

# Multinational Enterprises and Knowledge Flows

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## Research project

Using a balanced panel of 20 Multinational Enterprise data on patents and patent citations over the 1984-2004 period, the research would examine the relevance and structure of international and national spillovers, both intra-MNE and extra-MNE

# Research project (2)

**SECTORAL**



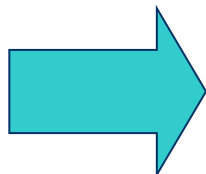
**Motor vehicles and parts**

**Pharmaceuticals**

**Semiconductors**

**Telecommunications**

**INTERNATIONAL**



**Europe**

**USA**

**South-East Asia & Japan**

# Research project (3)

2004: TOP 5 for each sector The FORTUNE 500 Database

Motor vehicles and parts



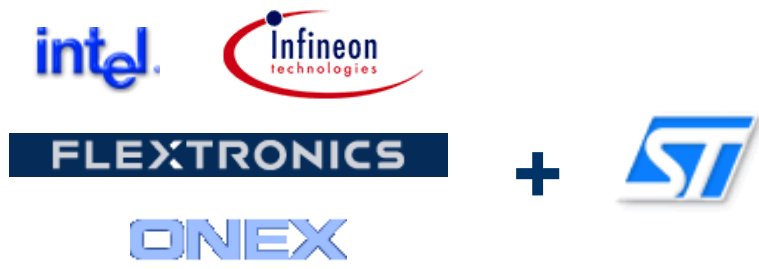
Pharmaceuticals



Telecommunications



Semiconductors



## Data (1)

Data set constructed and maintained by CESPRI – Bocconi University. This data set includes all patent applications to the European Patent Office (EPO), from June 1 1978 to June 1 2004. The data set comprises a total of 1,136,587 patents.

The data set includes the full set of bibliographic variables concerning each patent application:

- Priority, application, and publication number
- Priority dates, application and grant date
- Title and abstract
- Designated states for protection
- Status of application
- Main and secondary *International Patent Classification* (IPC) codes
- Applicant's name and address
- Inventors' names and addresses

## Data (2)

In addition, the data set also contains for each patent all citations made to other EPO patent documents. The data set includes a total of 585,231 citing patents and 465,924 cited patents, corresponding to a total of 1,119,764 citations.

All patent data were procured from the EPO and elaborated by CESPRI.

In particular, bibliographic data on patent applications are derived from the Espace Bulletin CD-R produced by the EPO, while information on patent citations come from the REFI tape also provided by the EPO. Data processing consisted mainly in a thorough work of cleaning and standardisation of rough information provided by the EPO.

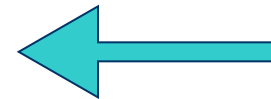
# Methodology (1)

- Tracing Corporate History



**WHO OWNS WHOM**

1984



2004

genealogical tree for each company & for each year

Prior research on MNEs using patent data: single year analysis assuming no changes in the structure over time (Cantwell 1993; Patel and Pavitt 1992).

Acquired firms were classified as part of parent company when the parent had obtained a controlling interest (>50% equity stake)

# Methodology (2)

## WHO OWNS WHOM 2004

- STMicroelectronics Holding NV (NETHERLANDS)
  - SGS-Thomson Microelectronics Ltd (CHINA)
  - ST Microelectronics Maroc S.A. (MOROCCO)
  - ST Microelectronics (KOREA, REP. OF)
- ....

## WHO OWNS WHOM 2003

- STMicroelectronics Holding NV (NETHERLANDS)
  - SGS-Thomson Microelectronics Ltd (CHINA)
  - ST Microelectronics Maroc S.A. (MOROCCO)
- ....



**ST Microelectronics (KOREA, REP. OF) subsidiary was acquired as part of the parent company STMicroelectronics Holding NV (NETHERLANDS) sometime during the 2003**

- WHW publications occur on March (i.e. WHW 2004 has been published on March 2004)



## Methodology (3)

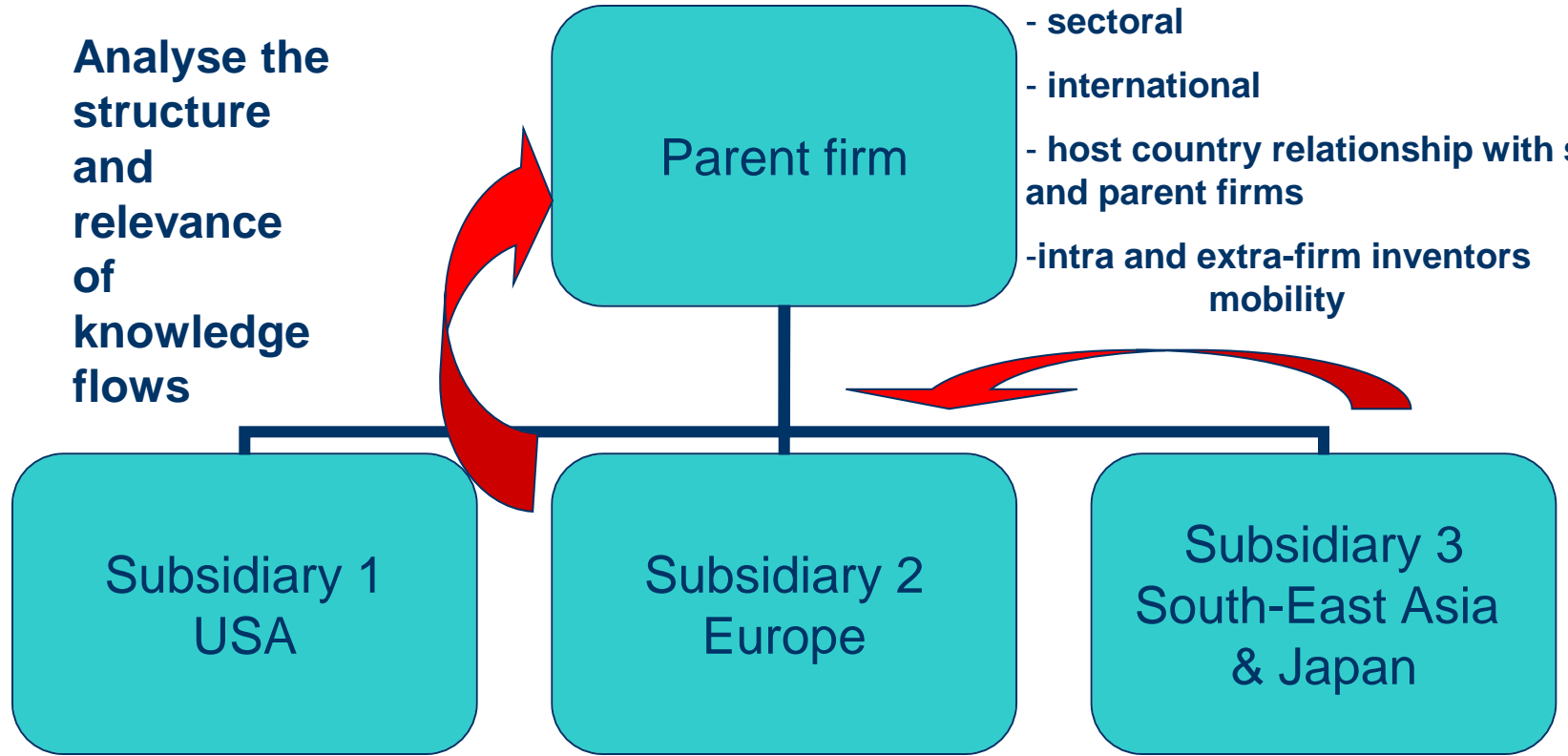
Additional problems in matching firms and patent citations:

- Name changes (Acquisition or just name changes?)
- Spelling mistakes on patent names and country-specific names

These problems require an extensive and largely manual process of search and verification

# Results expected

Analyse the structure and relevance of knowledge flows



- sectoral
- international
- host country relationship with subs and parent firms
- intra and extra-firm inventors mobility

# Feedback request (1)

## Patent Citation Analysis

*Open questions*

- Examiner citations
- Self-citations

# Feedback request (2)

## ESAMINER CITATIONS

The patent citations ... have two possible sources: (a) the inventor and the patent lawyer and (b) the patent examiner. [...] Interviews with patent reviewers reveal that the examiner undertakes a thorough search of files to determine the patent's relationship to existing patents. In the final list, some citations represent direct technological influences on a particular innovation, while other *citations may only represent indirect technological influences (since the patent examiner added them)*.

**(Almeida and Kogut, 1999; p. 908)**

**Jaffe et al. (1993) rule out any knowledge flow when the citation is provided by the examiner**

## Feedback request (3)

The USPTO requires the applicant himself to declare all the references he deems relevant to this end (“duty of candour” rule), so one can presume that many citations, although filtered by the examiner, come indeed from the designated inventors.

The EPO does not impose any requirement of that kind, so that all the citations come straight away from the patent examiners.

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From my viewpoint, considering that I will use EPO data, there is no reason to exclude that examiner’s citations (i.e. “unaware citations”) may indeed hide a knowledge flow. At most, we can presume that the cited and the citing inventors do not know each other, otherwise the former would have passed both the information on the patent’s contents and the information on the existence of the patent itself.

**Do examiner citations represent  
a knowledge flows?**

# Feedback request (4)

## SELF-CITATIONS

Patent citations running between patents from the same applicant

When citations are used to assess the value of the cited patent, self-citations have to be excluded to correct for the bias of the applicant's patenting strategy.

Distinction between firm-self-citations and inventor-self-citations: in order to detect all self-citations one should be able to track all the change of properties underwent by the cited companies (applicants) in the meantime: although the cited and the citing companies may be independent when the cited patent was issued, this may be no longer true when the citation occurs (the citing company may have acquired the cited one; or the two may have merged).

## Feedback request (5)

From my viewpoint, in all this case, we can be sure of both the existence of a knowledge flow and full awareness.

**Do self-citations represent an applicant's patenting strategy or a real knowledge flows?**