

# Patterns of S&T internationalisation among KORANET partners

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## Scope of this study

1. Degree and pattern of internationalisation in S&T among the KORANET member countries
  - a. Policy instruments
  - b. As measured by patent and mobility indicators
2. Korea's participation in EU & international collaboration programmes

## Policy instruments adopted in MCs for internationalisation of R&D

- Three dimensions, to promote
  - International collaboration on R&D projects
  - International mobility of scientists & engineers
  - Attractiveness of the R&D base to multinationals

## Policy instruments for international collaboration on R&D projects

- Direct financial support for international collaborative projects
  - Funds allocated to support joint research projects
  - Seed funding for workshops, exploratory visits or brokerage missions (most MCs)
  - Participation of foreign partners in MCs' programmes (e.g. Austria, Finland, France, Hungary, Turkey, UK)
  - Fiscal incentives (France, Turkey)

## Policy instruments for international collaboration on R&D projects

- Provision of information services
  - Partner search services; consulting services on legal, technical & managerial issues
  - Establishment of off-shore units, liaison offices & agencies (e.g. Austria, France, UK)

## Intergovernmental bilateral R&D agreements

- Number have grown in EU but 2/3rds are statements of intent or good will
- Driven by political, economic or cultural forces
- Bureaucratic measures but do increase level of engagement
- E.g. Austria's agreements are for 'general S&T cooperation'
- Hungary: majority of agreements for researcher mobility

## Intergovernmental bilateral R&D agreements

- Germany & France different: use bilateral agreements to advance specific S&T capabilities
- Korea: builds specific programmes based on formal agreements, with dedicated budget
- Establishment of joint institutes or joint programmes focused on strategic areas e.g. France, Germany

## Policy instruments for international mobility

- Policies towards inward mobility
  - Attraction of talent from abroad
  - Information services
  - Removal of barriers
- Policies towards outward mobility
  - Outgoing fellowship programmes
  - Students studying abroad

## Attracting talent from abroad

- Special funds for diverse studentships and schemes (e.g. AvH in Germany; UK's Chevening & PMI, France's Chairs of Excellence)
- Follow up support for alumni
- Specific repatriation programmes (Italy, Turkey, Hungary)
- Transforming 'brain drain' into an asset by maintaining links to Diaspora

## Attracting talent from abroad

- Information services (Hungary, Campus France, EURAXESS)
- Changes to immigration legislation (Austria, Germany, Italy, UK) or taxation (Austria, France, UK)
- Accreditation schemes for foreign qualifications

## Policies towards outward mobility

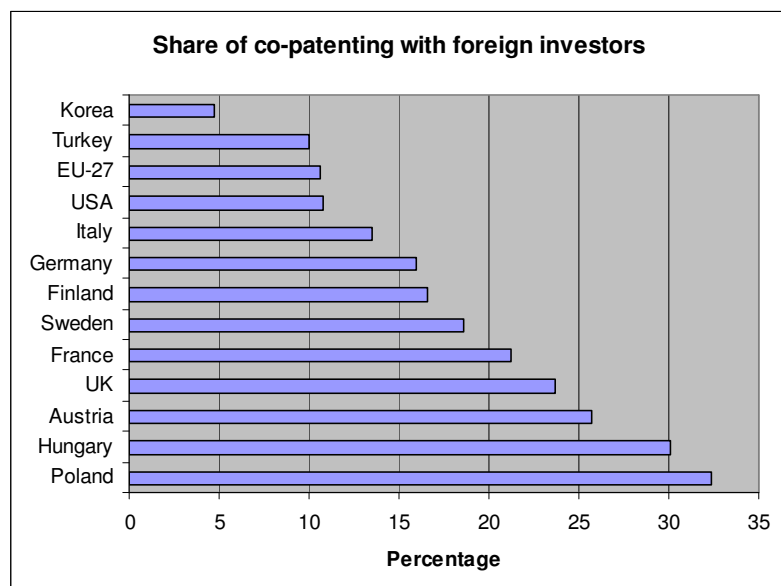
- Outgoing fellowship programmes (e.g. Germany's Humboldt and DAAD programmes)
- Some preconditions on returning (Turkey, Hungary, Poland)

## Policy instruments for attracting R&D of multinationals

- Diverse mixtures of support policies to induce foreign R&D investments:
  - Direct fiscal incentives (Austria, France, Hungary, UK provide grants)
  - Indirect incentives (administrative support, public procurement, subsidised locations)
  - Cluster policies to attract the R&D centres of multinationals (all MCs except Austria)
  - Promotion of national systems and competence (e.g. 'Invest in Germany')

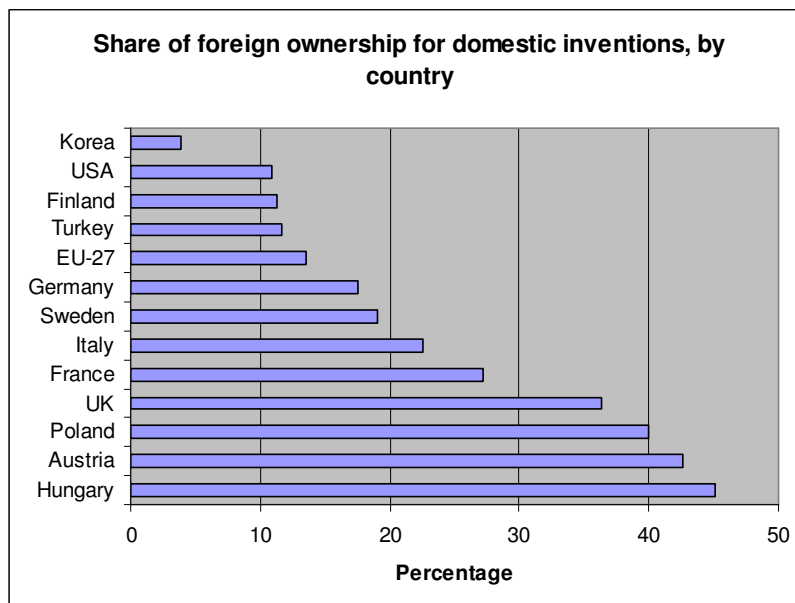
## Patterns of internationalisation of technologies and mobility

- Indicators based on patents
  - Cross-border collaboration of technology
  - Cross-border ownership of technologies
    - i. Foreign ownership of domestic inventions
    - ii. Domestic ownership of foreign inventions
- Cross-border mobility of people
  - Mobility indicators – who studies abroad and where
  - Trend of foreign students in tertiary education
  - Inward mobility



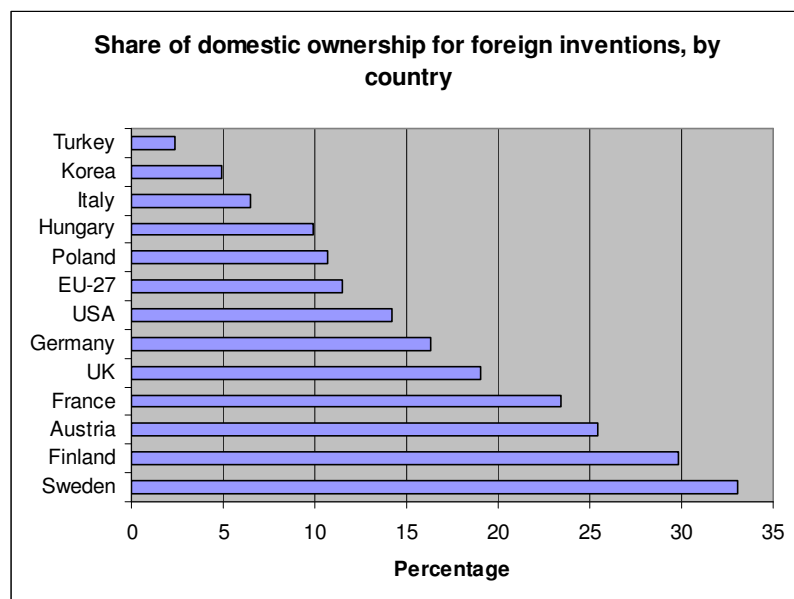
## Cross-border collaboration of technology

- Comparing 2007 with 1997, Hungary, Sweden, UK & Finland show an increase, while Turkey, Poland & Korea show a decrease
- EU MCs collaborate most with other EU countries (>60% in Austria, Finland, Poland & Sweden).
- Exceptions are UK & Turkey who collaborate with US (as do Korea, Japan & China)



## Foreign ownership of domestic inventions

- Average share stable at 25% between 1997 and 2007
- Hungary, France & Austria show big increase
- Turkey, Korea & Italy show decrease
- Inventions of EU countries mostly owned by other EU countries
- US owns >50% of inventions in Korea, Japan, Taiwan

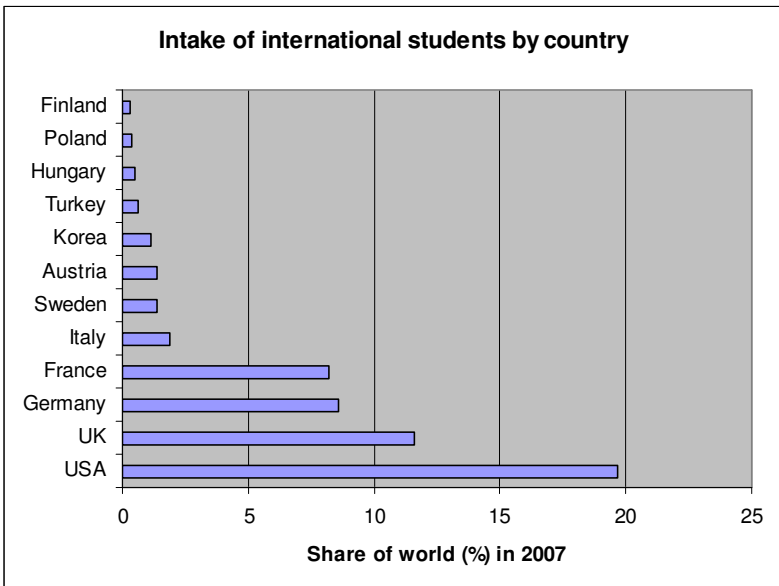
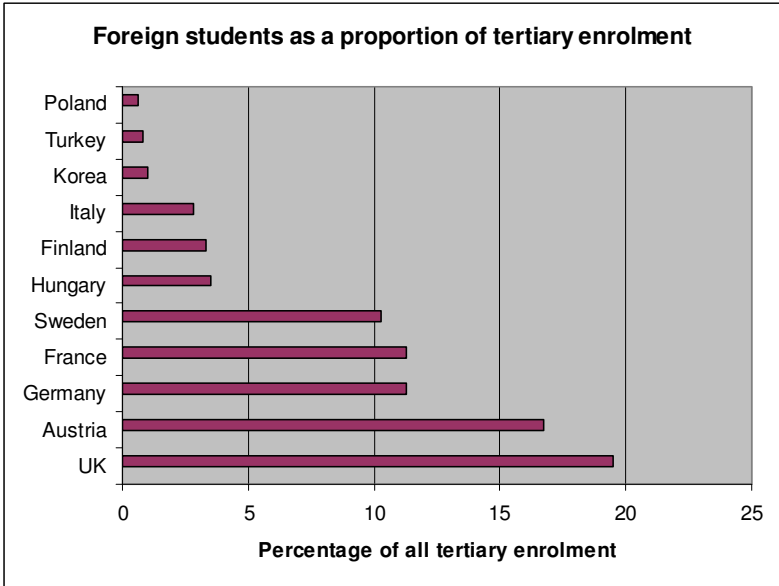


## Who owns domestic inventions?

- 51% of foreign inventions of MCs made by residents in other EU countries, 29% invented by US residents

## Mobility indicators

- In 2007, MCs received over 1m tertiary students from abroad (63% increase since 2000)
- Foreign enrolments in Korea have risen from 3,373 in 2000 to 31,943 in 2007
- Also rapid growth in Poland and Italy

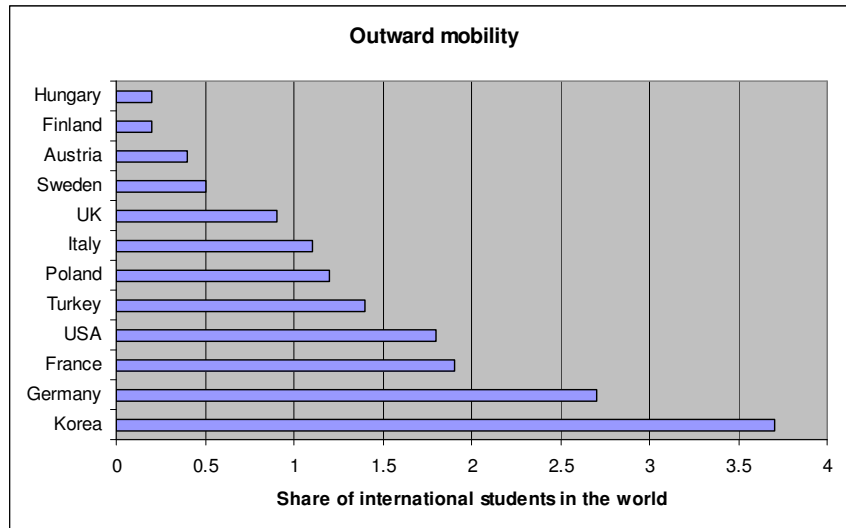


## Inward mobility

- UK, Germany, Turkey & Austria show a decline, while France & Korea have increased
- Origin of foreign students in each country
  - Most incoming students from Europe (37.3%) & Asia (32.8%), also Africa (16%)
  - France has 43.8% from Africa; UK 46.3% from Asia; Turkey 50.0% from Asia
  - Dominance of Asian students in Korea & Japan

## International students by field of education

- 29% of foreign students coming to MCs study science, engineering, manufacturing & construction
- Finland receives 40% in science fields; also high in Germany, Sweden & UK
- Poland receives only 10% in science fields



## Outward mobility

- Share of each country in international students
  - China is largest group of international students (15.2%); by comparison Japan is 1.9%
- Destination for outward mobility of each country
  - Germany most often selected as first choice
  - UK most often in top three choices

## Preferred destinations for study

	<b>1st</b>	<b>2nd</b>	<b>3rd</b>
<b>Austria</b>	Germany	UK	Switzerland
<b>Finland</b>	Sweden	UK	Germany
<b>France</b>	Belgium	UK	US
<b>Germany</b>	UK	Netherlands	Austria
<b>Hungary</b>	Germany	Austria	UK
<b>Italy</b>	Germany	Austria	UK
<b>Korea</b>	US	Japan	Australia
<b>Poland</b>	Germany	UK	France
<b>Sweden</b>	UK	US	Denmark
<b>Turkey</b>	Germany	US	France
<b>UK</b>	US	France	Canada

## Participation of Korea in EU and other international collaboration programmes

- EU RTD programmes
  - 8 projects under FP5, 19 under FP6, 20 under FP7
  - ICT (49%), health & life sciences (15%), environmental science (9%)
  - Industry participation low
  - In FP6 Korea accounted for 0.03% of all participation
  - Two reasons for low involvement ...

## Participation of Korea in EU international collaboration programmes

- Ineligibility of Korea for EC funding
  - Not an EU MS, not an Associated Country, not an ICPC
  - High income countries not included in ICPC list
- Weak research networking with EU
  - Preference for US
  - Difficulty in finding partners for EU projects
  - EU-Korea S&T Agreement (2007): 2.6bn KRW in 2010
  - KESTCAP

## Participation of Korea in EU international collaboration programmes

- EUREKA – pan-European, involving 38 member countries
- No central budget; must secure own funding
- Networking mechanism for participants; bottom-up approach
- 722 projects adopted at cost of 1.3b euro
- Korea – non-member country until 2008, now an associate member (with budget of 5b KRW)

## Other international initiatives

- CERN
  - Korea participating as a non-member state
- ISTC
  - Korea one of 13 member countries
- ITER
  - Korea one of 7 parties (joined in 2003)
- IAEA
  - Korea seated on board of governors
- HFSP and IIASA