



IFPRI

Insights into Agricultural Innovation: Global Evidence and Lessons for Pakistan

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Drivers of agricultural innovation

- Long-term investment in public R&D
- Conducive policy environment, appropriate incentives
- Competitive markets that encourage innovation
- Farmers who can experiment, manage risk
- Social rates of returns on R&D: 40 to 78 percent
 - High in relative terms – well above returns attainable from many alternative uses of public funds
 - Highest – in crop breeding and varietal improvement
 - Varied – but with proven impacts on agricultural production, poverty reduction, and food prices

Agricultural R&D spending in Pakistan

- New ASTI survey covers **250 agencies** in ag. R&D
 - Federal agencies: PARC, NARC, other
 - Provincial agencies: Punjab, Balochistan, Sindh, Khyber Pakhtunkhwa
 - Higher education agencies
 - Nonprofit agencies
 - Private companies
- Data analysis ongoing. All data presented here are *preliminary*



Agricultural Science and Technology Indicators (ASTI) Initiative

ASTI
led by IFPRI

Source: M.A. Niazi, G.-J. Stads, and L. Gao, PARC/IFPRI

Total public agricultural R&D spending

Preliminary data



2012

95 million US\$
(current prices)

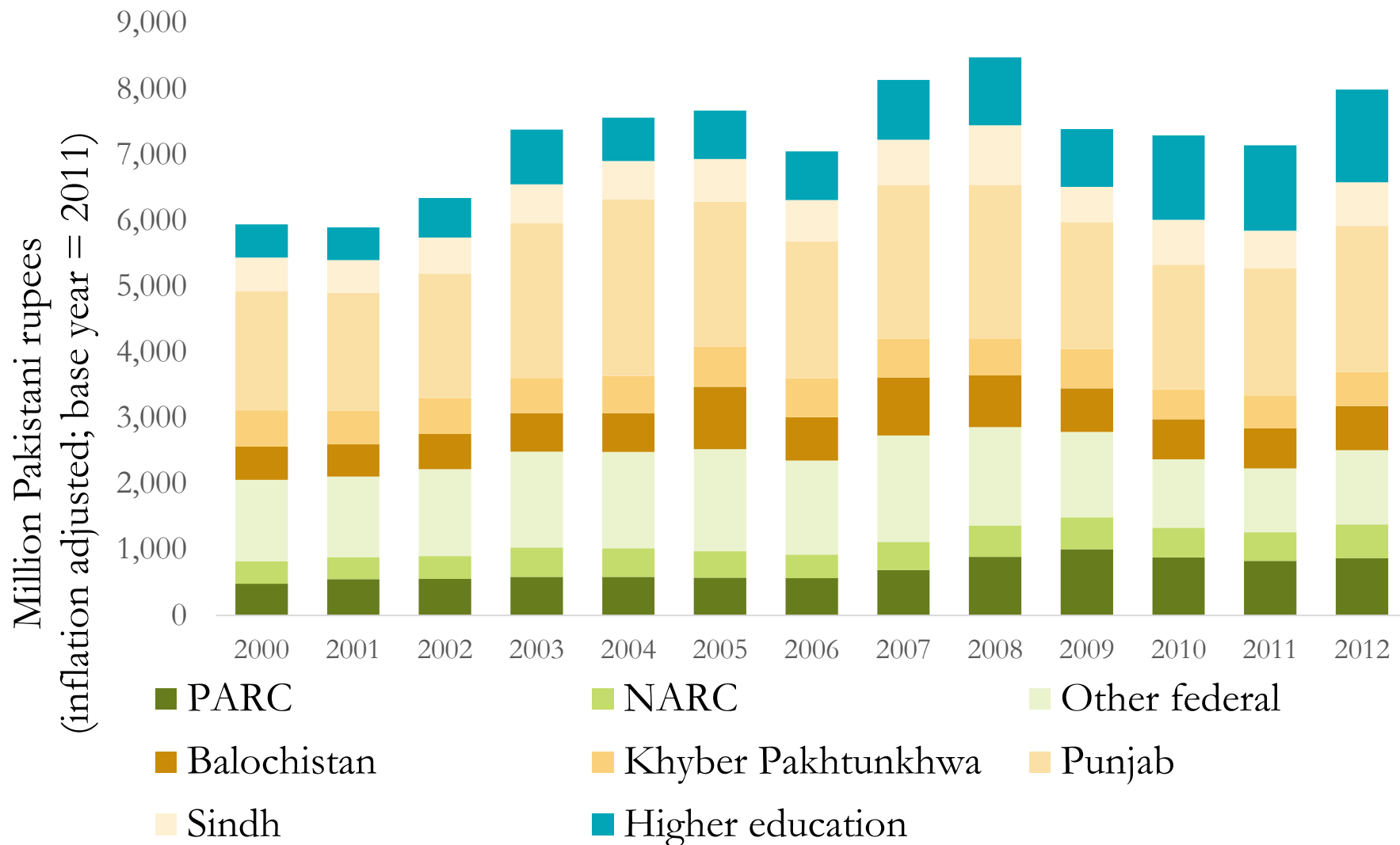
8.0 billion rupees
(2011 constant prices)



- Includes salaries, operating costs, and capital investments
- Includes research on crops, livestock, fisheries, forestry, postharvest, socio-economics, etc.
- Includes PARC, NARC and all other federal and provincial government, higher education, and nongovernmental agencies

Long-term stagnation in R&D spending

Preliminary data



Long-term stagnation in R&D spending

Preliminary data

- Total R&D spending increased by just 36% in real terms from 2000 to 2012, but at an erratic pace
- Most growth in R&D spending was driven by higher education agencies
- Share of federal R&D spending has decreased by only 3% during 2000-12, and still represents >30% of total spending
- Share of federal spending has decreased only 1% since devolution under the 18th Amendment

Relative underinvestment in R&D

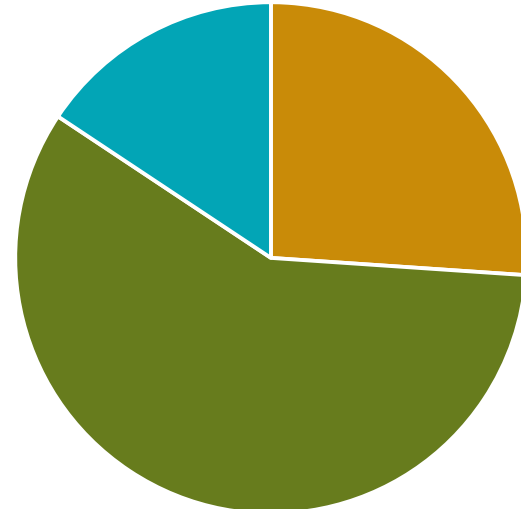
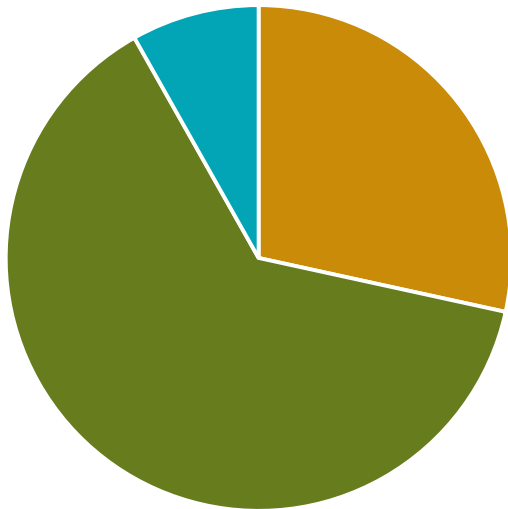


Signs of growth in research capacity

Preliminary data

2000: 3,401 FTE researchers

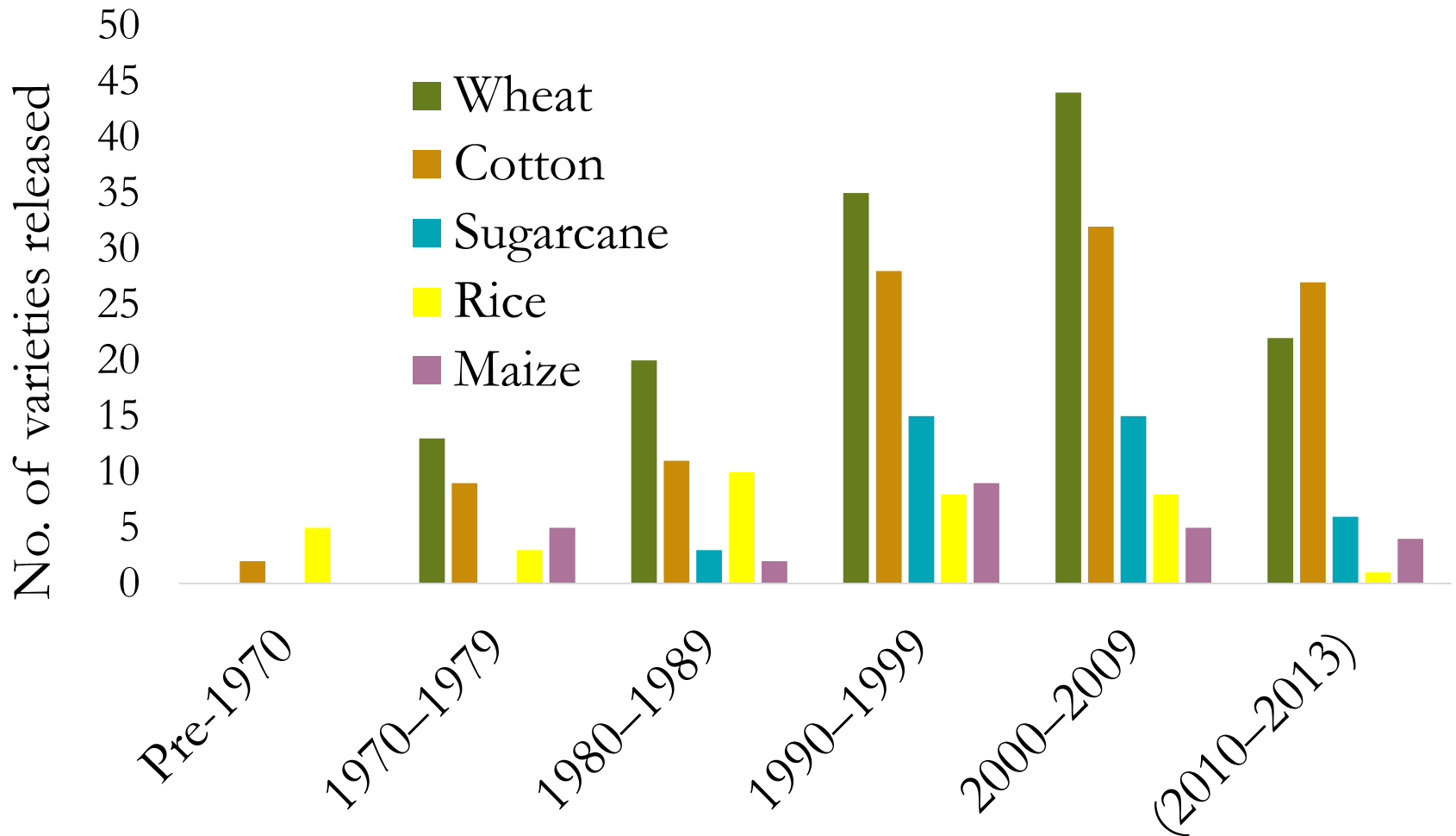
2012: 3,699 FTE researchers



■ Federal government ■ Provincial government ■ Higher education

Signs of innovation in the market

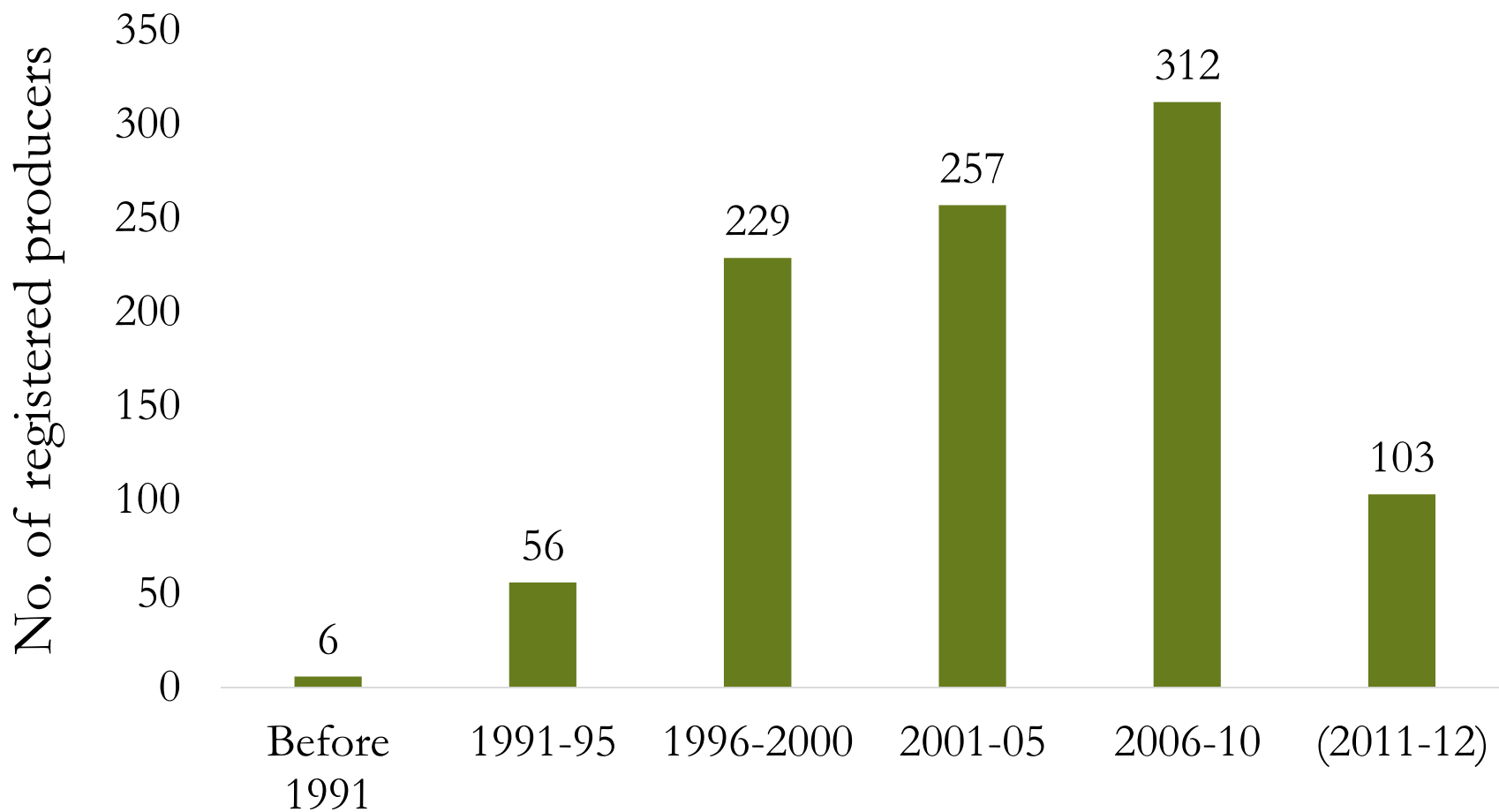
Release of varieties and hybrids, 1933–2013



Source: Rana, Spielman, and Zaidi (forthcoming), based on FSC&RD data

Signs of competition in the market

Seed producers registered with FSC&RD, 1981-2012



Source: Rana, Spielman, and Zaidi (forthcoming), based on FSC&RD data

Signs of policy progress...

- 2015 Amendment to the Seed Act
 - Recognizes the private sector in all aspects of the seed system: breeding, multiplication, marketing, distribution
 - Extends regulatory control over private sector
 - Extends regulatory control over hybrids as well as varieties
 - Allows for farmer saved seed
 - Provision 2(f)(ia): “person means any natural or legal entity and includes an association of persons, firm, partnership, society, group of persons, a public or private limited company, corporation, cooperative society or any other body corporate”
- Preliminary assessment:
 - Slightly better than business as usual if there is federal, provincial implementation capacity

...and tough decisions ahead

- Draft Plant Breeders' Right Act
 - TRIPS and WTO membership requires plant variety protection via patents or a sui generis system
 - Variety registration only has to pass a novelty test (DUS), does not have to be superior to existing varieties (VCU)
 - Provides scope for rewarding public breeders
 - Protects farmers' right to save, use, sow, exchange and non-commercially sell seed
 - But otherwise, provides limited farmer protections when compared to the 2001 Indian PPV Act
- Preliminary assessment:
 - Judicial capacity to process infringements remains an unknown

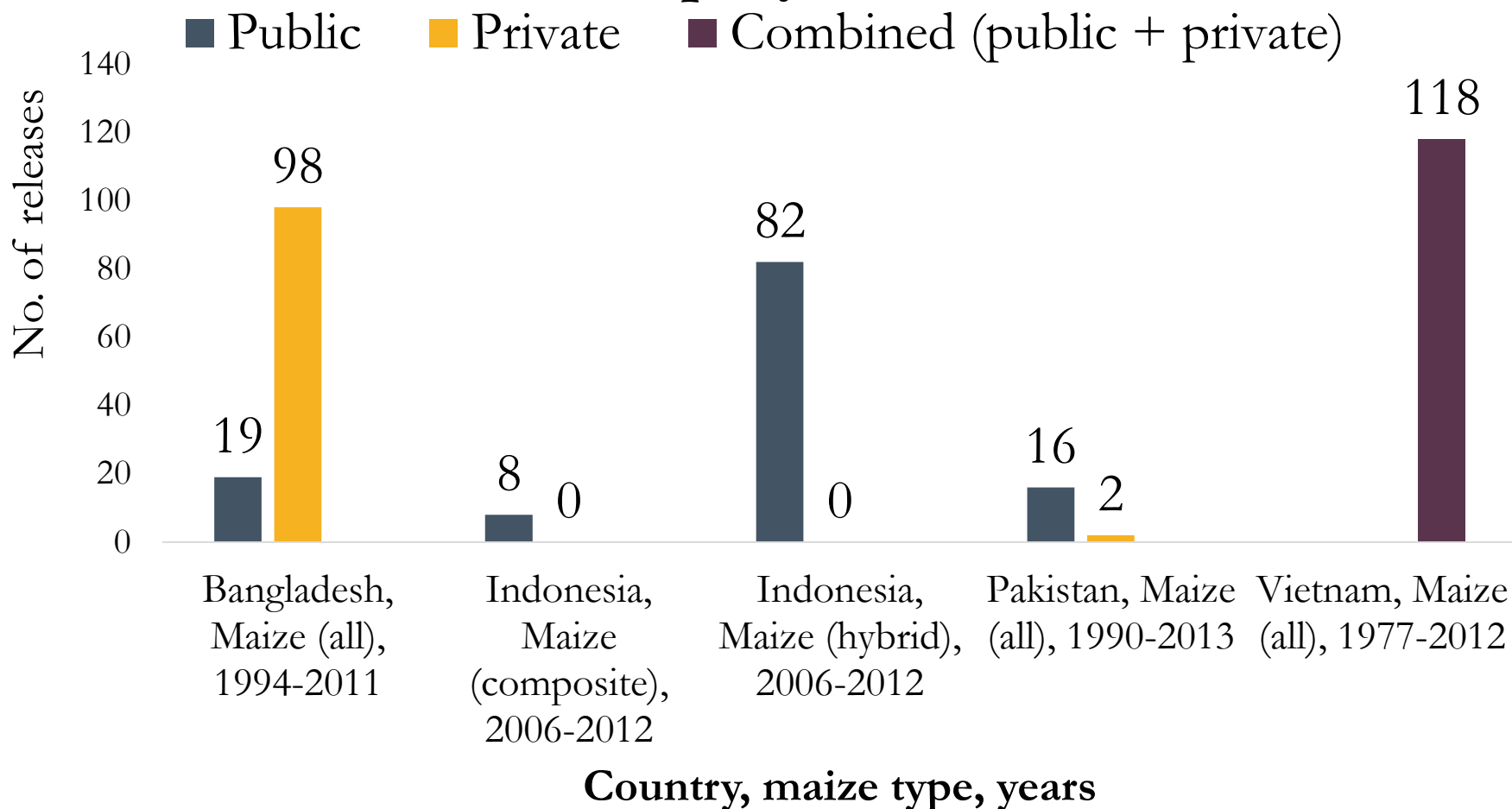
Concluding thoughts

- There is significant scope for increasing public R&D spending in line with global comparators
- There is a need to monitor and evaluate the impact of public policies and investments that influence technological change, especially in the seed system
- Evaluation requires a minimum dataset of
 - High-res, long-term household data on production
 - Industry performance: releases, sales, revenues
 - Industry structure: competitiveness
 - Innovation: Tools, methods, products
 - Regulation: Costs of doing business

The end

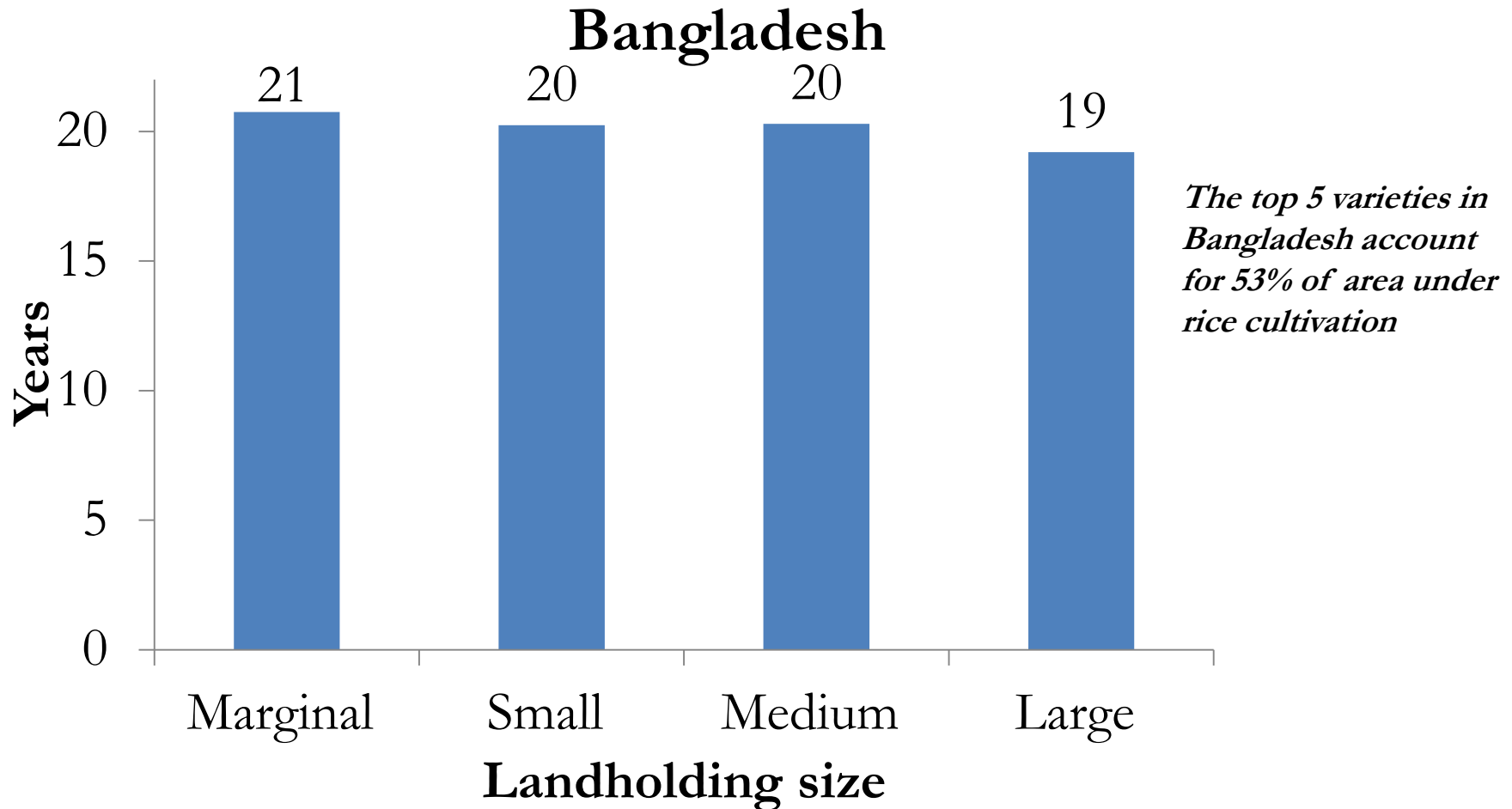
Rate of innovation \approx varietal release rate

Maize releases for selected crops, years and countries



Rate of innovation \approx varietal aging

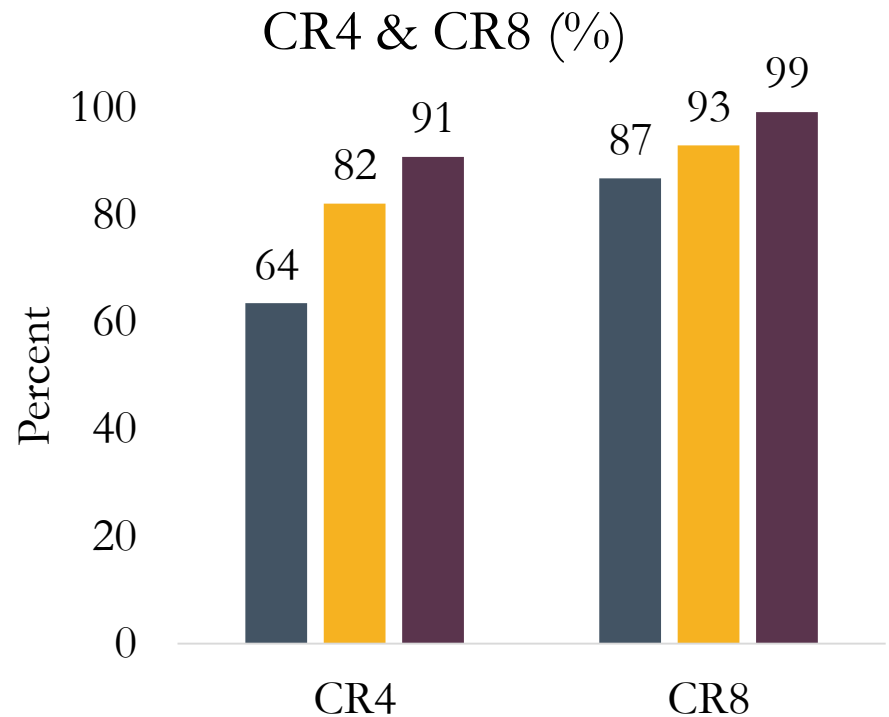
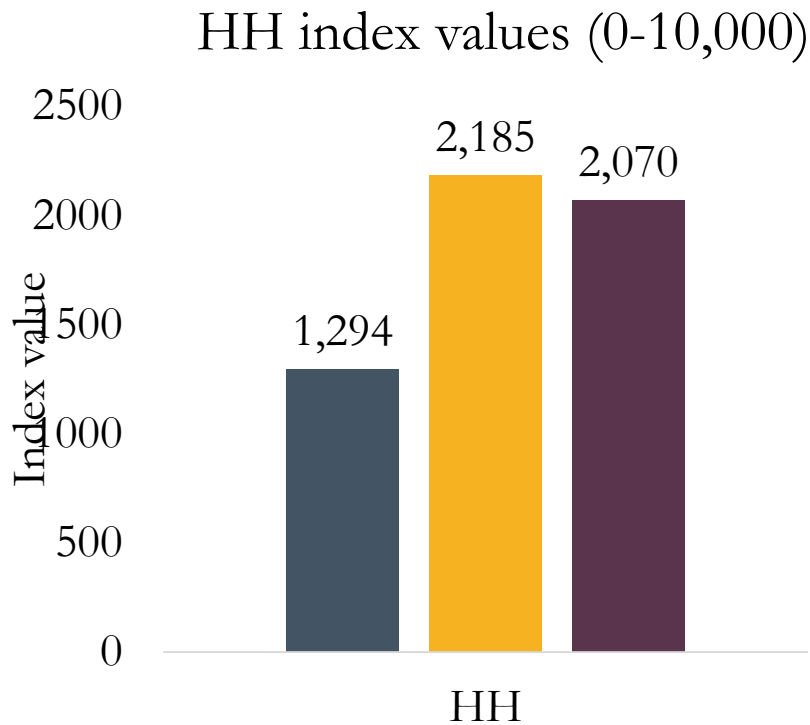
Average age of top 5 rice varieties under cultivation, by farmers' landholding size, Bangladesh



Competition \approx seed market concentration

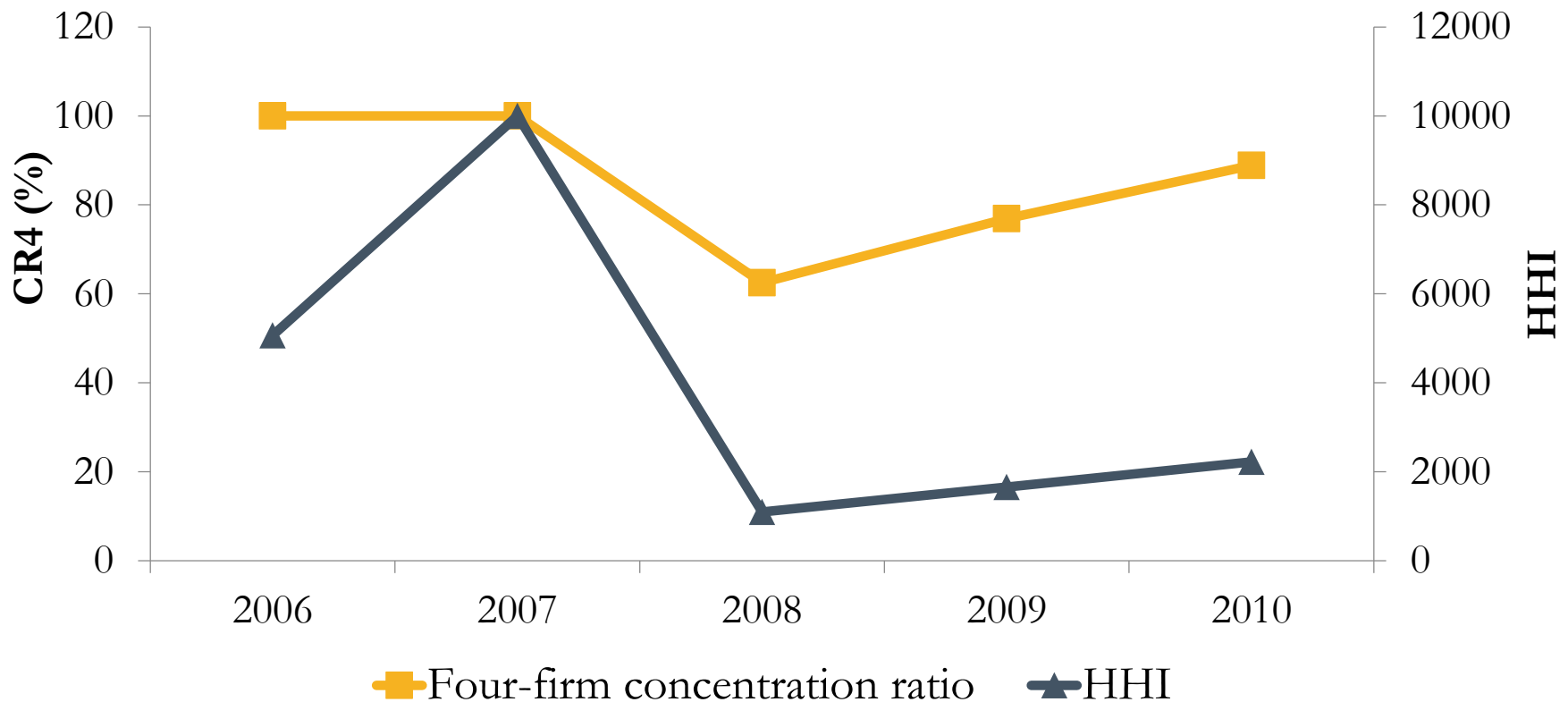
Concentration in Nepal's seed market, by crop, 2012

■ Paddy ■ Wheat
■ Maize



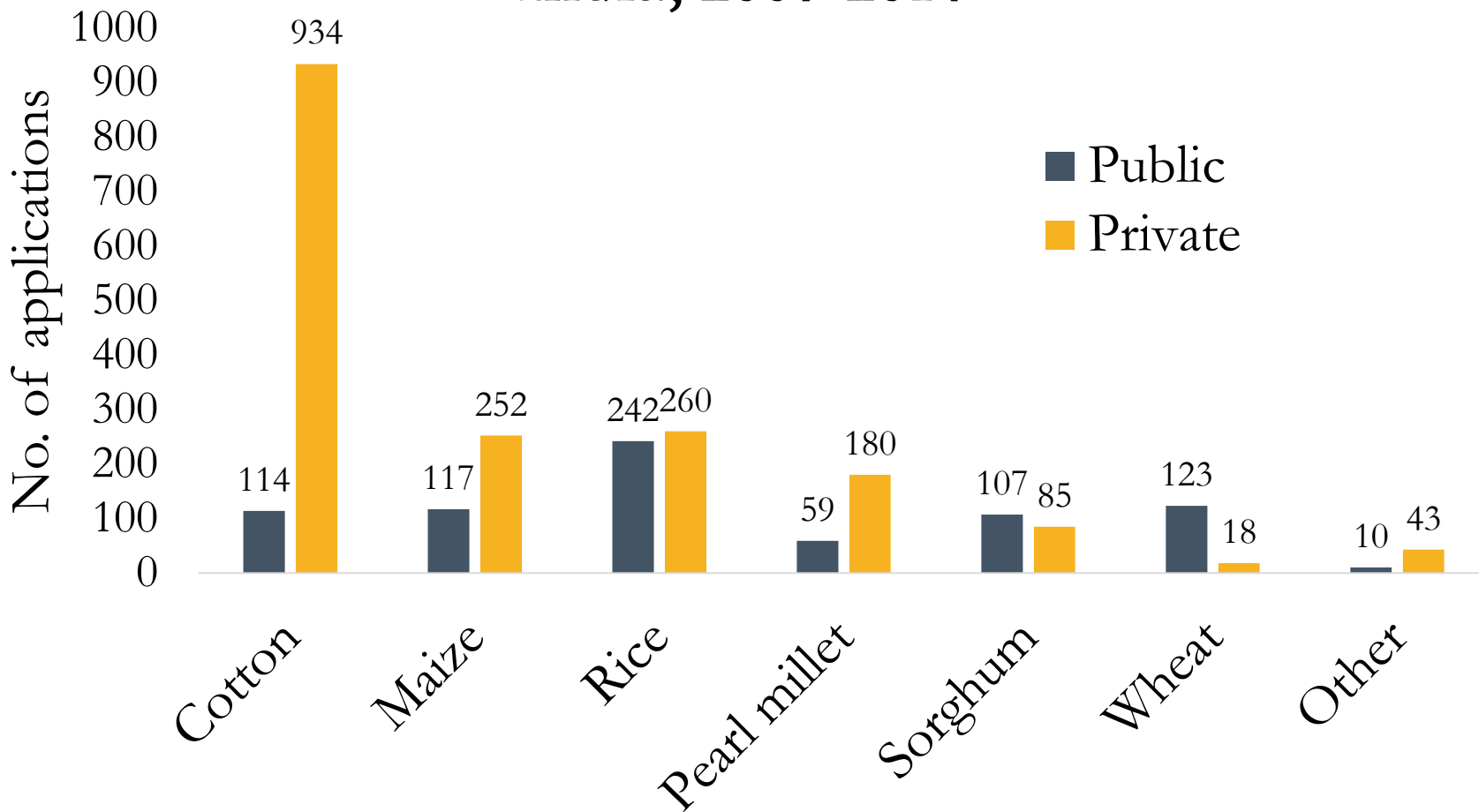
Competition \approx innovation market concentration

Concentration in India's innovation market
viz. transgenic R&D, based on field trial data,
1997–2008



Innovation incentives \approx IP protections

Applications for plant varietal protection, India, 2007-2014



Innovation incentives \approx IP regime strength

China

India

Brazil

South Africa

