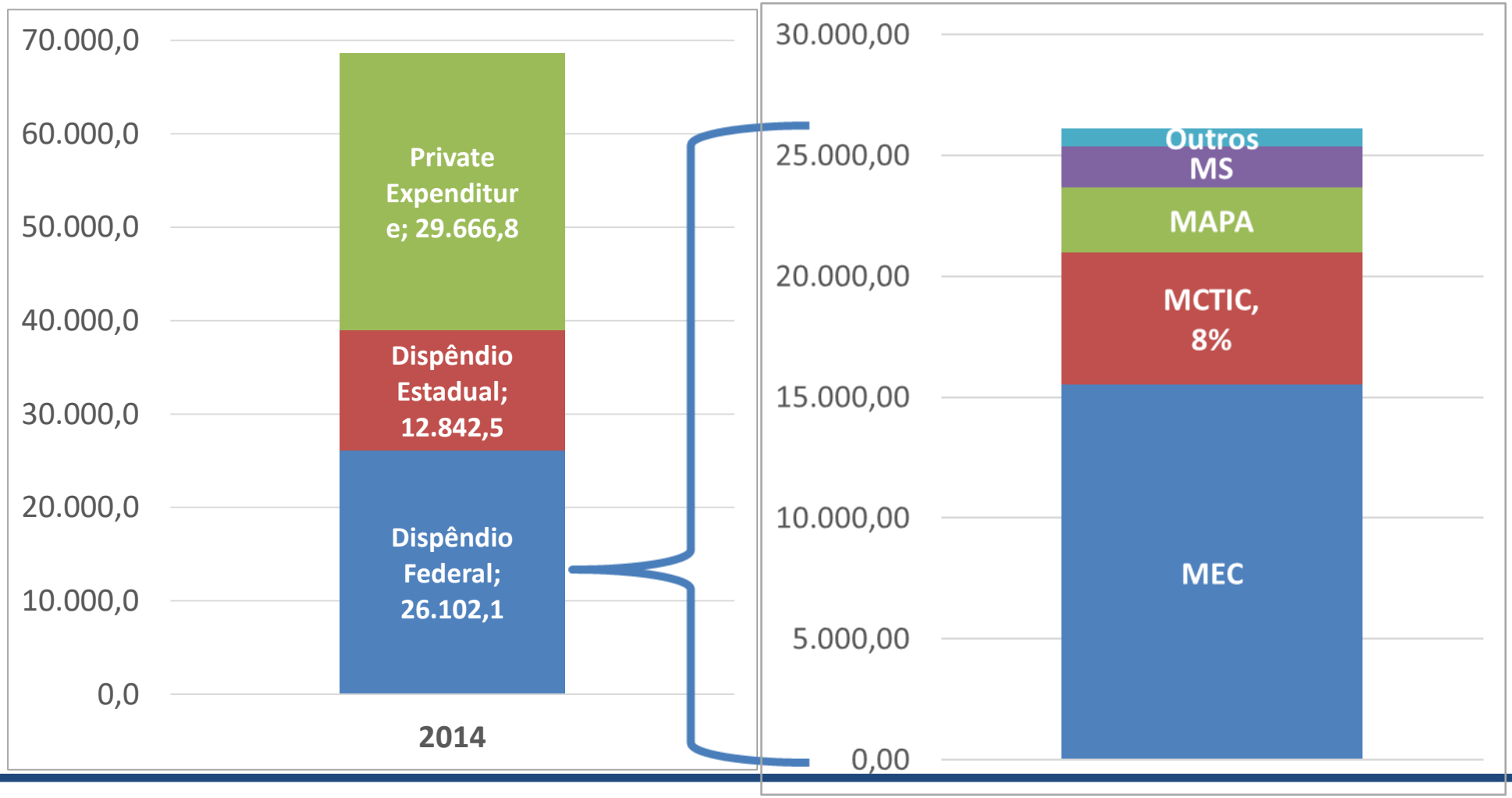
Financiamento à Pesquisa no Brasil e em São Paulo

Carlos H Brito Cruz
Diretor Científico
FAPESP

Outline

- Financiamento à Pesquisa no Brasil
- Financiamento à Pesquisa em São Paulo
- Diferenças e similaridades
- Desafios:
  - Publications and their impact
  - International collaboration
  - Collaboration with industry
- Conclusion

Tota R&D Expenditure and Federal R&D Expenditure; Brasil, 2014



MCTIC: dispêndios em P&D, 2014

Total	5.488,4
Fundo Nacional de Desenvolvimento Científico e Tecnológico - FNDCT[4]	2.833,9
Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq	1.858,6
Ministério da Ciência, Tecnologia e Inovação - Administração Central[3]	448,2
Agência Espacial Brasileira - AEB	182,7
Centro de Excelência em Tecnologia Eletrônica Avançada - CEITEC	110,4
Comissão Nacional de Energia Nuclear - CNEN	54,6

http://www.mctic.gov.br/mctic/opencms/indicadores/recursos_aplicados/governo_federal/2_2_3.html

State of São Paulo, Brasil

42	Million people
32%	of Brazil's GDP
45%	of Brazilian science
39%	of the PhDs graduated in Brazil (7,252 in 2016)
13%	of State budget for HE and R&D
1.7% GDP for R&D (2014)	

R&D entities in the State of São Paulo

There are

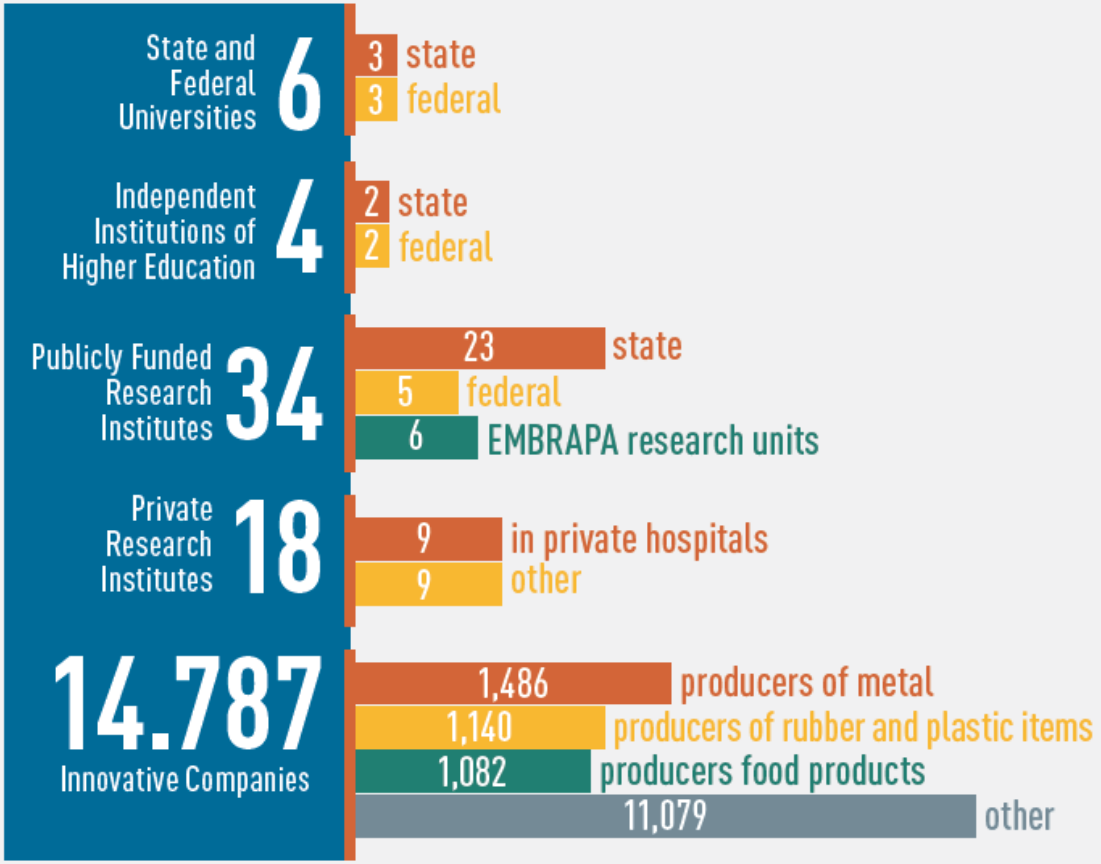
62 entities

in São Paulo whose mission is research, in addition to

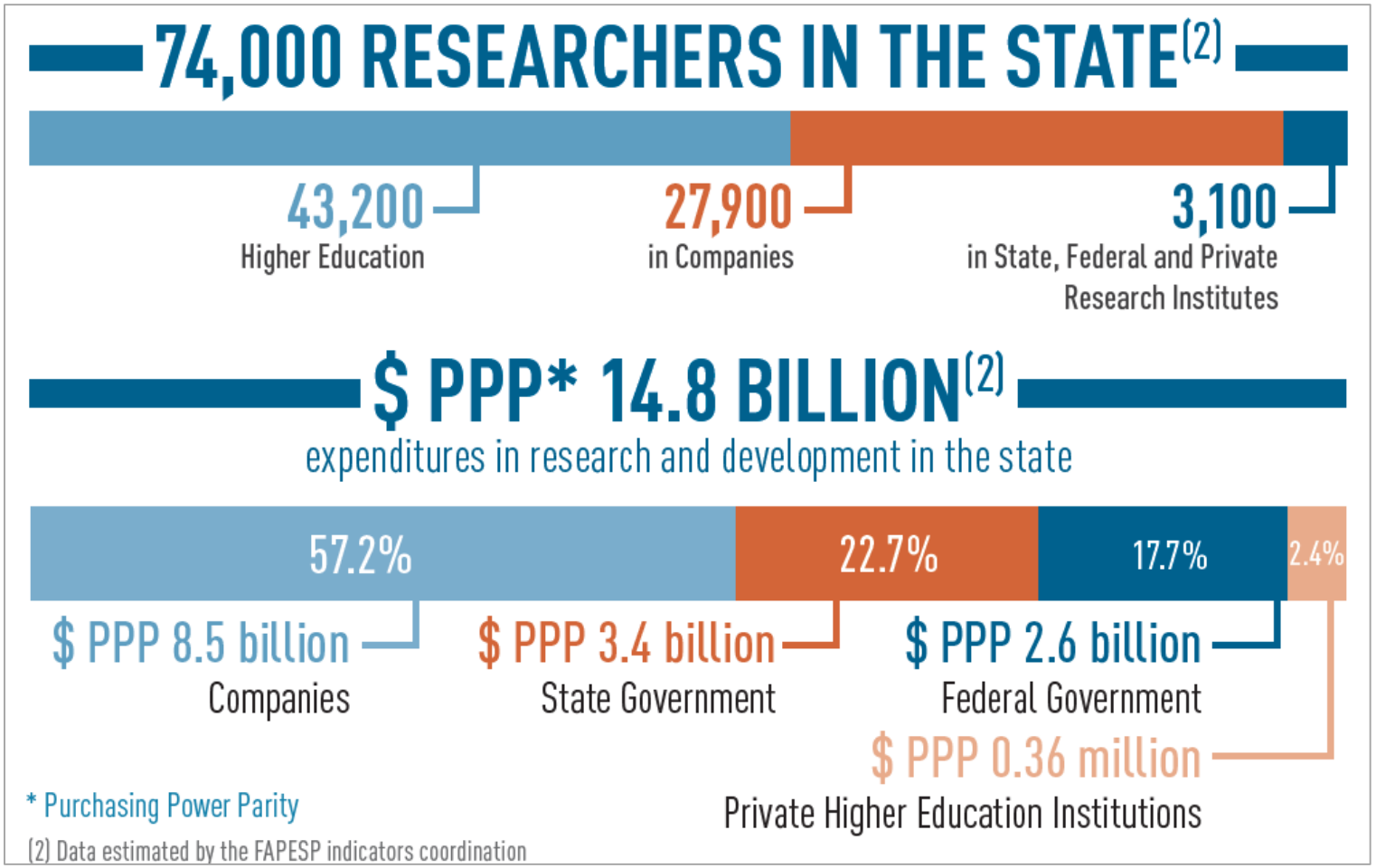
14,787 companies[1]

focused on developing innovation.

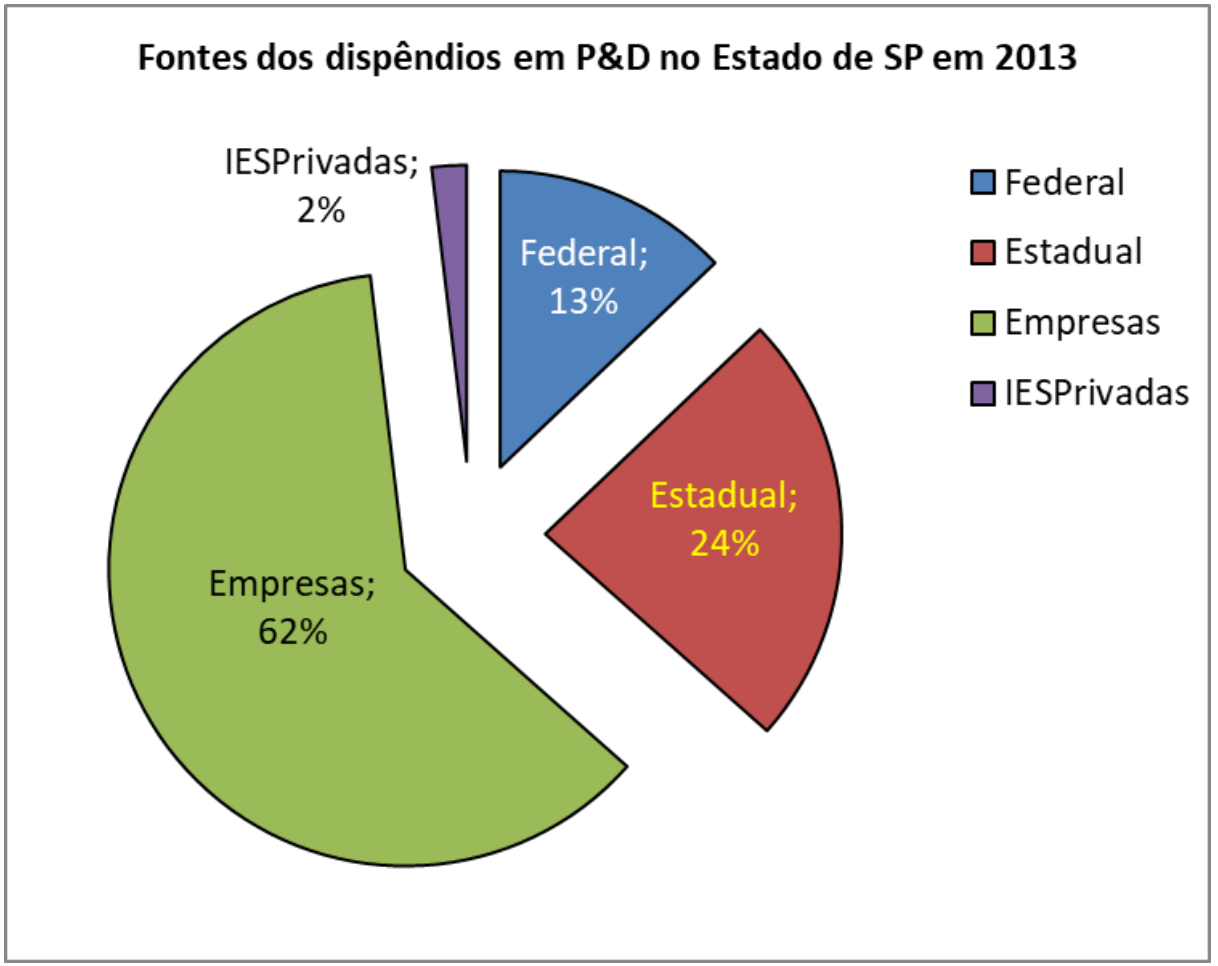
(1) Survey of Technological Innovation, Brazilian Institute of Geography and Statistics (PINTEC 2011, IBGE)



The S&T system in the state of São Paulo, Brazil

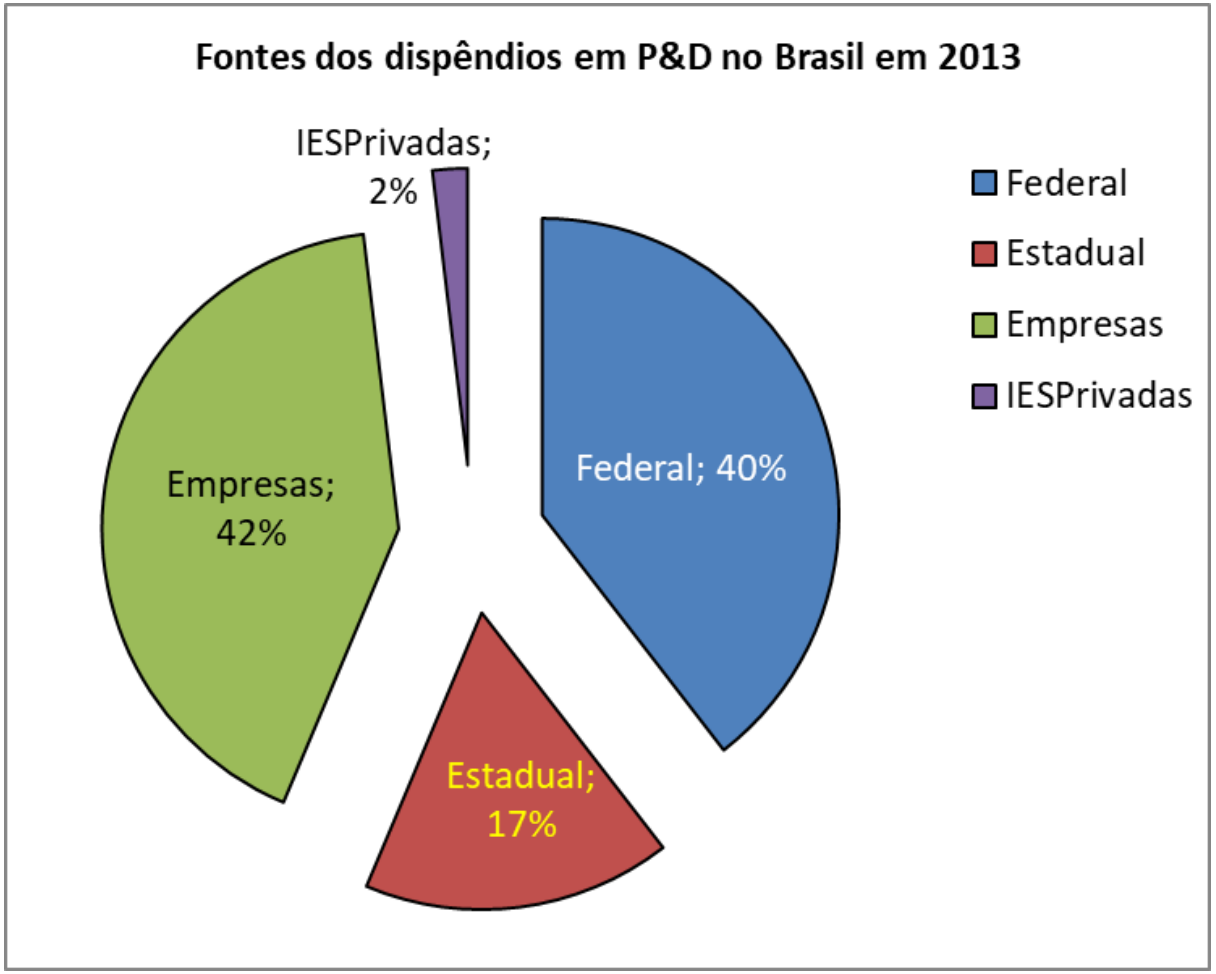


São Paulo: R&D Expenditures, 2013, by source



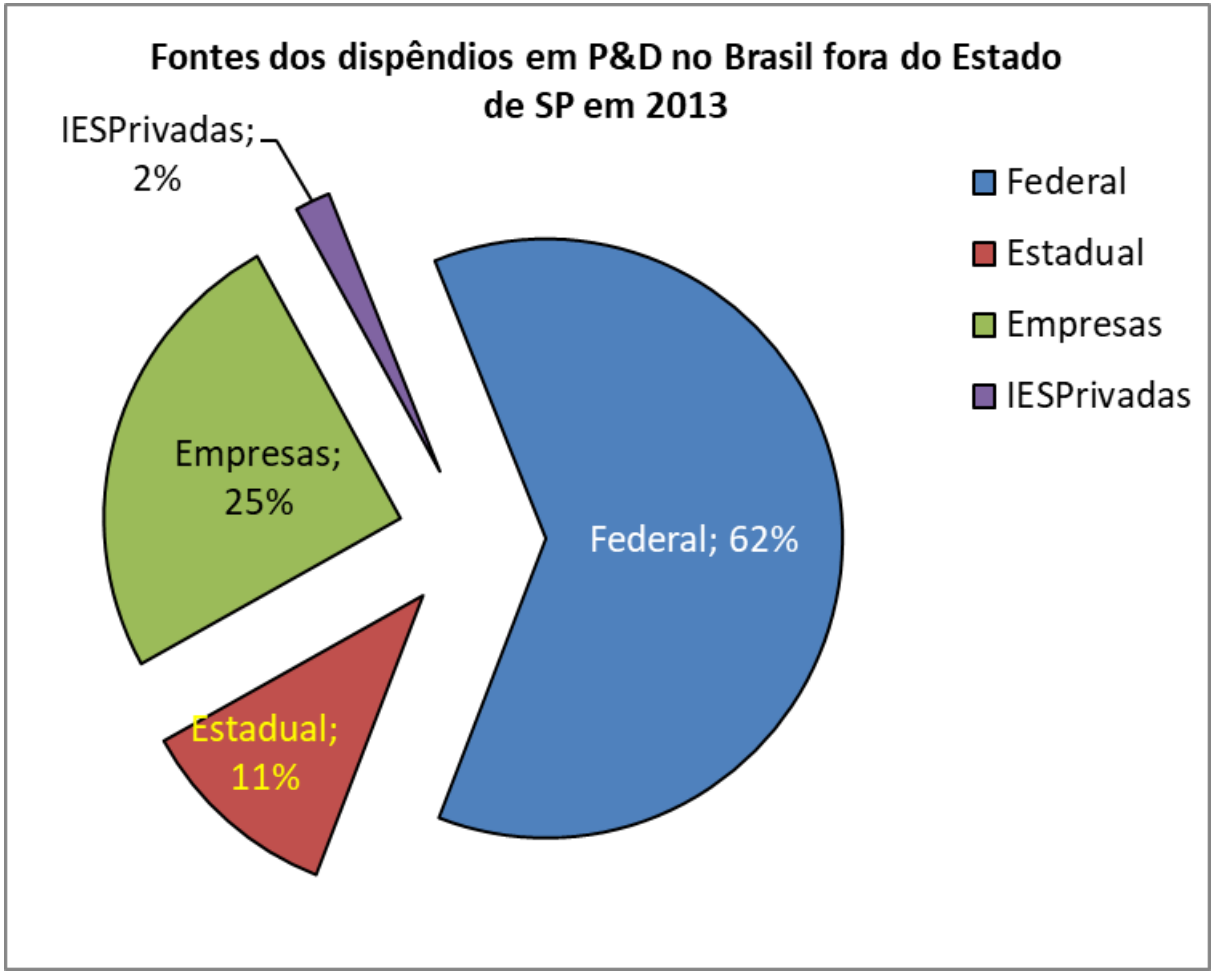
- R&D intensity – 1.7% of state GDP
  - From1.52% em 2008
- Gov. expenditure
  - State 63%
  - Federal 37%

Brasil: R&D Expenditures, 2013, by source



- R&D intensity – 1,15% of GDP
- Gov. expenditure
  - States 33%
  - Federal 67%

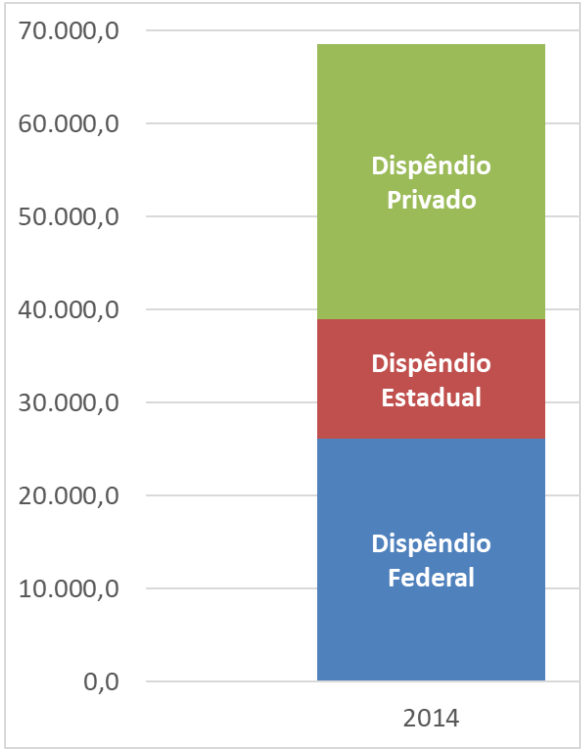
Brasil, outside São Paulo: R&D expenditures, 2013, by source



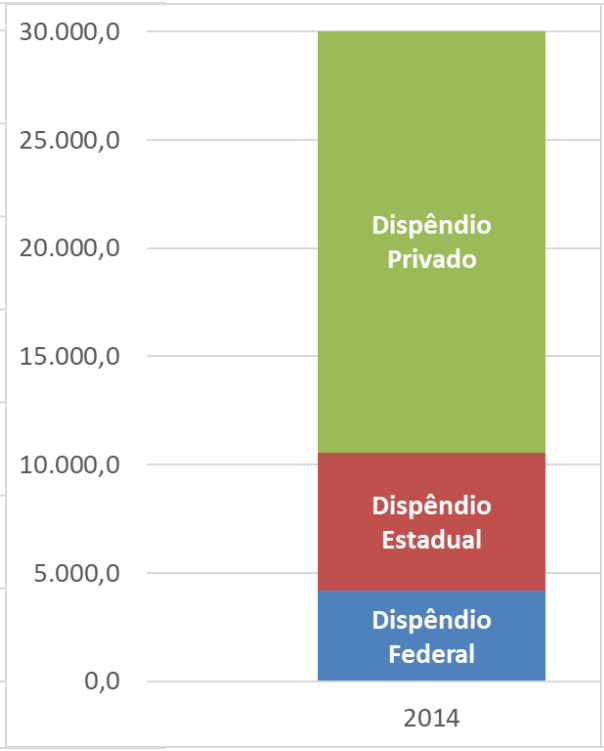
- R&D intensity – 0.95% of GDP
- Gov. expenditure
  - States 19%
  - Federal 81%

Brasil, São Paulo, Brasil fora de São Paulo

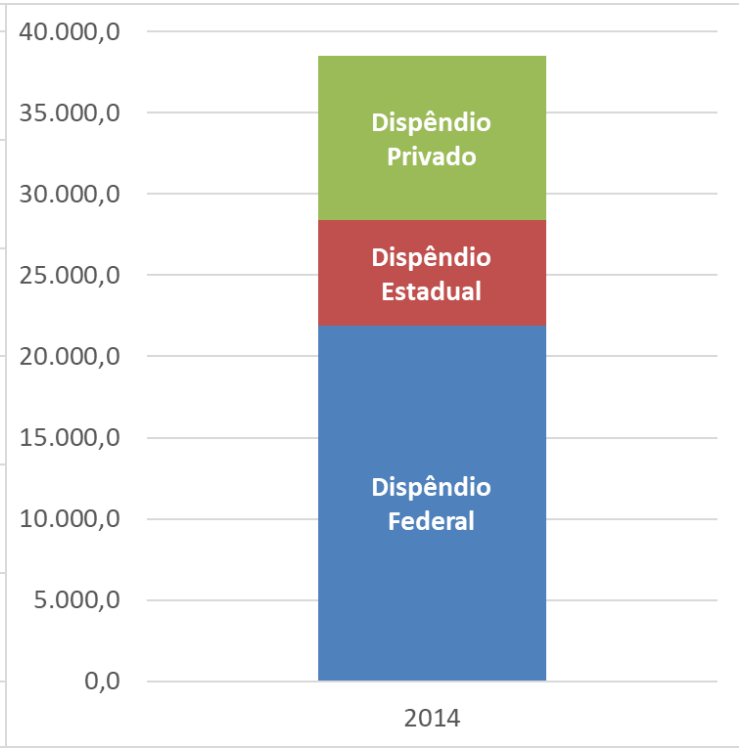
Brasil



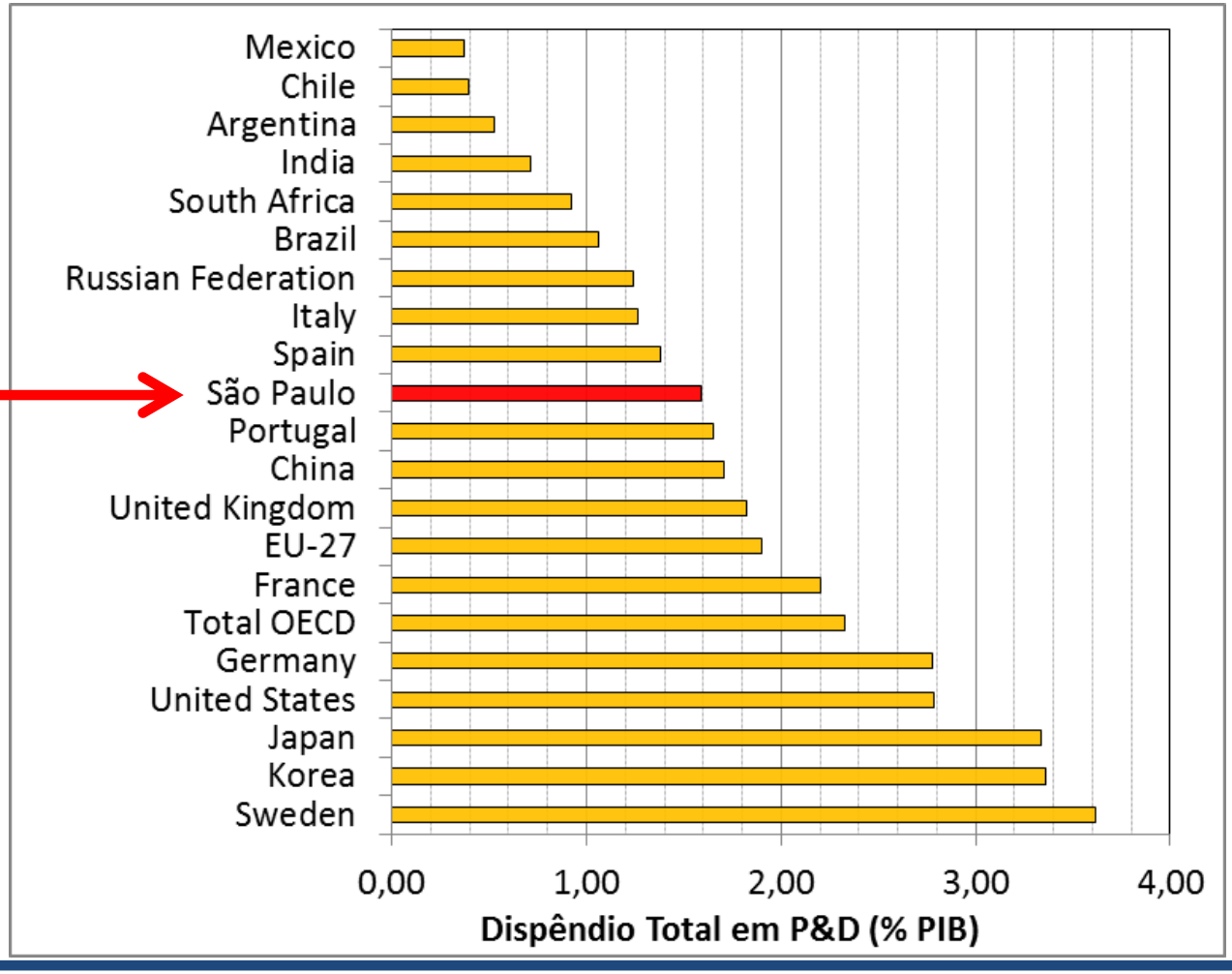
São Paulo



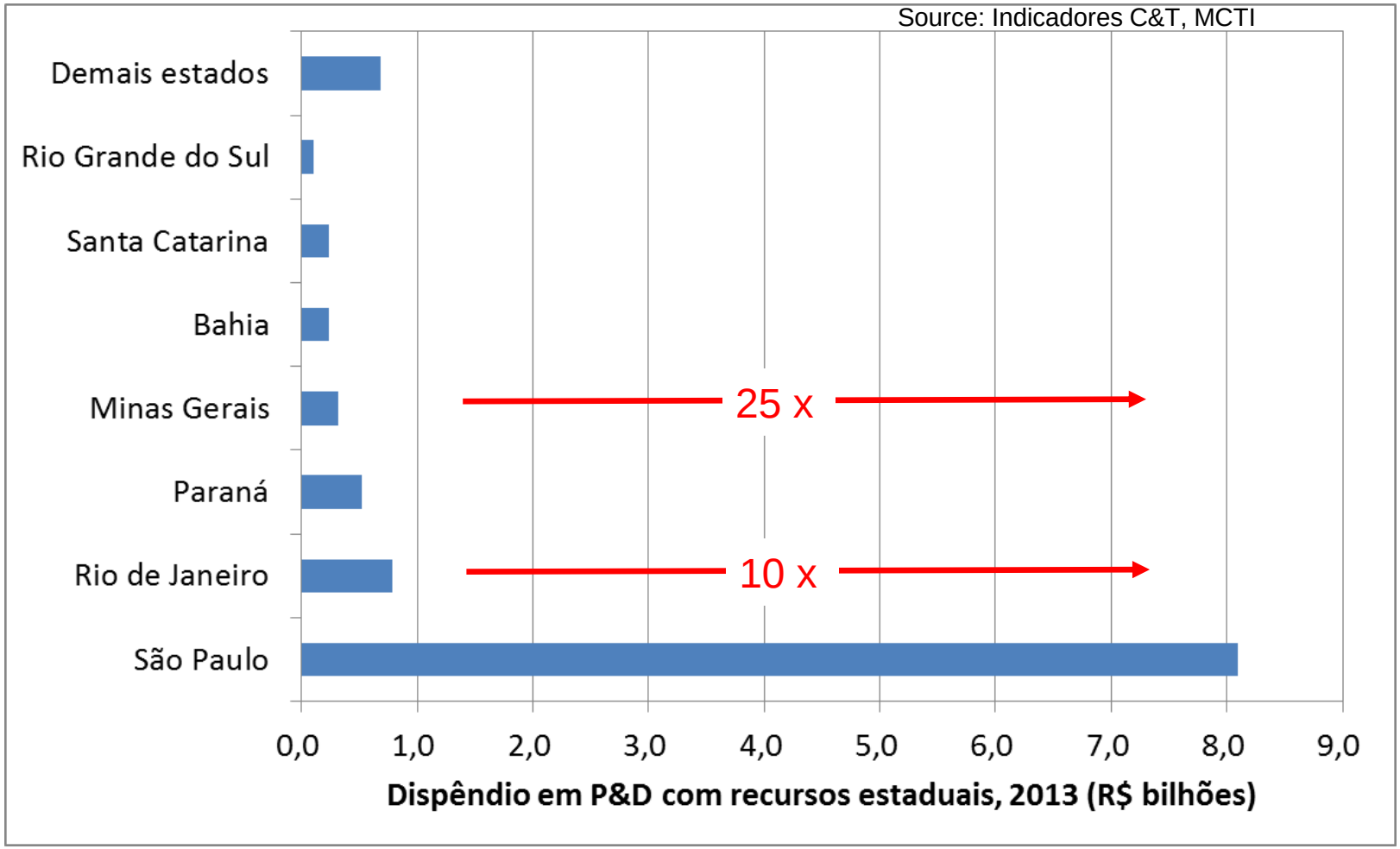
Brasil sem São Paulo



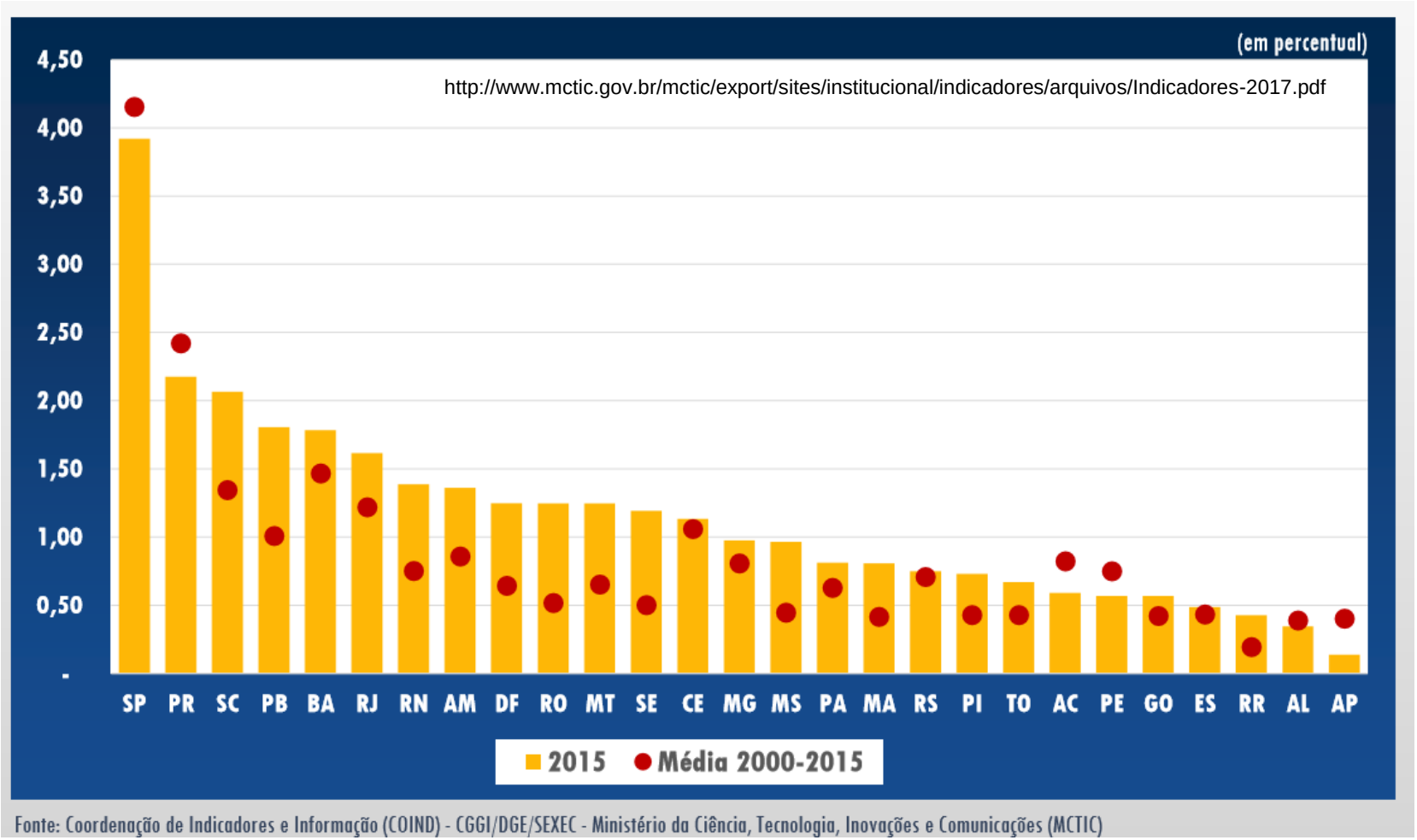
São Paulo R&D Expenditures
International comparison



Brazil: State R&D expenditures, 2013



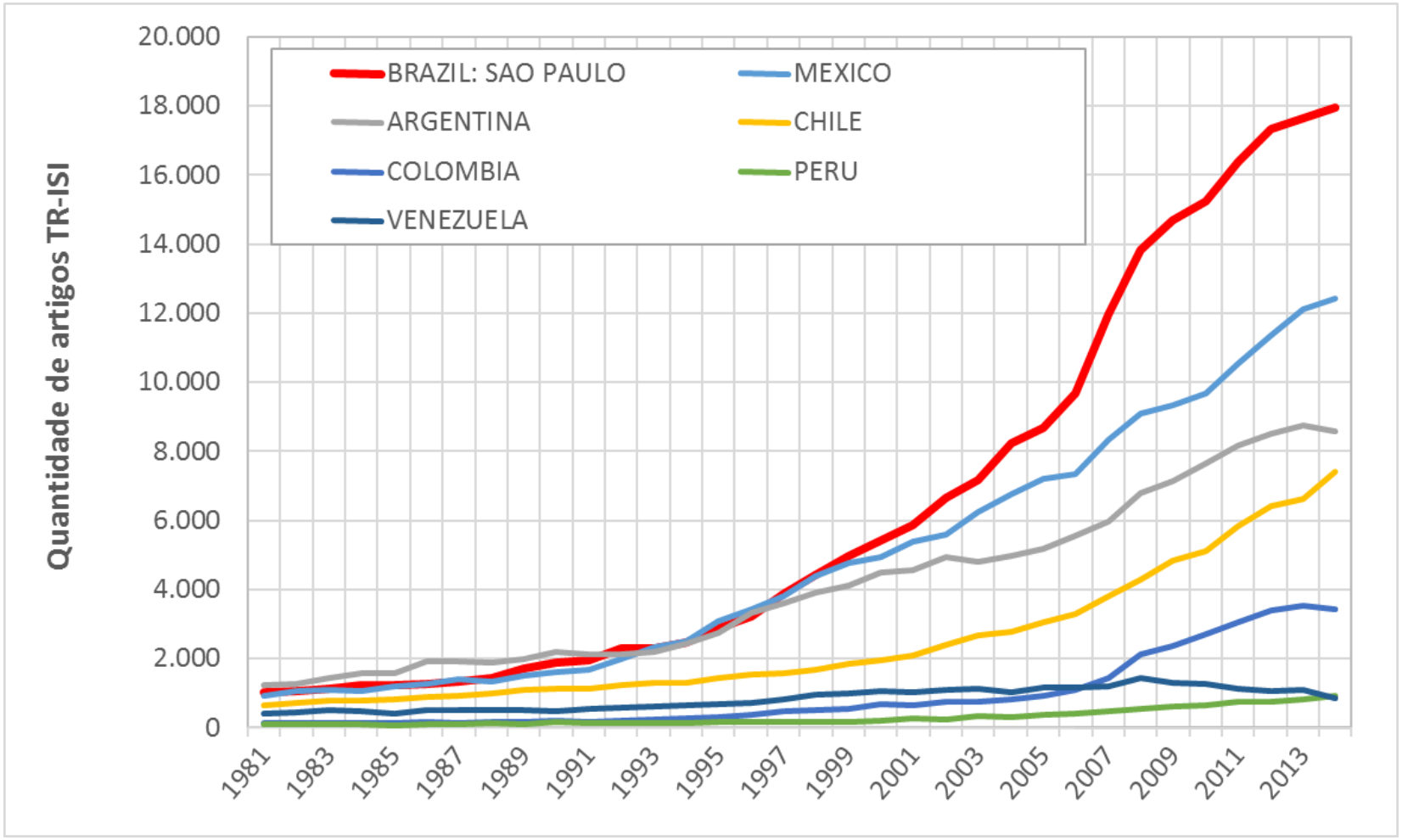
Dispêndio estadual em P&D em relação à receita estadual total, 2015



Fapesp: São Paulo Research Foundation

- Mission: support research in all fields
- Funded by the State of São Paulo with 1% of all state revenues
- All proposals are peer reviewed (26,000 proposals in 2016)
  - Average time for decision– 65 days; 40% success rate
- Annual budget: $PPP 534 million in 2016
  - Fellowships
    - In Brazil: 2,000 SI, 1,100 MSc, 3,000 DrSc, 2,000 Post-docs, 800 other
    - Abroad: 1,200 per year
  - Academic R&D
    - RIDC/11 years, Thematic/5 years, Young Investigators/4 years, Regular/2 years
  - University-Industry Joint R&D: Microsoft, Agilent, Braskem, Oxiteno, SABESP, VALE, Natura, Petrobrás, Embraer, Padtec, Biolab, Cristalia, Whirlpool, Boeing, Astra-Zeneca, Intel, plus hundreds of others
    - Engineering Res. Centers: 10 years joint grants FAPESP/Industry – PCBA, GSK, Natura, BG
  - Small bussiness R&D (PIPE): 1,500 SBE's (four awards per week in 2016)

São Paulo creates more articles than any country in Latin America




Invertebrate Systematics
nature
Citrus pathogen sequenced
Science Signaling
nature biotechnology
Microbes and Infection
Cancer Research
PHARMACEUTICAL RESEARCH
An Official Journal of the American Association of Pharmaceutical Scientists
PCCP
Physical Chemistry Chemical Physics
nature
SINK OR SOURCE?
Journal of the American College of Cardiology
AIP The Journal of Chemical Physics
Zeitschrift für Kristallographie
NEW CRYSTAL STRUCTURES
NCS
Analyst
NANOTECH
nature physics
There but not back again
MARINE & FRESHWATER RESEARCH
CHEMPHYSCHEM
A EUROPEAN JOURNAL
OF CHEMICAL PHYSICS AND PHYSICAL CHEMISTRY
PHYSICAL REVIEW LETTERS
17 December 2001
CrystEngComm
Analyst
JOC
Science
Cell
Proteomics Clinical Applications
9-10/15
Acta Crystallographica Section E
Structure Reports Online
siam REVIEW
METEORITICS & PLANETARY SCIENCE
JOURNAL OF MATERIALS SCIENCE
THE JOURNAL OF PHYSICAL CHEMISTRY
cellular microbiology
WILEY Blackwell
Proteomics
21|2017
nature REVIEWS
NEUROSCIENCE
JOC
The Journal of Organic Chemistry
Journal of NANOSCIENCE
Cell Reports
Science
ZIKA
Proteomics Clinical Applications
12/2016
PHYSICAL REVIEW LETTERS
PHYSICAL REVIEW LETTERS
7 FEBRUARY 2003

Unicamp 454 start-ups; 22 thousand jobs, R$ 3 bilhões in revenues (2016)

Start-ups created by students and faculty at Unicamp, 1974-2015

The three impacts challenge

- Social impact
  - Ideas that assist/help/enhance public policy
  - Ideas directly applied to societal benefit
- Economic impact
  - Ideas that create companies
  - Ideas that increase bussiness competitivity
  - Ideas that create industries
- Intellectual impact
  - Ideas that create more and better ideas
  - Ideas that make humankind wiser
  - Ideas that are cited in the literature

SOAR: Southern Observatory for Astrophysical Research

J.B. Haislip et al. "A photometric redshift of z ~ 6.39 for GRB 050904", Nature 440, 1

Infrared afterglow
unveils the explosi
billion years ago.
These results dem
used to trace the s
and reionization hi
Universe.

Starting 2014:

LLAMA
Large Latin American Millimeter Array

GIANT MAGELLAN TELESCOPE
GMT

cta
cherenkov telescope array

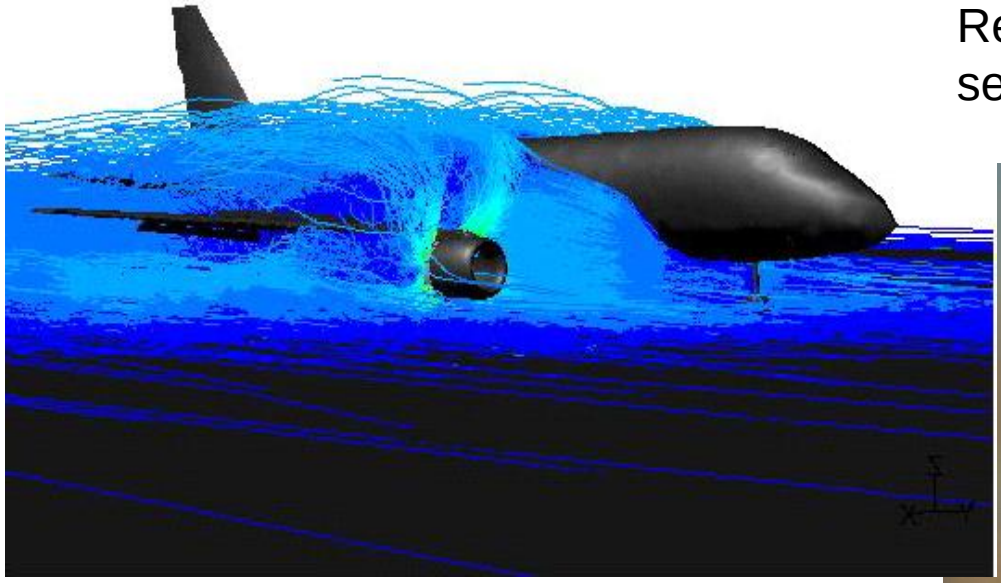
Javalambre
Physics of the Accelerating Universe
Astrophysical
Survey

USP, UFRGS, UNC Ch.Hill
Fapesp, CNPq, NSF,...

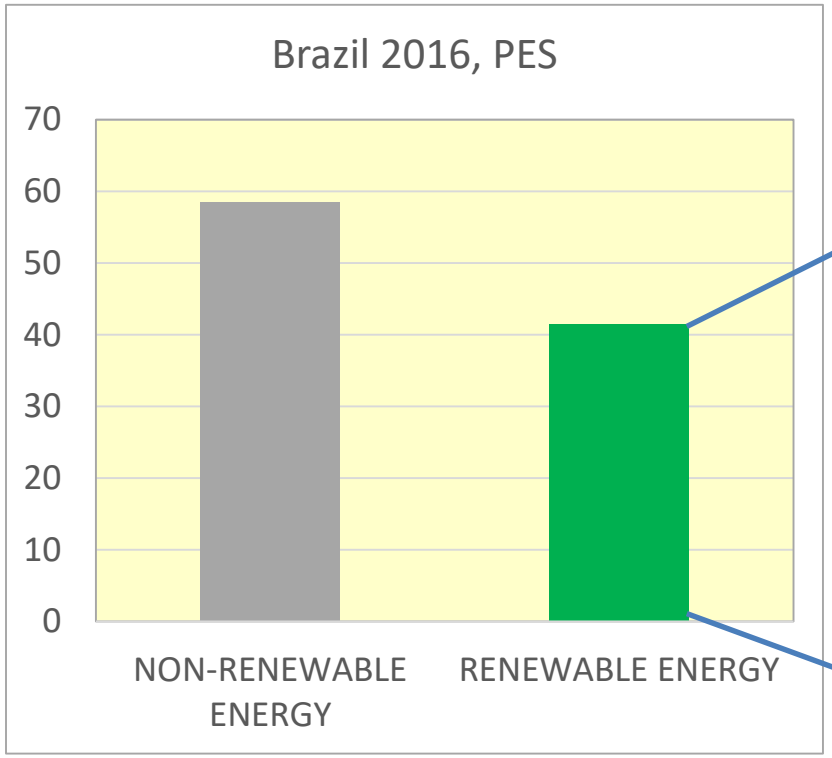
Embraer-FAPESP: R&D to build an innovative jet

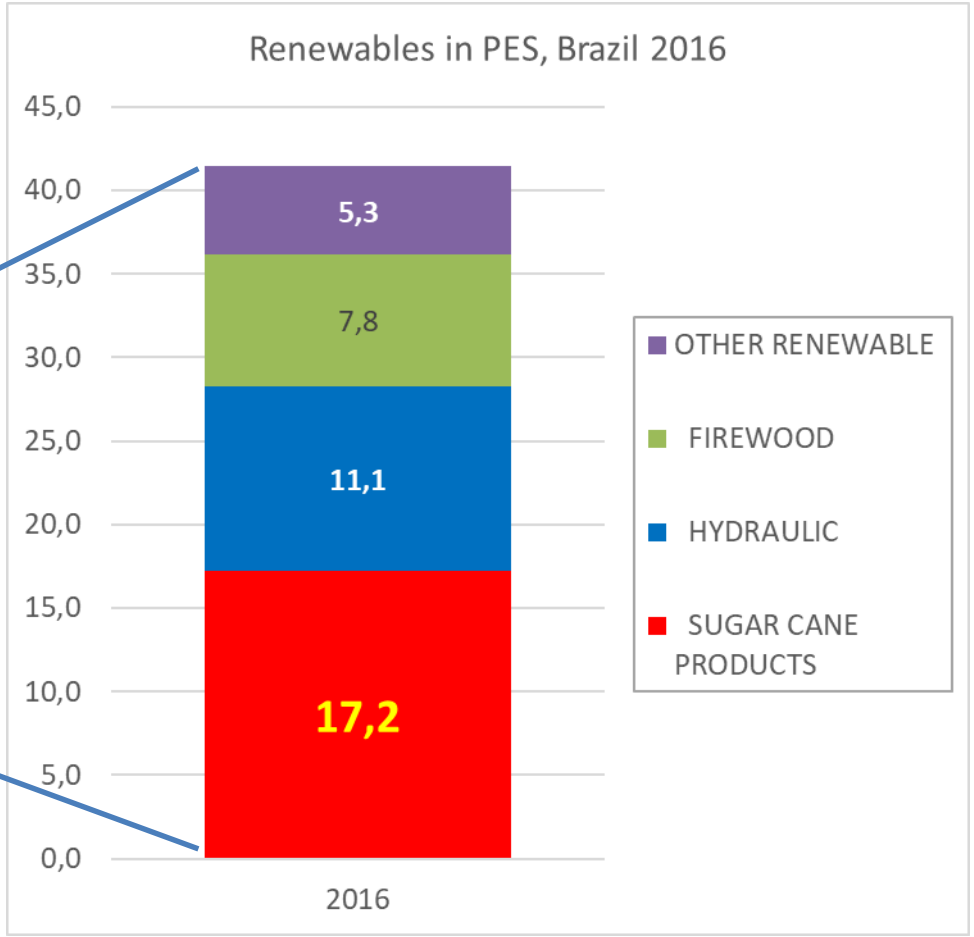
Computational Fluid Dynamics (CFD) simulation and tests

Research co-funded by FAPESP, involving several universities



Brazil Energy Supply - 2016





Political science

The City University of New York

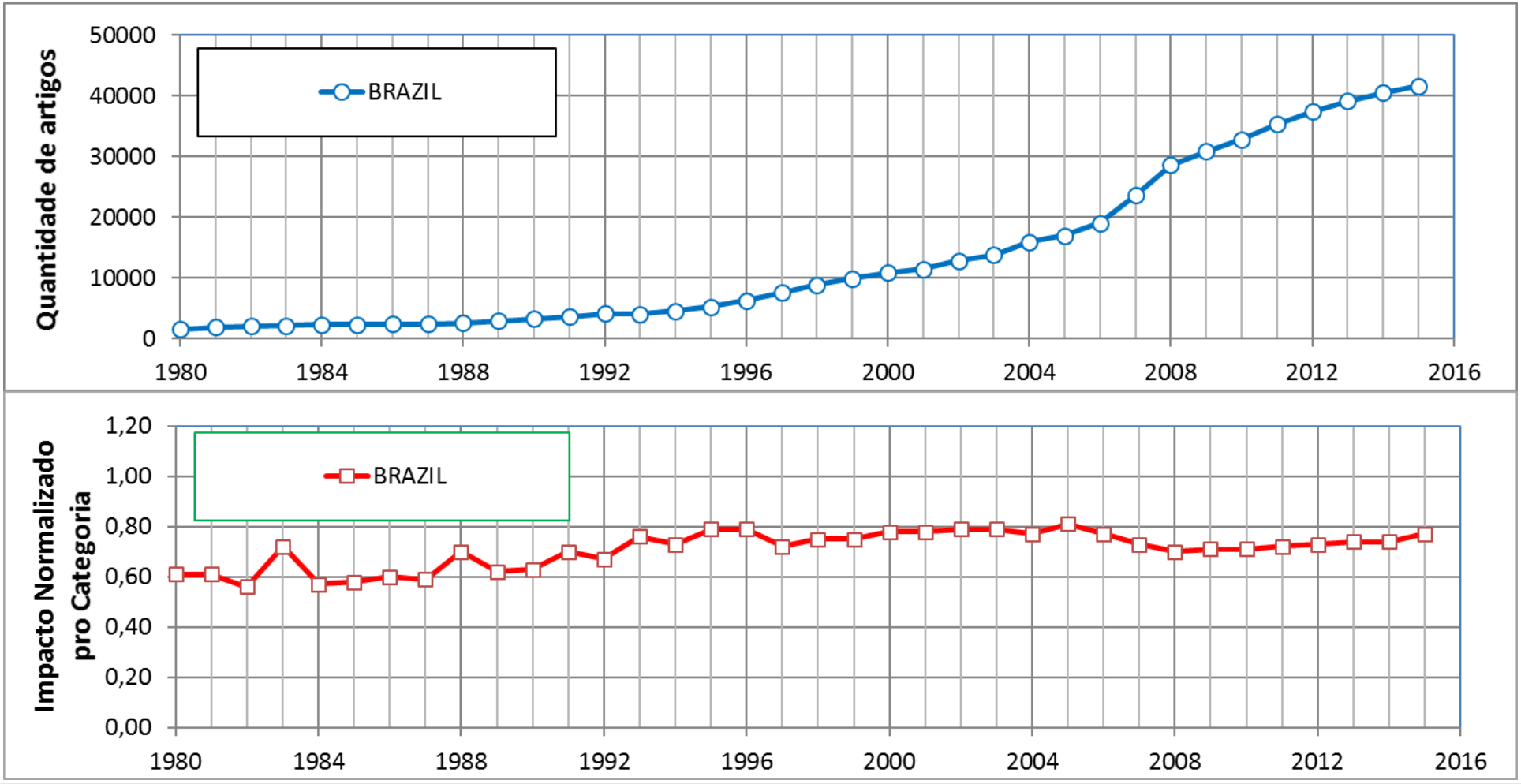
Presidential Power, Legislative Organization, and Party Behavior in Brazil

Argelina Cheibub Figueiredo and Fernando Limongi

Presidential regimes are considered to be prone to produce institutional deadlocks. In the generally shared view, influenced by the work of Juan Linz, presidentialism lacks a built-in mechanism to induce cooperation between the executive and legislative branches of the government.[1] Representatives and the president have different constituencies, and their mandates are independent and fixed. Hence the chances that the legislative and the executive powers will have the same agenda are small.

IMPACT AND COLLABORATION NETWORKS

Artigos publicados e seu impacto Brasil, 1981-2015



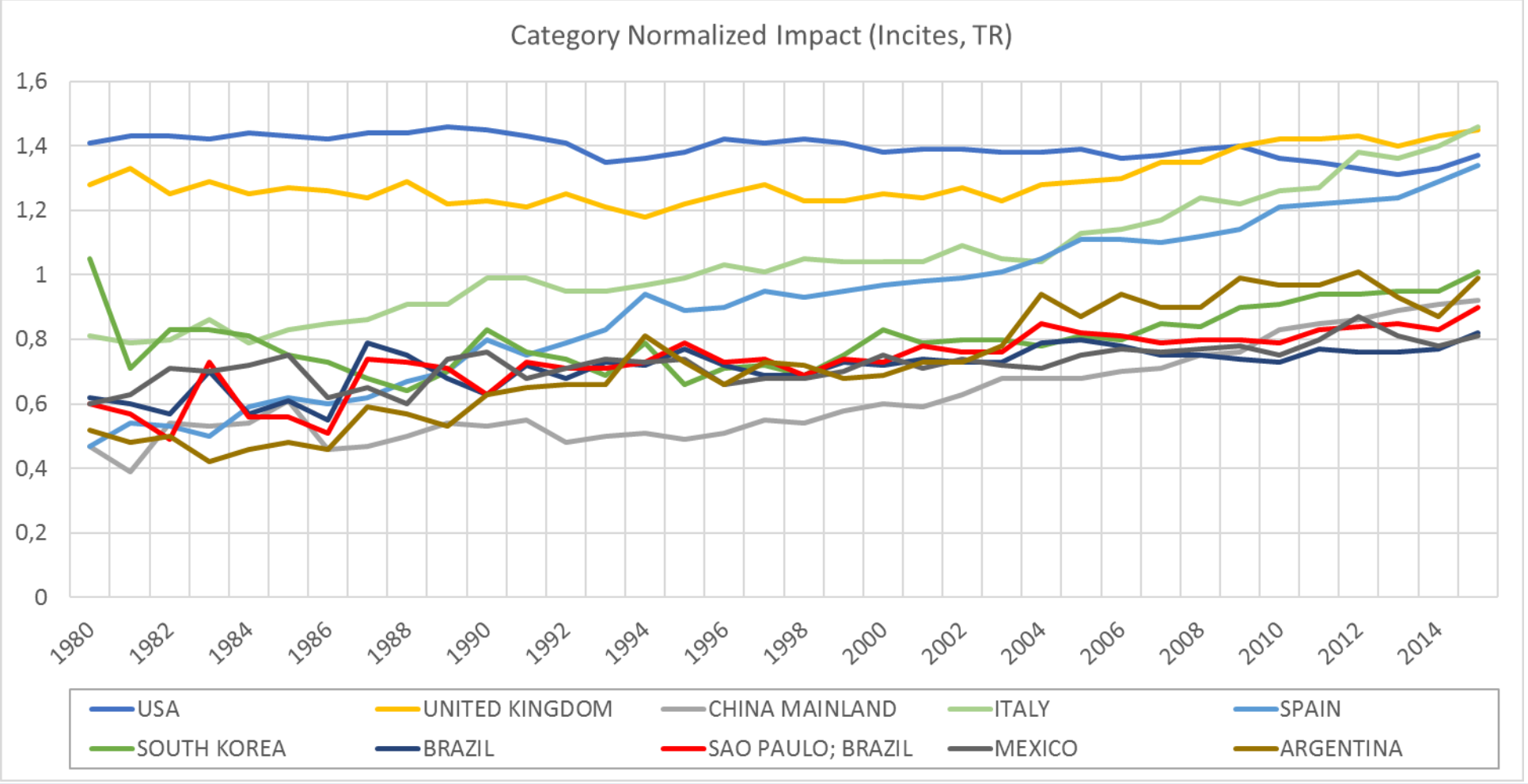
Patentes de empresas e pesquisadores em empresas

Efetividade do esforço de P&D em empresas para criação de ideias patenteáveis nos EUA (Brasil e países escolhidos)

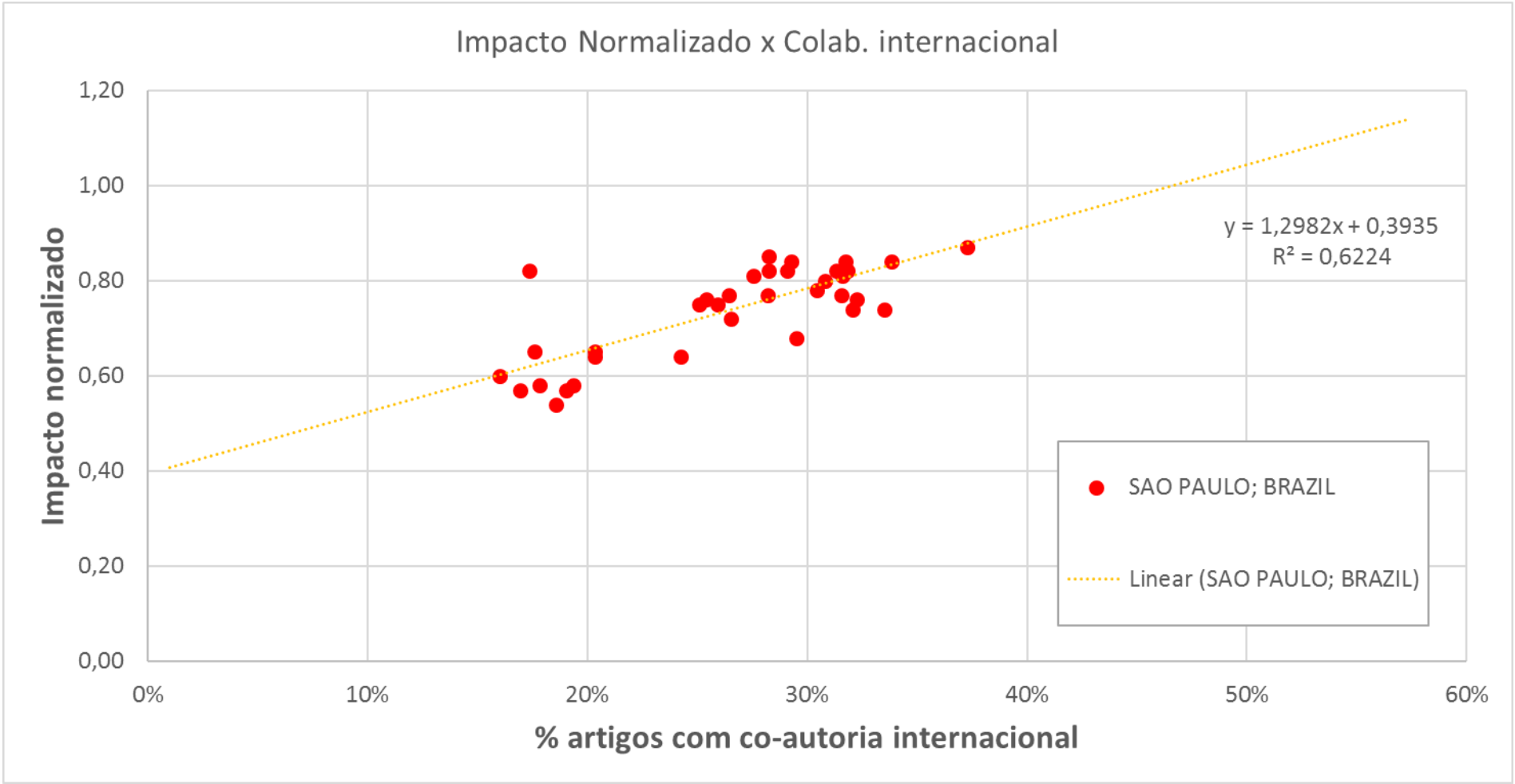
País	Patentes por ano, de 2011 a 2015	Patentes de empresas	Patentes de empresas – em %	Pesquisadores de empresas*	Patentes/10.000 pesquisadores (empresas)
Japão	50.998	49.958	98	534.908	934
Alemanha	14.870	13.973	94	216.320	646
Coreia do Sul	14.887	13.315	89	250.626	531
Itália	2.355	2.299	98	47.816	481
Reino Unido	5.643	5.178	92	108.614	477
França	5.851	4.704	80	197.056	239
África do Sul	149	78	52	6.192	126
Espanha	686	524	76	59.391	88
República Checa	152	134	88	16.698	80
Polônia	118	72	61	14.299	50
China	5.818	5.317	91	1.072.087	50
Brasil	**264**	**197**	**74**	**67.427**	**29**
Federação Russa	386	280	72	202.185	14

*Pesquisadores atuando em pesquisa e desenvolvimento (P&D) em empresas em 2011
Observação: não há dados sobre pesquisadores para os Estados Unidos, líder em patentes, na base da OCDE
Fontes: Patentes: United States Patent and Trademark Office; Pesquisadores nas empresas: Main S&T Indicators/OCDE e Pintec/IBGE (Brasil)

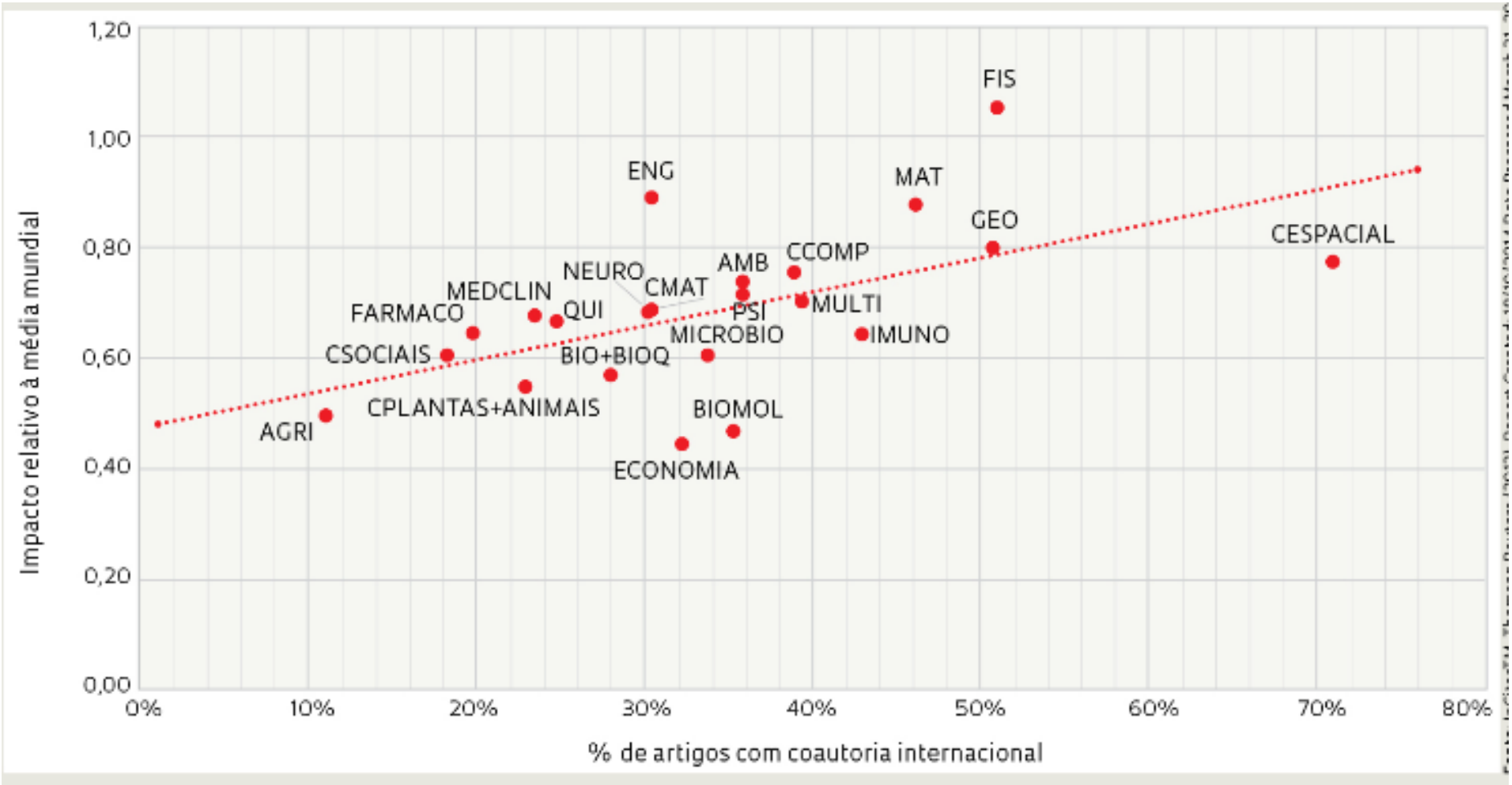
Evolução do impacto relativo, países selecionados, 1980-2015



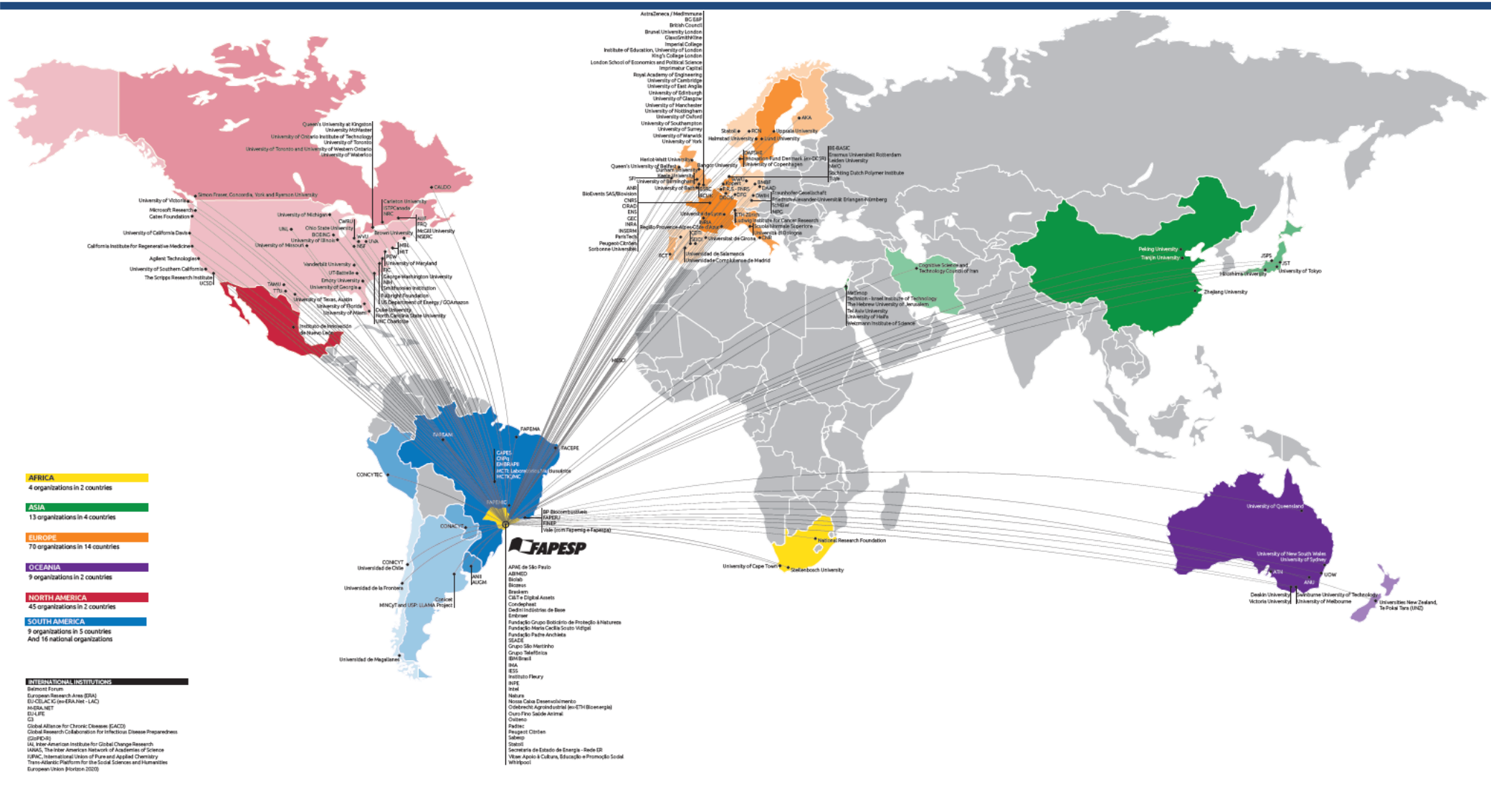
Impacto x Colaboração Internacional autores em São Paulo, 1980-2015



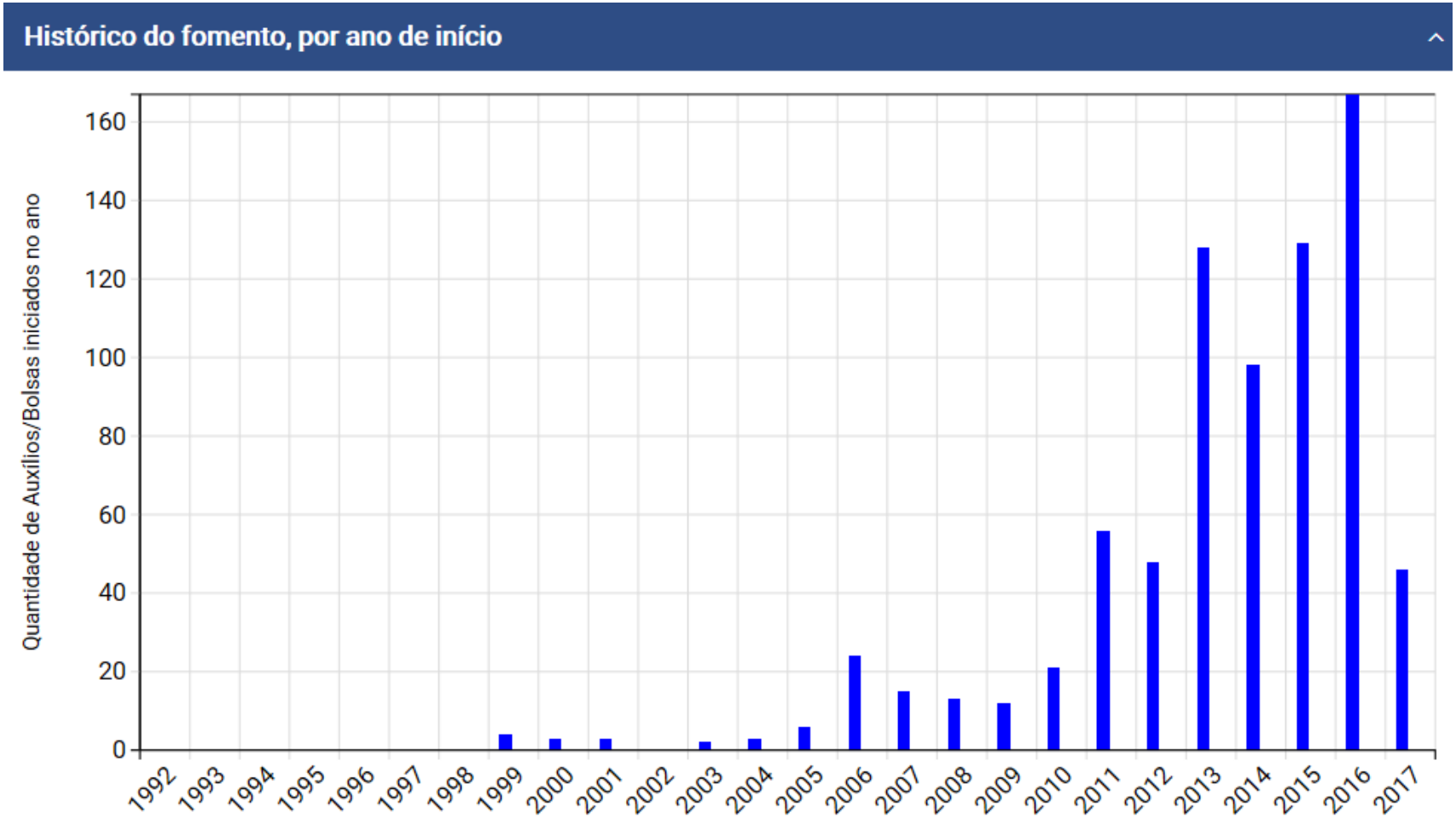
Impacto e Co-autoria internacional



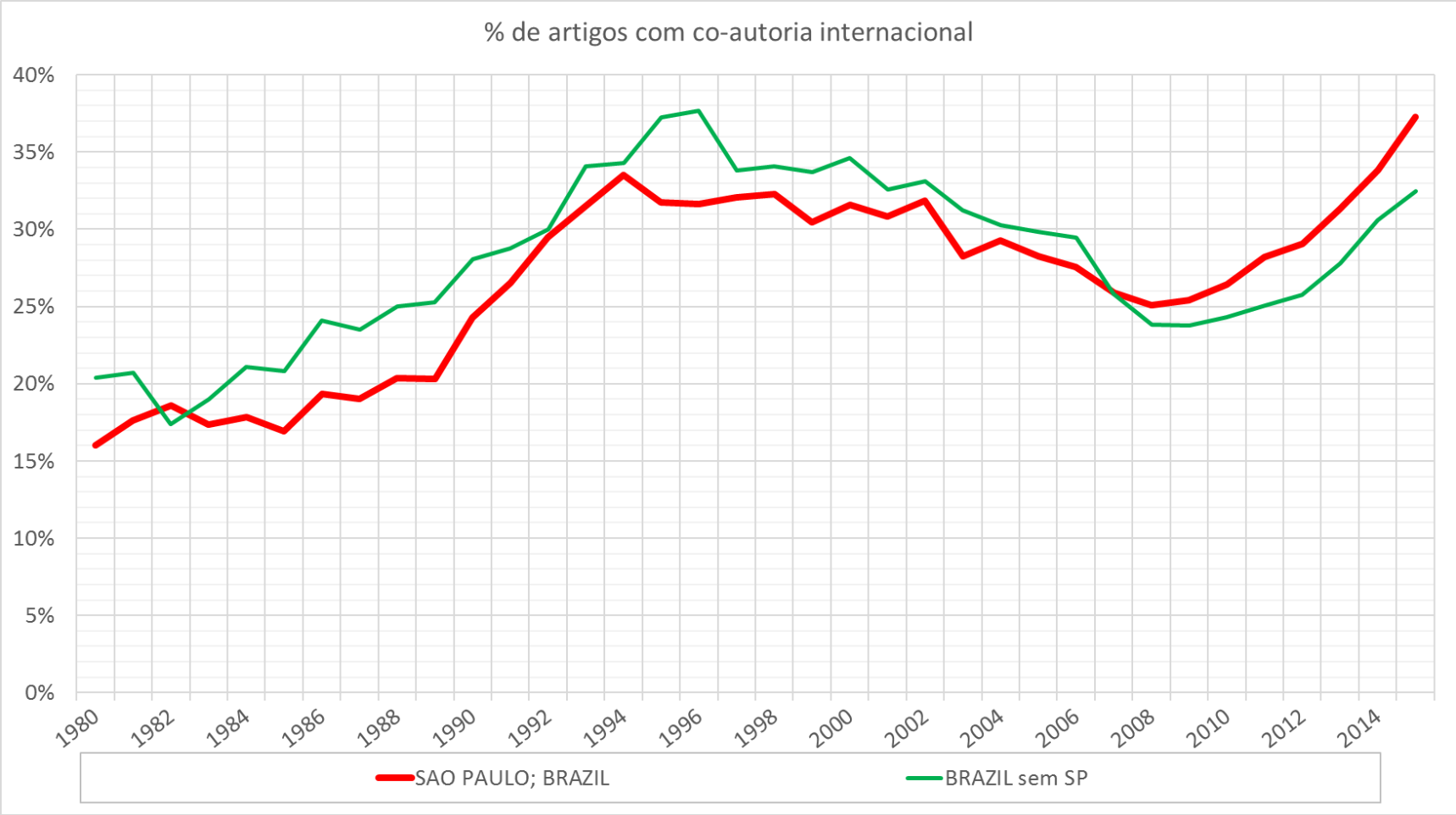
FAPESP's research collaboration connections



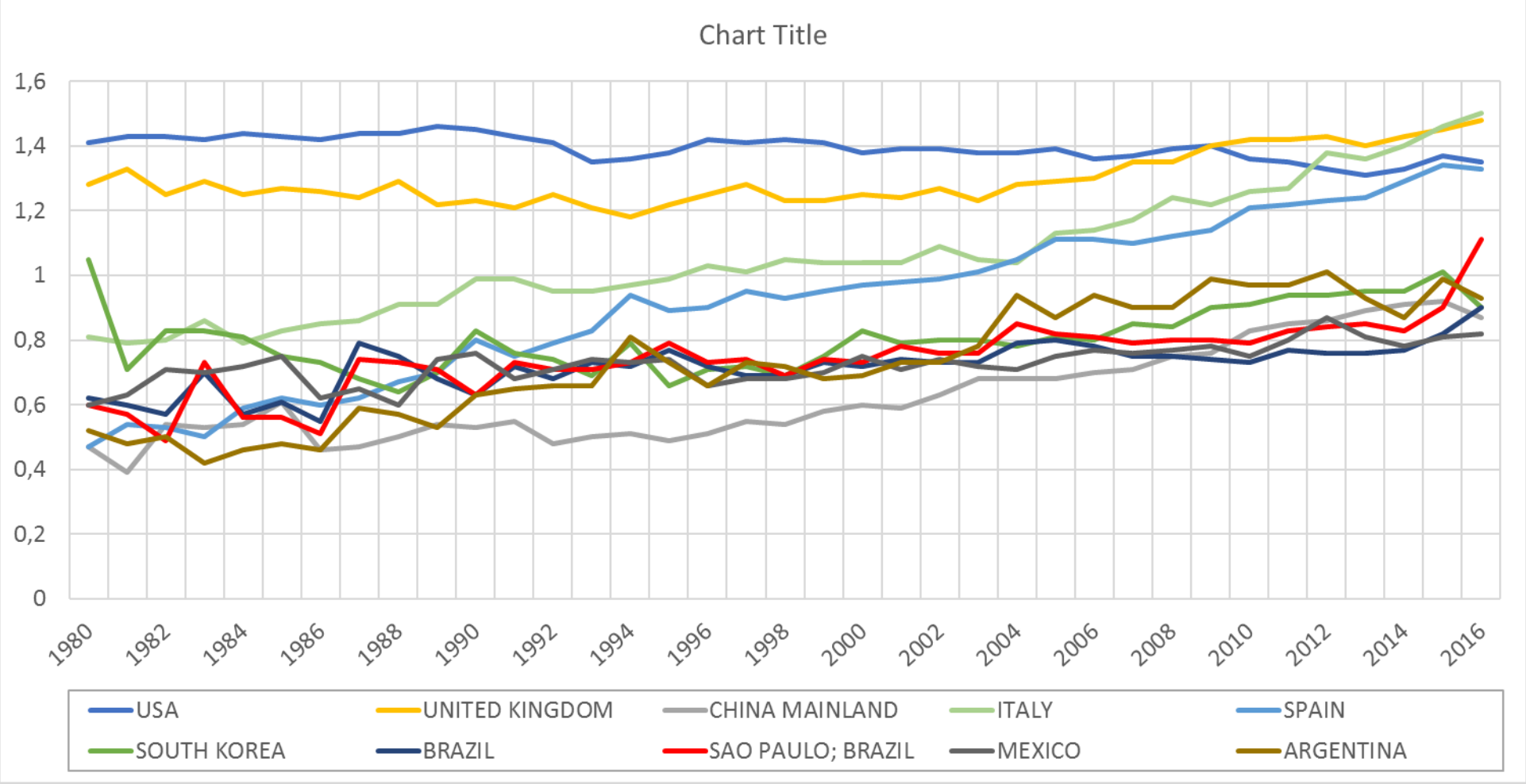
Grants for International research collaborative projects



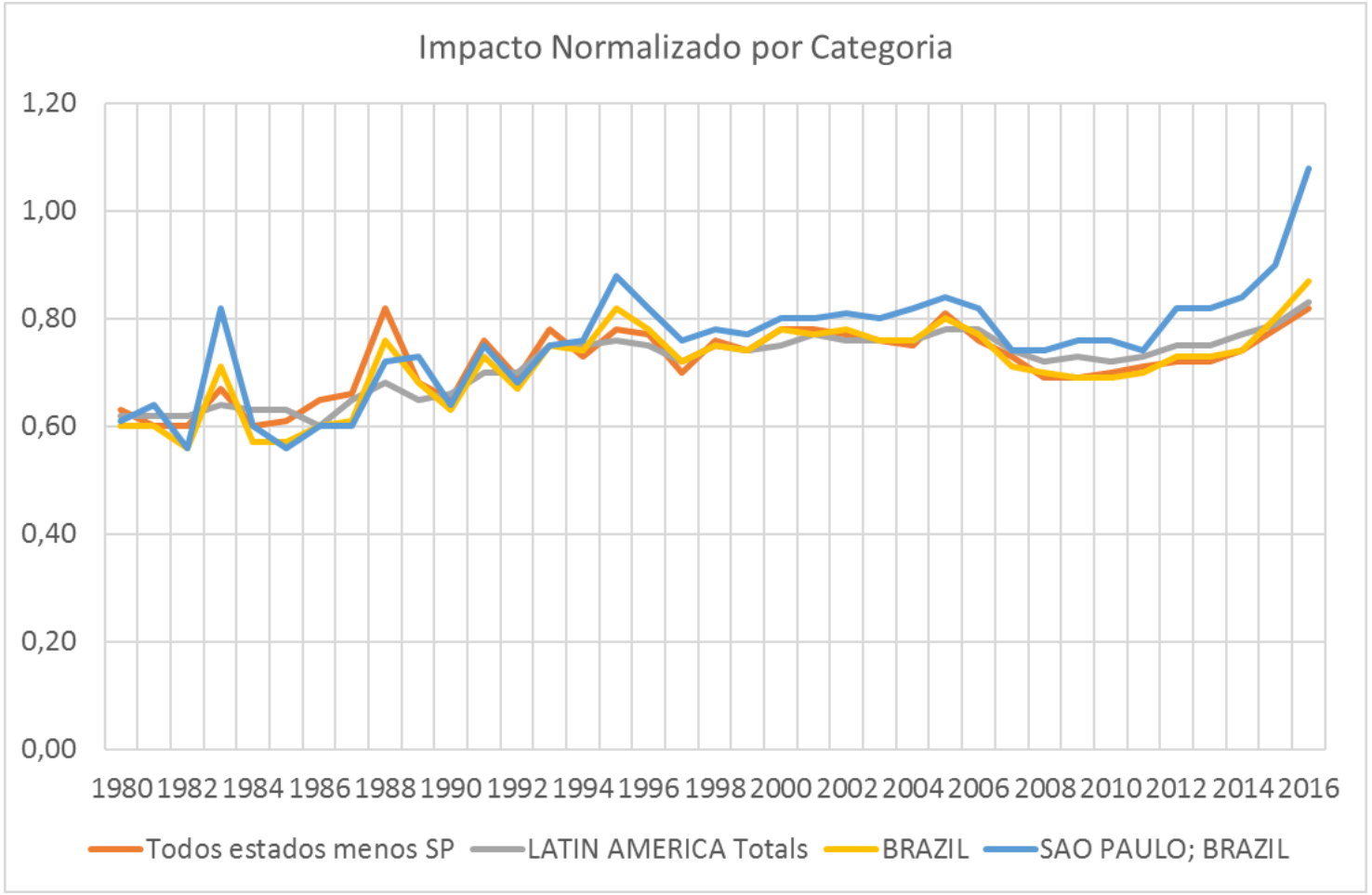
Sp e Brasil fora de São Paulo: artigos com co-autoria internacional



Evolução do impacto relativo, países selecionados, 1980-2016

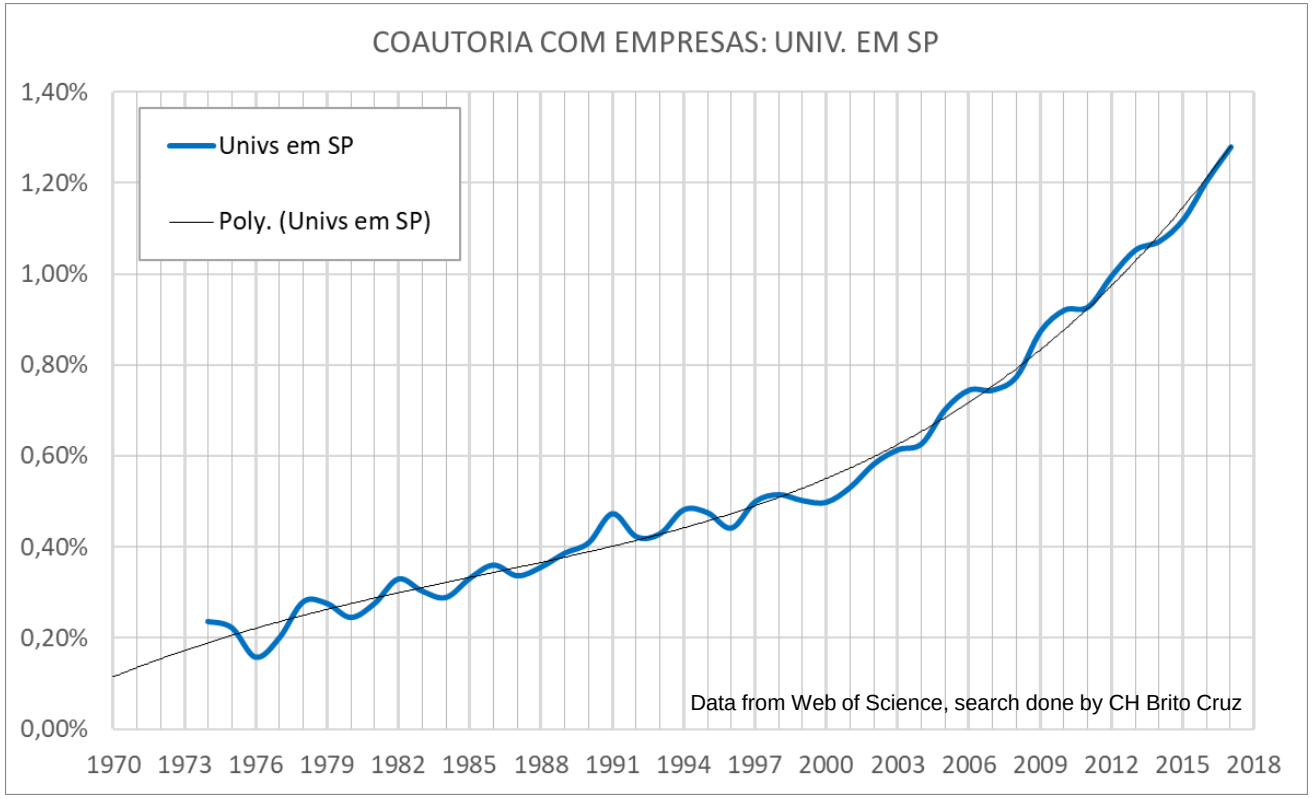


Normalized impact (Scopus)



CP-AUTHORSHIP BETWEEN UNIVERSITIES AND BUSINESS SECTOR LABS

Universities in São Paulo: research articles with a co-author from business



Quatro desafios

- Aumentar o dispêndio em P&D do setor empresarial
- Aumentar a qualidade do dispêndio em P&D do setor empresarial
  - Ambição e ousadia internacional
- Aumentar o impacto científico da pesquisa feita no país
  - Busca da qualidade, menos ênfase nas quantidades
  - Proteger o tempo do pesquisador contra tarefas extra-acadêmicas
    - Apoio institucional aos pesquisadores
  - Mais colaboração internacional e nacional
  - Desenvolver algumas universidades de classe mundial

Targeting higher impact research

- Protect researcher time against non-academic tasks
  - Grants Management Offices (EAIP)
- Facilitate collaboration – national and International; academia and business
- Work on a plan to raise visibility and impact of some journals edited from Brazil
- Foster bolder science projects
  - Deeper analysis of project content
  - Value citations received by articles as opposed to impact Factor of the journals they appear in (value is in the contente, not in the cover)
  - Favour research projects planned for boldness and impact
    - Thematic (5-years), Young Investigators (4-years), RIDCs (11 years), ERCs (10 years)