Strengthening research and innovation capabilities

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ECLAC

ALICIA BÁRCENA
EXECUTIVE SECRETARY

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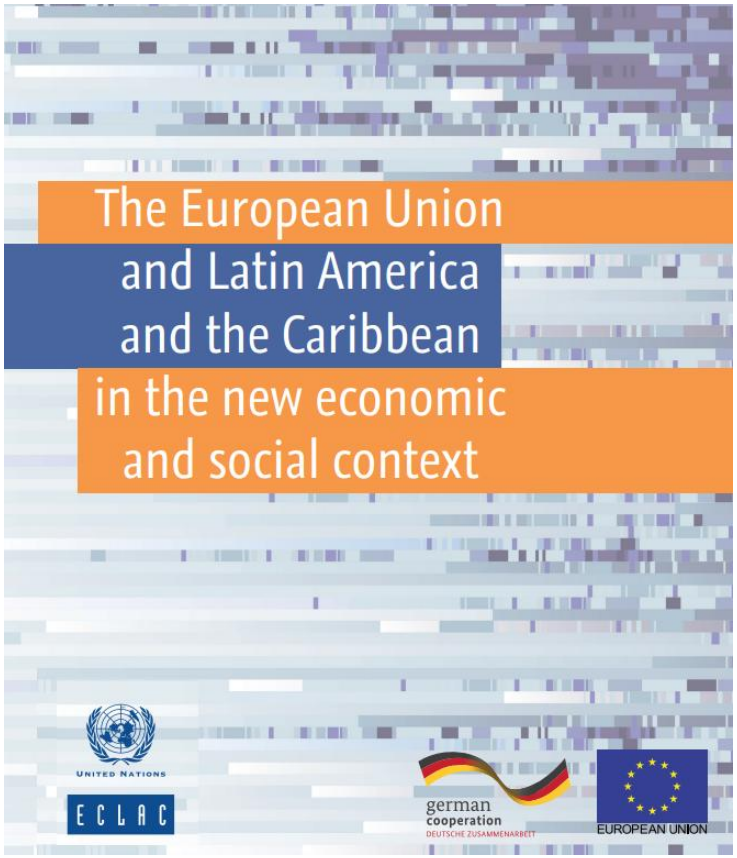
CELAC-EU: In need of a revised architecture of cooperation



The Global context

- Technological revolution
- Globalization of consumption patterns
- Reorganization of the global economy,

  with greater participation of Asia
- Increasing global environmental pressures

A new paradigm of research and innovation

- **Sustainable development** is a process that involves **equality, growth, structural change,** in a **sustainable way**
- The constructive **relationship between innovation and development** is unequivocal: new products, processes and production systems induce qualitative and quantitative changes in the economic and social structures
- **Learning processes, generation and diffusion of endogenous technological capabilities** are key elements for a sustainable development whose aim is to achieve a **broader social inclusion, more equality in income distribution** and low carbon production and consumption styes
- These **processes are highly specific** in terms of geographic, historical and cultural contexts. But there are some **common elements** which can be transferred within the evolution of socio-economic systems
- In general, **success cases** (e.g. the **catching up** of East Asian countries) are characterized by the presence of a public driven **vision and a clear and dynamic national strategy**, aiming at building **inclusive production systems** capable to solve the problem of structural heterogeneity, typical of peripheral economies.

Technological capabilities and development patterns

- **Participation into global trade and global growth** in following years will be grounded on a country's **ability to innovate** in technological, social and organizational fields.
- A distinctive mark of this new **knowledge economy** is precisely the **central role of innovation** in the **competitive game** and in the global division of work.
- At the same time, innovation capabilities are crucial in boosting possible **improvements in rent distribution.**
- Technological capabilities of Latin America: **investment** in **R&D is low, technology intensity and salary distribution are concentrated in low technology sectors.**

Latin America and the Caribbean is at a crossroads

- After a period of prosperity, the region is facing a more difficult external context and slower economic growth
- Not enough was done to increase investment in human capacities, and to reduce inequality
- With social progress, the region still remains the worst distribution of income, and other inequalities
- Stable but fragile democracies
- With challenges of environmental sustainability to move towards low-carbon paths
- With ways of integrating variable geometry

Where is the region today?

- Three realities: South America, Central America, and the Caribbean
- Lack of linkages in the production structure
- Slowdown of economic growth
- Insufficient investment
- Need of natural resource and environmental governance
- Poverty reduction stopped
- Loss of dynamism in international trade
- End of the commodity price supercycle
- Financial volatility
- High vulnerability to weather events
- Scarcity of quality public goods
- Weak institutions

Two antagonistic models of competition strategies

Static comparative advantages

Low-cost production factors
Availability of raw materials
Geographical factors

Dynamic comparative advantages

Technology and equipment
Knowledge
Structural change/ diversification
Innovation capacities

Spurious/ temporary/short-term competitiveness

Authentic / sustainable/long-term competitiveness

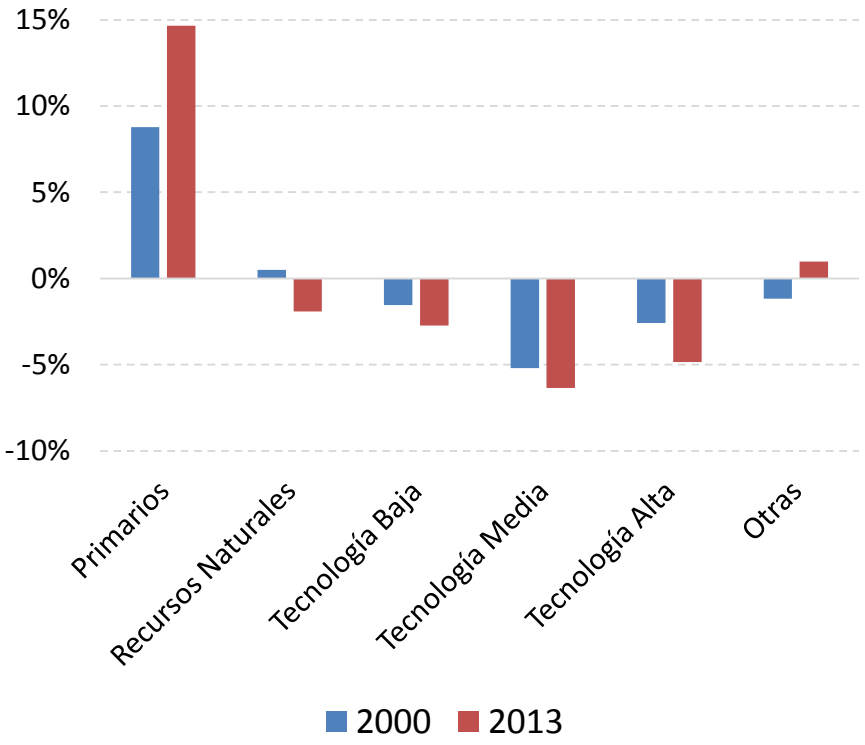
Low productivity

High productivity

Competitiveness depends not only on the incentives structure, but also on institutions and relations between the agents that make up national innovation systems

LAC has strong primary specialization

Balanza comercial de acuerdo a
la intensidad tecnológica de los productos, 2000 y 2013
(como porcentaje del comercio total en cada período)



Europe: more complex and diversified structure

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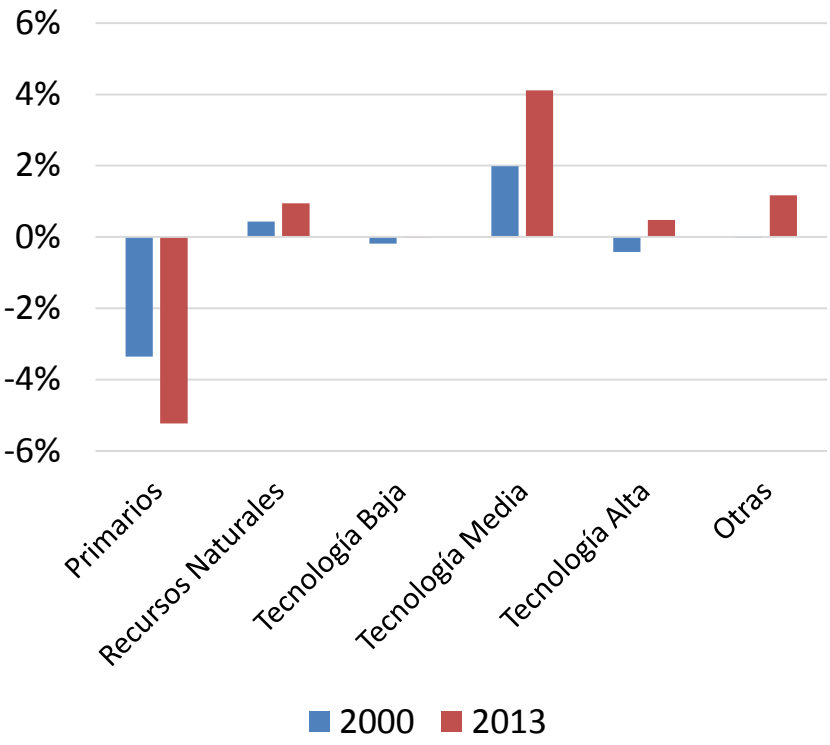
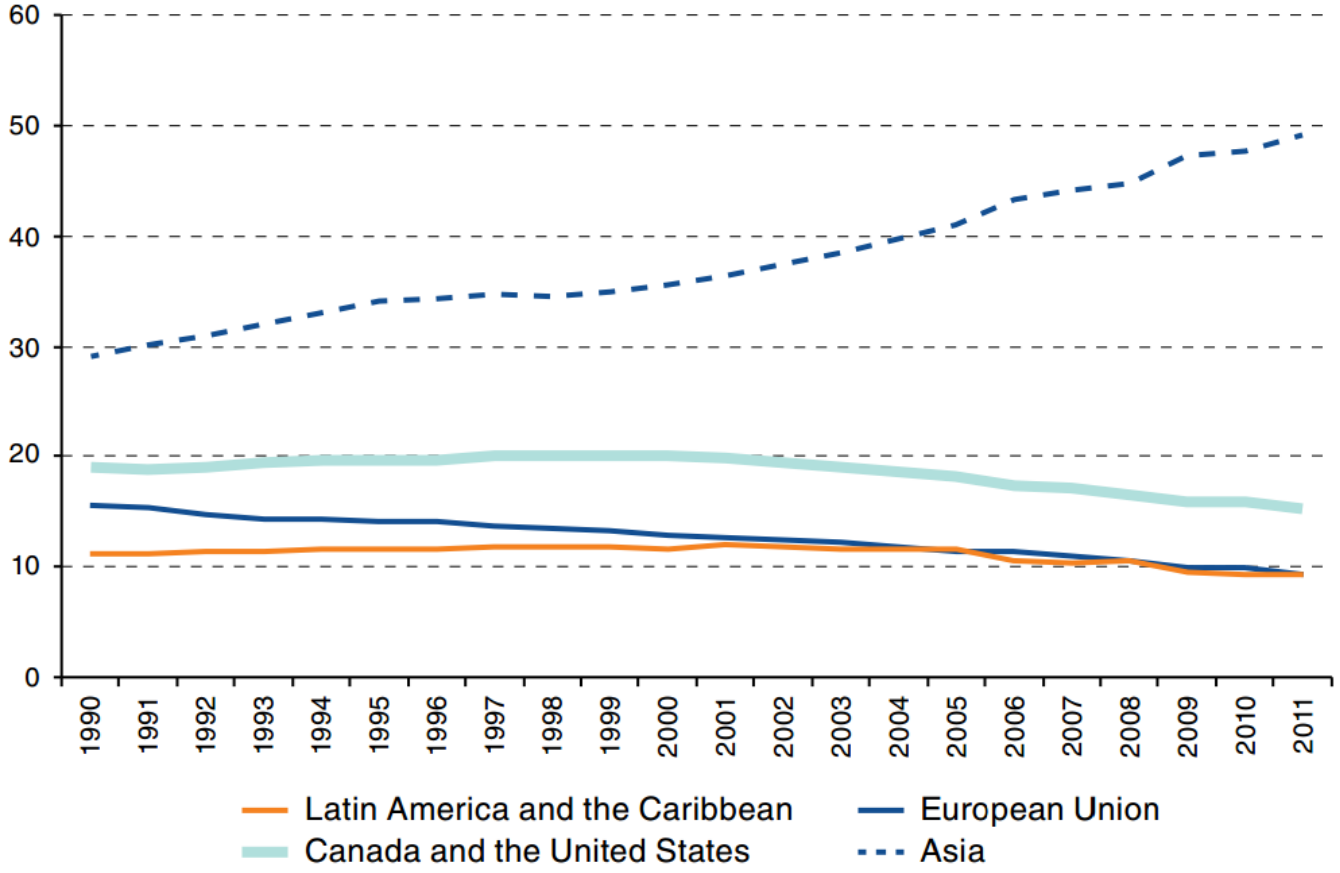


Global Greenhouse Gas Emissions 1990-2011

WORLD (SELECTED REGIONS): SHARE OF ALL GREENHOUSE GAS EMISSIONS, 1990-2011

(Percentage of worldwide total)

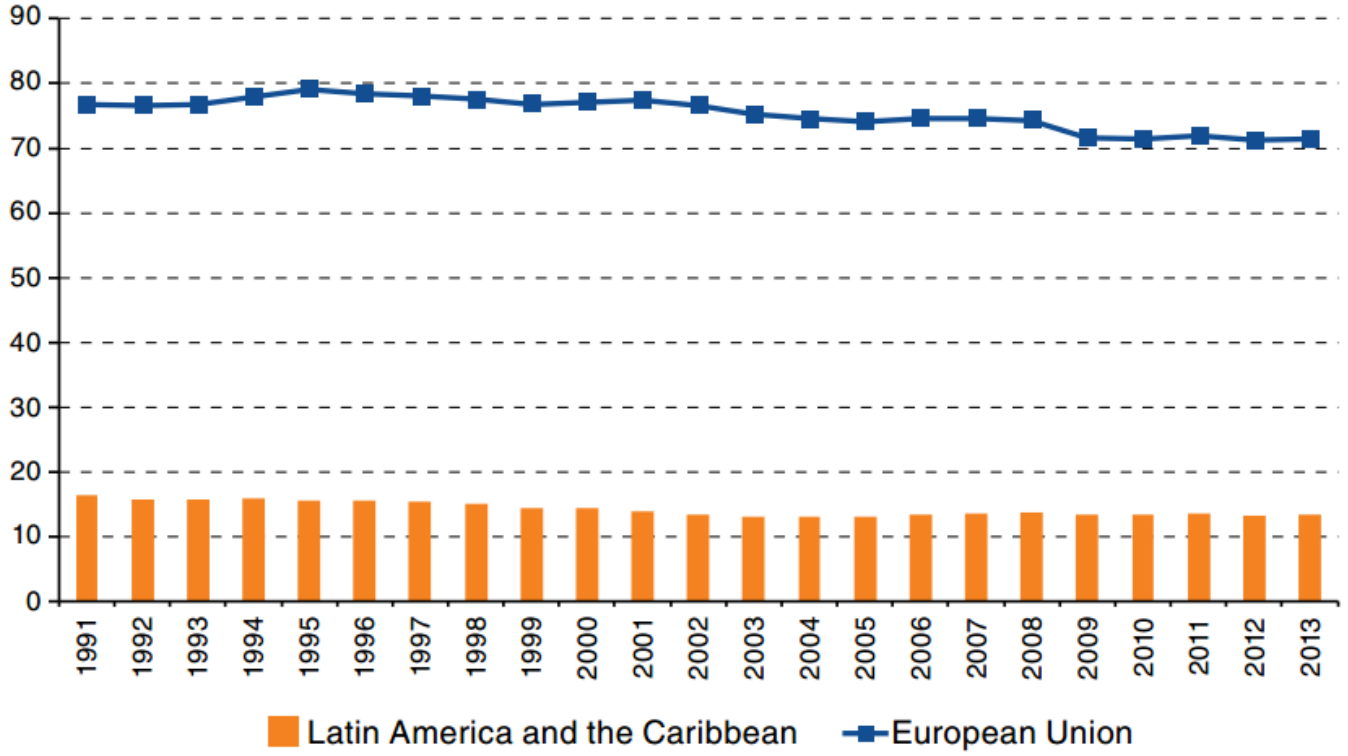


Fuente: Comisión Económica para América Latina y el Caribe (CEPAL) con datos de Climate Analysis Indicators Tool (CAIT) 2.0, Washington, DC: World Resources Institute.

Neither the European Union nor Latin America and the Caribbean is closing its relative-productivity gap with the United States

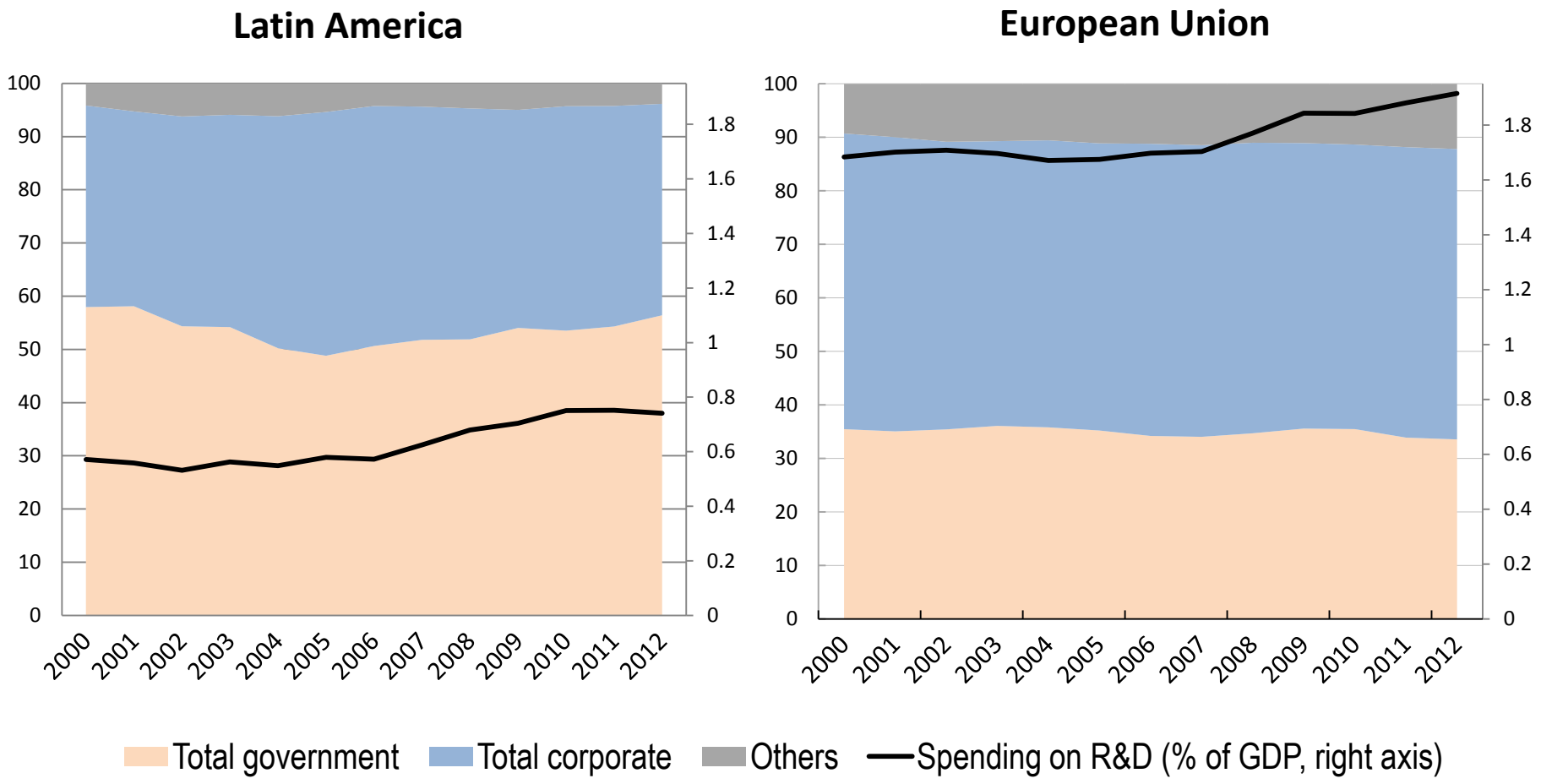
EUROPEAN UNION AND LATIN AMERICA AND THE CARIBBEAN: RELATIVE PRODUCTIVITY IN RESPECT OF THE UNITED STATES, 1991-2013

(Percentages)



Fuente: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of official figures.

Investment in R&D in the region contrasts with that of Europe



Source: ECLAC-EU-LAC Foundation, 2015.

Key elements of the knowledge economy

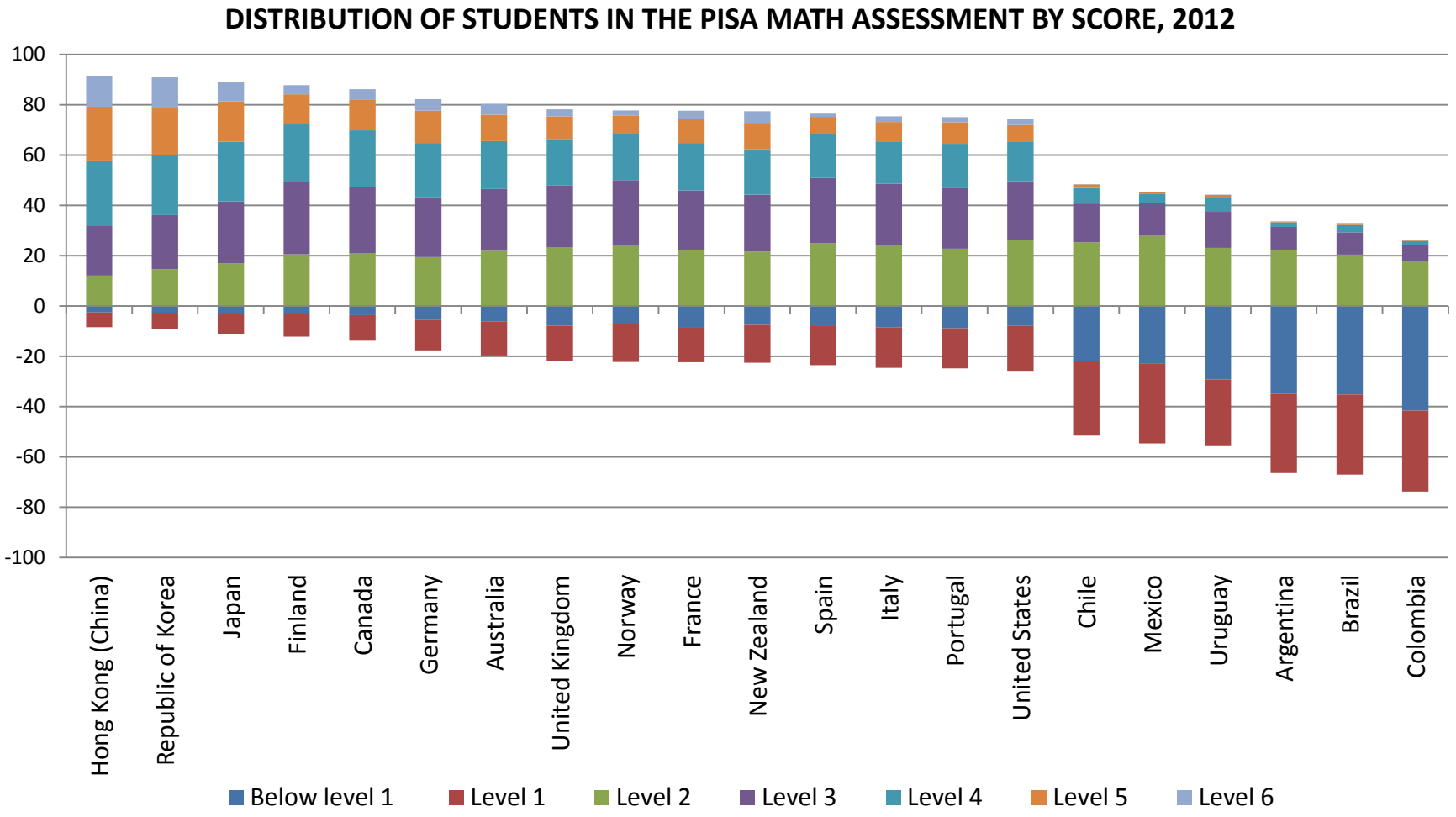
- The rise and development of the knowledge-based economy represents opportunities and challenges that Latin American countries must tackle
- Innovation dynamics, as well as the development of new scientific and technological opportunities and capabilities, are related to:
  - Investment in **research and development (R&D)**
  - **Human resources**
  - **Institutions** (businesses, universities, research centres, the public sector and civil society)
  - Institutional networks, which underpin innovation and can affect its direction

The way these variables interact is crucial in the generation of learning patterns, which are specific to each country and sector

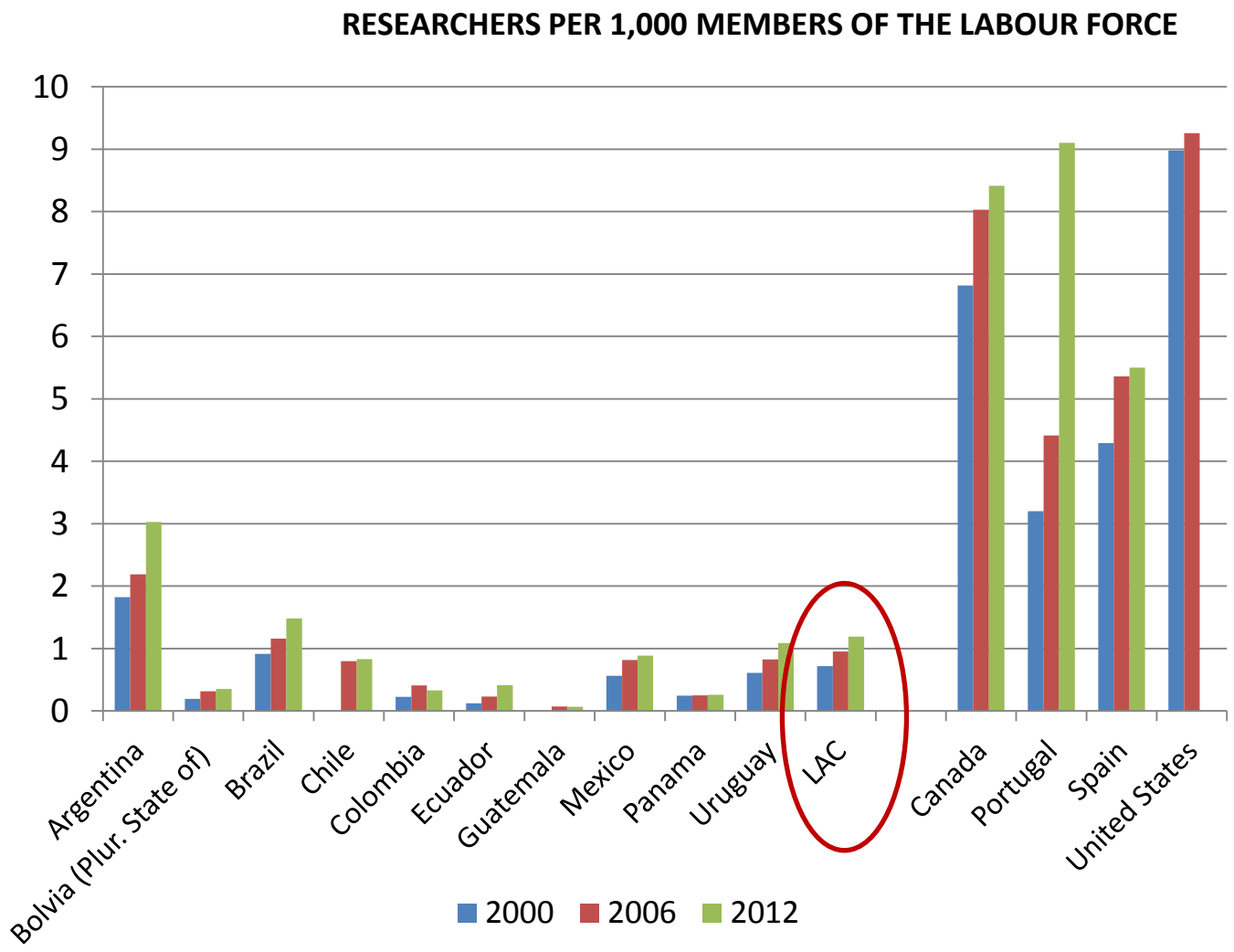
Education capabilities

- The gap between the training provided by the education system and the skills that the productive sector requires acts as a **barrier to increase the productivity** in the region, and makes an economy less competitive in an international context in which knowledge is increasingly crucial.
- Nonetheless, more people spending more time in the education system in LAC does not necessarily mean that skills are being taught and learned effectively, or that students are being trained in skills and abilities needed to enter the labour force. These considerations are part of the **qualitative side of education**, a field in which LAC is facing its toughest challenges.
- International comparisons reveal a particularly worrying gap in the quality of education.

Latin America and the Caribbean lags heavily in quality of education



Reseachers, key factors in science and technology



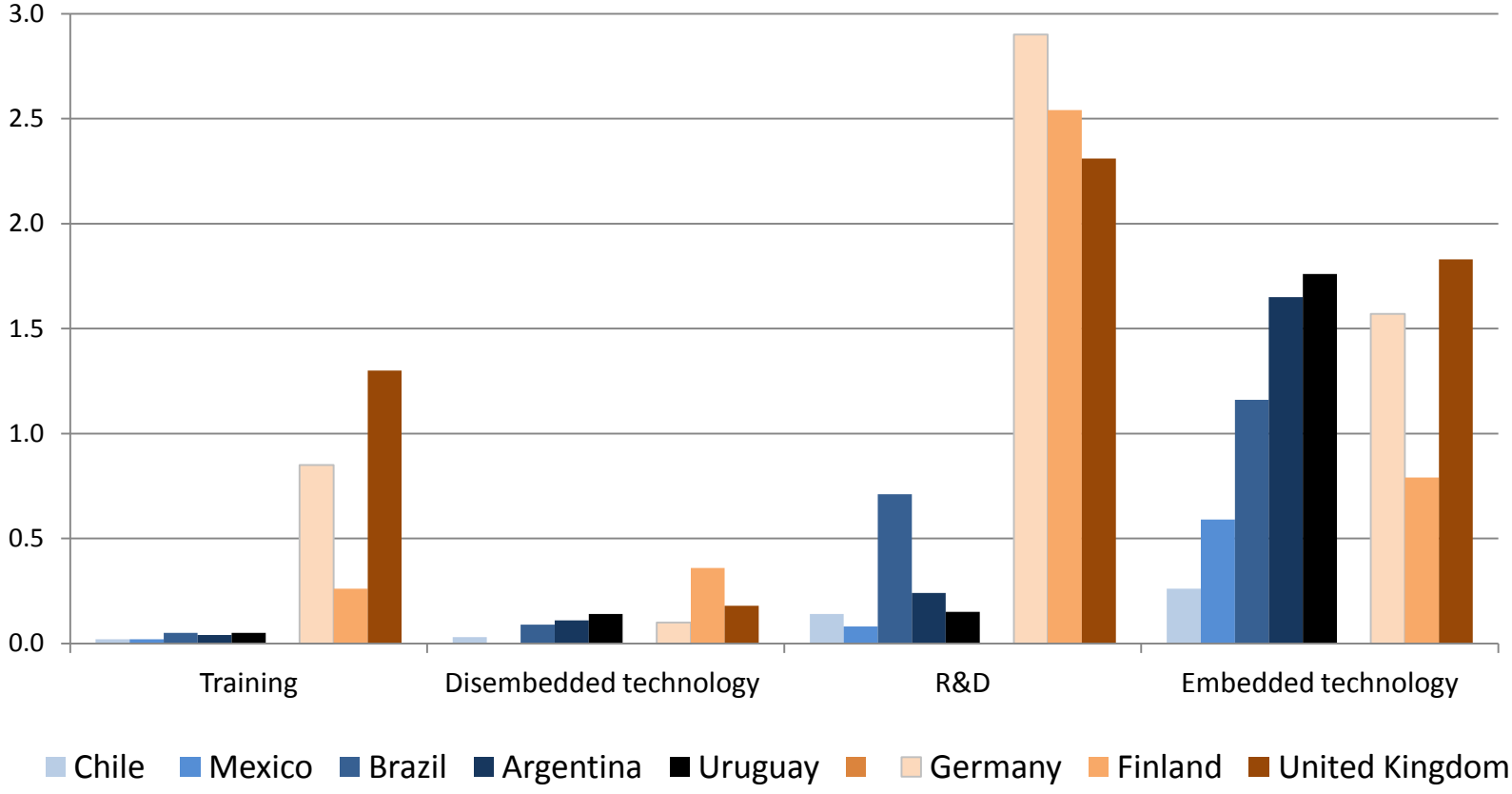
i. Latin America and the Caribbean lags far behind in terms of the number of researchers

ii. Very uneven situation between countries of the region, in terms of researchers in R&D

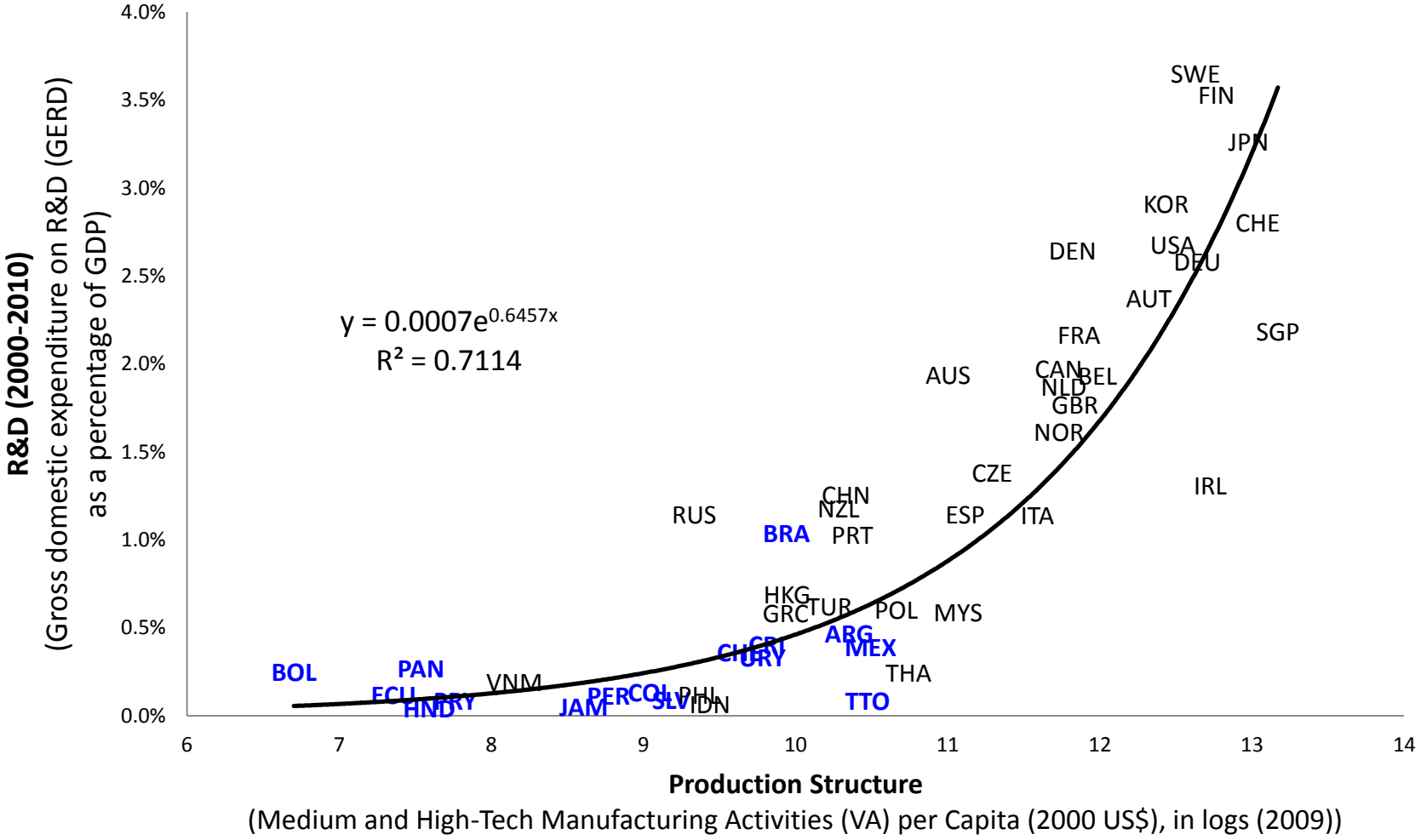
The production sector is not very active in R&D and shows little innovation capacity

SELECTED COUNTRIES: DISTRIBUTION OF INNOVATION ACTIVITIES IN BUSINESSES

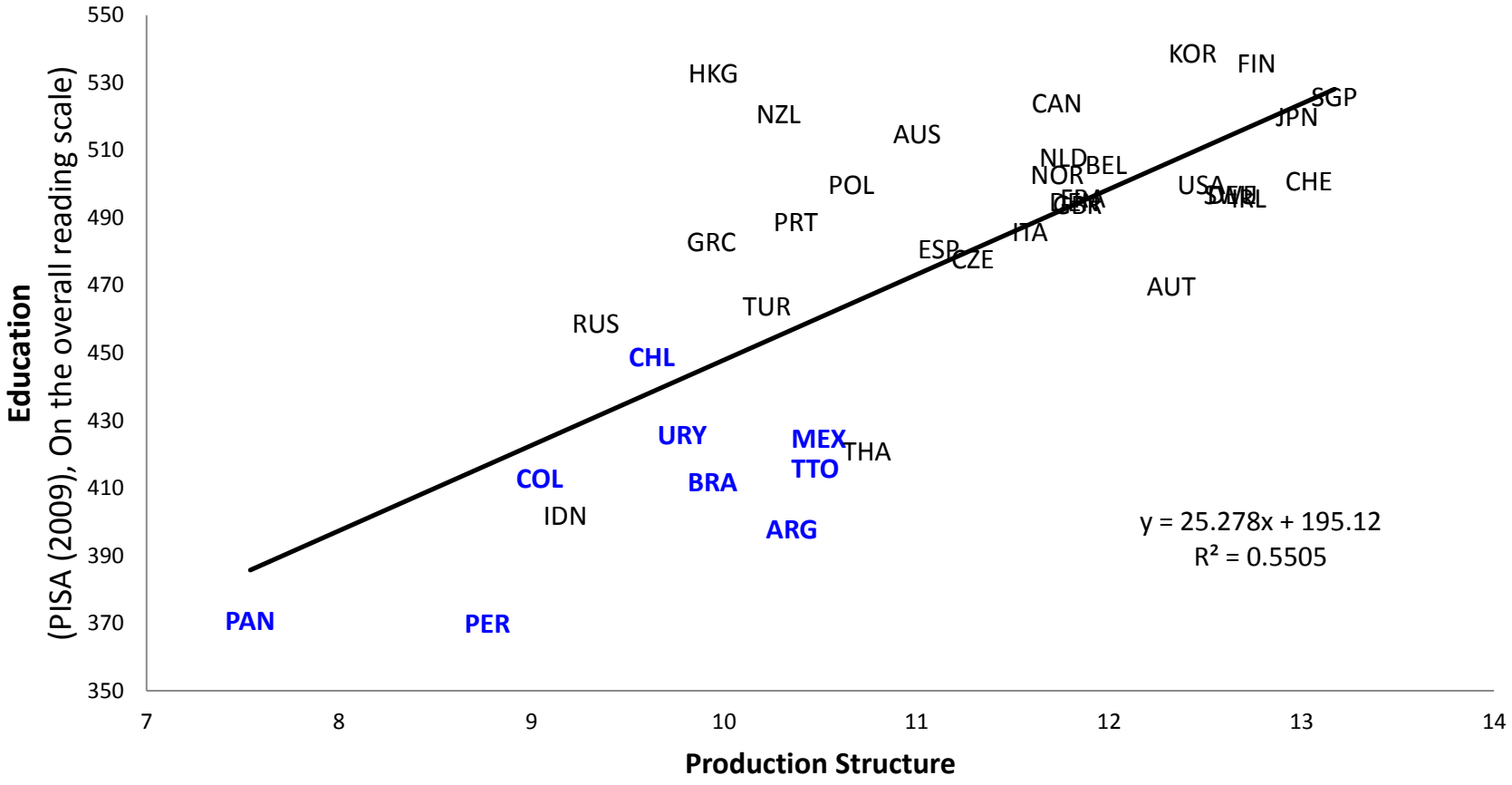
(Percentages of total sales)



A structure of low knowledge intensity does not demand R+D



A structure with few sectors that demand knowledge does not have incentives to invest in education



(Medium and High-Tech Manufacturing Activities (VA) per Capita (2000 US$), in logs (2009))

Knowledge-based capital in Latin America

- There are large differences between knowledge-based capital in Latin America and those of the OECD countries, in both the amount of stock and its composition.
- In Latin American countries, capital stock represents only 13% of the economy on average, less than half the OECD average (30%).
- More than 40% of Latin American knowledge-based capital stock comes from tertiary education (5.6% of GDP), and only 10% (1.3% of GDP) is from R&D, the core driver of innovation.
- The OECD countries, by contrast, invest much more in R&D, this has important repercussions on the types of innovation that can be developed in one region or another, which in turn affects the dissemination and incorporation of technology.

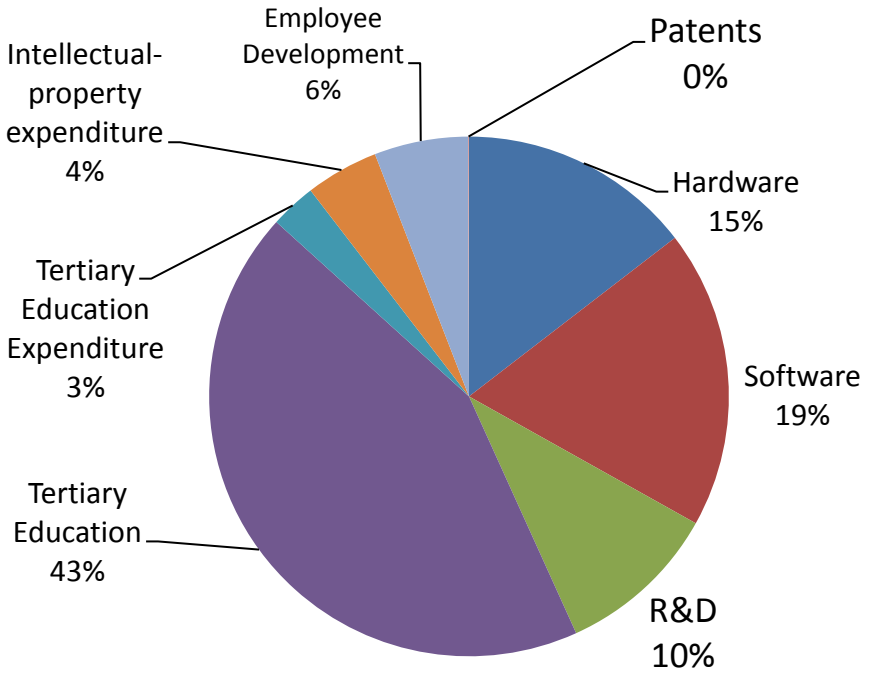
R&D in Latin America

- Although investment in R&D has increased in LAC, the stock of innovation capital – an additional measure of skills – is significantly lower than in the OECD economies.
- Inclusive growth requires more and better innovation. Innovation capital is an additional indicator of skills, measuring the capacity to innovate and disseminate innovation. The stock of innovation capital is far lower in Latin America (13% of GDP) than in OECD countries (30% of GDP).
- In Latin America it consists mainly of the stock of tertiary education, while in the OECD countries it consists mainly of R&D expenditure.
- These situations illustrate why it is important to strengthen ties between higher education institutions and the productive sector in the field of science and technology to better steer and promote R&D activities.
- It is important to strengthen STI institutions and governance so that an efficient and comprehensive institutional framework can be developed to disseminate technology and innovation.
- In LAC it's important to foster complementarities between the education system and innovation capacity.

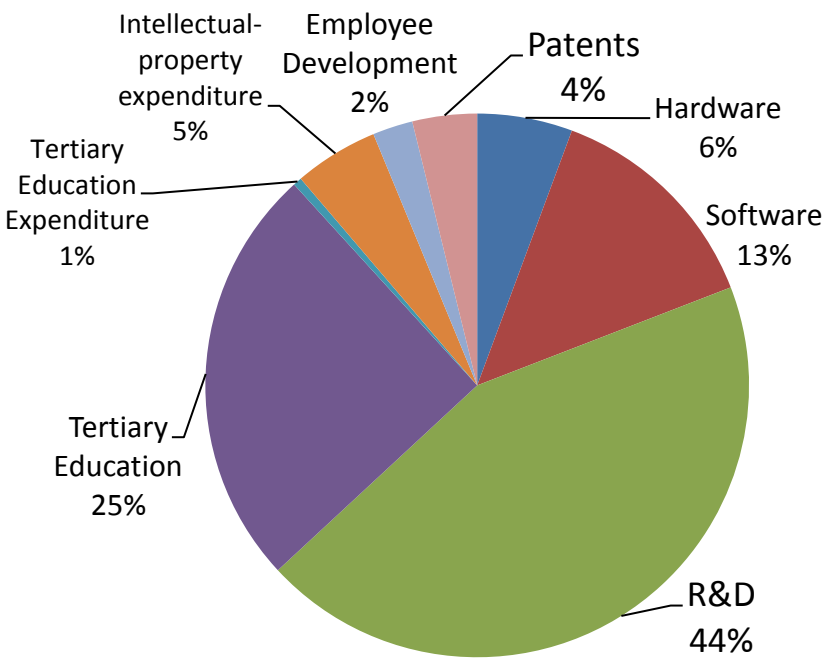
Composition of knowledge-based capital in Latin America and OECD countries

(as a percentage of GDP)

Innovation capital: average LA 13%



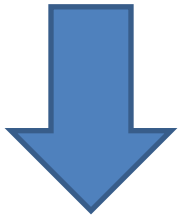
Innovation capital: average OECD 30%



Source: CEPAL-CAF-OECD, 2014.

Importance of science, technology and innovation public policies

- A public policy model with strong incentives to collaborate and foster partnerships between the public and private sectors, both in terms of strategy and funding, is much needed.
- The support mechanisms for technology transfer allow to identify linkages between different institutions, as well as the channels to do so, and the types of instruments that foster interactions.
- Collaboration can promote and ease the construction of social capabilities needed in different disciplines and organizations, based on trust, interaction and the accumulation of learning in order to foster innovation.



Mechanisms to support and promote technology transfer

Divergence: the basis of complementary specialization

	Universities	Business
Primary functions	Human capital formation Research	Making profits Remaining in the market
Reasons for generating knowledge	Intellectual motivations Testing and advancing scientific paradigms	Maintaining/expanding competitive edge by developing new products/processes
Use of results	Dissemination in the scientific community and to society (seminars, journals…)	Innovation Appropriability and protection (intellectual property: patents, industrial secrets, etc.)
Criteria for assessing results	Peer review and scientific community	Applicability, innovation, returns
Type of internal coordination	Flexible	Hierarchical
Financial resources for R&D	Mostly public	Mostly private

The importance of the linkages between universities and enterprises

- These differences are reflected in varied purposes and motivations for the establishment of linkages and relationships between universities and enterprises.
- Universities have strong technological development capabilities that should foster and reinforce enterprises' strong innovation capacities.

Universities	Business
• Train human resources	• Solve specific problems
• Update science and technology capabilities	• Economical alternative to in-house R&D (outsourcing of R&D)
• Disseminate and use basic research results	• Develop science and technology capabilities
• Alternative source of financing	• Pursue long-term innovative strategies to build competitiveness

Innovation is paramount for development

- Innovation is defined as a dynamic interaction process in which some actors that are led by market incentives (such as enterprises) and other institutions (such as public research centers and academic institutions) participate.
- Innovation is a **complex process**, susceptible to changes and with a high degree of uncertainty. Different actors take part in the innovation process, and their connections are fundamental to identify implications and opportunities related to the same innovation process
- In this sense, it is crucial to understand properly the inner functioning of the innovation process in order to suggest and promote **adequate public policies.**

Concluding remarks

- It is essential that skills become more diverse and more sophisticated. The region needs to **develop skills at the firm level**, create an institutional environment to coordinate and stimulate innovations.
- LAC has made progress on many fronts over the past decade, creating greater macroeconomic stability and reducing poverty and inequalities. However, this progress will not be consolidated if productivity gains, good-quality jobs and a smaller informal sector can be achieved.
- The region still invests little in innovation, even if commitments to science, technology and innovation may vary according to the country. One of the region's main problems, is the **lack of knowledge-based capital and its composition** (small proportion of activities related to R&D).
- It is important to progress in terms of **structural change** and export diversification (long-term strategy of competitiveness).

Concluding remarks (cont.)

- In order to gain authentic competitiveness, it is important to look for opportunities in sectors that can combine competitive advantages and innovation
- Advance in the design of mechanisms, instruments and institutions aimed at facilitating the integration of science, technology and knowledge in the production processes is a pending task for the region.
- Combine interests to decide which political and institutional changes are needed in order to increase the investment in STI. To achieve this, it is necessary to begin broadening awareness among industry, academia, and the public sector.
- Although many elements contribute to a successful strategy, four elements and the complementarities between them are especially important: **i) capacities/human capital**; **ii) production diversification**; **iii) sophistication of the production structure**; and **iv) technological development**.

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