

STRATEGIES FOR OPTIMIZING RESEARCH & INNOVATION THROUGH TECHNOLOGY TRANSFER [CASE STUDY OF MACEDONIA]

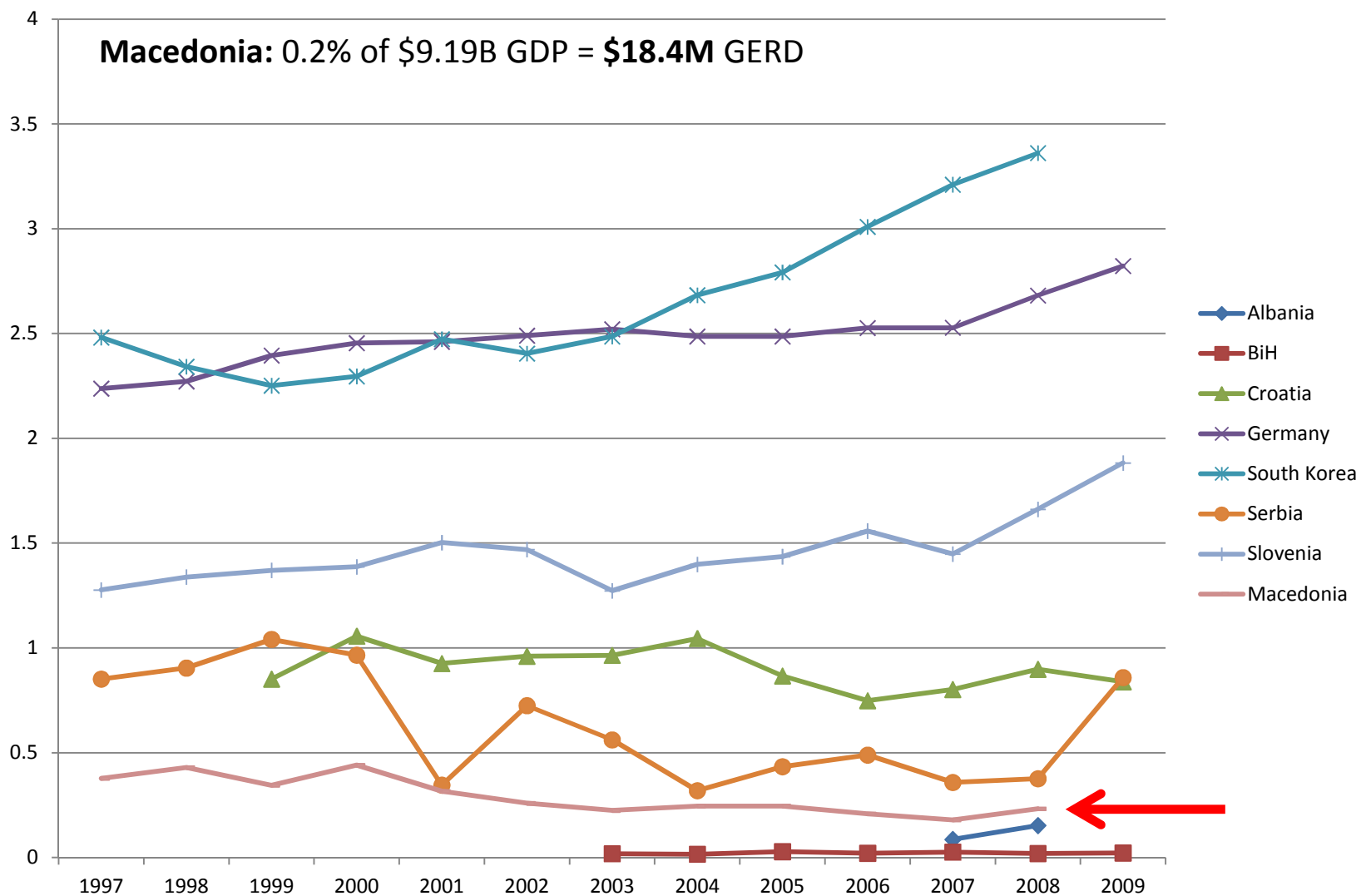
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STATE OF AFFAIRS – POLICY FRAMEWORK

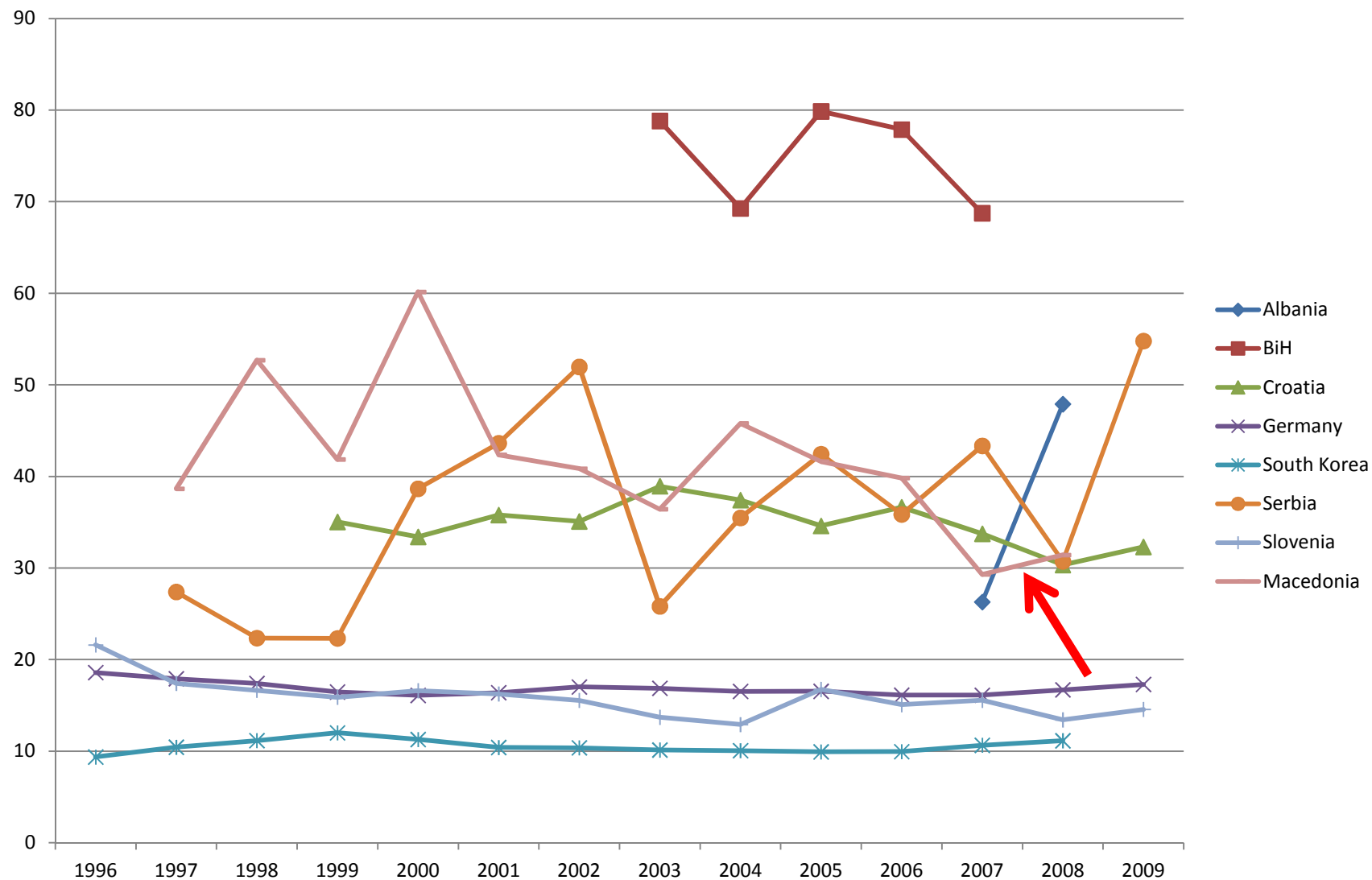
- Governmental bodies: Ministry of Education and Science; Macedonian Academy of Sciences and the Arts
- Legal framework - laws on: scientific & research activities; encouragement and support of technology development; higher education; intellectual property protection
- Research infrastructure: Macedonian Academy of Sciences and Arts; 5 public universities; 18 private universities; 44 faculties; 7 public scientific institutes; 20 R&D units within industry; consulting agencies and offices
- Weakness: small R&D budget, legal uncertainty, poor infrastructure, equipment, materials, tech fragmentation, technological discontinuum, small investments in applied R &D and innovation, low level of private investment, few researchers in the private sector, high brain drain

GROSS EXPENDITURE ON R & D (GERD) AS % OF GDP



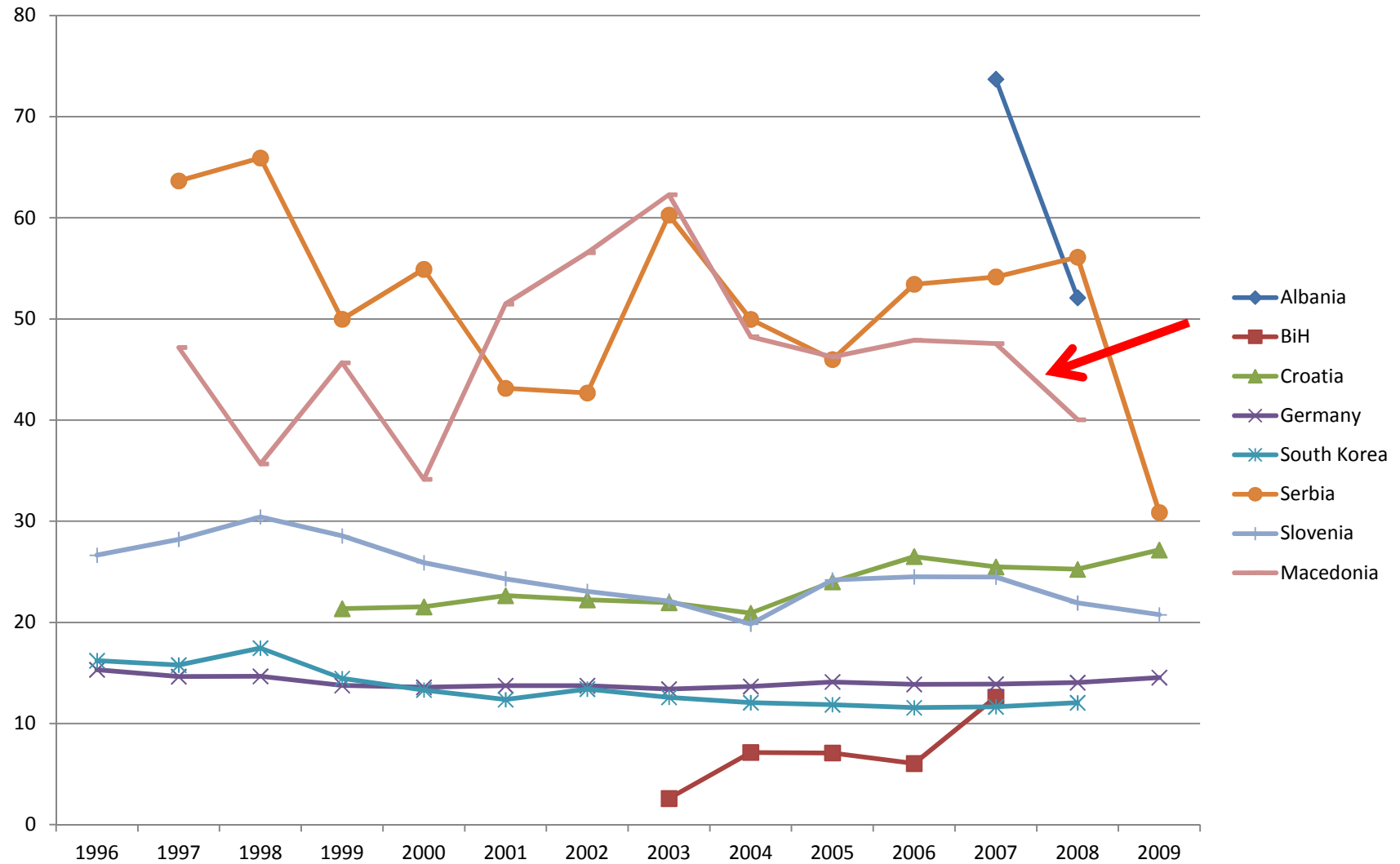
Source: UNESCOstat 2011

GERD – % BY HIGHER EDUCATION



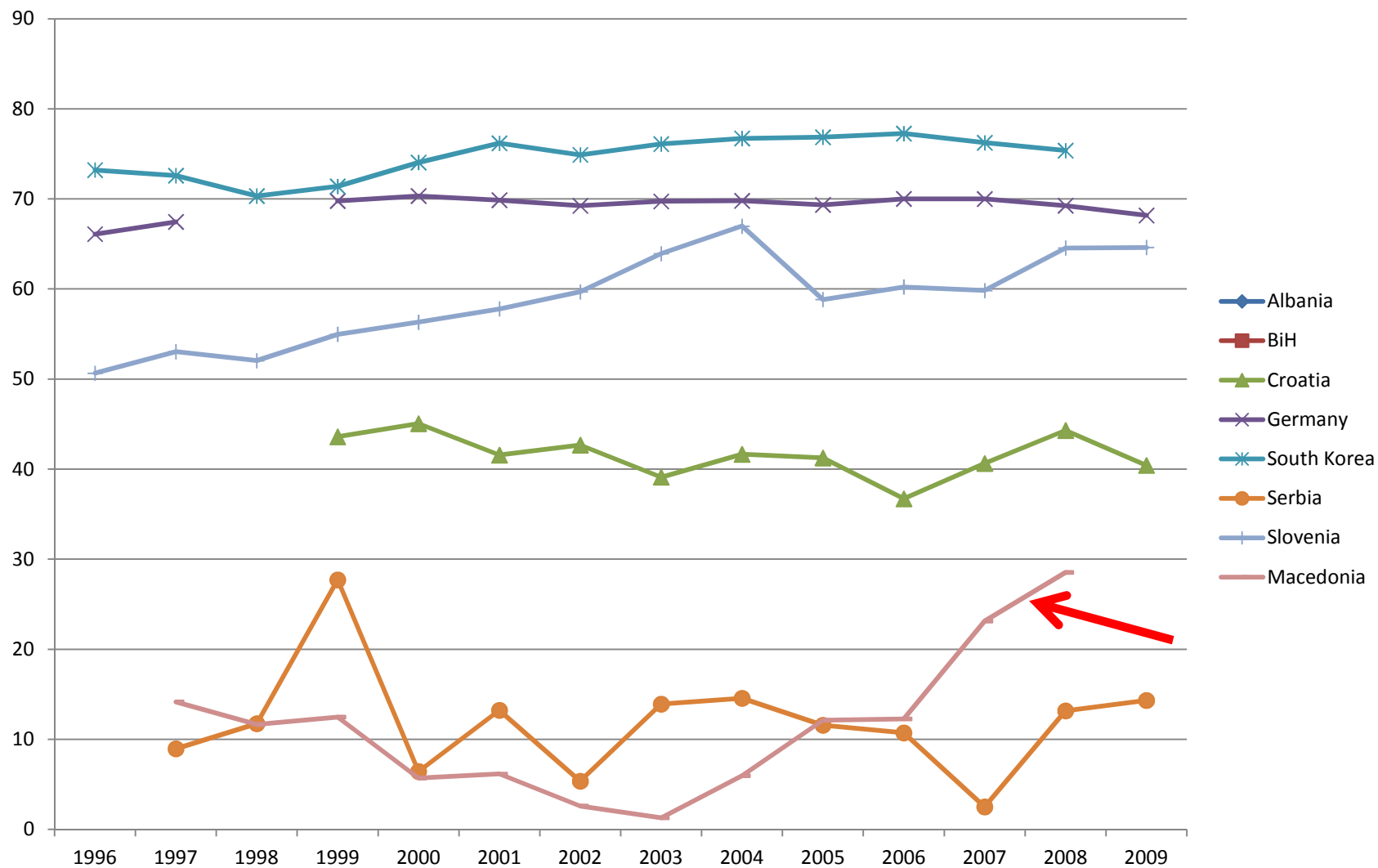
Source: UNESCOstat 2011

GERD – % BY GOVERNMENT



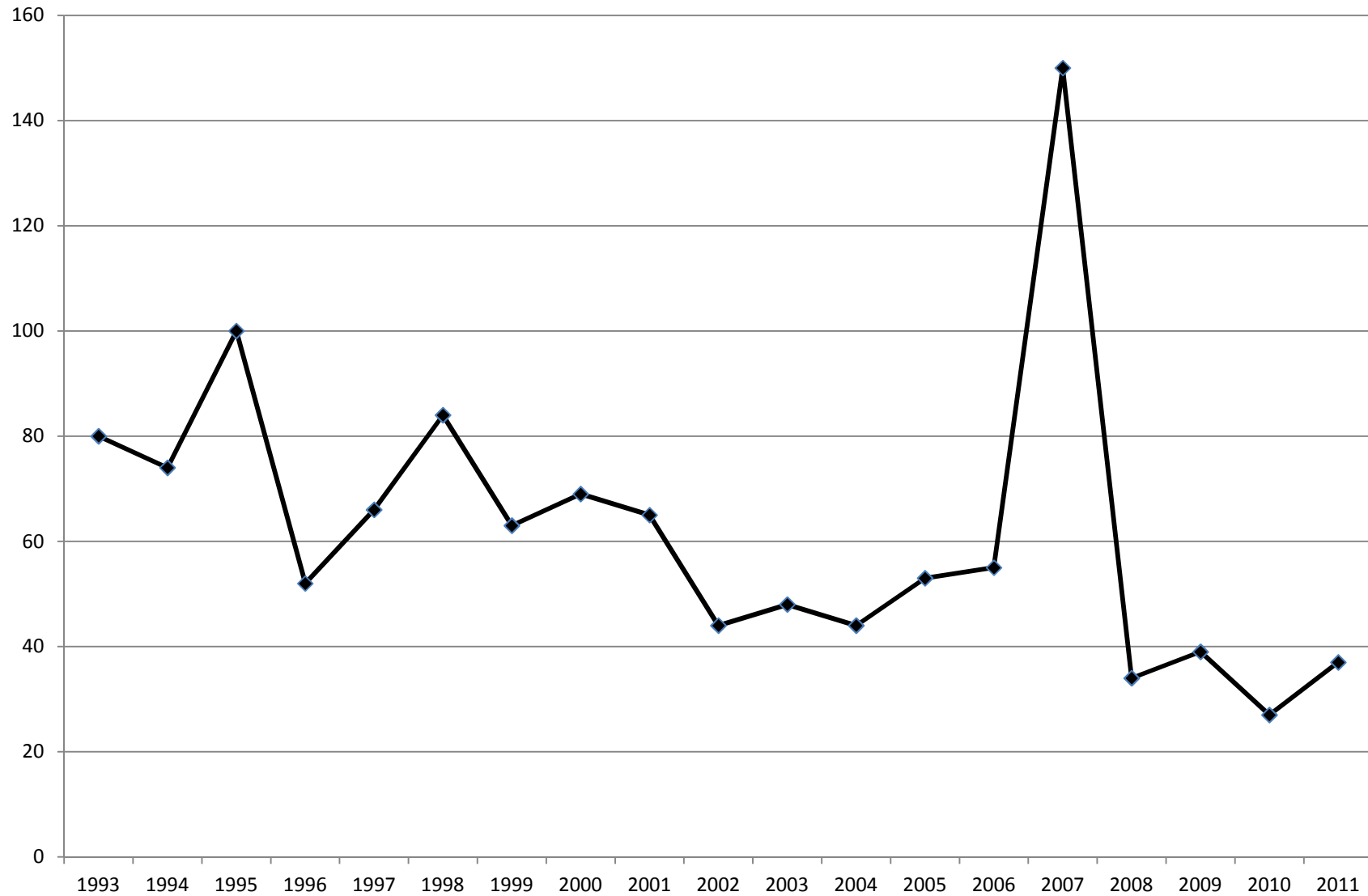
Source: UNESCOstat 2011

GERD – % BY BUSINESS ENTERPRISES

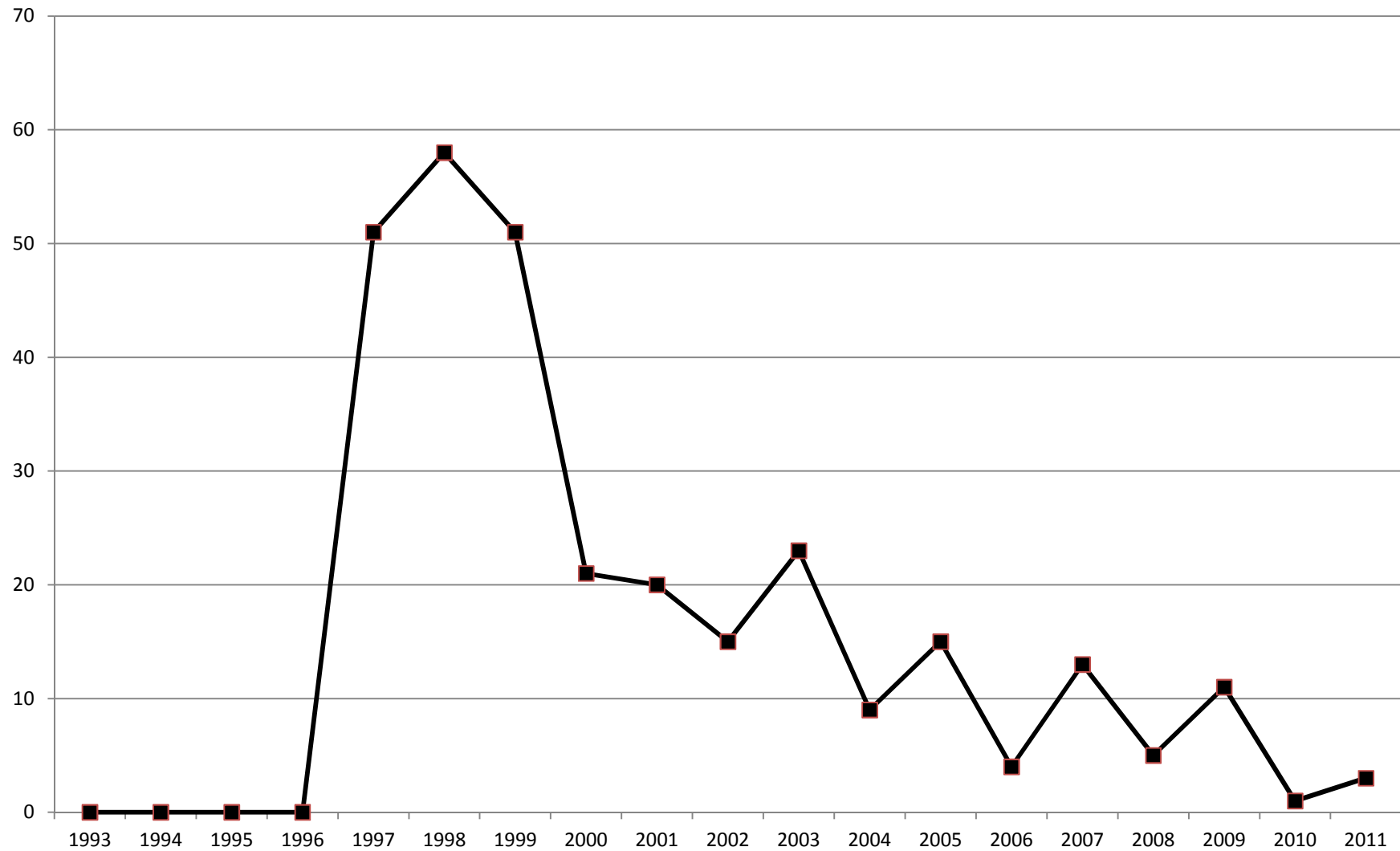


Source: UNESCOstat 2011

NATIONAL PATENT APPLICATIONS IN MACEDONIA



NATIONALIZED PATENT COOPERATION TREATY (PCT) PATENTS IN MACEDONIA



CAPACITY FOR INNOVATION

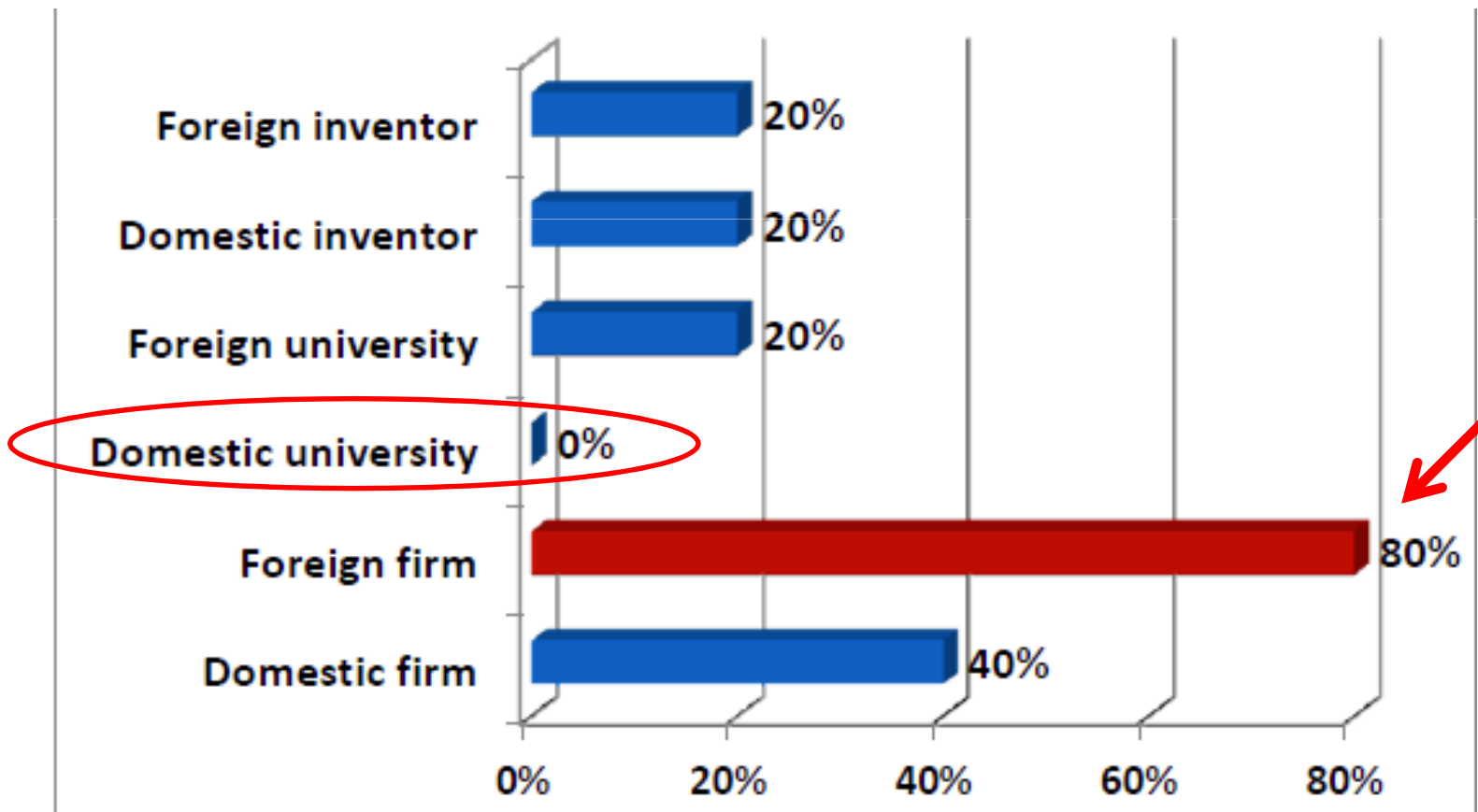
- Global Competitiveness Report (World Economic Forum), 2011 – 2012: Macedonian economic development is in the II (second) phase of **economy governed by efficiency**
- Global competitiveness index – Macedonia = 79th/142 countries
- Innovativeness index – Macedonia 105th (down from 97th); of the WB countries, only BiH is placed lower
- **Impossible for WB countries in the II (second) phase of economic development to implement public policies aimed towards promotion of sophisticated technological development**
- These countries should develop and implement long term strategies for transfer of new technologies and development of inherently developed domestic technologies

SURVEY “TECHNOLOGY TRANSFER IN MACEDONIA”

- 50 [200] high tech firms surveyed

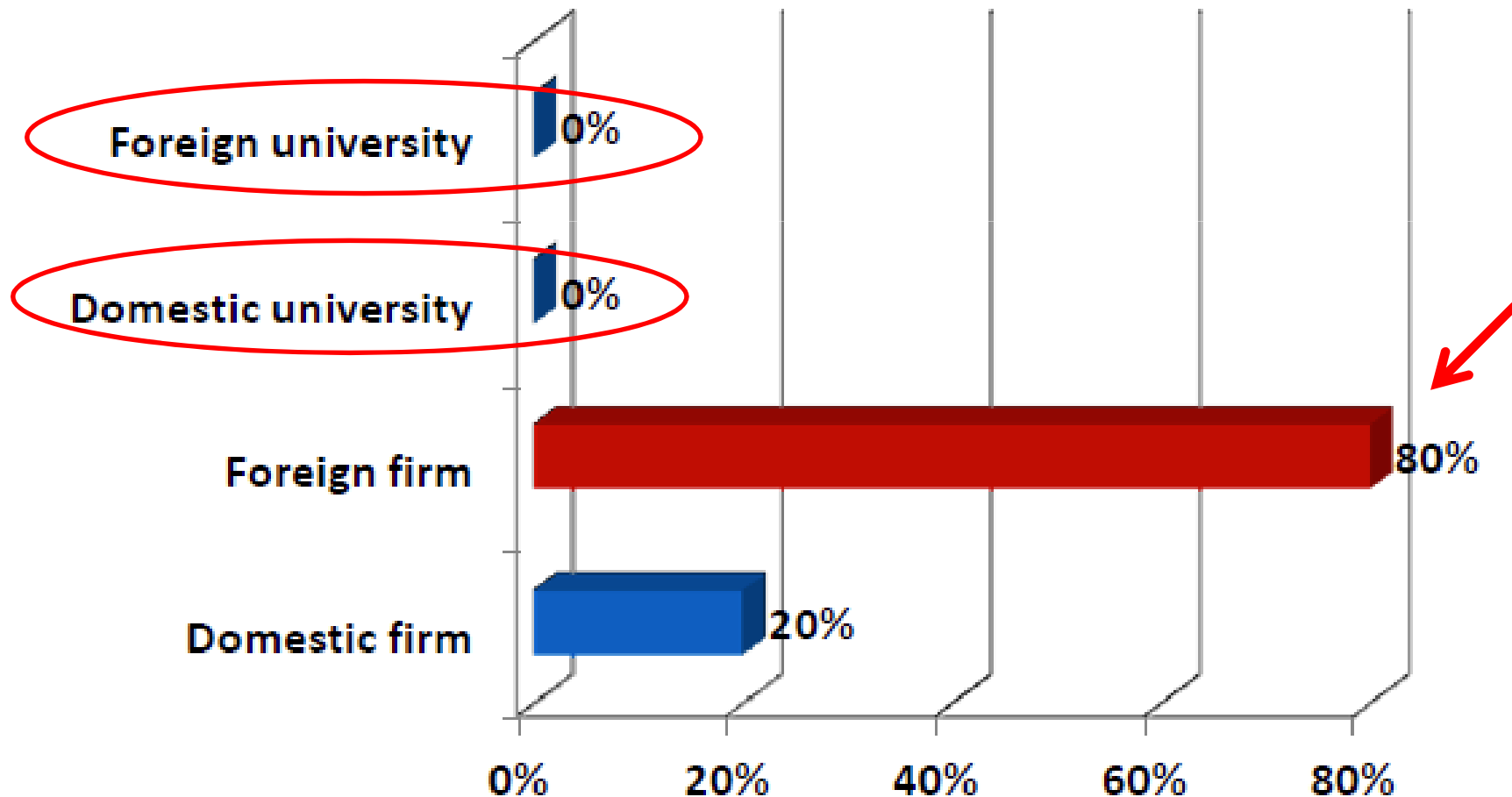
TRANSFER OF OWN TECHNOLOGY?

- Q6: YOU DEVELOPED THE NEW TECHNOLOGY WITH (MULTIPLE ANSWERS ARE POSSIBLE):



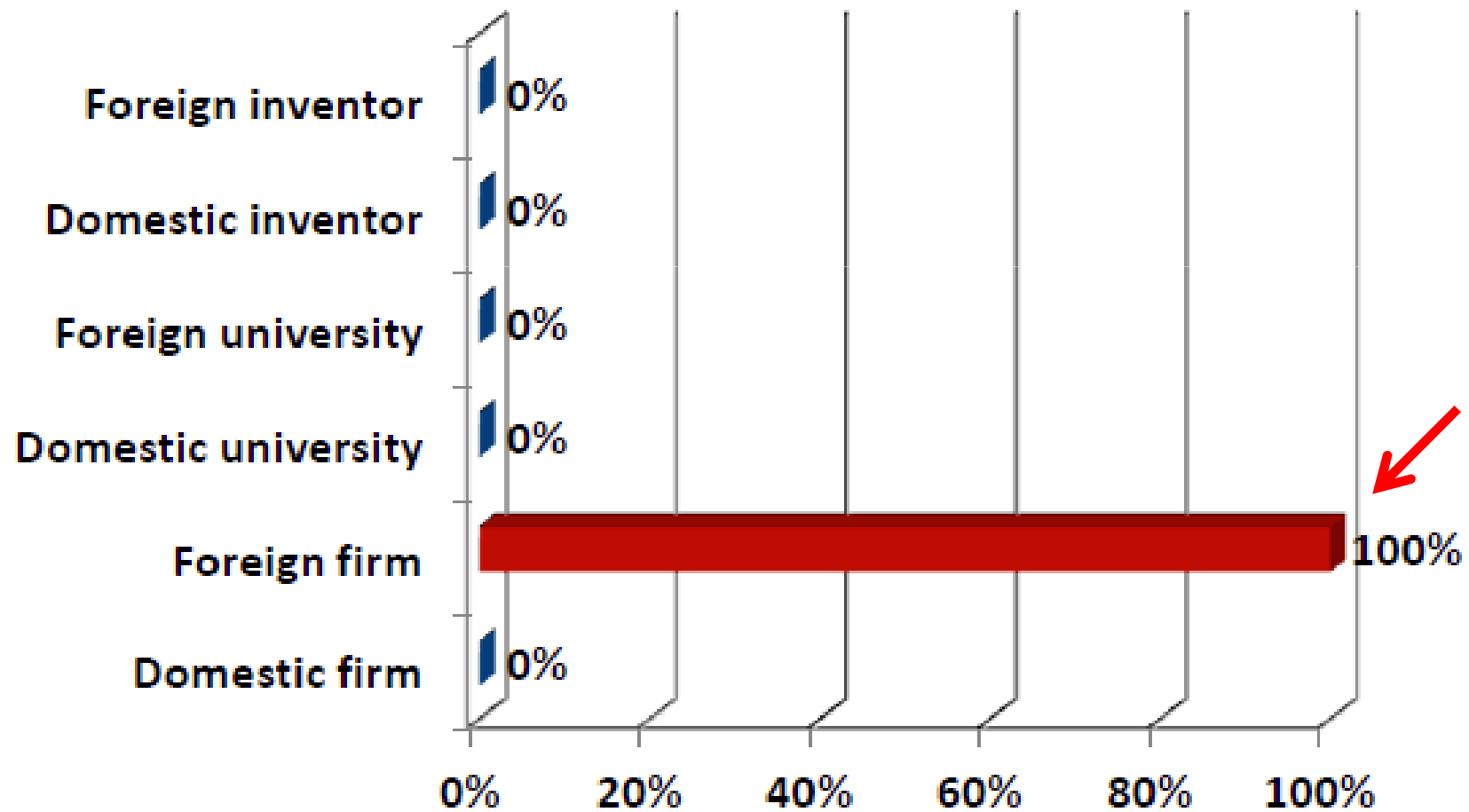
TECHNOLOGY TRANSFER TO?

- Q7: YOU TRANSFERRED YOUR OWN TECHNOLOGY TO:



RECEIPT OF TECHNOLOGY FROM?

- Q8: YOU RECEIVED TECHNOLOGY FROM:



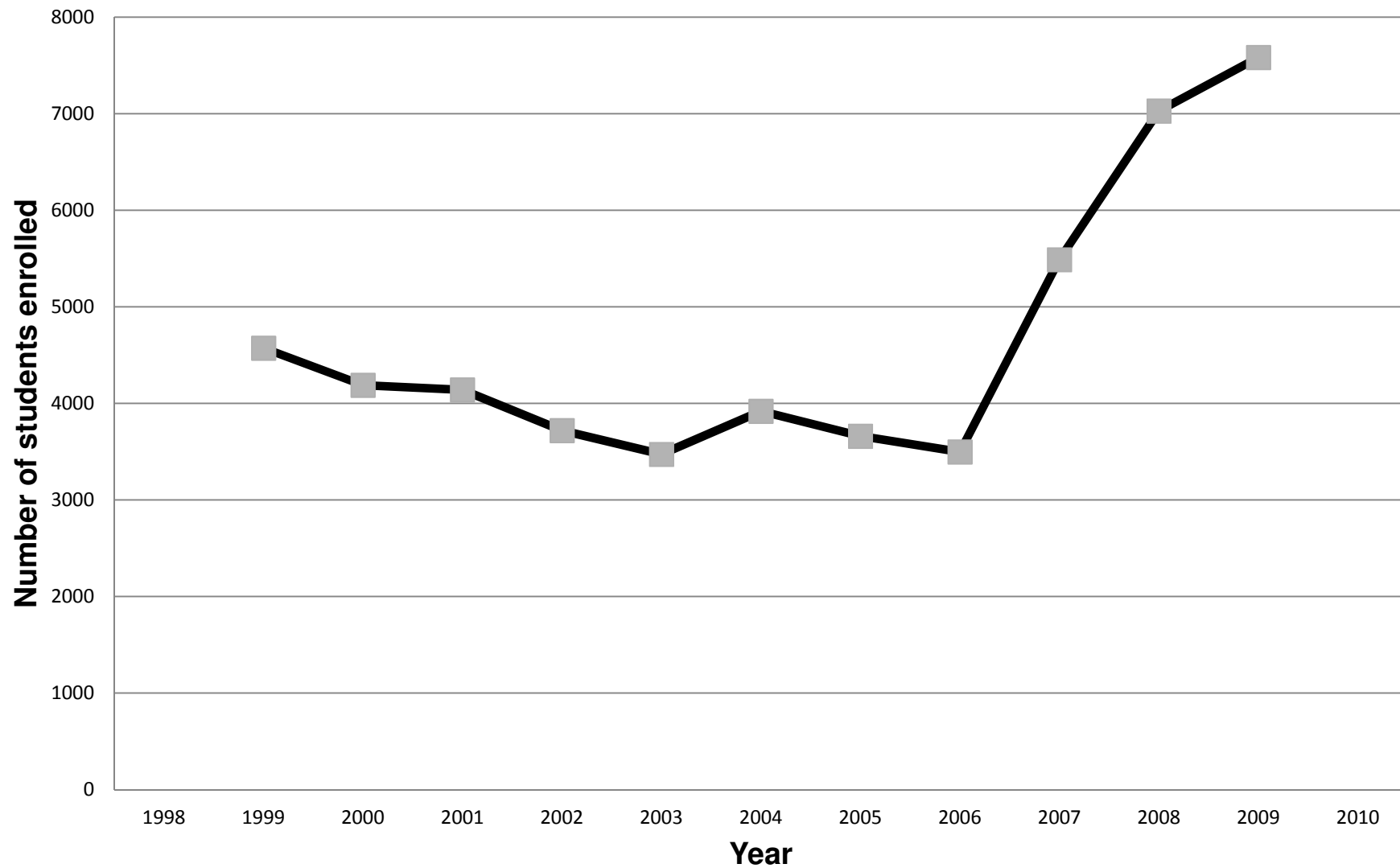
SURVEY RESULTS - SUMMARY

- MK firms transfer own technologies to other firms only
- 100 % of the respondents answered that they have transferred their own technology to a firm (and not a university)
- 80% of those transferred to a foreign firm, and 20% of those transferred to a domestic firm
- Macedonian firms do not receive technologies from universities (domestic/foreign)
- 100% of respondents answered that the technology was transferred to them by a foreign firm
- MK academia does not transfer its own technologies to the private sector
- 100% of the respondents answered that the government should allocate more resources from the budget in activities such as R&D (in this area Macedonia lags behind all the WB countries)
- Non-existent public-private partnerships (government/private sector/academia)

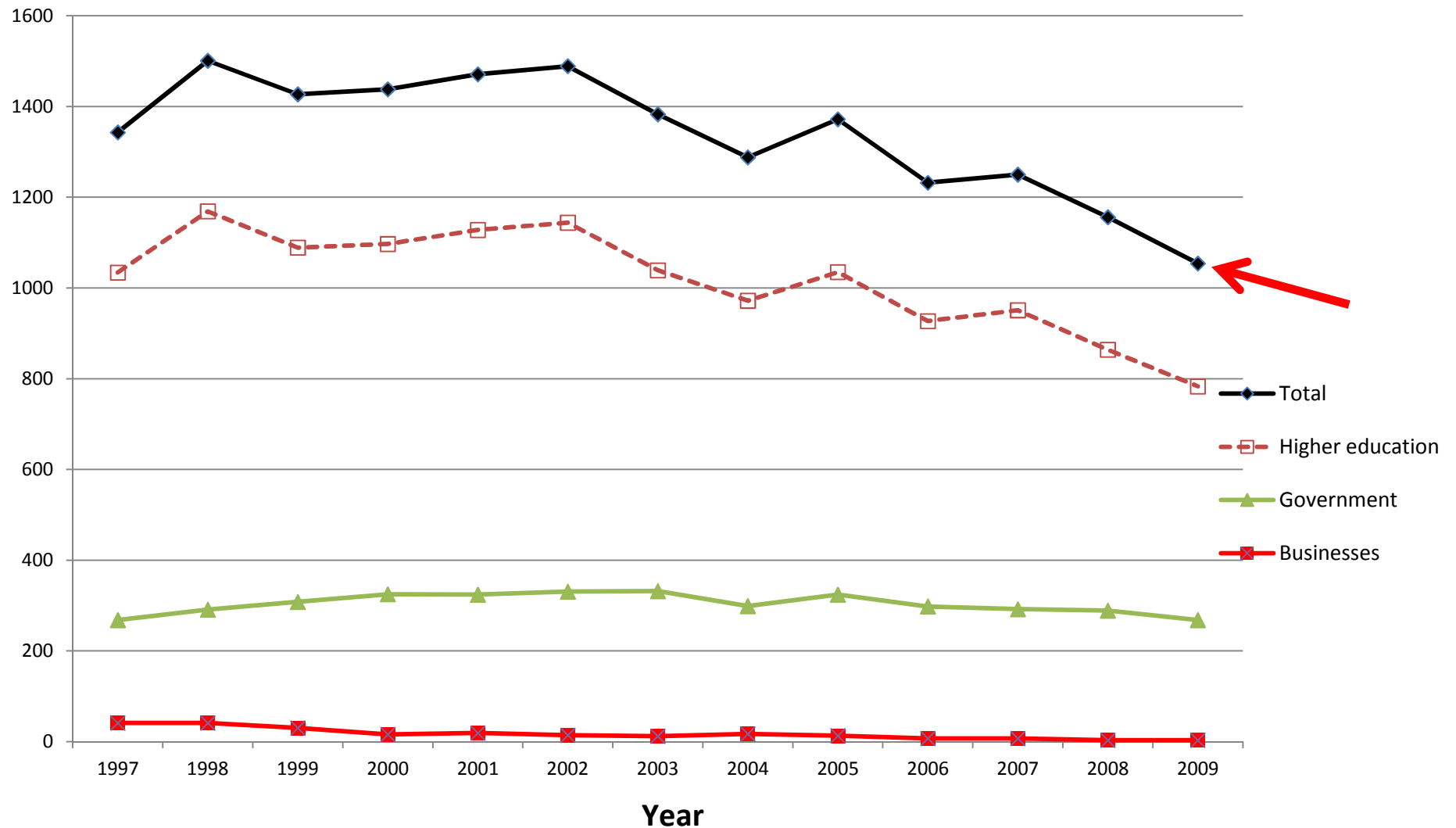
HUMAN CAPITAL

- Two major factors influencing technological growth in Macedonia:
 - Institutional framework
 - Literacy rate of the workforce
- The process of technology absorption, adaptation and integration into the local economy is dependent on quantity, quality and distribution of human capital in the region
- Human capital = competencies + health of the population needed for innovation/tech transfer

ENROLLMENT IN POSTGRADUATE STUDIES IN SCIENCE



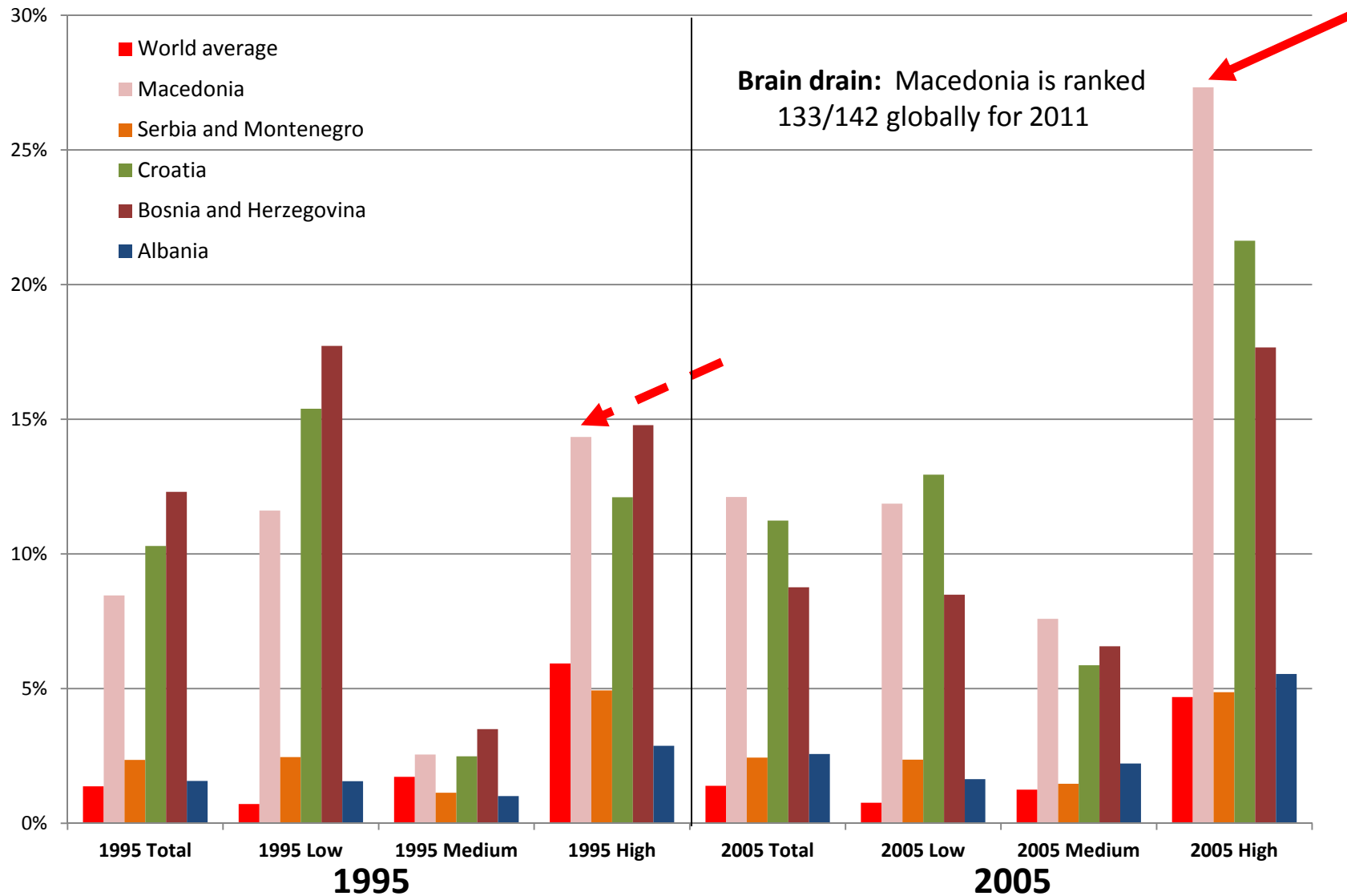
POSTGRADUATES (PhD, MSc)EMPLOYED IN R&D INSTITUTIONS



Source: MK State Statistical Office

EMIGRATION RATE BY EDUCATIONAL LEVEL

1995-2005



Source: OECD, F. Docquier, 2011

OBSTACLES TO INNOVATION IN MACEDONIA

- Even if there is a profitable technology investment, inadequate levels of income limit generation of investment resources
 - Low income level is a cause and consequence of low levels of human capital, limited funds for R&D, underdeveloped financial markets and weak institutional structure [vicious circle]
 - Illiteracy is decreasing. However this is insufficient to enable efficient absorption of new, both advanced and old technologies.
 - The government should strive towards creating **sustainable system of primary education**. This way, the secondary and tertiary education systems will be strengthened as well
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- Macedonia has good quality science and math education; number of graduates is similar to developed countries.
 - On the other hand, the brain drain rate speaks of the fact that all the talented people having the opportunity to leave the country, leave.
 - The institutional structure in Macedonia, especially the private sector and the government do not create the necessary preconditions for the young graduates to stay in the country and contribute to its development

DISHEARTENING REALITY

- Macedonia is ranked very poorly with respect to most of the factors of technological innovation. The only factor with relatively high ranking is the availability of VC. However, VC has little to do with financing of the initial stages of R&D of new technology. In this phase the most important instruments are the business angels and the finances received from the public authorities. Macedonia is on the bottom of the list.
- The level of competitiveness of Macedonian firms is very low (125/ 142)!
- Low level of cluster development; low level of ability for taking advantage of agglomeration economies and the Silicon Valley effect
- Small absorptive capacity for new technologies
- Technological discontinuum
- It is impossible for Macedonia, stuck in the phase of economy governed by efficiency, to implement policies of sophisticated technological development

THANK YOU

