

Knowledge for Growth – Industrial Research & Innovation (IRI)

< GLOBALISATION OF CORPORATE INVENTION >

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CORPORATE R&D: AN ENGINE FOR GROWTH, A CHALLENGE FOR EUROPEAN POLICY

< COLLABORATING IN CORPORATE R&D: EMPIRICAL EVIDENCE, TRAJECTORIES, AND IMPACT ON INNOVATIVENESS >

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Abstract

The Corporate Invention Board project, which aims at characterizing the nature and the extent of technological globalisation, gives the possibility to track and analyze the transformation of global patents portfolio of industrial groups overtime. It also identifies the geographic origin of patents' protected inventions.

The Corporate Invention Board complements the "Industrial R&D Investment Scoreboard" produced by Institute for Prospective Technological Studies. The industrial R&D Investment Scoreboard, an annual study of the European Commission, analyzes the performances of the 2000 industrial companies (1000 based within the European Union, 1000 outside) with the most important annual R&D investments. Through priority patents' statistics, the Corporate Invention Board focuses on the outputs of these R&D investments. Thus, the Corporate Invention Board provides information on technologies and on localisation of these investments.

The Corporate Invention Board project has developed an original database which combines information extracted from the "Patstat" patent database and from the "Orbis" financial database.

The first data compilation performed within the Corporate Invention Board project has demonstrated the feasibility of combining financial and patent data at a large-scale for characterising corporate technological strategies. Additionally, a user-friendly access to Corporate Invention Board data has been proposed through a website (www.CorporateInventionBoard.eu).

Two methodological adjustments, which will be implemented before summer 2010, should fix the main shortcomings identified in the Corporate Invention Board beta version released in December 2009.

Key words: patents, globalisation of R&D, multinational corporations, technology, strategy

JEL classification: O3 - Technological Change; Research and Development

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Annex 1: Corporate Invention Board information flow

1 - Introduction

1.1 Context

Globalization challenges strategies of main firms who must from now on conceive their development on a global scale: launch of new products, services or brands, conquest of markets, access to funds, skills and competences often require an international scope. Innovation, a critical factor of industrial dynamism, is linked to Research and Development (R&D), a function of the firm that is impacted by globalization. Growth of international R&D investments and the diversity of their localizations provide testimony to the importance of this trend. According to the United Nations Conference on Trade and Development World Investment Report 2005, in 1993, the R&D expenditure of companies through their foreign subsidiaries accounted for 10% of companies whole R&D expenditure, while this percentage reached 16% in 2002 (UNCTAD 2005, 125). Likewise OECD reports a growth of the share of R&D expenditure under foreign control in the manufacturing sector that went from 29,1 billions of dollars in 1995 to 51,6 billions of dollars in 2001 (OECD 2005, 119).

Mergers and Acquisitions played an important role in this process, involving at first countries on both sides of the Atlantic. Many American companies established R&D centres in Europe while at the same time, European multinationals got access to American research through acquisition of small high-tech companies. Pharmacy and biotechnologies provided a clear illustration of this phenomenon. Newly industrialized countries are now also following a similar process. Western multinationals have located research centres in Asia not only in China but as well in India where, for example, the city of Bangalore has acquired a strong visibility on the strategic radar of R&D managers. Meanwhile large Asian industrial actors have also established research centres in Europe and in the USA, often through acquisitions of large firms.

1.2 *Patents as a proxy for missing figures on international flows of industrial R&D investments*

International flows of industrial R&D investments still remain largely trapped in a statistical “blind corner”. Reports on foreign direct investment¹ fail to capture fully the technological component which is part of these global financial flows (OECD 2008). And figures on industrial R&D investment don’t disentangle properly the geographical (nor technological) spread of these investments (Hernández, Tübke, and Moncada-Paternò-Castello 2009).

Given this data gap, and despite their well known limitations², patents can be used as an interesting proxy for analysing globalisation of R&D. Using the methodological framework proposed by Dominique Guellec (Guellec and van Pottelsberghe de la Potterie 2001), OECD reports provide a regular monitoring on internationalisation of technology at global and field level. The OECD Science, Technology and Industry Scoreboard 2009 states for

¹ Trends in R&D expenditure of foreign affiliates in manufacturing

² Innovation can certainly not be reduced to technological inventions protected by patents. Business models, brands, trade secrets also have an economic value. Nevertheless, they are excluded from the perimeter of innovations protected by patents: by nature in the two first cases and by choice in the last one. Patents data relevance is limited to the domain of technological invention that forms only a part of the total innovation processes carried out within companies. patent data catches only poorly novelty within services and misses totally the branding factor.

instance: “*Patent data show a significant degree of internationalisation of research activities. On average, over 15% of the patents filed by an OECD country in 2004-06 under the Patent Co-operation Treaty (PCT) concerned inventions made abroad. Similarly, the share of inventions owned by another country accounted for just below 15% of all OECD filings*”. (OECD 2009)

The Corporate Invention Board project³ follows this “patent track” for characterising globalisation of R&D. But where OECD monitoring is mainly focused on a national (or regional) level, the Corporate Invention Board deals as well with corporate entities. Combining patent and financial data the Corporate Invention Board aims at tracking and analyzing the transformation of global patents portfolio of industrial groups overtime, including the geographic origin of patents’ protected inventions. The Corporate Invention Board project is an attempt at producing positioning indicators fit for analysing industrial actors’ technological strategies (Lepori, Barré and Filliatreau 2008).

2 - The Corporate Invention Board project and database

2.1 Methodology

The Corporate Invention Board project has been designed for complementing the “Industrial R&D Investment Scoreboard” produced annually by European Commission’s Institute for Prospective Technological Studies. The industrial R&D Investment Scoreboard, analyzes the performances of the 2000 industrial companies (1000 based within the European Union, 1000 outside) with the most important annual R&D investments. Through patents’ statistics, the Corporate Invention Board focuses on the outputs of these R&D investments providing information on technologies and on localisation of these investments.

2.1.1 Priority patents applications reveal technological potential at actor’s or territory’s level

The study of patents constitutes a powerful tool to analyze the potential of an industrial actor or of a geographical area. The National Science Foundation (NSF) in the USA, the Observatory of Sciences and Technology (OST) in France, Eurostat or the Organization for Economic Co-operation for Development (OECD) all use indicators based on these industrial property rights for their annual reports on science and technology.

Priority patents

In spite of these well-developed statistical uses, the choice of patents’ type of document to be analyzed is however not obvious. The difficulty stems from the geographically limited character of the protection granted by these titles of industrial property: a patent grants a temporary monopoly on a national territory.

³ The Corporate Invention Board project has been developed within the framework of the IFRIS research consortium (Institut Francilien Recherche, Innovation, Société) by research professors at ESIEE Management, with the participation of master students from the “scientific, technical and economic Intelligence” and the “Engineering of the numerical media” programs. It has also benefited from the support of HEC and the IPTS.

To obtain a protection on various national markets, a company has to apply for patent protection from the national patent office in each country it is aimed at. A single invention is thus protected by a family of patents. This family is composed of a first patent - known as the priority one - which establishes the anteriority of the invention; then a series of patents aiming to extend the protection of this invention beyond the country in which it was initially protected. The patent portfolio of a multinational group includes priority patents and their many extensions which reveal its international sales strategy. This duality makes any simple calculation problematic: a single invention is protected by multiple patent documents (applications and grants) registered in various offices.

To explore the technological strategy of multinational groups, the Corporate Invention Board - in accordance with recent methodological developments (Van Pottelsberghe de la Potterie, De Rassenfosse 2008) - focuses on the analysis of priority patents applications. Priority patents applications have the advantage of a date of filing closer to that of the invention - contrary to the extensions which are generally submitted at later dates. Priority patents applications are thus better adapted to stay close to the initial time of invention.

Patents as indicators of territorial excellence and technological specialization

The Corporate Invention Board project analyzes mainly three types of administrative information contained in the patent documents.

The first is the Patent's assignee's name which links an invention to the industrial group it belongs to. Through this, the nationality of the global ultimate owner of the invention can be identified as well as the industry it belongs to.

The second administrative information is the private address of the inventor. Through this, it is possible to locate the place of the invention, independently of the national office in which the patent was registered and of the nationality of the industrial group (the applicant) to which it was granted. Thus, the address in India of an inventor of a priority patent granted by the United States Patent and Trademark Office (USPTO) to a British industrial group is analyzed as built on Indian technological competences mobilized by a British industrial group.

The third administrative information relates to the technological field. This information, which appears in the "international patent classification" of the Worldwide Intellectual Property Organization of (WIPO) breaks down patents between 35 technological sub-fields, which are all gathered into 5 larger technological domains (WIPO 2008, 54). Thus, if category G03C appears in a patent, the invention concerned will be attached to the technological field of optics and the technological domain of the instrumentation.

Fractional counts of patents

When a patent has multiple attributions, the Corporate Invention Board project uses fractional counts. If a priority patent reveals, for example, two inventors with German addresses and a third with a French address, the corresponding invention is considered as building on 2/3 of competences originated from Germany and on 1/3 originated from France. The same procedure is used for the counts by technologies or attribution of an invention to several industrial groups.

2.1.2 Groups perimeter definition criteria

The patent portfolio of a given group is defined as the collection of the patents applied for by its “Global Ultimate Owner” (GUO) and by all its consolidated subsidiary companies - i.e those in which the GUO has a total participation higher or equal to 50,01% according to the Orbis financial database used to identify the perimeter of world industrial independent groups.

Industrial Group Population analyzed

The population of industrial groups analysed initially relied on the 2008 edition of “Industrial R&D Investment Scoreboard” produced by the Institute for Prospective Technological Studies of the European commission (Hernández, Tübke, and Brandsma 2008). This annual study analyzes the performances of the largest R&D annual spending groups. In total, it analyses 2000 industrial companies (1000 based within the European Union, 1000 based outside of it).

This initial group was supplemented in two ways. We added 433 Indian and Chinese companies, having declared R& D investments between 1999 and 2009. They were identified from the Compustat database. Then, we added the main assignees of patents identified in the management reports of the Worldwide Industrial Property Organization (WIPO), the European Patent Office (EPO), and the United States Patents and Trademark Office (USPTO).

These three steps provided us with an initial list of almost 3000 large multinational corporations, which coming from several sources, needed further processing since some companies could have been identified through several sources and because of industrial mergers’ dynamic. We have finally identified 2312 groups that constitute the population of companies analyzed in this project.

Perimeter of industrial groups

The delineation of industrial groups’ perimeter needed to have related entities (subsidiaries, companies acquired after a fusion and acquisition process) being aggregated under a single label. This aggregation has been performed using the “Global Ultimate Owner” (GUO) information from the Orbis financial information database edited by the Bureau van Dijk Electronic Publishing database. When a GUO has a share higher than 50,01% in a firm, this latter has been considered to be one of the former’s subsidiaries.

Following this procedure, we identify nearly 170.000 subsidiary companies assumed as constitutive of these 2312 industrial groups.

Geographical area and Industry of companies

The geographical and industry definitions of industrial groups is in line with European commission “Industrial R& D Prospective Investment Scoreboard”.

Industrial group citizenship is given according to the location of its general headquarters. Countries are then aggregated, firstly within larger geographical areas and secondly into continents.

Industry affectation of an industrial group is made on a single basis according to the classification ICB (Industry Classification Benchmark) developed by Dow Jones and the

Financial Times Stock Exchange (FTSE): they count 41 industrial sectors, regrouped into 18 super sectors, themselves regrouped into 10 industries.

2.1.3 Company name processing

The priority patent portfolio of a given group is defined as the collection of the priority patents applied for by its “Global Ultimate Owner” (GUO) and by all its consolidated subsidiary companies - i.e those in which the GUO has a total participation higher or equal to 50,01%. The implementation of this rule required matching the names of the GUO of the groups and the subsidiaries extracted from Orbis database. But it also requires matching those with the names of the applicants as listed in the Patstat database. This automated pairing required a strict match between the character strings of the two databases, which raised several difficulties.

As information comes from two distinct databases (financial and patents), additional processing to match this information was required. This was done by developing a specific in-house program. It first cleans company names of any spelling irregularity (for example, double spaces). It then removes the name of the companies’ legal designations (Ltd, Inc., Spa...) and uses names present in the Orbis database to fish those that are related in the Patstat database.

Difficulties related to the matching of databases

First of all, a company can appear with a different name and spelling within the patent database, for example, IBM and International Business Machines. It is thus difficult to regroup under a single label patents applied for with different applicant labels. This difficulty is overcome by using the harmonized names suggested in the Patstat database. We can thus gather the variations of an assignee name under a single one, known as the harmonized one.

A second difficulty rises when the name of the assignee which appears in the patent database does not correspond exactly to its legal name (GUO or subsidiary company name) used in the Orbis database; which can also differ from the common designation of this entity. Thus the Dutch group known as “Philips” in the Patstat patent database is listed in Orbis as a GUO whose name is Koninklijke Philips Electronics NV.

Preliminary standardization of character strings

The matching technique which is used in the Corporate Invention Board project builds on work carried out at the Catholic University of Leuven (Magerman, Van Looy, and Song 2006). The methodology, developed in collaboration with the Organization of Economic Co-operation for the Development (OECD), the Eurostat directorate of the European commission and the European Patent Office (EPO) can be summarized in two stages. It is first necessary to proceed to a spelling check and a cleaning stage and to remove, for example, double spaces appearing between two words or blank spaces preceding a comma. Then, legal designations of the companies (such as Ltd, Corp, Its, Inc...) that appear systematically in the Orbis database, but seldom in the patent one, need to be removed in order to improve the matching between the two.

This methodology has allowed us to identify more than 5 million priority patents registered by the 2312 studied groups.

2.2 Data sources

2.2.1 For patent information: the Patstat database

The Corporate Invention Board project uses the public Patstat database (October 2008 edition) produced by the European Patent Office (EPO)

This database currently constitutes the reference for the calculation of patent indicators, both in the academic world and for public policy makers. It is, among others, used by the Organization for Economic Co-operation and Development (OECD) for the production of technology indicators.

The Patstat database records patent applications published by national patent offices. It covers 80 national and regional/international patent offices: at international level, we can cite the Worldwide Industrial Patent Office (WIPO), at regional level, the European Patent Office (EPO), and at national levels the offices of the following countries: the USA, Germany, France, the United Kingdom, Italy, China, India, Japan, Korea... Because of this international coverage, Patstat can be considered as a worldwide patent database.

In addition to the titles and summaries of the patents, Patstat contains information such as patent registration and publication dates, names and addresses of assignees and inventors, international patent classification codes, citations, patent extensions and maintenance.

For the Corporate Board Invention project, some inventors' addresses have been supplemented with information from the OECD Regpat database.

2.2.2 For financial information: the Orbis database

To define the groups population and to identify their subsidiaries, the Corporate Invention Board project has used the Orbis financial database developed by Bureau van Dijk Electronic Publishing (BVDEP). This private database compiles financial information on nearly 60 million companies.

Among the multiple information proposed by Orbis, the Corporate Invention Board project uses more particularly those related to the shareholders, the subsidiaries, the industrial sectors and the location of the companies.

3 - Results

3.1 A large multipurpose data base

The Corporate Invention Board database contains more than 5,3 millions of priority patents which were applied for between 1986 and 2005 by 2312 multinational national corporations. The patents have been characterized according to 3 dimensions.

- Group. This first entry allows to identify the patents applied for by one (or a selection of) industrial firm(s).
- Technology. This second dimension permits the identification of the patents in one (or a selection of) technological field(s).

- Geographical area. This last entry allows to identify the patents with inventors from one (or a selection of) country(ies).

3.1.1 A wide range of possible exploitations

The Corporate Invention Board corpus offers a wide range of possible exploitations. It can be explored by combining 2 of the three dimensions presented above. Thus, by choosing “group” as a first dimension and “technology” as a second one, it is possible to analyze the distribution of a firm’s patents between various technologies. Another example: the choice of “technology” as a first dimension and “group” as a second one shows the distribution of the patents applied for in a particular technology by different firms.

The table presents the various analytical approaches corresponding to the 6 possible options resulting from combining 2 of the 3 criteria.

various analytical approaches for the Corporate Invention Board data set

First dimension Second dimension	Group	Technology	Geographic area
Group		Distribution of the patents applied for in a selection of technological fields among a selection of groups. <i>Ex: distribution of the patents of the technological field “optical” between the groups from the “electronics and electric component” industrial sector</i>	Distribution of the patents invented in a selection of geographical areas among a selection of groups. <i>Ex: distribution of the patents whose inventor is in Europe among American groups</i>
Technology	Distribution of the patents applied for by a selection of groups among a technological selection of fields. <i>Ex: ventilation of the patents of the European groups in all technologies</i>		Distribution of the patents invented in a selection of geographical areas among a selection of technological fields. <i>Ex: distribution of the patents whose inventor is in Germany among the “mechanics” technological fields</i>
Geographic area	Distribution of the patents applied for by a selection of groups among a selection of country of invention. <i>Ex: distribution of the patents of the groups from the IT sector among Asian countries</i>	Distribution of the patents applied for in a selection of technological fields among a selection of country of invention. <i>Ex: Distribution of the patents from the “biotechnology” technological field from “all countries”</i>	

3.1.2 Various levels of aggregation

The Corporate Invention Board data set can be analyzed at various levels of aggregation, for each of the three dimensions presented above.

- Group. Firms can be selected at an individual level (2 312 different entries), at sector level (41 different entries), super-sector level (18 different entries), or industry level (10 different entries) or be considered as a whole (1 entry). In short, this first dimension offers 5 levels of aggregation and a sum of 2.342 options.
- Technology. Technologies can be selected at a technological field level (35 entries), technological domain scale (10 entries) or be considered as a whole (1 entry). In short, this second dimension offers 3 levels of aggregation and a sum of 46 options.
- Geographical area. The geographical areas can be selected at a country level (204 entries), at a regional level (21 entries), at a continent level (6 entries) or be considered as a whole (1 entry). In short, this third dimension offers 4 levels of aggregation and a sum of 232 options.

Combining 2 of the 3 dimensions proposed for the analysis of the Corporate Invention Board data set and the various levels of aggregation offers more than 1,3 million combinations.

3.1.3 An user-friendly system for queries and visualisation

A visualisation page accessible on line (www.CorporateInventionBoard.eu) makes it possible to analyze the Corporate Invention Board database using a system of queries relating to three analytical dimensions (group, technology, geographical area).

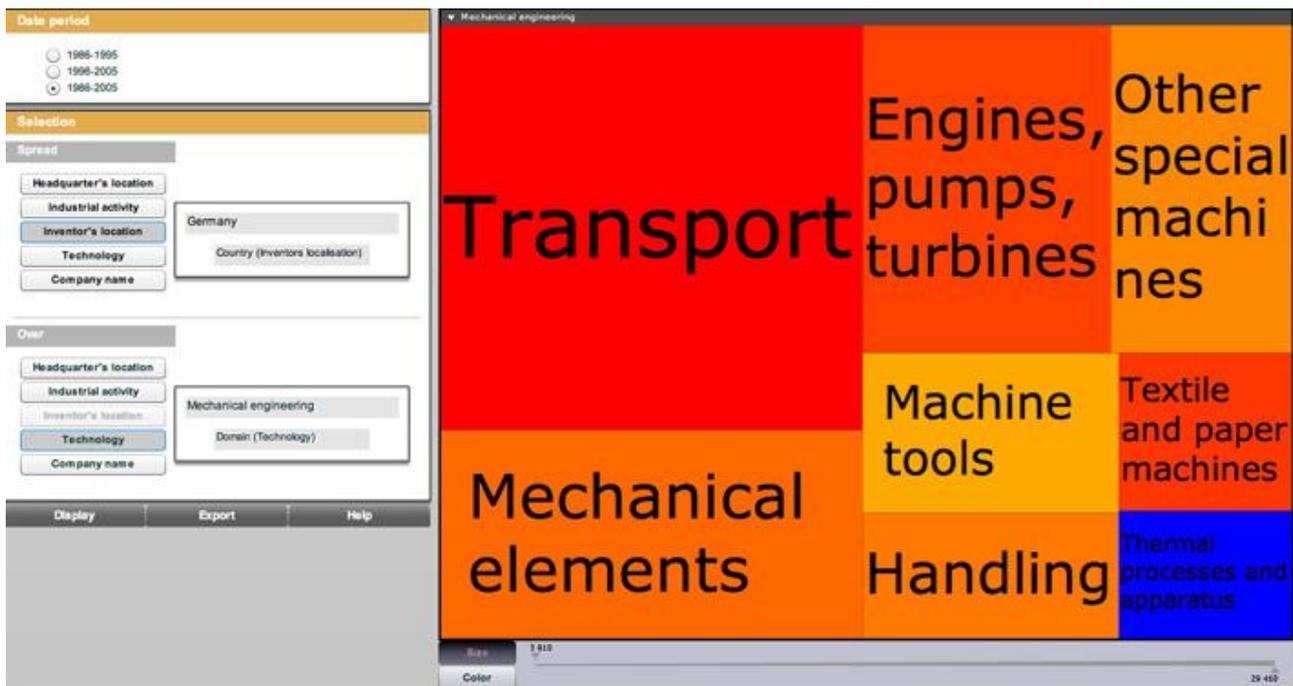
The results of these explorations are presented in a Treemap format. It shows diagrams composed of coloured quadrilaterals whose organization authorizes navigation towards finer levels of aggregation (see screen copy below).

These quadrilaterals carry two types of information: their surface reflects the share of the patents concerned compared to the request considered; their colour (in a continuum from blue to red, passing by the green and the yellow) reflects the share of these patents in the whole of the Corporate Invention Board corpus. The size and the colour provide thus elements for calculating a specialization.

As soon as the Corporate Invention Board database will be stabilized, a function of export will make it possible to download the data represented in the TreeMap diagrams.

Let us illustrate these possibilities of visualization with the following example: a request that aims at spreading the patents whose inventor is in Germany (i.e. with “geographical area” as a first dimension of analysis) over the technological fields belonging to the technological domain of “mechanics” (i.e. with “technology” as a second dimension of analysis). The screen copy below presents the results of this research.

Corporate Invention Board visualisation using TreeMap



- The entire surface of the coloured diagrams represents all the priority patents applied for in the technological domain of “mechanics” whose inventors have an address in Germany.
- The quadrilateral labelled “transport” corresponds to this technological field. Its size is proportional to the weight of this field in the whole of the “mechanical” technological domain for the patents whose inventors have an address in Germany.
- The colour of this quadrilateral reflects the proportion of the patents relative to the “transport” technological field in the whole of Corporate Invention Board data base.

3.2 A strong Asiatic bias

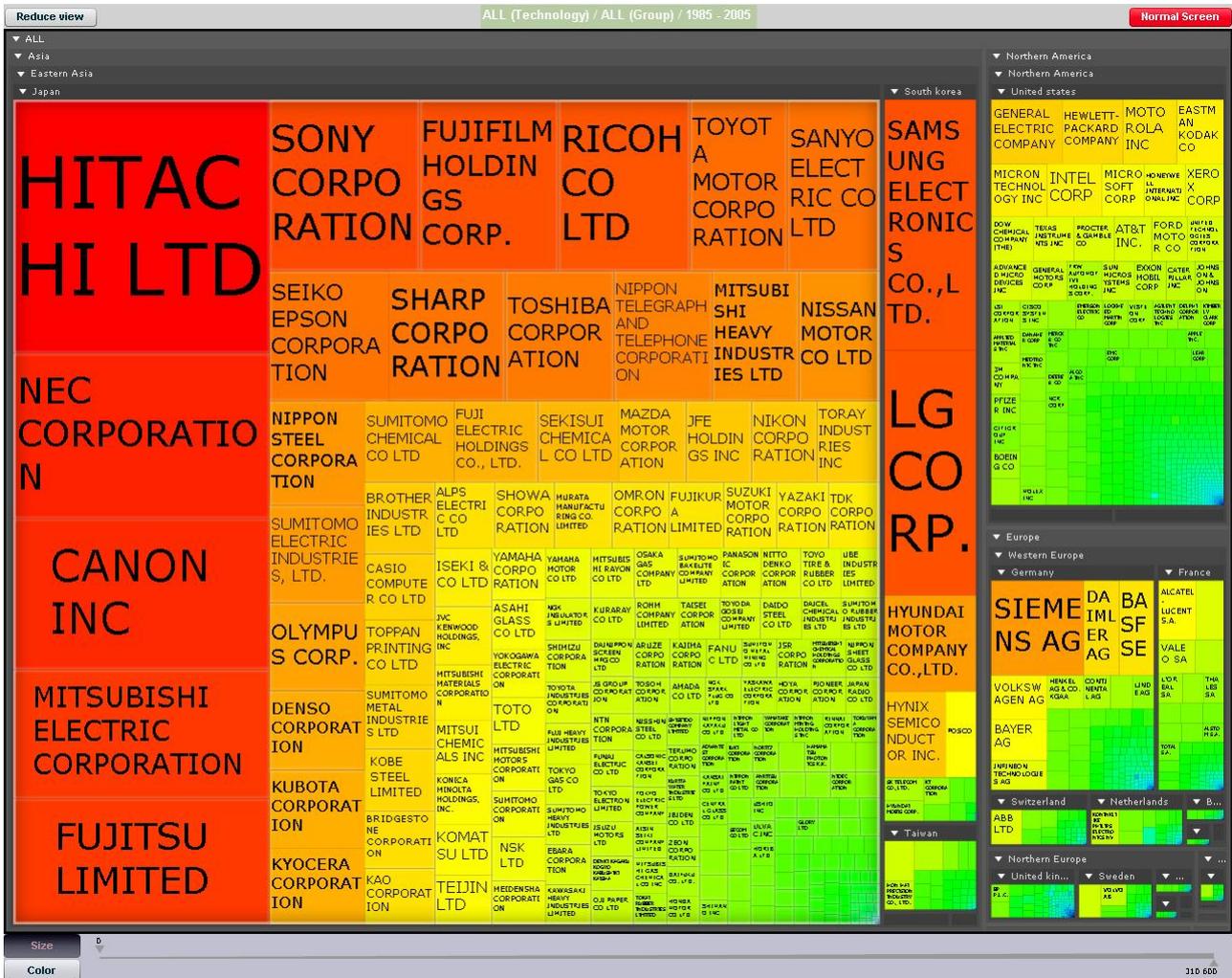
The dominant presence of Japanese and Korean companies in the Corporate Invention Board data base is a striking result. Japanese and Korean corporations possess three quarters of the total number of priority patents; Europe and North America own respectively 11% and 14%.

Two – most likely combined - hypotheses can explain this result. First, it reflects previously identified national propensities to patent and secondly reveals national characteristics of the patent system. Japan is for instance considered as offering an easy and light process for submitting patent applications, compared to the US and European systems where patent applications are more costly.

A next round of data compilation will soon help assessing both causes. A new treatment already initiated aims at selecting within the whole pool of patents (5,3 millions priority patents applied for by the top 2312 corporations from 1986 to 2005) a sub group of transnational priority patents: i.e. priority patents for which an application for extension has been submitted in a second patent office. This simple criterion, that results in setting a

quality threshold, should control for the second hypothesis, making therefore possible to assess this Asiatic patenting intensity and propensity.

Main inventors worldwide, based on priority patent applications from the Corporate Invention Board



This Asiatic bias does not prevent exploiting the Corporate Invention Board data base. It can be controlled by avoiding unfit international comparisons. It does not hinder, for instance, any transatlantic comparisons.

3.3 A reducible but inevitable margin of error

As for any treatment of large databases, it would be illusory to think of identifying without any mistake, the whole of the patents of the studied population of multinational corporations. The objective is to choose the most satisfactory trade off between the false-negatives and the false-positives. In the first case, it would mean matching a patent to a company, which it should not; in the second case, it would mean missing a patent applied for by a firm which would lead to its non integration in the company's patent portfolio. Nevertheless, a margin of error always remains when using an automated process.

Our goal was to limit the extent of error⁴ for the first beta edition and to work swiftly in order to improve it. A new set of rules aiming at improving the results of the matching process is currently developed and should be implemented before summer 2010.

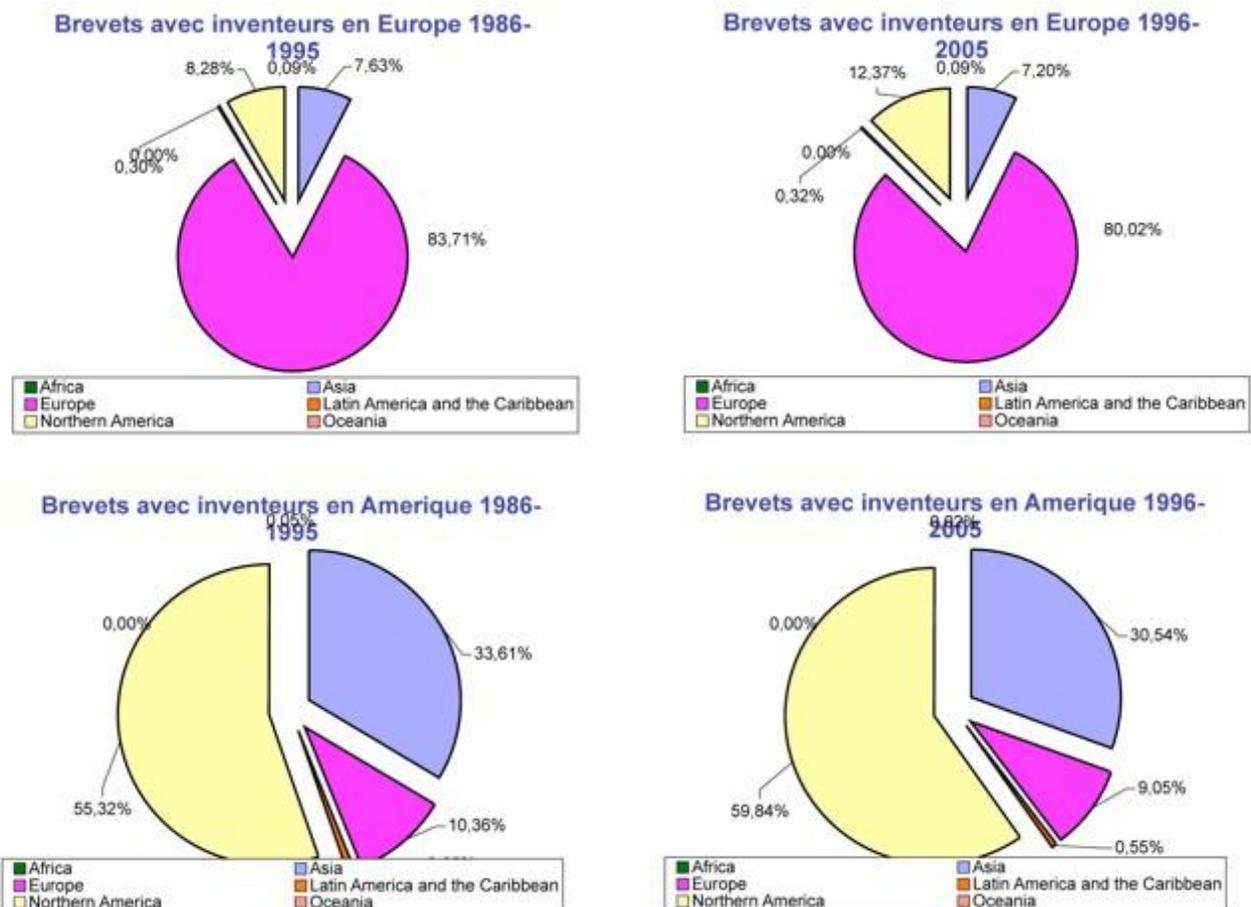
3.4 A first global picture of R&D globalisation

A preliminary study makes it already possible to identify a few traits of R&D globalisation over 20 years.

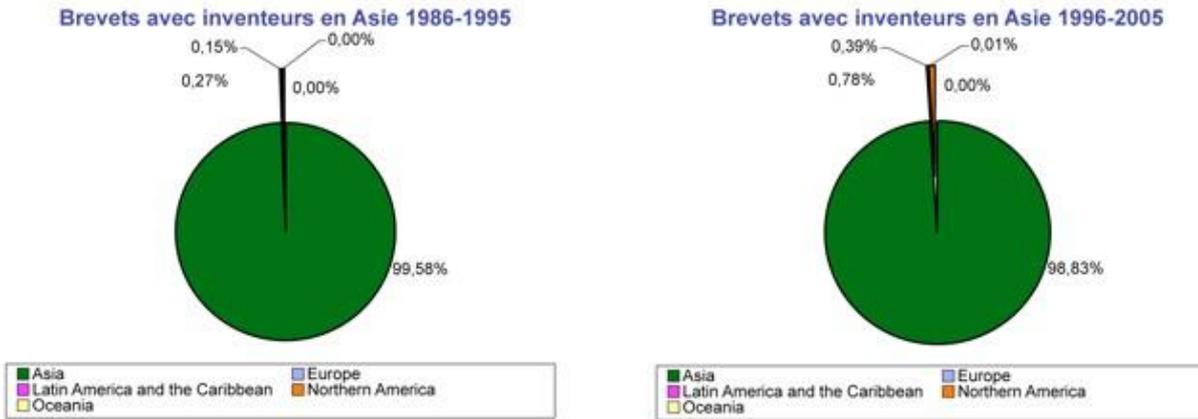
Domestic control over local inventions remains quite strong; no massive shift can be spotted at world level. But Northern American corporations seem to have extended their control over inventions, both for those made at home and abroad. During the 1996 to 2005 period, Northern American corporations have controlled 60% of inventions made in Northern America, which represents a 5 percentage points increase compared to the 1986 -1995 period. And simultaneously Northern American corporations control over inventions made in Europe has increased from 8% to 12%; European corporations controlling still 80% of inventions made in Europe; i.e. a 3 percentage points decrease.

It should be noted that in se same time, foreign control over inventions made in Asia remains quasi null.

Shares of domestic and foreign control over the zone inventions and number of patents

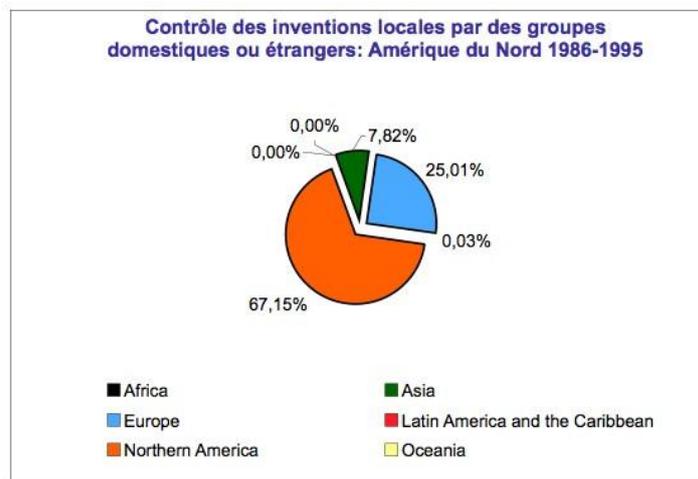


⁴ The main error spotted (to date!) in the CIB beta version is a poor identification of IBM as applicant – it has been fixed but not yet implemented.

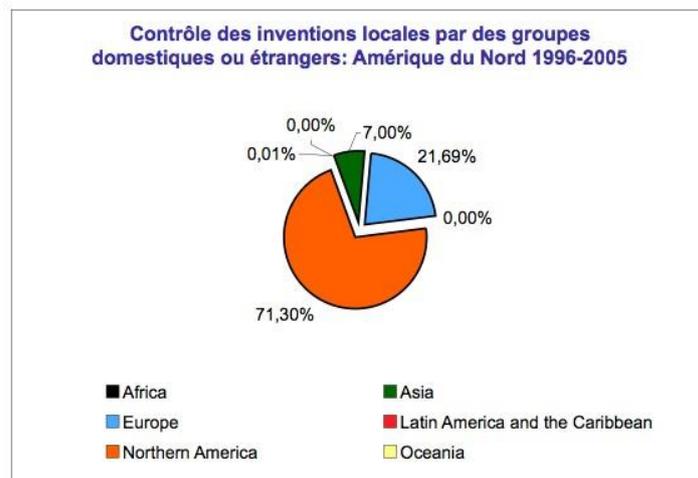


A similar pattern can be identified at the more disaggregated level of biotechnology. In this technological field, domestic control over local inventions has actually increased both in Europe and in Northern America. This somewhat non-intuitive result could be dimmed as “deglobalisation”.

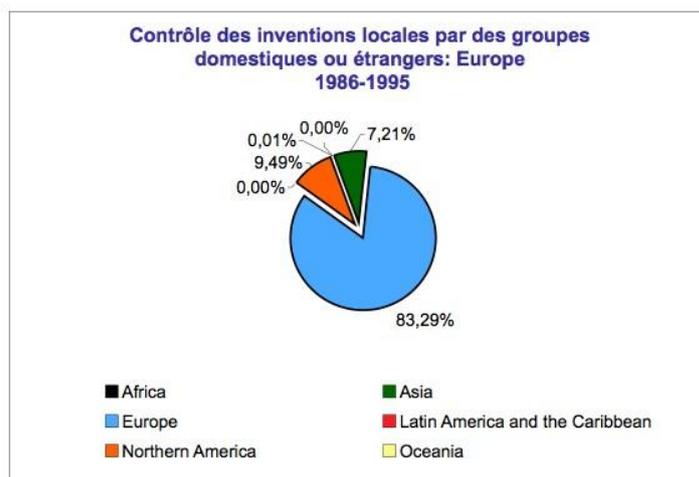
Domestic and foreign control over biotechnology inventions: Northern America for 1986-1995



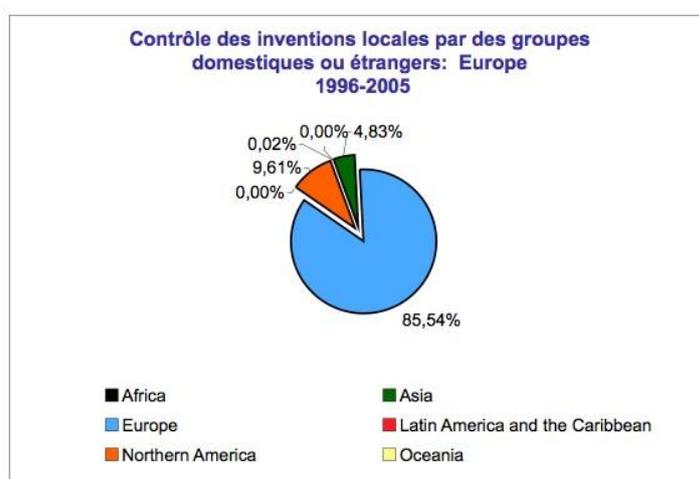
Domestic and foreign control over biotechnology inventions: Northern America for 1996-2005



Domestic and foreign control over biotechnology inventions: Europe for 1986-1995



Domestic and foreign control over biotechnology inventions: Europe for 1996-2005



3.5 Siemens technological strategy

The study of Siemens, who has been the largest European applicant over the 1986 to 2005 period, provides another interesting perspective on the many facets of R&D globalisation.

In the first place, the German corporation has considerably increased his patenting activity, more than doubling the number of priority patent it applied for. The flow has reached 365147 priority applications during the 1996 to 2005 period, compared with 169265 during the 1986 to 1995 period.

During the period under scrutiny, Siemens has modified his technological footprint, shifting away from electrical machinery towards telecommunications⁵. The share of the former technological field in the priority patent applied for by Siemens has decreased from 21,2% to 15,2%, the latter has increased from 8,6% to 13,2%.

⁵ This analysis is based on patents applied for before 2006. It does not take into account Siemens' change of strategy regarding telecommunications.

Finally, the share of Siemens' priority patents invented outside of Germany has increased from 14,70% to 20,47 %. But this increase of foreign inventions does not stem from a rise of Indian or China that hardly appear as inventor's location for Siemens. It results mainly from a growth in the number of Siemens' inventions made in Hungary and Italia.

4 - Conclusion and further research

The first data compilation performed within the Corporate Invention Board project has demonstrated the feasibility of combining financial and patent data at a large-scale for characterising corporate technological strategies. Additionally, it has proposed a user-friendly access to this data.

Two methodological adjustments, which will be implemented before summer 2010, should fix the main shortcomings identified in the Corporate Invention Board beta version released in December 2009.

In the first place, the use of transnational priority patent applications should correct the Asiatic bias that appears in the beta version that is based on all priority applications

Secondly, correcting a set of residual mistakes in the applicant name treatment will improve the quality of our knowledge on corporate patent portfolios⁶.

The original, extensive and robust Corporate Invention Board data set on corporate invention will feed various streams of academic research.

Three research projects have already been launched, that aim respectively at:

- Assessing the most recent academic results on globalisation of industrial R&D with the Corporate Invention Board (Corporate Invention Board) data set (project developed with Université Paris-Sud - France)
- Linking patent portfolios characteristics with corporate strategies (project developed with CSIC - Spain)
- Analysing an industrial R&D production function using robust non parametric econometric methods (project developed with University of Pisa - Italy)

Moreover, in order to enlarge the use of the Corporate Invention Board data set, IFRIS should launch later this year a competitive call for research proposals: the selected researchers will get the Corporate Invention Board data base compiled according to their research design.

5 - References

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⁶ A systematic checking of names' matching has been started.

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6 - Annex 1: Corporate Invention Board information flow

Corporate Invention Board information flow

