

Innovation in Latin America

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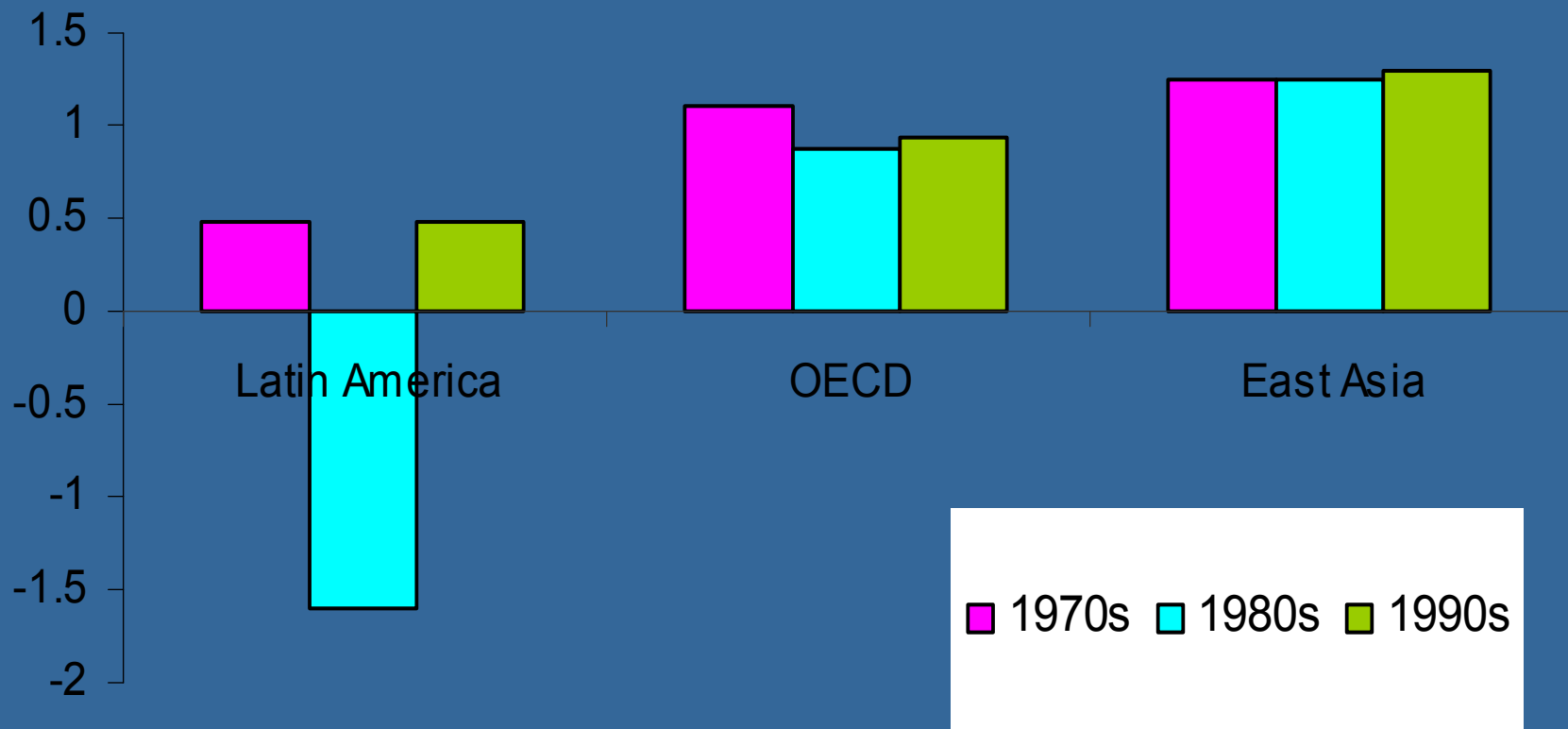
Colombian Colloquium Harvard-MIT,
Cambridge, November 2005

This presentation

- Why do we care about innovation and “innovation policies”?
- Does LAC have an innovation problem?
- Towards an Efficient National Innovation System in LAC countries

Latin American deficient productivity growth

Annual Growth of TFP



Source: Loayza, Fajnzylber, and Calderon (2002)

Drivers of TFP Productivity Growth

- Structural change: Improved allocation of resources among existing sectors (through increased trade, etc)
- Creative destruction: Entry and growth of more productive firms, exit and decline of less productive ones
- Innovation in a broad sense:
 - Technological Change introduced by new firms or in existing firms: transfer, adaptation and creation of new technologies.
 - Development of new activities and exports (goods and services)
 - Improved managerial and organizational practices

Innovation policies should go hand in hand with other policies that facilitate structural change and creative destruction

Innovation, TFP and Accumulation

- Most innovations and TFP increases require accumulation: investment in new capital goods, processes, layouts, enhanced skills.
- Innovation and TFP increases may result as a natural consequence of Accumulation (*technologies incorporated in new capital goods*) but Accumulation is often driven by expected gains from innovation.
- **More importantly, “good” institutions and policies foster accumulation, innovation and TFP increases simultaneously**

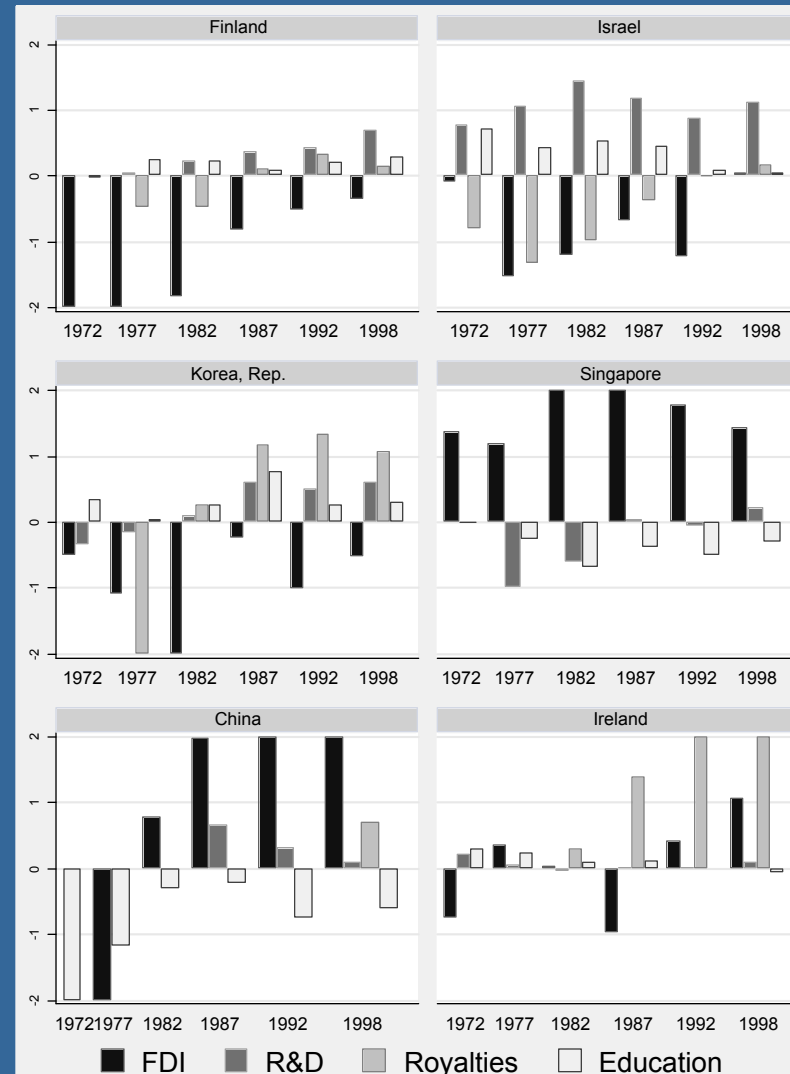
Innovation by firms depends on (econometric evidence):

- Institutions (over-regulation, property rights and contract enforcement) and macro stability
- Competition (trade openness, internal markets): U-shape
- Skills (workers skills; engineers and scientists)
- Specific “innovation-related” institutions and policies: The so called National Innovation System
- Availability of Risk Capital and Labor Market Flexibility

Why do we need specific Innovation Institutions and Policies (a NIS)?

- Appropriability problems, Spillovers and Externalities
- Economies of scale (critical mass) and Agglomeration Externalities
- Path dependence (innovations lead to or facilitate new innovations)
- Synergies with the educational process (universities)
- Presence of non market institutions and coordination failures
- Historical evidence: US, Scandinavia, Australia, Korea, Singapore, Israel, etc

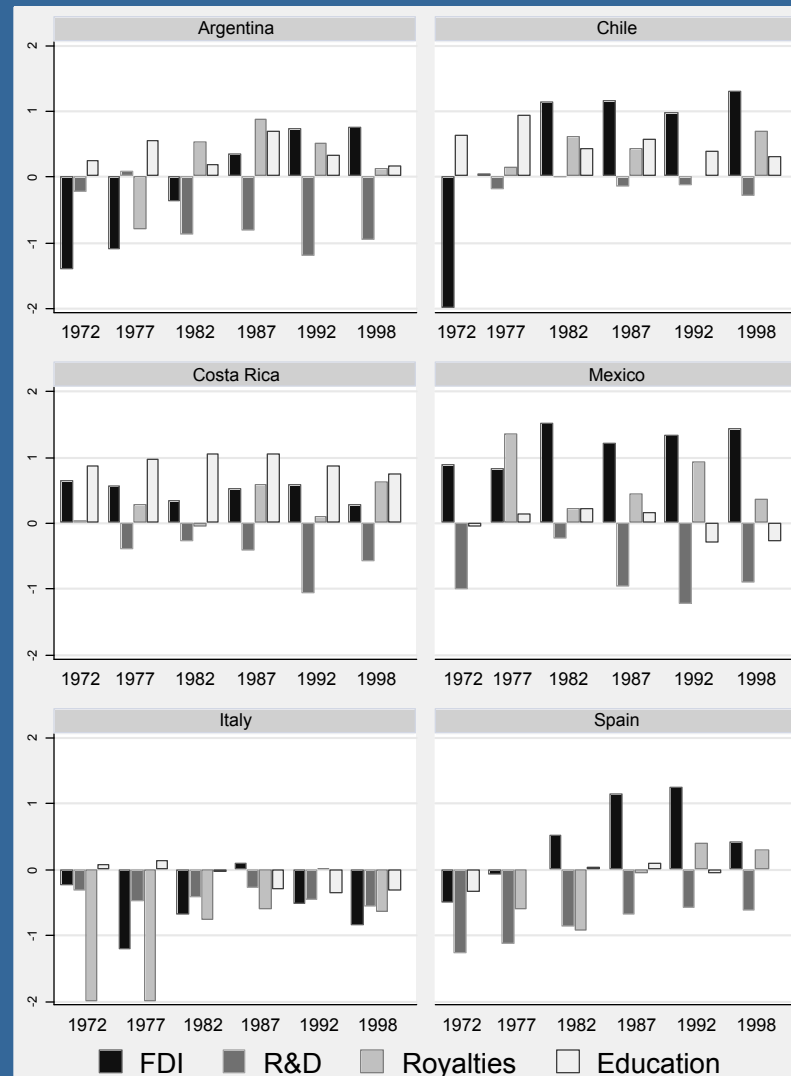
“High tech” Success Stories: Deviations From Trend for Four Indicators of Technological Adoption and Capacity



Source: Maloney (2005b)

The Latin Model:

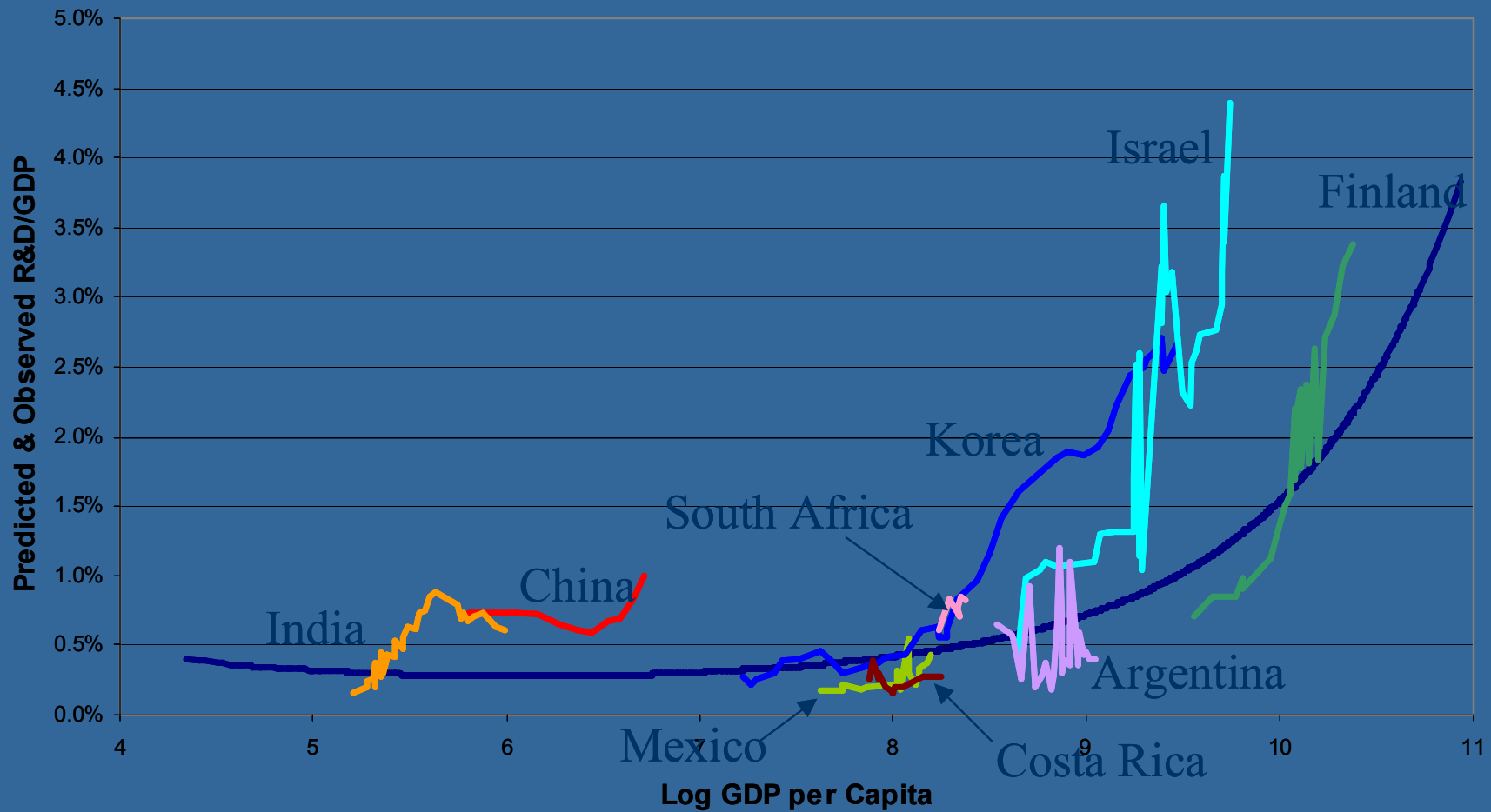
Deviations From Trend for Four Indicators of Technological Adoption and Capacity



Source: Maloney (2005b)

R&D across the Development Process

Predicted vs. observed R&D/GDP



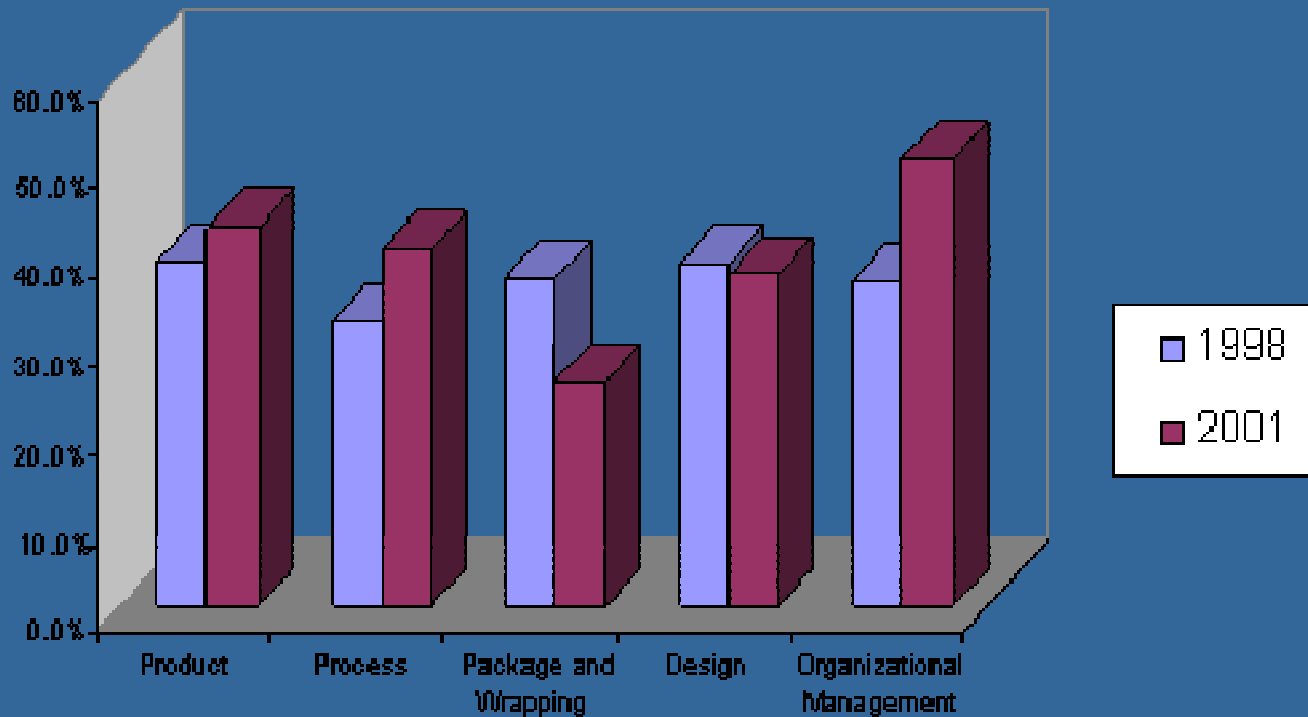
Source: Lederman and Maloney (2004)

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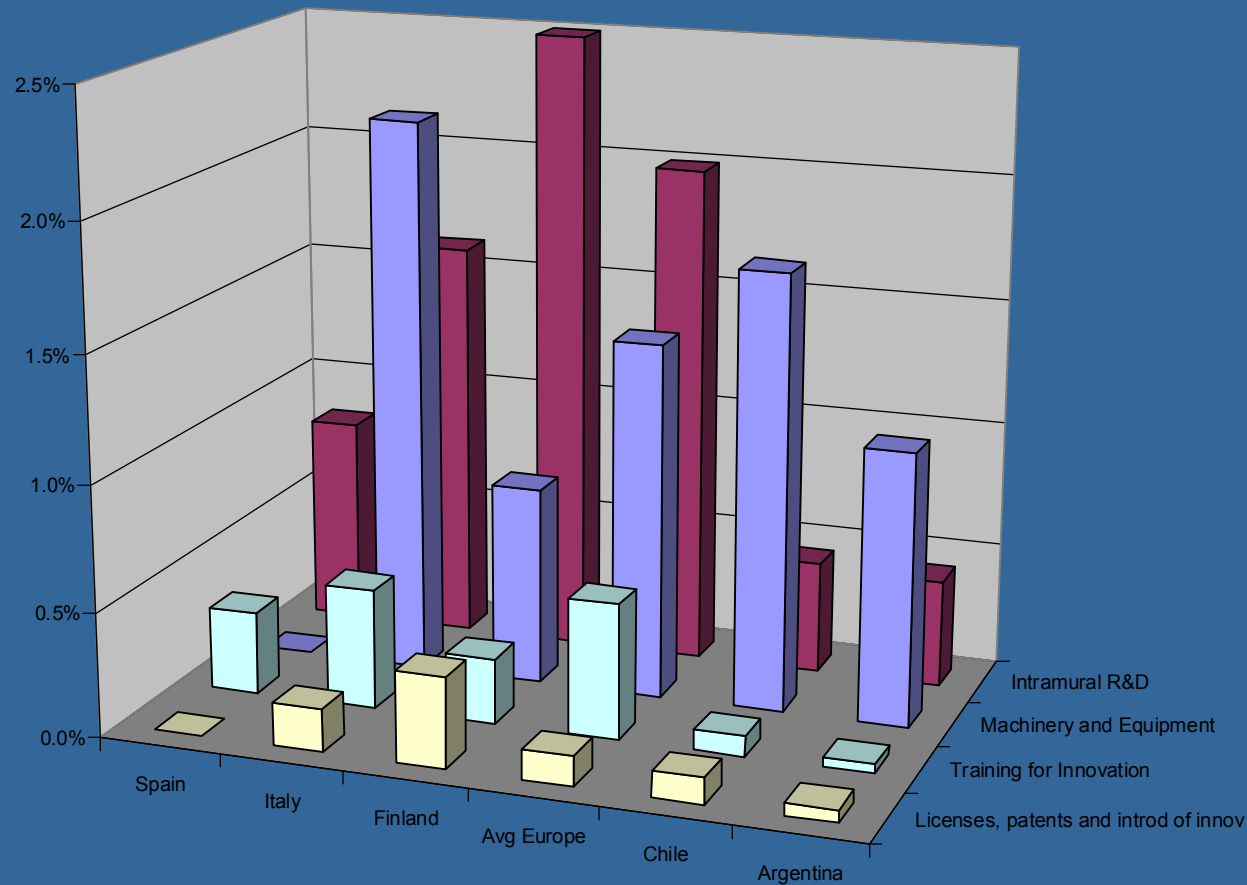
Does LAC have an “Innovation” problem?

Percent of Manufacturing Establishments Declaring That
They Have Made Innovations in...



Source: Beneventi (2004)

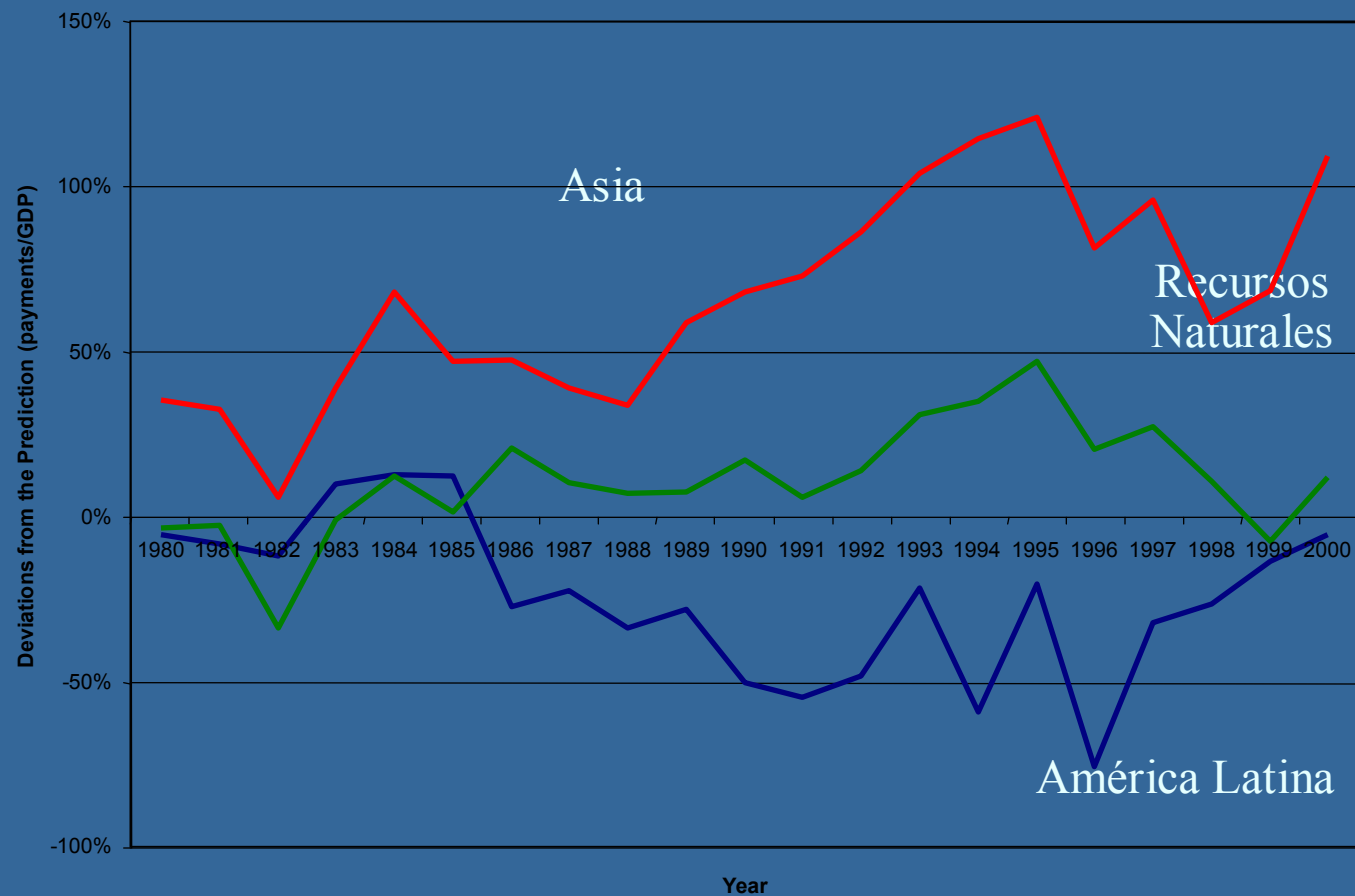
Does LAC have an "Innovation" problem?



Source: Authors elaboration based on enterprise innovation surveys in Europe and Chile.

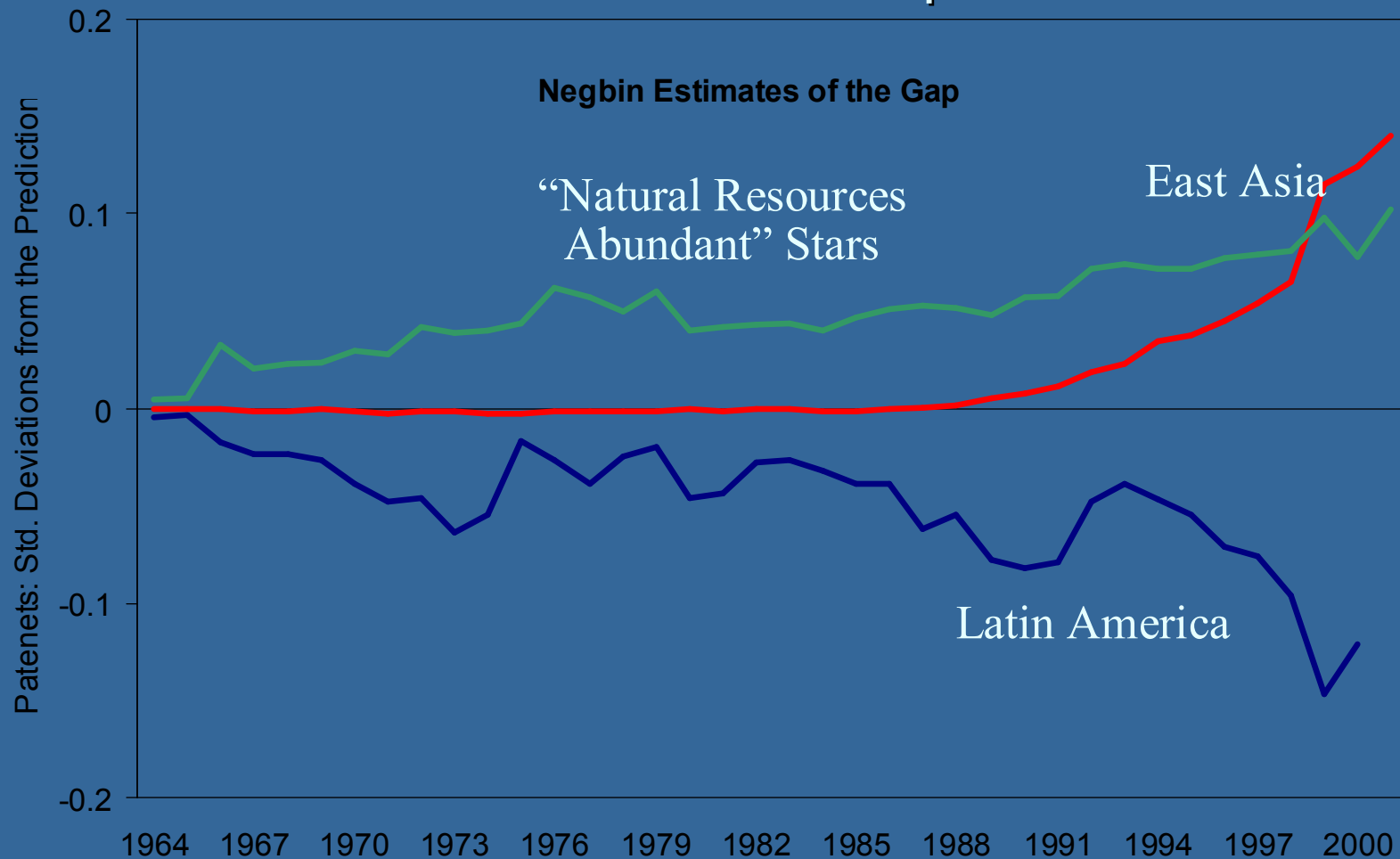
Does LAC have an "Innovation" problem?

A measure of the innovation gap:
License payments - deviations from prediction



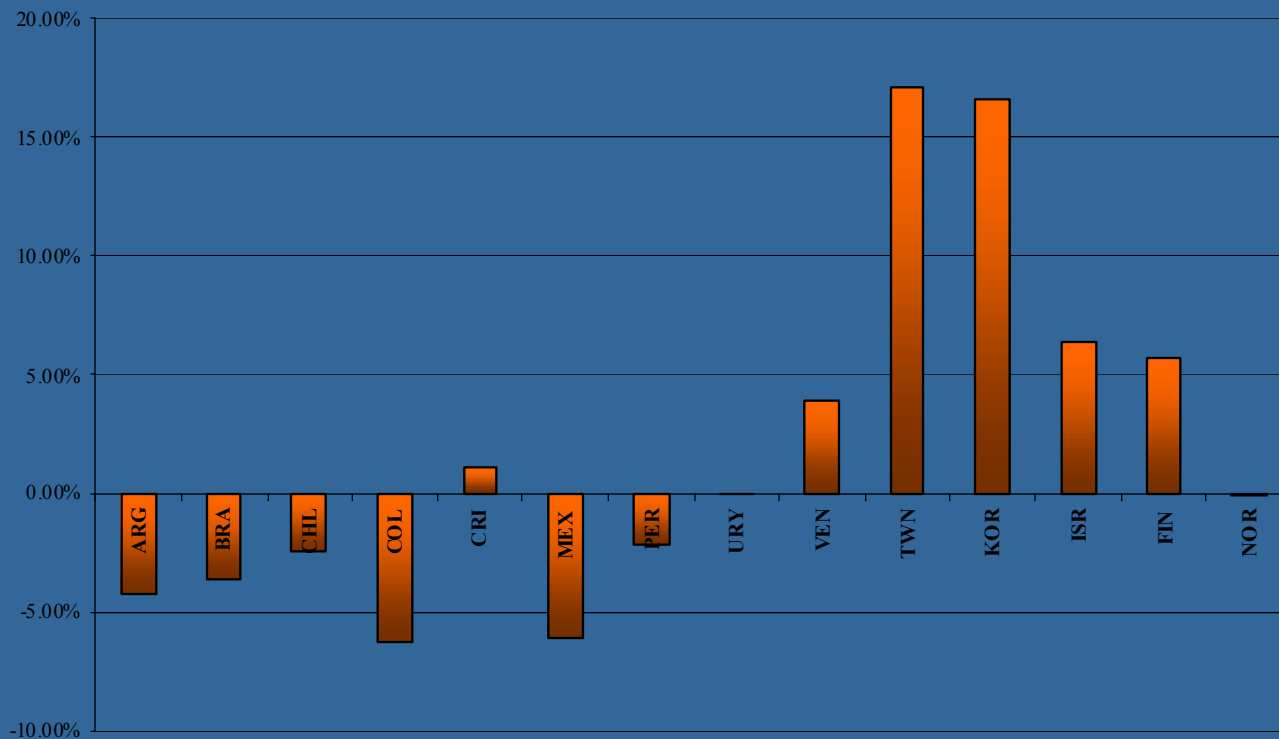
Does LAC have an "Innovation" problem?

A measure of the innovation gap:
Patents - deviations from prediction



Should LAC worry about enhancing innovation? Low efficiency of converting R&D into patents

$$\text{Patents} = B_1 \text{I\&D} + B_p \text{ country} * \text{R\&D}$$

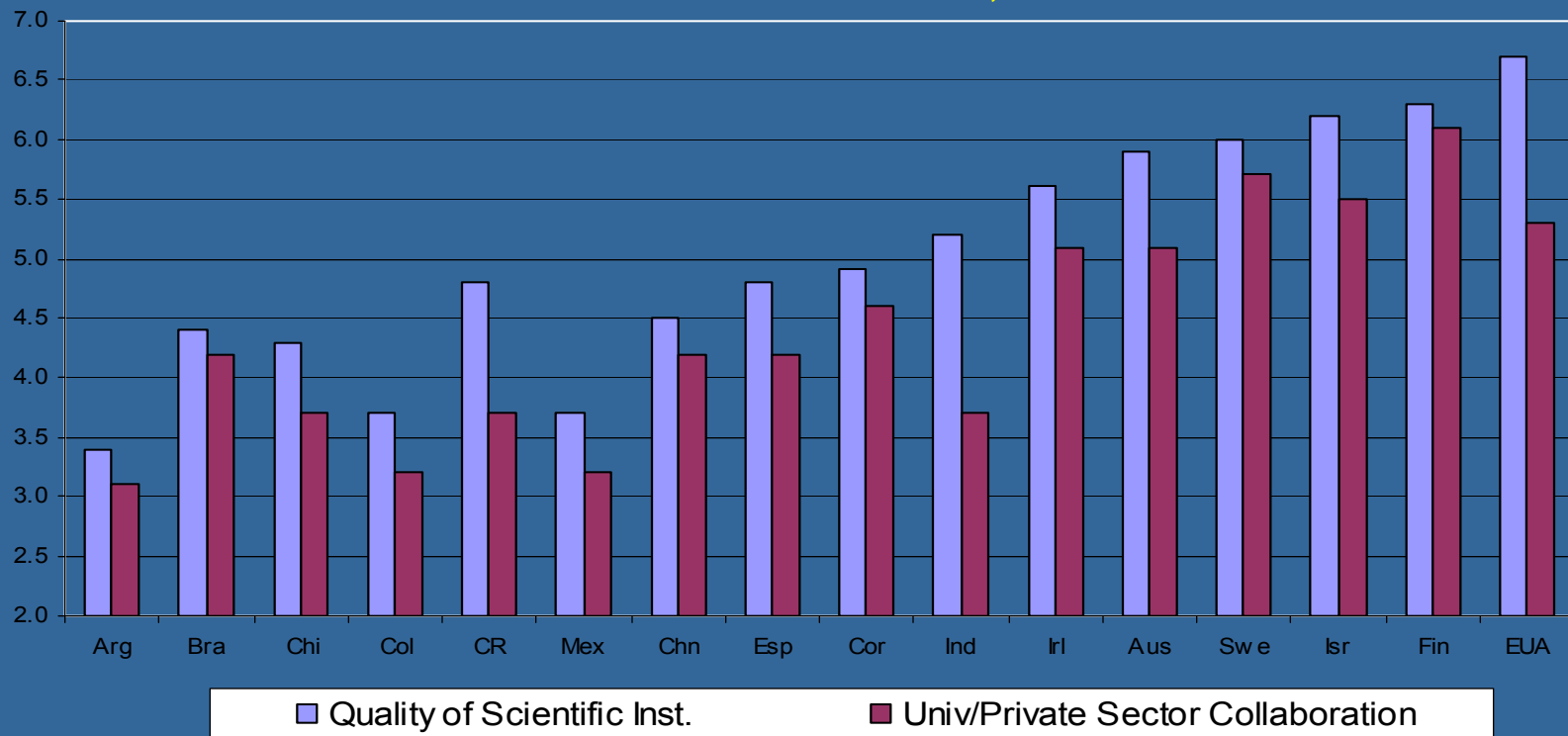


Source: Bosch, Lederman and Maloney (2004)

..due, inter alia. to disconnects between Universities and firms

(interviews with entrepreneurs: score 1-7)

- Finland 40% of firms have formal arrangements with U
- Chile 25% and not very fruitful
- Less than 20% financed and done by firms (most by U)
- 60% R&D devoted to basic science, US 15%



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- **Towards an Efficient National Innovation System in LAC countries**

Towards an Efficient NIS

Dealing with appropriability and spillovers: IPR's vs Subsidies

- Two models of the S&T process;
 1. Linear: Scientific discoveries (largest spillovers) > technological breakthroughs > concrete technological innovations (smaller spillovers)
 2. Feedback: Concrete technological requirements and innovations (large spillovers) > Scientific discoveries and technological breakthroughs (large spillovers)
- Implications:
 1. Linear: Concentrate Subsidies in basic S&T and use "strong" IPR's for concrete technological innovations
 2. Feedback: Spread Subsidies across the process and use "weaker" IPR's

Towards an Efficient NIS

Dealing with spillovers: Stimulating firms demand for innovation : Subsidies vs Tax Credits

- Advantages of Tax Credits vs Subsidies:
 - Reduce rent seeking
 - Avoid Government failures in picking “winners”
 - Lower administrative costs
- Disadvantages of Tax Credits vs Subsidies:
 - Proportional to R&D costs and not to value of externalities (social vs private ROR)
 - Low efficiency (high fiscal cost) due to difficulties in limiting benefits to “marginal” R&D
 - Incentives to classify other expenditures as R&D

Towards an Efficient NIS

Dealing with spillovers: Designing Efficient Matching Grant Funds

- Governance:
 - Private sector and academic representation
 - Approvals by Experts, including foreign experts
- Size of Subsidy;
 - Around 50% or more
 - Range according to potential size of spillovers?
- Priority to “Strategic Areas”:
 - Revealed/potential comparative advantage
 - Public goods: Health, Environment, Public Infrastructure
- Fostering Cooperation:
 - Cooperative projects
 - Firms>Universities
- Monitoring and Evaluation

Towards an Efficient NIS

The Role of Universities and Public Research Institutes

- From Entitlements to Competition
- Balancing “basic financing” (multi annual reviews against performance) and program/project competitive finance.
- Incentives for researchers: promotions, remuneration, IPR’s
- Infrastructure: labs, TTO’s
- Other links: Student practices, specialized training, advisory and consultancy services.
- Governance and Culture: Defining University Roles

Towards an Efficient NIS: Other Specialized Institutions

- Promulgation, adoption of standards and certification;
- Extension Services to transfer technologies and management techniques, specially in agriculture and light industry.
- Coordinating and Facilitating cooperative R&D efforts
- Oversight functions for publicly funded or subsidized private research.
- International "antennae".

The cases of Fundacion Chile and Inbio (CR)

Towards an Efficient NIS:

Innovation Clusters

- The rationale: innovation (and skill enhancing) spillovers are often largely limited to a “sector” or group of inter-related firms (including suppliers, distributors and users).
- Key: support emerging clusters: do not attempt to promote them from scratch.
- “Clusters” should be essentially vehicles for efficient public/private cooperation on resolving market and coordination failures, not just on innovation and skill enhancing (in supplies, infrastructure, marketing, FDI attraction, etc.)
- Risk: avoid rent seeking behavior and artificial and costly development of local suppliers

Towards an Efficient NIS

International Connections

- International links among firms (technology transfer and innovations often happen through the interaction with and support from foreign suppliers and buyers), among universities and among local firms and foreign universities.
- International brain circulation: temporary immigration agreements (e.g., US/Mexico) and advance on “movement of persons” under WTO.
- The role of Russian-Jewish, Chinese, Irish, and Indian diasporas: how can LAC extract some benefit back from its “brain drain”?.