compares a region’s share of industry employment ($s_{i,p}$) with the area’s share of aggregate activity/employment p (xp). When an area’s employment share in an activity is significantly greater than the area’s share of aggregate employment, this is interpreted as indicating a concentration, or specialization, in the given activity. Measures of EC indicating geographic concentration is interpreted as indicative of trade in that activity, in the sense that local employment exceeds local demand in some areas and the difference is traded outside the area.

The authors propose to modify the EC measure to look at the difference between the region’s share of industry employment and the region’s share of industry demand :

$$(4) EC_i = \sum_p (s_{i,p} - IDS_{i,p})^2$$

This new measure allows comparison of a region’s share of an industry’s employment (s_i) with the region’s share of demand for that industry ($IDS_{i,p}$).

The second measure of geographic concentration used is the Gini coefficient:

$$(5) G_i = | 1 - \sum_p (\sigma Y_{i,p-1} + \sigma Y_{i,p}) * (\sigma X_{i,p-1} - \sigma X_{i,p}) |$$

where p ’s index regions (sorted by the region’s share of industry employment), $\sigma Y_{i,p}$ is the cumulative share of industry i employment in region p , and $\sigma X_{i,p-1}$ is the cumulative share of industry i employment in region ($p-1$).

The Gini measure is modified to :

$$(6) G_i = | 1 - \sum_p (\sigma Y_{i,p-1} + \sigma Y_{i,p}) * (\sigma IDS_{i,p-1} - \sigma IDS_{i,p}) |$$

where $\sigma IDS_{i,p}$ is the region’s share of demand for industry i .

The authors implement these measures using employment information from 2000 Decennial Census of Population Public Use Micro Sample (PUMS) files. The geographic entity used is the Consolidated Metropolitan Statistical Area or the Metropolitan Statistical Area. Measures of geographic concentration are used for each industry. Given the high degree of correlation between the two indices, the authors focus on the adjusted Gini index.

Table 1. Types of services by degree of concentration

Degree of concentration : Gini class	Gini class 1 (least geographically concentrated) G<1 (36 %)	Gini class 2 (1<G<3) (37 %)	Gini Class 3 (G ≥3) The most geographically concentrated (27 %)
Information	Newspaper publishers Radio and television broadcasting and cable Libraries and archives	Wired telecommunications carriers Data processing services Other telecommunication services Publishing except newspapers and software Other information services	Motion pictures and video industries Sound recording industries Software publishing
Finance and insurance	Savings institutions, including credit unions Banking and related activities	Insurance carriers and related activities Nondepository credit and related activities	Securities, commodities, funds, trusts, and other financial investment
Real estate and rental	Video tape and disk rental Other consumer goods rental	Commercial, industrial, and other intangible assets rental and leasing Real estate Automotive equipment rental and leasing	
Professional, scientific, and technical services	Veterinary services Accounting, tax preparation, bookkeeping, and payroll services	Architecture, engineering, and related services Other professional, scientific, and technical services Legal services Specialized design services Computer systems design and related services Advertising and related services Management, scientific, and technical consulting services	Scientific research and development services
Management		Management of companies and enterprises	
Administrative support	Waste management and remediation services Business support services Services to buildings and dwellings Landscaping services	Employment services Other administrative and support services Investigation and security services Travel arrangement and reservation services	
Education	Elementary and secondary schools Colleges and universities, including junior colleges Other schools, instruction, and educational services	Business, technical, and trade schools and training	

Health care and social services	Hospitals Nursing care facilities Vocational rehabilitation services Offices of physicians Outpatient care centers Offices of dentists Offices of optometrists Residential care facilities, without nursing Child day care services Other health care services Office of chiropractors Individual and family services	Community food and housing, and emergency services Offices of other health practitioners	
Arts, entertainment, and recreation	Bowling centers Other amusement, gambling, and recreational industries	Museums, art galleries, historical sites, and similar institutions Independent artists, performing arts, spectator sports, and related	
Accommodation	Drinking places, alcoholic beverages Restaurants and other food services Recreational vehicle parks and camps, and rooming and boarding houses	Traveler accommodation	
Other services	Automotive repair and maintenance Barber shops Religious organizations Commercial and industrial machinery and equipment repair and maintenance Drycleaning and laundry services Car washes Electronic and precision equipment repair and maintenance Civic, social, advocacy organizations, and grant-making and giving	Nail salons and other personal care services Other personal services Business, professional, political, and similar organizations	Labour unions Footwear and leather goods repair
Public administration	Justice, public order, and safety activities Administration of human resource programs Other general government and support Executive offices and legislative bodies Military Reserves of National Guard Administration of economic programs and space research Administration of environmental quality and housing programs	Public finance activities	National security and international affairs US Armed Forces, branch not specified US Coast Guard US Air Force US Army US Navy US Marines

Source : From Jensen & Ketzler (2005).

However, the observation of the demographic characteristics of workers in the different activities enables to qualify a bit more the result of higher service jobs vulnerability caused by globalization. In opposition to the traditional views that services are activities protected from international competition, which contributes to jobs preservation, the results obtained show instead that services jobs are predominantly in tradable services, which are relocatable. The authors get an average number of 30 percent of jobs that are potentially tradable or relocatable in the very broad sense of the word by which the authors define the concept of tradability. The authors add that a total of 10 percent of the jobs reputed relocatable (mobile) in the services sector are classified as nontradable. Employees in tradable services (see Table 1) have nevertheless higher level of qualification and wages than those employed in nontradable services. This population is moreover predominantly a males one. Workers in nontradable sectors get salaries lower by 10 percent compared to those working in tradable sectors. In all, the two effects accumulate : being employed in a sector reputed as tradable and occupy a job itself characterized as tradable enable to enjoy higher earnings. Thus characteristics of employees in tradable services (high qualification and wages) show a certain coherence with the observation of strong comparative advantages revealed by the US international trade in services activities compared to manufacturing or nontradable services.

Application to the French case

A recent study applied to France by Barlet et alii (2008) for DIACT (*Groupe Economie des Services et Territoires*) adopts the approach by Jensen & Kletzer (2005). The goal is to propose an identification as well as a classification of mobile and nonmobile services from the analysis of the concentration levels of service activities. Which of the Metropolitan France regions are the most vulnerable to the intensification of the international open up of services? To measure concentration, the authors use the modified Gini coefficient of the demand distribution, as well as the Ellison & Glaeser index. The authors use the CLAP (*Connaissance locale de l'appareil productif*) database which comprises 1,910,550 establishments of at least one employee. Population data from 1999 census and national accounts data (Input-Output Table) complete the database as for imports, exports and production by industry. The database is broken down in 36,248 municipalities, 94 départements, 21 administrative regions and 341 employment areas. Their results confirm that services are characteristically less concentrated than industry. Most concentrated services as per modified Gini and Ellison & Glaeser measures are air transportation, research-development, insurance, audiovisual services, and computer services. These seven industries account for 881,154 jobs in 2005. Least concentrated services are, as in Jensen & Kletzer study, retail, automotive repair and maintenance, social services, post and telecommunications, and health care.

2.2. International trade in services liberalization

Services account nowadays for more than two thirds of GDP and FDI in developed countries, and for 20 to 25 percent of international trade. Over the 1995-2003 period, annual growth of trade in services has exceeded the annual growth of trade in goods in the EU15 as well as in the United States (+6 percent and +5,5 percent respectively for the EU15, and +6 percent and +5 percent for the United States). In the United Kingdom, over the same period, growth of trade in services is twice the annual growth of trade in goods and agricultural products (+8 percent against +4 percent a year). International trade in services is organized around the WTO negotiations framework and its four main liberalization modes (see Table 2) taken from Bhagwati (1984 and 1985) work. For Hill (1999), only services provided directly by a domestic producer to a consumer abroad can be considered as traditional cross-border trade. International negotiators took this service specificity into account when defining the internationalization modalities in the GATS (General Agreement on Trade in Services) signed in Marrakech in 1994. They retained a broad view of international trade in services, grouping all knowledge- and know-how-related transactions between a resident from one country and resident from another one, independently of the place of transaction. Thus, many service transactions become international only by the difference of the residence between the buyer and the seller of service (Lipsev, 2006).

International trade in services, according to the Manual on Statistics of international trade in services published by the United Nations⁵, happens through four modes of supply. Distinction is made based on whether the service supplier, the consumer, or neither, moves from one country to another for the transaction to be affected. The first of these modes, called Mode 1 or *cross-border supply*, takes place when the consumer remains in his or her home territory while the service crosses national borders, the supplier being located in a different country. This mode is similar to the traditional notion of trade in goods, where both the consumer and the supplier remain in their respective territory when the product is delivered. Mode 2, called *consumption abroad*, occurs when a consumer moves outside his or her home territory and consumes services in another country. Furthermore, firms located in a given country may provide services internationally *via* their subsidiaries. This mode of supply, Mode 3, is called *commercial presence*. The last mode of supply of services, Mode 4, or *presence of natural persons*, occurs when an individual has moved into the territory of the consumer to provide a service, whether on his or her own behalf of his or her employer. This last mode covers therefore two different categories of people : self-employed and short-term employed. Graph 1 summarizes visually the four modes of supply of services.

According to the study by Bensidoun & Unal-Kescenzi (2007) using balance of payments data, the EU27 is the leader in exports of services when the

⁵ <http://unstats.un.org/unsd/tradeserv/TFSITS/manual.htm>

intra-communautary trade is included. At the national level, the United States dominates in 2005 (15 percent of world exports in services compared to 8 percent for the United Kingdom, 6 percent for Germany and 5 percent for France). Besides, structures of exports of the United Kingdom and the United States are quite similar and services-looking, while Germany and Japan keep specialized in manufactured products.

Furthermore, analysis of trade in services through modes 1 and 2 between residents and nonresidents show that « travel and transportation », traditionally dominant, have been losing ground compared to « Other services » which represents now 49 percent of world trade in services. Amongst « Other services », « Royalties and licence fees » and « financial services » have developed very fast, in opposition to « Communications services », « Construction services » and « Personal, cultural and recreational services ». Mode 3, which gathers all sales in the host country *via* FDI operations, remains however preponderant : its share of international trade in services is about 80 percent for the United States, 73 percent for France, 67 percent for Germany. The geographical breakdown of exports of services through this mode shows that, for the United States, France and Germany, firms come predominantly from Europe, whereas in the case of Japan, firms are mainly American, both in terms of purchases (imports) and sales (exports).

Modes 1 and 4 remain, according to this study, marginal in trade in services, except for Japanese imports where modes 1 and 4 dominate slightly. Moreover, the share of merchanting and trade-related services in trade in services is very significant for all countries (between 62 percent and 87 percent of trade under mode 3). Mode 2 (tourism) is important for France (17 percent).

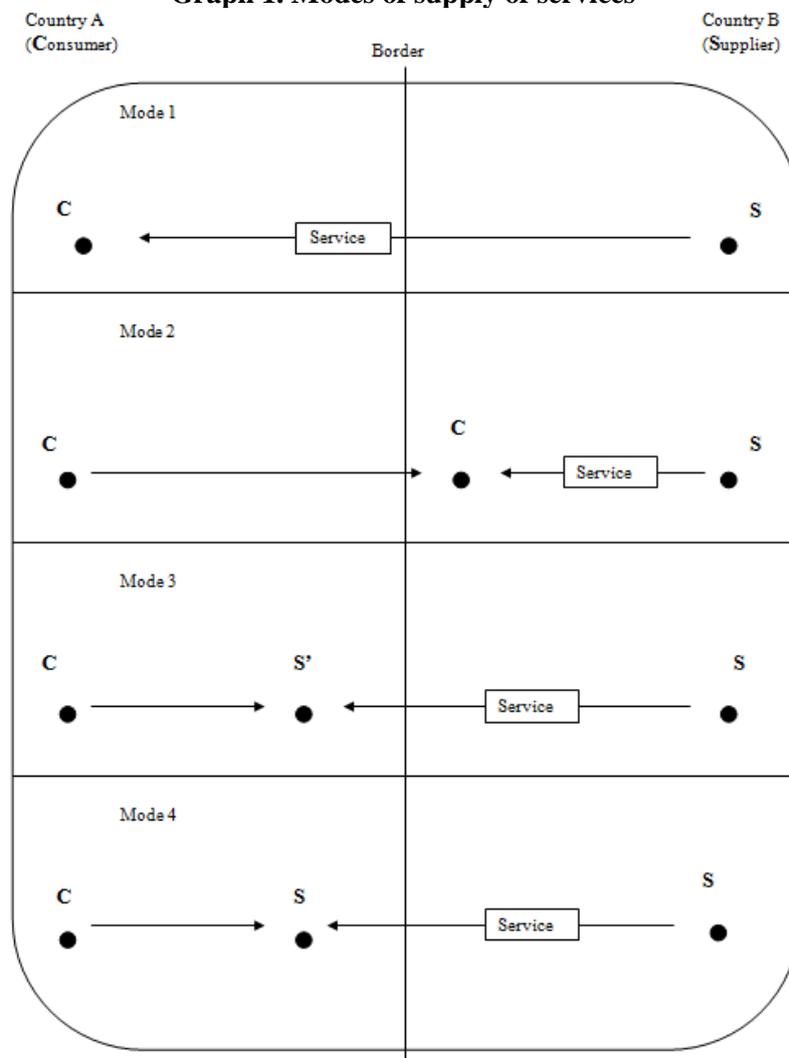
Developed countries are more and more specialized in services

Bensidoun & Unal-Kescenzi (2007) analyse international specialization using a revealed comparative advantages index applied to the international trade of the primary, secondary and tertiary sectors of Japan, the E27 and the United States, and correcting it from trade surpluses and deficits (trade balance's contribution index by CEPII) : results thus do not depend on eventual deficits for instance. Japan confirms its positioning on manufactured products, while services contribution is positive in the case of the United States. In the case of Europe, the situation of the tertiary sector is more shaded. A comparison between European countries shows that France enjoys a pronounced specialization in services, yet declining because of the deterioration of the « Other services », while its strength remains Tourism. Furthermore, as for the United States, the United Kingdom has fully committed and specialized in services, giving up industry little by little.

Next, the authors compare the United States and the EU27 according to their positioning for each tertiary activity. The calculation of the balance divided by the world trade for each service (expressed in percent) shows an asymmetry in the situation of the category « Royalties and licence fees »,

strength of the United States (like Personal, cultural, and recreational services, as well as Financial services) but weakness of Europe (like Personal, cultural, and recreational services). Insurance services are the weakness of the United States, whereas Computer and information services and Finance are strengths of Europe. « Other services », considered as more dynamic, are rather a strength for the United States, the United Kingdom and to some extent Germany, but definitely a weakness for France, where their trade is declining. Expressed in annual growth rate, position of France lies somewhere between Bulgaria and Czech Republic. Only « Other royalties and licence fees » and « Communications » industries remain on the upward trend.

Graph 1. Modes of supply of services



Box 2. Measure issues of trade in services as per the 4 modes of supply

Measuring trade in services through each of the four modes (*cross-border supply, consumption abroad, commercial presence, presence of natural persons*) is statistically delicate. In effect, if the balance of payments counts cross-border trade and trade resulting from consumption abroad (mode 1 and 2), no distinction between goods- or services-related operations is available when it comes to FDI, i.e. commercial presence (mode 3). Finally, there does not exist harmonized statistics about temporary presence of natural persons abroad (mode 4). Besides, up to mid-1990s, only merchandise trade-related trade in services were identified in balances of payments : transportation, travel (tourism), all other service activities being grouped in a super-category called « Other services ». Since then, eleven categories of trade in services have been distinguished : transportation, travel, construction services, communications services, insurance services, financial services, computer and information services, other royalties and licence fees, other business services, personal, cultural and recreational services, and Government services.

According to WTO, the sale of a service to a nonresident (trade in a broad sense as per GATS) is mainly done through commercial presence (see Table 2). Yet, sales of services to residents through commercial presence abroad can be estimated by FATS (*Foreign Affiliates Trade in Services Statistics*) statistics, which compile activities by resident subsidiaries of foreign multinational firms (FMN) established in the considered country (FATS inward) and activities of subsidiaries of based abroad the considered country (FATS outward). The turnover of these latter can be used as a proxy of sales abroad⁶. However, comparisons between cross-border trade and sales abroad through commercial presence are tricky. Indeed, FATS data are broken down by activity of the mother company, and not by activity of the group as a whole or by type of traded product (counted through modes 1 et 2). The issue is particularly difficult for trading operations where the value of the sold good is included in the turnover of the commercial subsidiary, or in construction, where the value of the building material used is included. Furthermore, FATS and balance of payments data are not directly comparable for they are recorded following a different classification, by product (goods, services) and by activity, respectively. Bensidoun & Unal-Kenzensi (2007) processed these data for four countries : the United States, Japan, France and Germany. They specified that this was not the only estimation who took into account the issue of data harmonization.

The difficulty of the approach of mode 3 should be highlighted ; GATS proposes a very broad definition of the notion of « trade ». FDI corresponds to a production, a creation of value added, jobs in the host country rather than the home country ; in that sense it differs from trade where production, value added and jobs are generated in the home country. Thus, considering sales done by foreign subsidiaries of national firms as « trade » may seem excessive for they are linked to the production of the service abroad to sell it on-site. Certainly, this mode of calculation may seem rough. For instance, it is a mean and categories are very differentiated at this level. Given the existence of sectoral FATS data, it is possible to discriminate according to service activities. However, some differences make comparisons difficult. To obtain these figures on mode 3, the authors indicate that a correction is necessary to go from the

⁶ The value of imports should be subtracted from turnover in order to avoid double counting : the value of services imported by the Home country (exported by the mother company to the foreign subsidiary, as per mode 1) is included in the turnover considered as the sale abroad by the FMN from the Home country, as per mode 3. However, data are not always available for FATS outward.

turnover of the category Commercial services to the commercial margin (the commercial service per se). To achieve this, two approaches can be adopted : run a calculation based on the gross margin rate (between 20 percent and 25 percent) and apply a uniform rate of 25 percent to the entire set of categories which would correspond to the service part of the turnover. With balances of payments, distributive services data are included in the traded goods. Another method, more drastic, would therefore be to exclude commercial trade (and construction). This option is in particular suggested by OECD.

Table 2. Correspondence between the four modes of supply of services and the various forms of firms internationalization

From the point of view of country A towards country B	Mode 1. Cross-border supply	Mode 2. Consumption abroad	Mode 3. Commercial presence	Mode 4. Presence of natural person
Trade in services between country A and country B	Classic Export of services (broadcast of a TV program using satellite,...)	Consumer located in B crosses the border to go to A : (tourism, health care, legal consultation, ...)		Supplier from A crosses the border but this time as a physical person
Market seeking FDI			Service is supplied by supplier from A who crosses the border as a moral person, and set up a durable office or subsidiary in B: (representational office of an airline or bank or insurance company branch)	
Relocation or offshoring	Import to A from B Outsourcing : service is aimed at final consumption in the home country (call centers) or intermediate consumption (data capture, accounting...).			

The share of services in FDI dominates and keep growing

The share of services in the total FDI stock has grown in most countries between 1995 and 2003, to represent now more than half of the world stock, and even totalling 88 percent of inward FDI stock in Germany and 82 percent of outward FDI stock in 2003. The share of FDI in services compared to GDP has also increased over the same period.

Nonetheless, as in industry, FDI in services aims at penetrating markets, and is not a relocation of service activities for wage cost difference reasons. For this, offshoring or mode 1 « cross-border supply » of trade in services according to the WTO typology (column 1 of Table 2) is a more appropriate tool.

Table 3. Share of services in inward and outward FDI stocks in 2003

	Inward FDI stock in services as percentage of total inward FDI stock	Inward FDI stock in services / GDP	Outward FDI stock in services as percentage of total outward FDI stock	Outward FDI stock in services / GDP
France	80	23,4	82	32,9
Germany	88	24,2	81	24,7
United Kingdom	66	22,3	61	42,3
United States	62	8,1	74	12,2

Source : *van Welsum et Reif (2006)*.

Effects of trade in services liberalization

Quantitative studies of the effects of liberalization of trade in services use Computable general equilibrium models (CGEM) to run their analyse⁷. An overall picture of these studies are shown in Table 4 (Rabaud & Montalieu, 2007).

Dee & Hanslow (2001) input bilateral FDI stocks of 19 regions in the GTAP (*Global Trade Analysis Project*). After a 10-year period, the authors find that multilateral trade in services liberalization has generated a decrease of real income in Canada, the United States and the EU. In the case of the EU, the loss –estimated to six billions of dollars- almost compensates gains derived from the multilateral liberalization in agriculture and industry, whereas in the same period, the United States show a global gain. However, the improvement of real income resulting from trade in services liberalisation obtained by Dee & Hanslow (2001) is directly linked to very high estimates of Chinese tariffs. According to the study by Brown & Stern (2001) on multinational firms (FMN) producing a differentiated product and organizing their production in different host countries (mode 3) to sell their services, suppression of obstacles to trade in services leads to sensible effects on welfare, in particular in Canada, the EU and the United States, to the detriment of some other countries (Chile, South Korea, Mexico, and Thailand). When liberalisation is limited to the service activities alone, the stronger expansion of this sector at the expenses of others, in developed countries, leads to a slight reduction of the improvement of their real income and welfare. Nonetheless, big service importers win, while producers loose. The magnitude of the decline of service activities in developing countries is higher than for other activities, some even expand, like textile-related activities. Overall, the global welfare gain contracts slightly (\$152 billion instead of \$156 billion).

⁷ Analysis of elimination of barriers porterior to the Uruguay round (Dee & Hanslow, 2001), the study of elimination of obstacles to commercial presence (Brown & Stern, 2001), temporary movement of natural persons (Walsmey & Winters, 2003) and the role of the differentiated intermediate good that services can represent (Markusen et al., 2006) are summarized by Rabaud & Montalieu (2007).

Table 4. Welfare and income gains from trade in services liberalization comparison

Authors	Market structure	Type of service	Mode	Type of suppressed barriers	Welfare and income gains	Comments
Brown and Stern (2001)	Multinational firms - firms producing differentiated goods and services		Mode 3 : commercial presence of foreign multinational firms	Barriers to market access as estimated by Hoekman	Increase by \$90bil of Global GNP; some developing countries loose, while developed countries win	Based on simplistic and over-estimated restriction and market access indices
Dee and Hanslow (2001)	Economies of scale and monopolistic competition like big group in all sectors		Mode 1 (cross-border trade) and mode 3: (commercial presence, bilateral FDI flow)	Tariff equivalents to trade and investment barriers posterior to the Uruguay round	Increase of the real global income by \$130bil, including \$100bil for China alone	In China, obstacles in all service categories are identical to the high tariff equivalents in banking and telecommunications services
Markusen, Rutherford and Tarr (2006)	Final good using a composite input of domestic and foreign services, produced with international economies of scale	Knowledge- and qualified labour-intensive services, intermediate goods, economies of scale, differentiated by firm and by nationality of firm, subjects to high trade costs	Modes 3 and 4 : imported services combine qualified labour and domestic composite input to imported composite input	Barriers to foreign property (mode 3) or movement of professional staff employed by FMNs (mode 4)	Relaxing of trade in services barriers reducing their price. If services price is divided by 5, home importer country welfare improves by 15 percent.	Not all regulations are necessarily protectionists. Effect of restrictions on prices would therefore be more limited. Some high elasticities of substitution overvalue productivity gains
Walmsley and Winter (2003)		Liberalisation of temporary movement of natural persons; employed in all sectors, including services	Mode 4: liberalisation of temporary movement of natural persons	Increase of quotas of both qualified and nonqualified labour by 3 percent of their workforce in developed and developing countries	Increase of global welfare by \$153bil, 0,6 percent of global GDP. Developing countries win more than developed countries; migration of nonqualified workers creates the highest gains	Productivity differentials are assimilated to salary differences, which leads to an over-estimation of migration and therefore welfare gains

Source : Rabaud and Montalieu (2007).

Finally, we can mention the study by Markusen et al. (2006) that analyzes the impact of suppression of restrictions pressing foreign business services providers while taking account of specificities of these activities. They obtain a welfare gain of 15 percent when business services price is divided by five. Var-

ious studies make these results doubtful (Rabaud and Montalieu, 2007; Guillonchon et alii, 2006). Besides, like Deardorff and Stern (2004), regulations in services should not all be considered as protectionnists, « *many regulations follow legitimate goals, such as health protection, security or fraud or other misconduct prevention* ». If liberalization was restricted to the protectionist regulation suppression alone, the outcome would be a lower price reduction. Trade gains resulting from empirical studies based on CGEM remain fragile, leave aside short-term adjustment costs and assume FDI and temporary migration liberalization.

2.3. Relocation and international outsourcing of service activities

Besides these rash estimations, there are several serious studies on directly relocatable jobs through, in particular, outsourcing and offshoring. As a matter of example, van Welsum and Vickery (2005) have calculated the share of jobs in service functions that can be directly relocated. Employment data are selected by examining meticulously tasks and functions of services and by taking into account four criteria of « relocatability » : intensity of ICT usage ; transferability afar of the service with the help of ICT (call centers for instance) ; degree of knowledge or know-how codification in service activities (patents, software...) ; optionality of face-to-face relations between suppliers and clients.

The result obtained is that around 20 percent of posts occupied in such functions are potentially internationally relocatable, mainly because of the intensive usage of ICT and the increased degree of tradability of services. Blinder (2005), with other methods, finds that 20 percent of service jobs are relocatable in the United States (year 2004). Mankiw and Swagel (2006) relativize the phenomenon and estimate that outsourcing and offshoring are not responsible for a significant share of job losses observed in the United States during the economic slowdown in the early 2000s. The study from van Welsum and Reif (2006) estimates that share of potentially relocatable jobs in the EU15 has increased from 17,1 percent in 1995 to 19,2 percent in 2003. In the case of Canada, the estimation is around 20 percent in 2001, to decrease to 18,6 percent in 2003. Not only does the share of relocatable jobs stay below 19 to 20 percent in all developed countries, but this share tends to shrink everywhere, except in the EU because of intracommunity relocations linked to the integration of new member states.

These studies move away from catastrophist estimations by consulting groups like Forrester Research who bet on a 44 percent of total employment. Furthermore, data regarding « relocatable jobs » do not always distinguish between foreign market-seeking purpose relocations and « reimport » of the final service by the home country of the supplier who relocated. Yet, most studies using individual data conclude that relocatable service activities from the United States are foreign market-seeking FDI.

Finally, as in the case of industry, jobs lost through relocation may be offset by jobs creation in the same activities owing to complementary effects between relocations and competitiveness in the home country of firms. Mann (2003 and 2004) shows that offshoring affects work structure within an activity, in particular by modifying the qualification structure of workers. Around 125,000 programming jobs have been lost between 1999 and 2003, but 425,000 computer and software engineer and analyst jobs have been gained, which are more qualified (and usually better remunerated). Over the same period, Mann (2004) notes that more than 500,000 jobs have been lost in « routine tasks » service jobs, such as telemarketing or data entry.

Other studies confirm that low qualified programming jobs are mainly lost in the United States and relocated to India. Accounting and computer maintenance tasks are also subject to offshoring. But highly qualified occupations are also concerned : network administration, software programming and development, engineering, design, legal services... Overall, most severe estimations state a transfer of 180,000 jobs a year to foreign subsidiaries of American multinationals between 1997 and 2001, or 0,16 percent of private jobs in the United States (Mankiw and Swagel, 2006).

Some have seen, in the emergence of the Information and Communications Technologies (ICT) and the related-services, a profound modification of conditions of the supplier/customer relations. Yet, the vast majority of services remains conditional to the necessity of a direct relation between supplier and customer and no trend of a disappearance of this direct relation is perceptible. Nevertheless, it is clear that the nature and the impact of this relation on the quality of service and on the service firm location are now more complex. The analysis of the role of this consumer/supplier relation is important, in that the choice of location of service activity depends on it (du Tertre, 2008). All tradable services are not necessarily relocatable in the sense we understand relocation, i.e. seen as a substitution process for some bits of activity, from national to foreign production.

ICT have certainly allowed to increase relocation of financial services activities to some fiscal heavens (offshore financial centers) and of other information services (Malecki and Morizet, 2008). But, as shown in Table 5, relocation of service activities should not be mixed up with offshoring. For the very same service activities, some firms (i) internalize functions and therefore do not relocate (onshoring), ii) internalize through creation of subsidiaries abroad or through Mergers & Acquisitions (FDI), iii) outsource functions domestically (onshoring) or iv) outsource functions internationally (offshoring).

This matrix analyse (Table 5) is not sufficient yet to explain the true reasons of the strong heterogeneity of service firm practices when it comes to relocation. This is why it is necessary to introduce an analysis of the nature of Information services potentially candidates to offshoring or relocation (Table 2).

In reality, the production of a service is defined by three aspects : (i) the production process as such (nonspecific to the service activity) ; (ii) the production of the service is done through face-to-face with the client ; (iii) the externalization of tasks by the firms to the clients. As explained by du Tertre (2008), services put at stake the issue of accessibility and co-production of services between suppliers and clients. The client is traditionally supposed nearby or in front of the supplier since the co-production supposes a synchronic process. The fact that ICT allow a fragmentation of the co-production *via* supply of service from distance while conserving the face-to-face synchronic relation does not represent a systematic incentive for firms to relocate the supply of their services.

Table 5. Internalization, externalization, international outsourcing of service activities

		Firm governance mode	
		Internalization	Outsourcing
Geographic location	Onshore (domestic)	Service supplied by the firm in the domestic country (i)	Service outsourced to a domestic operator (Zara outsources to André distribution logistics) (iii)
	Offshore (abroad)	Relocation to the group foreign subsidiary (DELL to its subsidiary in Bangalore) (ii)	Outsourcing to an independant firm based abroad (software outsourced by Microsoft to Bangalore, accounting activity of Rhodia outsourced to Accenture in Prague...)(iv)

Source : Mouhoud (2008).

3. SEMI-ENDOGENEOUS DETERMINATION OF SERVICE CATEGORIES BY ANCHORING LEVEL ON NATIONAL TERRITORY

Typologies of studies shown previously are purely empirical : a service is said tradable when it is concentrated an its production is independent from location of demand. A service is nontradable when the location of its production depends on the location of demand. It is necessary to introduce an analytical dimension of the nature of services, derived from location factors of service activities themselves.

Several factors influence the choice of the location of a service : households income, firms presence, spatial considerations in nonattractive territories but in which development of activities could be encouraged thanks to, for instance, a road hub, a transit area, ICT, be these service or industrial activities.

Current service definitions and classifications distinguishing between trading and nontrading services or business or household services does not enable to properly capture the diversity of location and service territory anchoring strategies. We propose a prospective analysis of the future of services in territories by building an endogeneous typology taking into account location of activities criteria. It is then possible to cross territories and services types to characterize the degree of vulnerability of territories to international relocation of the different types of services they host, in terms of anchoring or volatility of these activities.

Given the specific characteristics of international trade in services, we apply the methodological approach developed for the study of the production of services in the case of France by Mouhoud (2010).

First, starting with a service activity center-periphery approach, we define six groups of services, identified according to three location of production criteria that are (i) access to resources ; (ii) economies of agglomeration ; and (iii) proximity to clients. Each of these three criteria, when pronounced, has a centripetal effect on concerned location of service activities, and translates into a more pronounced anchoring of them, while less importance of these criteria has on the contrary a centrifugal effect which translates into dispersion of the actors of the concerned service industries. The identified groups are as follows : knowledge-based services, public or private collective services, logictic services of intermediation, local intermediary and final consumption services, immaterial services of final consumption, and support functions-related services.

Knowledge-based services correspond to services for which knowledge, its dissemination and immaterial investments play a preponderant role. Much sought-after resources are immaterial by nature with very important possibilities of economies of agglomeration (knowledge externalities...), while necessity of client proximity is pronounced.

Public or private collective services trade off in terms of location between search of economies of agglomeration in order to reduce costs, which plays in favour of a concentration of activities, and the necessary proximity to clients or customers, which plays rather in favour of a geographical dispersion. Conversely, the question of access to resources is not posed with much intensity. Such services are quite territorially anchored and not really exposed to international competition. Their trade is more conditional to political and urban development choices, as well as to technological differential.

Logictic services of intermediation need resources – land and infrastructures – to develop. Proximity with similar firms generates important economies of agglomeration linked to the induced infrastructures development. Proximity with clients is a secondary location criterion. Territorial anchoring is important but in a lesser extent than for knowledge-based services. Logictic services of intermediation are less exposed to international competition thanks to weaker proximity-to-clients constraint.

Local intermediary and final consumption services is characterized by proximity to clients constraint, main location criterion. *De facto*, territorial anchoring is quite weak. Nonetheless, this proximity tends to protect activities of this group from international competition.

Conversely, *Immaterial services of final consumption* need resources, both land and natural resources, to exist. Territorial anchoring is therefore quite important. For instance, tourism needs specific territorial consideration to differentiate. Territorial anchoring seems natural. However, this does not translate here into protection of the activity against international competition. Recipient of the service can move across borders.

Support functions-related services, finally, are characterized by the absence of major location criteria: no notable need for specific resources, non-determinant economies of agglomeration and weak pertinence of the proximity-to-clients criterion. These services are codifiable, standardisable, in such a way that prestations can be delivered without particular territorial tie. Production costs minimisation is the main setting-up driver, exactly like in labour-intensive industries.

Next, we distribute the different service categories as defined in the Extended Balance of Payments Services (EBOPS) classification of the Manual on Statistics of international trade in services published in 2001 by the United Nations, among the six service groups.

Construction services, information services, other royalties and licence fees, legal services, business and management consulting, and public relations services, advertising, market research, and public opinion polling, research and development, architectural, engineering and other technical services, at the same time steadily territorially anchored and weakly exposed to international competition as far as costs are concerned, pertain to knowledge-based services.

Additionally to waste treatment and depollution and other personal, cultural, and recreational services, government services pertain to public or private collective services, subject to strong economies of scale.

Transportation, postal and courier services, merchanting and other trade-related services, operational leasing services, agricultural, mining, and other on-site processing services, other business services and services between related enterprises form the group of logistic services of intermediation.

Personal travel forms the immaterial services of final consumption, and offers a variety of forms (health, education, etc.).

Business travel are part of local intermediary and final consumption services, as well as life insurance and pension funding, freight insurance, financial services, and franchises and similar rights.

Telecommunications services, other direct insurance, reinsurance, auxiliary services, computer services, accounting, auditing, bookkeeping, and tax consulting services meet the requirements of support functions-related services.

Table 6 recaps the constitution of the six groups of services and lists the associated service categories.

4. SEMI-ENDOGENEOUS BREAKDOWN OF SERVICES AND INTERNATIONAL SPECIALIZATION : AN INTERNATIONAL COMPARISON

Once the breakdown of the different categories of services according to EBOPS classification in the six groups of services is completed, we try in a second movement to determine the revealed comparative advantages of countries in trading services with the rest of the world. The indicator corresponds to the total net contribution of countries to international trade in services, service by service. This indicator is as follows :

$$F_{ik}^n = \frac{1000}{Y_i} \left[(X_{ik} - M_{ik}) - \frac{W_k}{W} (X_i - M_i) \right]$$

with : i : country ; k : service ; n : year

Y_i : GDP of country i in PPP

X_{ik} : exports of country i in service k

X_i : total exports in services of country i

M_{ik} : imports of country i in service k

M_i : total imports of services of country i

W_k : international trade in service k

W : international trade in all services⁸

⁸ NOTA 1: Data only for 198 countries.

NOTA 2: Some countries do not include 291 (Government services n.i.e) in 200, namely Algeria, Anguilla, Bangladesh, Benin, Bhutan, Bolivia, Botswana, Brunei Darussalam, Burkina Faso, Cambodia, Cameroon, Cape Verde, Chad, China, Macao SAR, Comoros, Congo, Croatia, Cuba, DRC, Dominica, Equatorial Guinea, Ethiopia, Faeroe Islands, Gabon, Guinea, Guinea-Bissau, Haiti, Iceland, Iran, Israel, Kenya, Kiribati, Kyrgyzstan, Liberia, Madagascar, Mauritania, Montserrat, Morocco, Nepal, Norway, Oman, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Sao Tome and Principe, Seychelles, Sudan, Suriname, Switzerland, Togo, Turkey, Ukraine, UAE, United Rep. of Tanzania, Uzbekistan, Zimbabwe.

NOTA 3: Data for Zimbabwe only for 2000-2002.

Table 6. Semi-endogeneous classification of service categories by their degree of tradability

Polarisation (mark-ups)	Strongest	Stronger	Strong	Weak	Weaker	Weakest
Access to resources	Strong	Weak	Strong	Weak	Strong	Weak
Agglomeration economies	Strong	Strong	Strong	Weak	Weak	Weak
Proximity to clients	Strong	Strong	Weak	Strong	Weak	Weak
Anchoring level	Very high	High	High	Low	High	Very low
Positioning relatively to competitors	Very important	Important	Neutral	Important	Weak	Very weak
Service activities grouping	1. Knowledge-based services	2. Public or private collective services	3. Logistic services of intermediation	4. Local intermediary and final consumption services	5. Immaterial services of final consumption	6. Support functions-related services
List of service activities	Construction services Information services Other royalties and licence fees Legal services Business and management consulting, and public relations Advertising, market research, and public opinion polling Research and development Architectural, engineering, and other technical services Audiovisual and related services	Waste treatment and depollution Other personal, cultural, and recreational services Government services, n.i.e.	Transportation Postal and courier services Merchanting and other trade-related services Operational leasing services Agricultural, mining, and other on-site processing services Other business services Services between related enterprises, n.i.e	Business travel Life insurance and pension funding Freight insurance Financial services Franchises and similar rights	Personal travel	Telecommunications services Other direct insurance Reinsurance Auxiliary services Computer services Accounting, auditing, bookkeeping, and tax consulting services

We use data from the UN ServiceTrade database⁹, which is the most complete worldwide database on international trade in services using the EBOPS classification. The period considered is 2000-2007. The indicator is calculated for 2000 (beginning of period) and 2007 (end of period), in order to analyze not only the structure of relative specialization of the countries in the sample, but also the change in structure of national advantages over time.

Because the sample should only include countries for which foreign trade data are sufficiently broken down, only eleven selected countries have been selected : Australia, Canada, Czech Republic, France, Germany, Italy, Latvia, Netherlands, Sweden, United Kingdom and United States.

Imputation of missing data for some service categories for the requested year when data for this very same category is available for other years has been done as follows :

Given k the service, sub-category of service K , for which the export or import value x_k is missing for the year t , such as

$$\forall t = 1, \dots, T, t \in \mathbb{N},$$

$$X_{K,t} = \sum_{k=1}^n x_{k,t}$$

the estimated value \tilde{x}_k of x_k is such as :

$$\tilde{x}_{k,t} = \frac{X_{K,t}}{T-1} \sum_{\substack{t'=1 \\ t' \neq t}}^T \frac{x_{k,t'}}{X_{K,t'}}$$

In the case of missing value for a sub-category for the required year when data for all other sub-categories for the same year are available, the following estimation is calculated :

Given k the service, sub-category of service K , for which the value x_k is missing for the year t , such as $\forall t = 1, \dots, T, t \in \mathbb{N}, X_{K,t} = \sum_{k=1}^n x_{k,t}$, the estimated value \tilde{x}_k of x_k is such as :

$$\tilde{x}_{k,t} = X_{K,t} - \sum_{\substack{k'=1 \\ k' \neq k}}^K x_{k',t}$$

The results of the calculation of the revealed comparative advantage indicator for the different countries of the sample are given in Table 7.

⁹ <http://unstats.un.org/unsd/servicetrade/default.aspx>

By confronting results of the calculation of the revealed comparative advantage indicator in trade of each service for each country of the sample with the semi-endogeneous classification of service categories by degree of tradability, we obtain for each country the degree of anchoring of service industries for which the country enjoys a comparative advantage.

Results¹⁰

Trade in services between **Australia** and the rest of the world is not characterized by pronounced revealed comparative advantages or disadvantages. This country shows a very clear revealed comparative advantage only for personal travel, and a pronounced comparative disadvantage in transportation. It is worth noting however a strengthening of this comparative advantage over time.

Canada shows quite pronounced comparative advantages or disadvantages in various service industries whose territorial anchoring is varying. Thus, this country enjoys comparative advantage in heavily territorially anchored service industries such as research and development, architectural, engineering and other technical services, and merchanting and other trade-related services. This country enjoys as well relatively pronounced comparative advantage in computer services, more geographically volatile. Conversely, transportation, franchises and similar rights, reinsurance, and above all personal travel are for Canada industries where a comparative disadvantage is clear. These industries have a more and less pronounced territorial anchorage. It is besides worth noting that the comparative disadvantage of Canada in transportation and franchises and similar rights is deepening over time.

Czech Republic shows several service industries with more or less pronounced revealed comparative advantage, with varying territorial anchoring: transportation, business and, in a more heavily fashion, personal travel, advertising, market research, and public opinion polling, government services. Similarly, this country shows comparative disadvantage in various service industries with more and less pronounced territorial anchoring, such as other royalties and licence fees, business and management consulting, and public relations services, merchanting and other trade-related services, other business services and services between related enterprises, financial services, and finally reinsurance. It is worth noting furthermore that the comparative advantage or disadvantage of these industries is strengthening over time.

France enjoys a moderate comparative advantage in construction services, merchanting and other trade-related services, industries heavily territorially anchored, and a very pronounced comparative advantage in personal travel. Conversely, this country records a comparative disadvantage marked in transportation and business travel, both heavily territorially anchored, and a more moderate comparative disadvantage in financial services, more volatile industry.

¹⁰ Tables “Intensity of the revealed comparative advantage by degree of relocatability of service” and tables “Sign of revealed comparative advantage indicator by service activities group according to polarization” can be provided upon request to the authors.

Furthermore, the comparative advantage in construction, merchanting and other trade-related services, and personal travel is growing over time, as does the comparative disadvantage in transportation, business travel and financial services.

Germany is the only country in the sample that shows significant revealed comparative disadvantage for only one service industry, namely business and personal travel. Comparative disadvantage in this moderately anchored industry is prominent and grows over time. For several other service industries, for most of them heavily territorially anchored, this country enjoys a more and less pronounced comparative advantage and, except for personal travel, growing over time. These are construction services, research and development, architectural, engineering and other technical services, government services, merchanting and other trade-related services, financial services, other business services, and personal travel.

Italy shows, as far as service industries are concerned, only a few significant revealed comparative advantages and disadvantages. On the comparative advantage's side, there are financial services and personal travel, for which the country enjoys strong comparative advantage. These two industries are only slightly territorially anchored. Amongst service industries for which Italy shows a comparative disadvantage, there are transportation, operational leasing services, and other business services, all three moderately territorially anchored. The significance of either comparative advantages or disadvantages intensifies over time.

Latvia enjoys significant a comparative advantage in three service industries, namely advertising, market research, and public opinion polling, highly territorially anchored, transportation and financial services, moderately territorially anchored services. Transportation is outstanding for the exceptional intensity of the comparative advantage Latvia enjoys for this service industry, even though it has slightly decreased over time, in opposition with the two other service industries. Some service industries, conversely, record a pretty pronounced comparative disadvantage. This is the case for highly territorially anchored service industries like construction services, architectural, engineering and other technical services, or business and management consulting, and public relations services ; it also the case for much less territorially anchored service industries such as personal travel (showing a very pronounced comparative disadvantage in the case of Latvia), telecommunications services or reinsurance.

Netherlands show comparative advantage in many service industries, independently of their degree of territorial anchoring. The same goes with service industries for which this country shows a comparative disadvantage. This country has managed, in less than a decade, to create or strengthen significant comparative advantages in service industries as diverse as construction services, research and development, government services, transportation, agricultural, mining, and other on-site processing services, other business services, franchises and similar rights, and accounting, auditing, bookkeeping, and tax consulting services. However, in transportation, the comparative advantage of this

country, even though it remains high, has strongly dropped over time. Amongst service industries for which Netherlands shows a significant comparative disadvantage, we find business and management consulting, and public relations services, advertising, market research, and public opinion polling, merchandising and other trade-related services, business and personal travel, and financial services.

Sweden, as Netherlands, shows comparative advantages and disadvantages in many service industries, independently of their degree of territorial anchoring. Amongst service industries showing pronounced comparative advantages are other royalties and licence fees, architectural, engineering, and other technical services, merchandising and other trade-related services, freight insurance and computer services. Sweden has, except for transportation where it lost with time its comparative advantage, recorded an increase of its comparative advantage for all these service industries over time. Conversely, service industries like business and management consulting, and public relations services, advertising, market research, and public opinion polling, research and development, other business services, financial services, personal travel and telecommunications services are subject to a significant comparative disadvantage. Sweden has recorded for all these service industries, over time, a deepening of its comparative disadvantage.

Table 7. Revealed comparative advantage indicator

Sector	AUSTRALIA		CANADA		CZECH REP.		FRANCE		GERMANY		ITALY	
	2000	2007	2000	2007	2000	2007	2000	2007	2000	2007	2000	2007
205	-4.32	-7.99	-1.08	-2.71	2.31	3.5	-2.55	-3.67	3.24	0.33	-2.8	-4.18
237	-1.28	-0.15	-0.66	-0.63	2.86	2.74	-0.85	-1.38	-3.34	-4.25	0.38	-0.14
240	6.55	10.55	-0.36	-14.23	6.42	6.54	6.82	8.51	-16.53	-22.94	7.64	9.58
246	0.02	0.18	0.07	0.05	-0.01	-0.23	0.02	0.15	-0.04	-0.17	-0.11	0
247	-0.5	-0.18	-0.01	0.47	0.38	0.24	-0.08	0.44	-0.41	-0.3	-0.34	-0.63
249	0.02	0.06	0.24	0.37	-0.03	0.3	0.63	1.38	0.13	1.66	0.13	-0.06
254	0	0	0.05	-0.35	0	0	n.a.	n.a.	0.02	-0.04	-0.12	-0.81
255	-0.01	-0.01	0	0.01	-0.02	-0.03	n.a.	n.a.	-0.05	-0.17	-0.04	-0.1
256	-0.24	-0.25	0.01	0.05	-0.01	-0.07	n.a.	n.a.	0.03	-0.06	0.08	-0.11
257	0.17	0.13	-1.22	-1.57	-0.46	-1.04	0.85	-0.64	0.05	1.43	-0.06	0.07
258	-0.11	-0.11	0.18	0.33	-0.01	-0.02	n.a.	n.a.	0.01	0.02	-0.06	-0.02
260	0.24	0.32	-0.51	0.46	-0.73	-2.61	-0.87	-1.47	1.89	2.37	-0.12	1.77
263	-0.03	0.03	1.94	1.85	-0.08	0.04	-0.17	-0.25	0.08	0.51	-0.33	-0.36
264	-0.04	0	-0.11	0.13	-0.02	-0.11	-0.03	-0.1	-0.13	-0.19	-0.01	0
891	-0.36	-0.75	-0.63	-1.67	-0.06	-0.34	n.a.	n.a.	-0.49	-0.21	0	-0.22
892	-1.2	-2.12	-1.06	-1.77	-0.26	-2.31	n.a.	n.a.	-0.55	-0.63	0	-0.04
269	0.27	0.58	0.2	1.06	-0.66	-2.33	0.57	1.6	1.22	3.85	-1.34	-0.68
272	-1.02	-0.85	-0.28	-0.48	-0.17	-0.62	-0.36	-0.81	0.13	0.2	-0.37	-3.22
275	0.16	0.13	-0.03	0.16	-0.41	0.05	0	n.a.	n.a.	n.a.	-0.02	0.02
276	0.08	0.2	0.01	0.05	0.04	0.15	0	n.a.	n.a.	n.a.	-0.07	0.04
277	-0.01	0.22	-1.1	0.51	-0.53	-1.54	-0.05	n.a.	-0.87	-0.92	-0.05	0.36
278	0.04	0.17	-0.01	0.38	-0.03	1.23	-0.27	-0.53	-1.08	-0.15	-0.11	-0.12
279	0.19	0.45	1.98	1.78	-0.79	-0.62	0.18	-0.11	0.24	1.28	0.07	0.36
280	0.49	0.46	0.88	1.61	-0.4	0.36	0.04	-0.6	-0.27	1.74	-0.27	0.66
282	0	0	0.02	-0.06	0	0.08	n.a.	n.a.	n.a.	n.a.	-0.01	-0.1
283	-0.13	-0.1	0	0.03	-0.01	0.09	n.a.	n.a.	n.a.	n.a.	0	0.01
284	0.01	-0.25	-0.4	0.76	-5.2	-0.27	-0.24	-1.32	1.98	2	-0.79	-1.6
285	0.24	0.34	0.14	0.47	-0.28	-1.35	0.66	-0.32	-0.08	-0.83	0.12	-0.07
288	0.89	-0.88	-0.2	0.13	0.04	0.27	-0.39	-0.44	-1.27	-0.49	-0.26	-0.56
289	0.18	0.3	0.17	0.08	0.24	-0.24	-0.02	-0.22	0.11	0.03	-0.17	0.11
291	0.15	-0.03	0.62	0.66	-0.13	1.19	-0.67	-0.25	1.62	1.85	-0.31	-0.79

Table 7 (continued)

Sector	LATVIA		NETHERLANDS		SWEDEN		UK		USA	
	2000	2007	2000	2007	2000	2007	2000	2007	2000	2007
205	23.48	23.11	11.37	5.67	7.29	-0.97	-6.39	-9.63	-3.23	-3.22
237	0.6	0.55	-1.11	-1.08	-10.68	-0.01	-0.22	-1.45	0.16	0.08
240	-11.62	-12.3	-9.22	-11.67	-20.11	-14.72	-9.24	-20.64	1.57	1.19
246	0.19	0.03	0.02	0.29	0	-0.01	-0.16	-0.14	-0.04	-0.04
247	0.49	-1.27	0.01	-0.13	-0.46	-1.31	-0.03	0	-0.24	-0.07
249	-1.42	-3.31	3.48	1.38	1.63	-0.49	-0.17	-0.65	0.06	0.16
254	-0.02	0.14	0.07	0.17	-0.07	-0.09	n.a.	-0.5	n.a.	n.a.
255	-0.11	-0.02	-0.55	-0.74	0.83	1.18	n.a.	-0.68	n.a.	n.a.
256	-0.03	0.06	0.1	0.3	-0.06	-0.01	n.a.	3.15	n.a.	n.a.
257	-2.65	-1.57	-0.36	-0.79	0.2	-0.46	n.a.	-0.17	-0.71	-0.13
258	-0.01	-0.1	0	-0.04	0.02	-0.1	n.a.	1.37	n.a.	n.a.
260	-0.21	3.45	-0.38	-2.67	0.95	-1.27	9.7	23.24	0.72	2.19
263	0.11	0.3	-0.15	0.36	0.89	9.31	n.a.	2	0.06	-0.66
264	-0.2	-0.67	0.14	0.63	-0.22	-0.07	n.a.	1.18	0.21	0.25
891	-0.13	-0.3	-0.16	5.13	0.31	0.28	n.a.	-0.44	0.04	0.21
892	-0.61	-0.84	-0.69	0.24	1.26	7.65	n.a.	2.1	2.64	3.84
269	1.29	-0.71	-1	-3.76	6.54	24.92	0.76	-0.19	n.a.	n.a.
272	-0.08	0.11	0.94	-0.55	0.35	-0.89	-0.35	-0.66	0.32	0.4
275	-0.08	-0.16	-1.3	-0.47	-0.78	-0.17	n.a.	2.12	0.2	0.31
276	-0.05	-0.41	2.71	3.46	-0.52	-0.29	n.a.	0.82	n.a.	n.a.
277	-0.78	-1.29	-2.07	-1.72	0.08	-1.65	n.a.	1.47	0.04	0.29
278	0.26	1.89	-0.07	-1.4	-2.77	-4.07	n.a.	0.14	-0.08	0.05
279	-0.22	-0.15	0.76	1.53	0.42	-7.22	n.a.	2.05	-0.05	0.04
280	-0.51	-1.09	-0.25	0.27	-3.83	2.86	n.a.	2.08	0.12	0.19
282	n.a.	0	0	0.01	0.01	0	n.a.	-0.01	n.a.	n.a.
283	0.09	0	-0.11	3.96	0.04	-0.15	n.a.	0.14	n.a.	n.a.
284	-0.19	-0.33	-1.03	2.7	-1.67	-5.27	n.a.	0.1	0.38	1.75
285	-0.62	-0.49	-0.58	0.05	0.3	0.48	n.a.	0.21	0.57	0.98
288	-0.32	-0.38	-0.05	-0.45	0.17	-0.26	0.26	-0.02	0.57	0.92
289	-0.2	-0.28	-0.02	0.15	0.05	-0.05	0.08	0.45	-0.03	-0.02
291	-0.15	-0.11	-0.97	2.3	0.81	0.2	-1.04	-1.66	0.02	-1.33

Legend

205	1 Transportation	272	9.2 Operational leasing services
237	2.1 Business travel	275	9.3.1.1 Legal services
240	2.2 Personal travel	276	9.3.1.2 Accounting, auditing, bookkeeping, and tax consulting services
246	3.1 Postal and courier services	277	9.3.1.3 Business and management consulting and public relations services
247	3.2 Telecommunications services	278	9.3.2 Advertising, market research, and public opinion polling
249	4 Construction services	279	9.3.3 Research and development
254	5.1 Life insurance and pension funding	280	9.3.4 Architectural, engineering, and other technical services
255	5.2 Freight insurance	282	9.3.5.1 Waste treatment and depollution
256	5.3 Other direct insurance	283	9.3.5.2 Agricultural, mining, and other on-site processing services
257	5.4 Reinsurance	284	9.3.6 Other business services
258	5.5 Auxiliary services	285	9.3.7 Services between related enterprises, n.i.e.
260	6 Financial services	288	10.1 Audiovisual and related services
263	7.1 Computer services	289	10.2 Other personal, cultural, and recreational services
264	7.2 Information services	291	11 Government services, n.i.e.
891	8.1 Franchises and similar rights		
892	8.2 Other royalties and license fees		
269	9.1 Merchandising and other trade-related services		

Data available as of 18 September 2010.

United Kingdom is the most polarized country of the sample when it comes to industries recording significant comparative advantages. Indeed, these industries are either strongly territorially anchored, either conversely very weakly territorially anchored. Among the many territorially anchored service industries showing pronounced comparative advantages, we find information services, other royalties and license fees, legal services, business and management consulting, and public relations services, research and development, architectural, engineering, and other technical services. As for less territorially anchored services, we find financial services, other direct insurance, auxiliary services and computer services. Conversely, service industries showing marked comparative disadvantages are much less numerous and moderately territorially anchored. They are government services, transportation, business and personal travel. Comparative disadvantages for all these service industries has been deepening with time.

Finally, in the case of the **United States**, only Government services and transportation services, both strongly territorially anchored, show a significant comparative disadvantage. Conversely, this country enjoys, without surprise, significant comparative advantages in industries where territorial anchoring is as varied as for personal travel, financial services, other business services and other royalties and licence fees.

5. CONCLUSION

A new typology of service activities ensued from an analysis of the determinants of geographic location of economic activities has been proposed and applied to the international specialization of a sample of industrial countries. Six service categories have been organized according to their anchoring level ; from the most geographically anchored, and therefore most protected from price competition (Knowledge-based services) to the most volatile and relocatable to low-wage countries (Support functions-related services).

A United Nations database on international trade in services has been used and accommodated to identify the anchoring level of the different service categories, and a measure of revealed comparative advantages has been applied to a sample of developed countries. This analysis shed new light on the true nature of international specialization in the different service categories by going beyond the usual breakdown between industrial countries versus countries specialized in services.

The two following set of results can be derived from this analysis.

Firstly, five groups of countries can be identified. One group is rather specialized in highly anchored service activities, and encompasses Australia, Canada, the Netherlands, and Sweden. The second group is rather specialized in moderately anchored service activities, and comprises of Czech Republic and Latvia. A third group of countries is rather specialized in weakly anchored service activities. France and Italy are in this group. The case of Germany comes as a surprise since this country supplements its specialization in non-price com-

petitive industrial activities with a specialization in highly anchored service activities, but also in less anchored services. Indeed, this country shows a comparative specialization for the whole spectrum of the different groups of service categories. Finally, a fifth group, composed of the United Kingdom and the United States, shows specialization in both very weakly and very highly anchored service activities, but not in moderately anchored services.

Secondly, all countries of the sample show specialization in one or another group of service categories. Countries specialized in knowledge-based services are the United Kingdom, Netherlands, United States, Canada and Australia. Countries specialized in public or private collective services, conducive to strong economies of scale, are primarily Germany, Sweden and Canada. Countries specialized in logistic services of intermediation and local intermediary and final consumption services are Latvia, the Netherlands, Canada, and Sweden. Countries specialized in immaterial services of final consumption (tourism and personal travel essentially) are France, Italy, United States, Australia and Czech Republic. The United States, given the fact this country also shows specialization in other service categories, is less sensitive to fluctuating international demand and exchange rates than countries like France or Italy (tourism). Finally, countries specialized in support functions-related services, highly relocatable, are the United Kingdom and in a lesser extent Sweden. It is worth noting in the case of the United Kingdom that the vulnerability of this country to relocation of service industries is tempered by its strong specialization in knowledge-based services.

Overall, this study reveals that countries highly specialized in industrial activities also show specialization in highly anchored service activities, supplementing them (knowledge-based services, public or private collective services, logistic services of intermediation). The Netherlands, Sweden, Germany, Canada and Australia are in this configuration. Other countries, which have the reputation of being specialized in services after a desindustrialization process, such as the United States and the United Kingdom, curiously do not show a high international specialization in service activities. Finally, a third group of countries, France, Italy, Czech Republic, and Latvia are rather vulnerable to relocation of service activities, being specialized in rather weakly anchored service activities.

Lessons for economic policy can be drawn from this analysis, and services should be part of non-price competitiveness strategies design of developed countries when it comes to stand up to the rise of low-wage countries in the international competition. Integrating developing countries in the analysis using the same semi-endogeneous typology would be a useful supplement to this analysis.

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**SPÉCIALISATION INTERNATIONALE DANS LES SERVICES :
UNE ÉVALUATION A PARTIR D'UNE NOUVELLE
TAXINOMIE THÉORIQUE**

***Résumé** - L'hypothèse persistante de non-échangeabilité des activités de services a conduit à une méconnaissance générale du rôle des services dans la spécialisation et les performances des pays, notamment développés. Pourtant, la part des services dans le commerce international ne cesse de croître, prouvant de fait leur échangeabilité, et questionnant sur leur potentiel de délocalisation, ou délocalisabilité. Cet article propose une taxonomie originale des activités de services selon leur degré d'ancrage territorial, c'est-à-dire fondé sur les déterminants de leur localisation. La spécialisation internationale est mesurée pour chacune des activités de services sur un échantillon de pays développés. Il en découle, par croisement des résultats obtenus, un état des lieux de la volatilité des services dans lesquels les pays sont spécialisés, utile pour la mise en place de politiques fiscales, sociales, commerciales ou d'emploi.*

Mots-clés : SPÉCIALISATION PAYS, COMMERCE INTERNATIONAL DE SERVICES