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RESEARCH INFRASTRUCTURE FOR SCIENCE
AND INNOVATION POLICY STUDIES

THE ROLE OF LARGE MULTINATIONAL FIRMS IN THE KNOWLEDGE DYNAMICS OF METROPOLITAN AREAS

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RISIS Research Seminar

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- ◆ Bridging two quasi-separate trends in Innovation Studies
- ◆ MNE as “The missing actors” while they “are indisputably one of the keys to understanding urban and regional development” (Yeung 2009 review of geography studies)
- ◆ Still a “nascent field” (Chakravarty et al. 2021 review of how international Business has addressed the link between MNE and Global cities)
- ◆ Global cities critical to MNE for “knowledge seeking”
- ◆ The question: what role do Large Multinational Firms (LMF) play in the knowledge dynamics of Metropolitan areas



3 core choices linked to RISIS developments

- ◆ A central indicator of Knowledge output: patents
- ◆ Mobilisation of 2 RISIS databases patents
 - **RPD database**, an enriched and simplified version of the Patstat database (version 2017)
 - **CIB database** of large firms, gathering the 4000 largest industrial firms worldwide combined with a new **matching service (PAM)** enabling to allocate patents to groups (more than 300000 subsidiaries integrated)
- ◆ New bridging possibilities: the ability to identify MA worldwide following OECD approach to functional urban areas → **RISIS CORTEXT geocoding and geolocalisation tools**

<https://geomapping.cortext.net/>

Documentation <https://docs.cortext.net>

Why patents ?

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- ◆ - For OECD a good indicator of firm innovative capacities
 - Enlarged coverage with digital & biotechnology activities (even if creative services remain largely under-covered)
 - critical dimension in the valuation of start-up firms
 - Key advantages: rich technological and geographical information
- ◆ RPD and CIB are databases of priority patents applied worldwide by legal organisations (based on Patstat 2017). This takes roots in the worldwide patent indicator (de Rassenfosse, Res. Pol., 2013) - No double counting/application - close to the inventions



Our indicator: International patents

2IP5 priority patents: patents applied in a least 2 IP5 offices as a marker for internationally valuable technology output of R&D

Priority patents applied in several countries (higher economical value, reduce national bias)

Patents applied in main economical zones: US, EU, JP, CN, KR

International Patents: 16.5% of all priority patents

→ 2010-2014: 716 160 Intl. geocoded priority patents

→ 2000-2004: 542 492 Intl. geocoded priority patents

Geography of LMF inventions

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Following the FUA (Functional Urban Areas) concept based on a core dense space (inhabitants' density) with areas functionally depending on it (commuting data), the Cortext geo tools identify 4200 MA worldwide.

Large Metropolitan Areas (LMA): population over 1.5 M

Mid-size Metropolitan Areas (MMA): 100 000 to 1.5 M

Small Metropolitan Areas (SMA): 50 000 and 100 000

Non Metropolitan Areas (NMA)

TOTAL URA	Asia	Europe	Northern America	Total
Large metropolitan area (LMA)	111	40	32	183
Mid size metropolitan area (MMA)	564	451	137	1152
Small metropolitan area (SMA)	862	639	279	1780
Non metropolitan area (NMA)	1075	1514	63	2652
Total	2612	2644	511	5767



Our set of Metropolitan Areas (MA)

3115 MA worldwide (Asia, Europe, North America)

1817 MA with inventive activities 10-14

1616 MA include LMF inventions 10-14

1211 MA active both 10-04 and 00-04

- ◆ **948 MA : MA with a significant and sustainable invention activity (>10 patents over 5 years)**

Our set of Metropolitan Areas (MA)

◆ Geography

15% of MA are Asian MA ; they produce 50% patents

50% of MA are EU MA ; they produce only 25% patents

35% of MA are NA MA ; they produce 25% patents

◆ MA size

LMA represent 13% MA but produce almost 70% patents (+4 pts in 10 years)

MMA represent 49% MA but produce 26% patents (-4 pts in 10 years)

Low contribution of SMA in the patent production (5% quite constant)

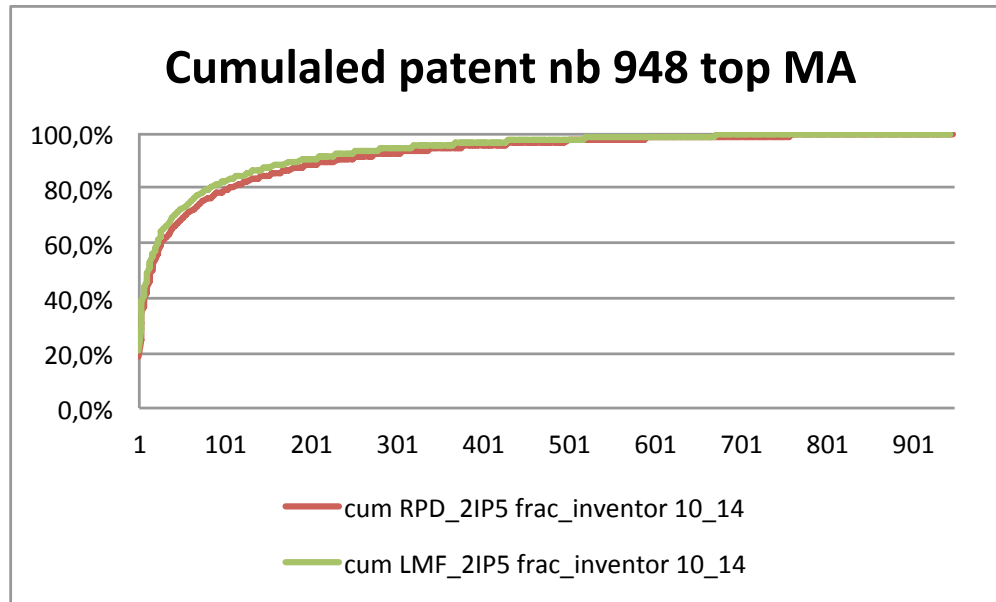
But heterogeneous contribution of LMA/MMA over continent:

Asia: LMA: 86% of patents

North America: LMA: 65%; MMA: 25%

Europe: **LMA :37% ; MMA: 52%**

Distribution of patents within the 948 MA



- ◆ Highly skewed distribution of the patent (RPD and LMF)
 - 948 MA: 99.6 % of the patents
 - Top 100 MA: 82%
 - Top 10 MA: almost 50%

Our objectives

- ◆ How LMF play a role in the MA knowledge dynamics ?
Can we identify variables linked to LMF to explain MA knowledge dynamics ?
Does the LMF contribution to the overall MA knowledge dynamics vary across MA ?
- ◆ Study of the knowledge dynamics of MA between 2000-2004 and 2010-2014
 - Growth of the number of patents
 - Evolution of MA technology profile
- ◆ Study of the LMF knowledge dynamics in MA:
 - Share of LMF patents in MA (LMF drive knowledge production in MA)
 - Techno profile of LMF (Matching of LMF profile to RPD profile)
 - Geography of LMF (Origin of LMF)
 - Presence of top large LMF (LMF attractivity effect)*
 - Strategy of firms (market/knowledge driven; strategic MA ; top firms)*

1.1 Growth of the number of patents

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◆ **Growth of the patent number: + 32% in 10 years (10-14: 623 573 patents)**

- **Driven by Asia: +48% (CN/TW/IN/KR)**
Asian LMA: 45% of patents in Asia, growth: +52%
 - EU/North America: moderate growth:
North America (+20%) > EU (+15%)
EU : low growth in DE, FR, IT, NL (negative growth)
- US: growth driven by LMA
EU: growth MMA >LMA

	Share in RPD 10_14	Growth RPD patent nber
Asia	52%	48%
JP	33%	8%
KR	8%	127%
CN	7%	2002%
TW	2%	460%
IN	1%	318%
Europe	24%	15%
DE	9%	7%
FR	4%	12%
GB	2%	68%
NL	2%	-14%
SE	1%	50%
IT	1%	1%
CH	1%	19%
North America	24%	20%
Total	100%	32%

Top 26 MA (RPD share $> 0,5\%$)

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Top 26 MA: quite stable over time
(except 4 new MA from CN or KR in
10-14)

Concentrate 60% of patent production;

High growth of patent number: 137%

- **Very fast growth: MA in KR, CN, TW**
- **Fast growth in North America top MA**
(San Jose, Detroit, San Diego, SF, Seattle)
- **Negative or low growth in EU top MA**
(except Stockholm)

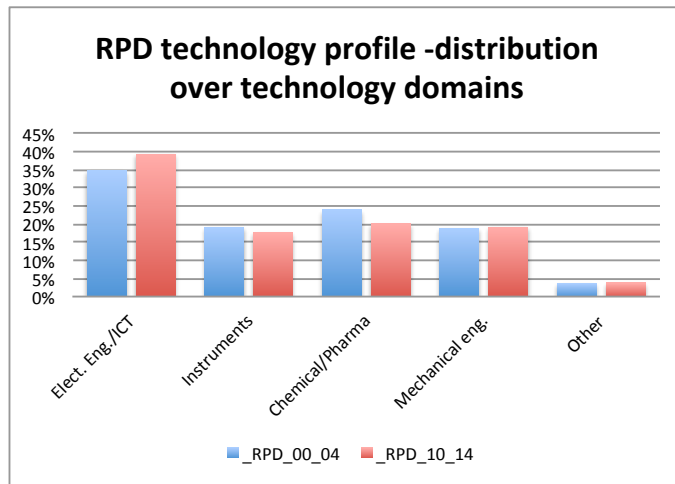
MA	Type	Country	Continent	Share RPD 10_14	Growth RPD patent nber
Tokyo	LMA	JP	Asia	18%	6%
Osaka	LMA	JP	Asia	7%	9%
Seoul	LMA	KR	Asia	6%	127%
Guangzhou	LMA	CN	Asia	3%	2860%
San Jose	LMA	US	NA	2%	47%
Beijing	LMA	CN	Asia	2%	1623%
Taipei	LMA	TW	Asia	2%	489%
Nagoya	LMA	JP	Asia	2%	17%
Paris	LMA	FR	Europe	2%	-8%
Detroit	LMA	US	NA	1%	244%
Boston	LMA	US	NA	1%	12%
San Diego	LMA	US	NA	1%	72%
Anjo	MMA	JP	Asia	1%	28%
San Francisco	LMA	US	NA	1%	41%
Shanghai	LMA	CN	Asia	1%	1238%
New York City	LMA	US	NA	1%	-24%
Stuttgart	LMA	DE	Europe	1%	-8%
Seattle	LMA	US	NA	1%	75%
Munich	LMA	DE	Europe	1%	6%
Daejeon	MMA	KR	Asia	1%	175%
Los Angeles	LMA	US	NA	1%	7%
Minneapolis	LMA	US	NA	1%	5%
Eindhoven	MMA	NL	Europe	1%	-35%
Chicago	LMA	US	NA	1%	5%
Houston	LMA	US	NA	1%	89%
Stockholm	LMA	SE	Europe	1%	77%
Top 26				60%	137%
Total				100%	32%

Growth of the patent number by technologies

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(5 broad technology domains)



Technology domains	Growth RPD patents
Electrical.eng./ICT	49%
Instruments	20%
Chemical eng./pharma	9%
Mechanical. Eng.	30%
Other	34%
Total	30%

In 10-14: ICT/Instruments/Chem.Pharma/Mechanical distribution: 40/20/20/20

- High growth of Elect./ICT patents (+49%)
- Low growth in Chemical_Pharmaceuticals (9%)
- Moderate growth in Instruments/Mechanical eng.

1.2 Evolution of the technology profile

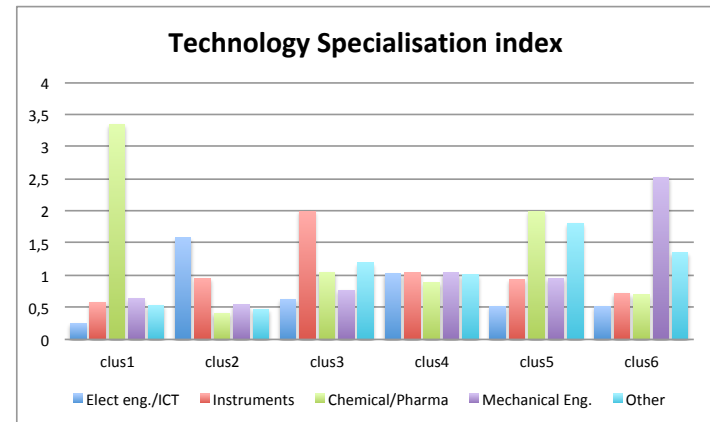
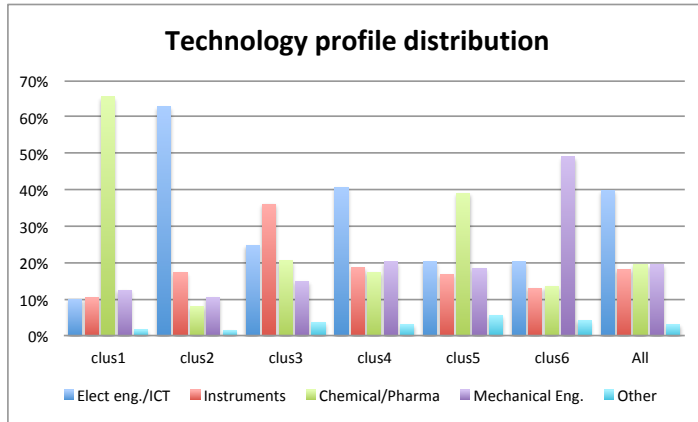
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◆ Methodology:

- Calculate MA technology profile (5 domains) for the 948 MA (10-14 and 00-04: RPD and LMF patents)
- Clustering of the MA profiles (K means) - 6 clusters
- Study the composition of clusters in the 2 periods of time
 - ❖ Relative growth of clusters: Number of MA, number of patents
 - ❖ Stability of MA inside clusters:
 - number (and patent production) of MA with **stable technology profile** (same cluster in 00-04 and 10-14)
 - number (and patent production) of MA with **unstable technology profile** (MA moving from one cluster to another cluster between 00-04 and 10-14)

Clustering of MA (6 clusters) RISIS



clusters 10_14	MA number 10_14	Distribution MA 10_14	Distribution patents 10_14
Non-specialised (clus 4)	278	29%	47%
Chemical Pharma. (clus 5)	246	26%	15%
Mechanical eng. (clus 6)	178	19%	9%
Instruments (clus 3)	99	10%	4%
ICT (clus 2)	75	8%	23%
Chemical Pharma ++ (clus 1)	72	8%	2%
Total	948	100%	100%

- 29% of MA (47% of patents): Non-specialised MA (follow the average worldwide technology distribution)
- Other MA: specialised in 1 domain (Mechanical eng./Instruments/ICT/Chemical-Pharma. (28%)
- Only 8% MA specialised in ICT (producing 23% patents)
- 1 large cluster in Chemical-Pharma. (with engineering & instruments) and 1 small ultra specialised cluster in Chemical-Pharma. only (34% of MA, 17% of patents)

Geography of clusters

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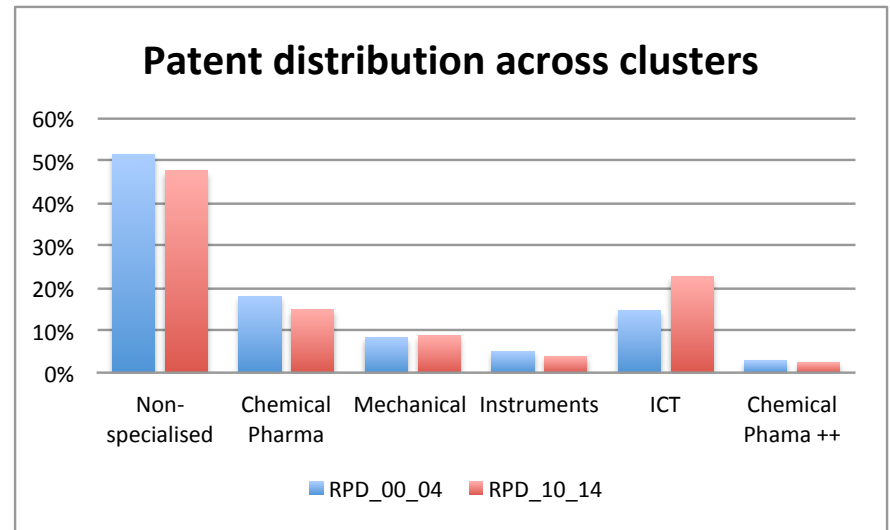
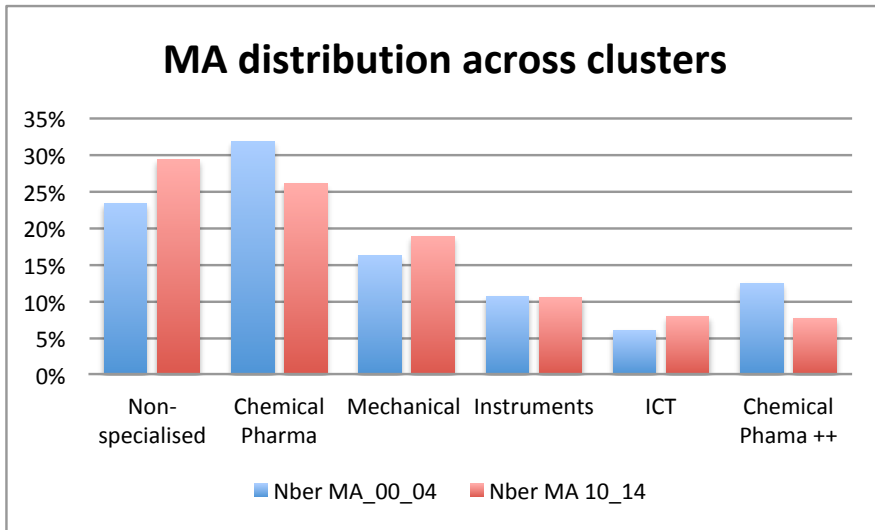
Number
of MA

Clusters	MA 10_14 distribution	Asia	Europe	North America	Total
Non-specialised	29%	25%	46%	29%	100%
Chemical Pharma	26%	9%	54%	37%	100%
Mechanical	19%	4%	60%	36%	100%
Instruments	10%	5%	49%	45%	100%
ICT	8%	37%	29%	33%	100%
Chem.pham ++	8%	19%	46%	35%	100%
Total	100%	15%	50%	35%	100%

Number
of patents

Clusters	RPD patent 10_14 distribution	Asia	Europe	North America	Total
Non-specialised	47%	70%	16%	14%	100%
Chemical Pharma	15%	6%	53%	41%	100%
Mechanical	9%	21%	44%	35%	100%
Instruments	4%	14%	44%	42%	100%
ICT	23%	68%	6%	26%	100%
Chem.pham ++	2%	6%	61%	32%	100%
Total	100%	52%	50%	24%	100%

- Non-specialised MA : EU > Asia = NA; Patents: **Asia (70%)** >> NA=EU (15%)
- ICT: Asian MA and **Asian patents dominate** ; **EU patents = 1/4 NA patents**
- Other specialisations: low Asian contribution ; EU patent production dominates
 - Chemical-Pharma. and Mechanical eng.: EU >> NA
 - Instruments: Europe = NA



Overall MA de-specialisation: more non specialised MA in 10-14

But an overall increase of patents from specialised MA

Growth of ICT cluster (patents: + 8 pts ; MA: +2 pts)

Decrease of Chemical Pharma cluster (patents: - 3 pts ; -100 MA)

Cluster growth by continents

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- ◆ **De-specialised of MA: a trend observed in the 3 continents**

De-specialisation quite often in small MA (Rank above 100, i.e. patent share $\leq 0.1\%$) but it occurs also in large MA (e.g. San Francisco, Dallas, Atlanta)

- ◆ **ICT growth driven by Asia: +19 MA ; large patent growth (+150%)**

EU patent production decreases; NA patent production stable (in less MA)
Internal growth of ICT MA and new ICT specialised MA

- ◆ **Chemical Pharma: global decreasing trend in the 3 continents:**

both number of MA and patent production lower

In top 100 MA: a core of 19 stable MA with a growing patent production (+25%)

- **Mechanical Eng.: Overall global stability (patent growth: world trend)**

EU patent production decrease (from 53% to 43%) to the benefit of NA patent production (from 23% to 35%)

Most of the changes of specialisation occur in small MA (in ranks 200-400)

- **Instrumentation: Overall decrease (no patent growth)**

Asia contribution declines for the benefit of EU

Top 100: Eindhoven moves to the cluster in 2010-14 (ICT in 2000-04)

Stability of MA technology profiles /1

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Stable MA: same cluster: 00-04 and 10-14

Unstable MA: change clusters between the 2 periods of time

clusters	MA nb RPD_10_14	MA same cluster RPD_00_04	%_MA stable (same cluster)	% patents originating from stable MA	%_patents originating from unstable MA
Non-specialised	278	139	50%	88%	12%
Chemical Pharma	246	152	62%	82%	18%
Mechanical	178	99	56%	74%	26%
Instruments	99	46	46%	55%	45%
ICT	75	35	47%	75%	25%
Chemical Pharma ++	72	56	78%	91%	9%
Total	948	527	56%	82%	18%

◆ 56% of stable MA

◆ 82% of the patents are produced in stable MA

◆ Unstable MA are rather MA with low patent production

- Low share of stable MA (50%) among non-specialised MA but their total patent production still dominate (88%)
- Low share of stable MA in ICT (47%) but large share of ICT patent (75%)

Stability of MA technology profiles /2



Criterion: rank in MA patent production

Rk MA	% RPD_10_14	% stable MA	% unstable MA
Top 10	45%	90%	10%
Top 20	55%	85%	15%
Top 100	80%	76%	24%
Top 200	89%	75%	26%
Top 300	93%	69%	31%
Top 500	98%	63%	37%
Top 948	100%	56%	44%

- ◆ Higher share of stable MA among top inventive MA
- ◆ The larger the patent production, the more stable are MA (constant technology profile)

Stability of MA technology profiles by continent

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- ◆ A higher share of stable MA in North America (60%) (EU = Asia 54%)
- ◆ A higher share of patents from stable MA in Asia (93%) (mirroring its higher patent growth) compared to EU (71%) and NA (67%)
- ◆ But very important differences at continent level within clusters

clusters	Share of patents from stable MA	Asia	Europe	North America
Non specialised	88%	97%	76%	56%
Chemical Pharma	82%	47%	79%	90%
Mechanical	74%	67%	75%	77%
Instruments	55%	46%	25%	90%
ICT	75%	92%	31%	40%
Chem Pharma ++	91%	91%	87%	98%
total	82%	93%	71%	67%

Unstabilities of MA technology profiles

421 MA (44%) (MA distribution: AS:15% ; EU: 38% ; NA: 43%)

18 % of patents (patent distribution: AS:19% ; EU: 53% ; NA: 32%)

Patent growth in unstable MA: 32%

3 Modes of technology profile changes:

- ◆ **De-specialisation:** 33% of MA and 31% patents (patents growth: 30%)

First from Chem. Pharma:17% of all changes

Patents geographical distribution: NA: 52% ; EU: 33% ; Asia: 15%

- ◆ **Re-specialisation:**19% of MA but 40 % patents (patents growth: 45%)

First to ICT: 30% of all changes

Patents : NA: 50% ; EU: 24% ; Asia: 25%

- ◆ **Changes of specialisation:** 48% of MA but only 29% patent (patents growth: 18%)

Patents : NA: 24% ; EU: **63%** ; Asia: 14%

Central & increasing role of LMF in MA production

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- ◆ LMF/ RPD patent ratio in 2000-2004: 77%
473 432 MA patents ; 363 390 LMF patents
LMF / RPD patent ratio in 2010-14: 80%
2010-2014: 623 573 MA patents 10-14 (+32%) ;
497426 LMF patents (+39%)
- ◆ One quarter of MA with a LMF/RPD ratio below 50%,
but only 4% of total patents

LMF/RPD	MA number	Patents 00-04	Patents 10-14
<50%	26%	4%	4%
50-69%	29%	14%	17%
70-85%	29%	30%	30%
>85%	16%	52%	49%
Total	100%	100%	100%

Growth of LMF/RPD ratio by continent



	LMF/RPD 00_04	LMF/RPD 10_14	Evo LMF/RPD
Asia	86%	85%	-1%
Europe	70%	71%	3%
North America	69%	77%	12%
Total	77%	80%	4%

- Uneven LMF/RPD patent ratio (2010-14) over continent and countries:
Asia (85%) > North America (77%) > Europe (71 %)
High Asia ratio is linked to very high role of LMF in Japan (90%)
Heterogeneity between countries (EU: with DE, NL, FI above EU average; and Southern EU below EU average)
- Evolution of LMF/RPD ratio over continent and countries:
Asia globally constant, even with very strong increase in China and India (+20 points)
Slight increase in Europe equally split (except Benelux with strong decrease in Eindhoven)
Very strong reinforcement of LMF role in North American MA (69 to 77%)

LMF/RPD ratio over time in clusters

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Cluster	MA number	LMF/RPD 00-04	LMF/RPD 10-14
Non-specialised	278	81%	83%
Chemical Pharma	246	65%	68%
Mechanical eng.	178	76%	84%
Instruments	99	73%	74%
ICT	75	78%	81%
Chemical Pharma	72	75%	77%
Total	948	77%	80%

◆ LMF/RPD varies across clusters

- ICT: high LMF/RPD (linked to dominant role of Asian MA and very strong specialisation of large US MA)
- Chemical-Pharma. and Instruments: moderate LMF/RPD (linked to EU/NA MA)
- Mechanical eng.: Traditionally high LMF/RPD ratio

◆ LMF/RPD evolution over time:

- Rather stable with a very high role of LMF in the fast growing ICT cluster
- Only exception: Strong progression of LMF role in Mechanical eng. (NA progression in 10 years)
- Lower quasi stable levels for Chemical-Pharma.. and Instruments (strong role of EU and NA MA)

LMF/RPD ratio and technology profile stability in MA

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- ◆ Very high levels of LMF share in stable MA (well over 80%)
2 exceptions: Chemical Pharma.,
Instruments (around 70%)

cluster	MA number	LMF/RPD 10-14	LMF/RPD	
			Stable MA	Unstable MA
Non-specialised	278	83%	85%	69%
Chemical Pharma	246	68%	69%	65%
Mechanical eng.	178	84%	86%	78%
Instruments	99	74%	72%	76%
ICT	75	81%	81%	80%
Chemical Pharma ++	72	77%	77%	78%
Total	948	80%	81%	74%

- ◆ MA changing specialisation have a lower LMF presence (74% against 81% for stable MA)
 - MA that de-specialise or change specialisation have a lower presence of LMF that does not change over time (70%)
 - MA that re-specialise (mostly toward the ICT cluster) do it with an increased role of LMF (73% to 80% over the 2 periods)

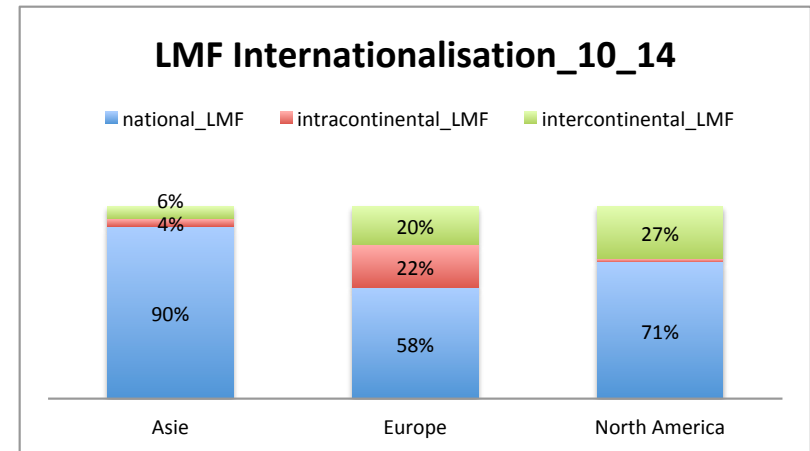
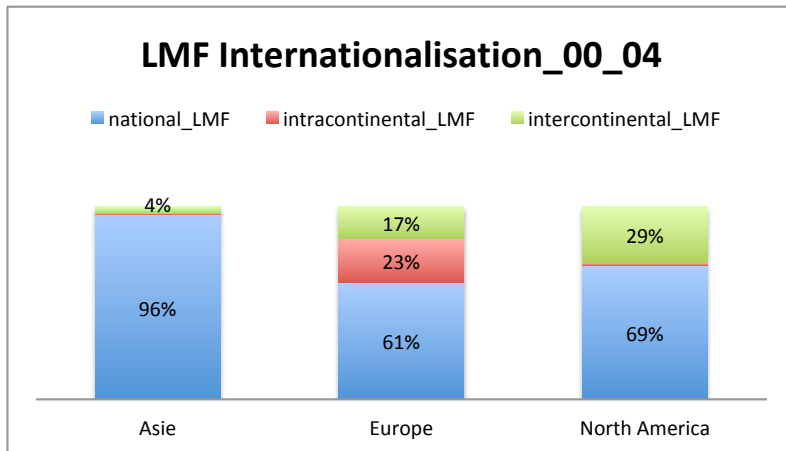
Unstable MA	MA number	LMF/RPD 00-04	LMF/RPD 10-14
De-specialisation	139	67%	69%
Re-specialisation	82	73%	80%
Change specialisation	200	70%	70%
Total	421	70%	74%

LMF internationalisation over time

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Home country of LMF (LMF HQ) compared to their invention host country



Host locations (10-14):

Asia: inventions by national LMF (90%) – low (but increased) international attractiveness

North America: national LMF dominate (70%, quite stable) but North America attract a significant share of LMF from overseas (27%, decreasing trend)

Europe: Strong international attractiveness: intracontinental and intercontinental attractiveness account respectively for 22% (stable) and 20% (increasing trend) of LMF inventions

LMF internationalisation by country



ASIA

- Long lasting low international attractiveness in JP, KR
- CN: increasing national share (fast growing patent production of CN LMF ; relative share of overseas LMF drops 45% to 20%)
- IN: growing overseas international attractiveness

Country	national LMF 10_14
JP	97% (stable)
KR	95% (stable)
CN	56% (+21 pts)
IN	22% (-26 pts)

EUROPE

- Moderate international LMF presence (DE, FR, Benelux, North EU): National LMF dominate
Trend in 10 years: increasing presence of non national LMF except in FR (DE stable)
- High international attractiveness (GB, IL, South and Eastern EU)

Trends: Stable GB, IT, Eastern EU
 Increasing in IL (overseas)
 Decreasing in Southern EU

Country	national LMF10_14
DE	67% (-3 pts)
FR	64% (+11 pts)
GB	17% (stable)
IT	29% (stable)
Benelux	54% (-13 pts)
CH	46% (+4 pts)
East EU	9% (stable)
South EU	22% (+11 pts)
North EU	64% (-5 pts)
IL	10% (-14 pts)

LMF Internationalisation in clusters

MA classified according to the role of non national LMF in their total patent production:

- over 50%, high intl attractiveness,
- below 10% quasi exclusive role of National LMF

Role of non-national LMF	MA number	Patents 10-14	LMF/RPD 10-14
High (>50%)	46%	16%	66%
Medium high (30-49%)	19%	15%	71%
Low (10-29%)	20%	21%	79%
marginal (<10%)	15%	48%	87%
Total	100%	100%	80%

Very limited variations between technology profiles

Key differences between clusters:

Non-specialised: marginal MA: 65% of patents with LMF/RPD ratio: 90%

ICT: 'marginal + Low' MA : 85% of patents

Chemical Pharma.: 'High + Medium high' MA: 78% of patents with low LMF/RPD ratio (65%)

Mechanical eng.: lower role of MA with high role of non national LMF (39% of MA and 11% of patents)

- ◆ Opposite situations:
 - 46% of MA have a high attractiveness but gather only 15% of patents
 - and it is the reverse with MA with quasi-exclusive national LMF
- ◆ The greater the 'international attractiveness (i.e. role of non-national LMF), the lower the role of LMF

Very preliminary results

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- OLS
- Evolution of number of patents in MA
 - High geography effect (continent / country)
 - MA size: not significant
 - LMF/RPD: significant in EU but very low + coefficient (not enough diversity)
 - LMF Internationalisation:
 - Significant, positive effect of intracontinental in Asia (high coefficient)
 - Significant, positive effect of intracontinental in Europe (low coefficient)



- LMF are present in nearly all MA, and play a central role (80% of MA total patents) that is still increasing (+ 3 points in one decade)
- Though MA are strongly stratified (top 26 MA represent 60% of patents), the presence of LMF is wide ranging (Only 25% of MA representing 4% of IP have a share below 50%)
- One important result is that 70% of MA exhibit strong specialisations in the 4 main technological domains while 30% mirror the overall production profile (40% in ICT, and 20% in the 3 other domains: Chemical-Pharma., Mechanical engineering and instruments).
- Trajectories of both groups differ widely in term of patent production, growth and roles of LMF.



- Non-specialized MA are larger (47% of patents), especially technologically 'stable' MA over period (50% of MA and 88% of patents). One unexpected result is that moves go in both directions: de-specialisation (15% of MA and 6% of patents) and re-specialisation (9% of MA and 7% of patents, 2/3rds going to ICT). LMF role also differs between stable (85%) and unstable MA (69%)
- Specialised MA exhibit very different features depending upon their specialization: ICT MA (8%) are far larger (23% of patents), grow far faster (150%) based upon very strong LMF presence (over 80%).
To the opposite Chemical-Pharma MA (34% of MA, 17% of patents) have a very limited growth (7%) and lower & stable LMF ratios (70%). Instrument MA (10 of MA and 4% of patents) exhibit similar features with even less growth (-1% against 7%)
Finally, MA specializing in Mechanical engineering (19% of MA, 9% of patents) just exhibit average features based upon a strong reinforcement of LMF role (from 76 to 84%)



- We tested the role of the internationalization of LMF in MA. This remains dominated by very different features associated with countries, even within Europe.
In Asia, MA from Japan, Korea and Taiwan have shares of national LMF over 90%, while in China and India, non-national LMF prevail.
In the US the average share of national LMF is 70% and the rest is borne by intercontinental LMF (mostly from Europe and Japan)
In Europe national LMF still prevail (58%) with nearly equal shares from other European LMF (22% stable) and from LMF from other continents (20% growing).
But figures are strongly contrasted between for instance UK (only 17% from national LMF) and Germany (67%). Some countries see a strong decrease of the role of their national LMF (Benelux -11 points) while other witness the contrary (France + 11 points).

Testing Our 3 core hypotheses



- Yes LMF play a central and this is wide ranging, through sizes, geographical locations and technology profiles
- If ‘non-specialised’ MA play an important role, they grow more slowly; and contrary to what we expected there is not a strong movement towards this profile, as the ‘re-specialisation’ move is as important
- And geography plays an important role but probably at a higher level than MA themselves, pushing towards adopting multi-level approaches. This also goes against most results about ‘global cities’ which tend to say that they evolve independently from their national context



- Address the 3 questions raised by the recent IB review
- - is there a different role of LMF when they are few or numerous, when they exhibit similar or different profiles?
 - do 'global cities' (with the recent criteria developed by scholars like Belderbos) exhibit different LMF involvement and features compared to other MA?
 - Does the strategic orientation of firms (knowledge vs market driven) impact on the dynamics of MA? This could be addressed mobilizing the work already done for qualifying the orientation of patents
- Another important aspect is the role of the MA environment in the location strategies of LMF considering 3 dimensions: the role of universities and more widely public research, the importance of the start-up milieu and the impact of social & cultural milieux (using work developed by urban scholars)
- Finally, we are still searching for the best model for developing an integrated approach

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