

Looking a Gift Horse in the Mouth: China's Production Surge and Innovation in Solar Photovoltaics, 2006–2020

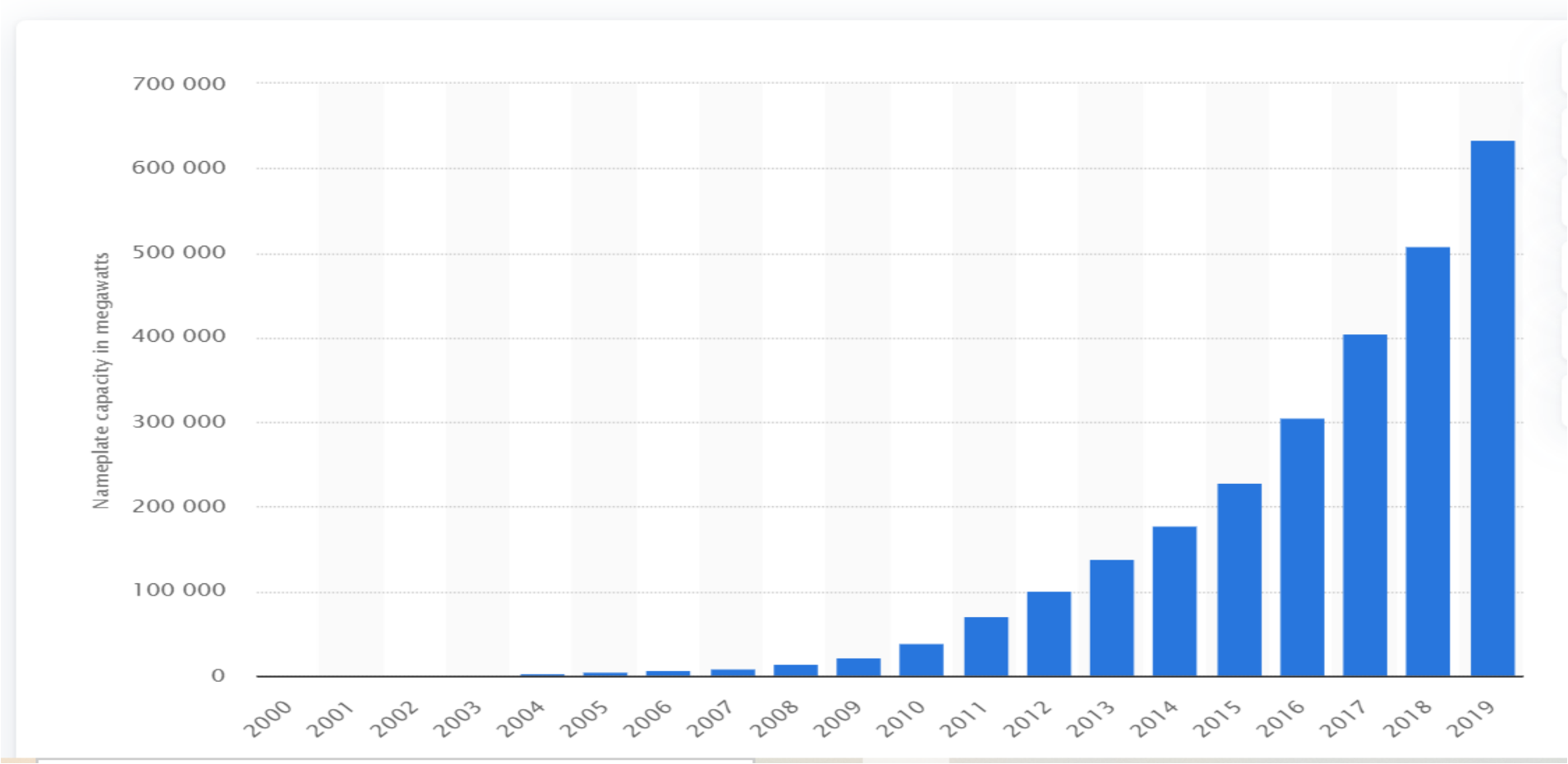
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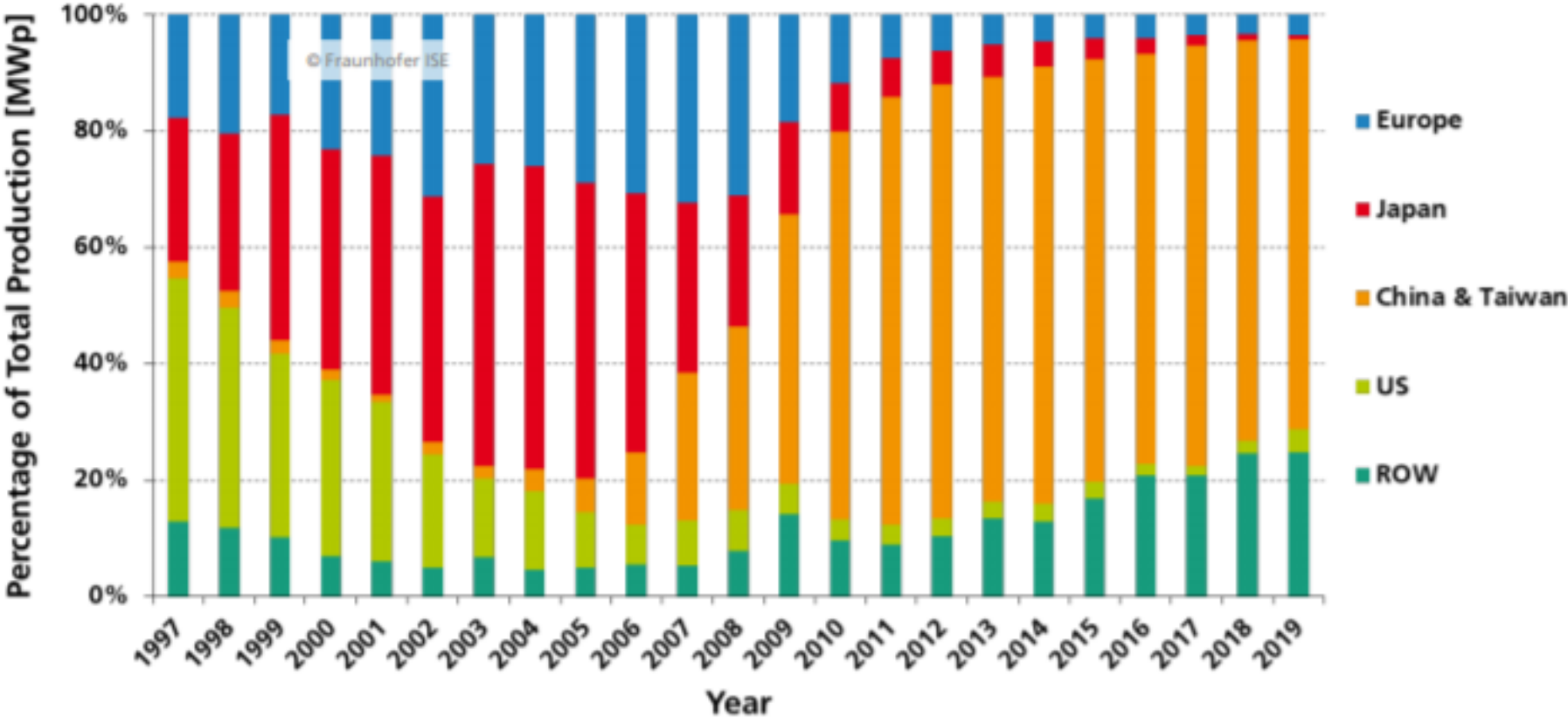
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@ProfDavidHart

Cumulative Global Solar PV Installed Capacity, 2000-2019



PV Module Production by Region, 1997-2019



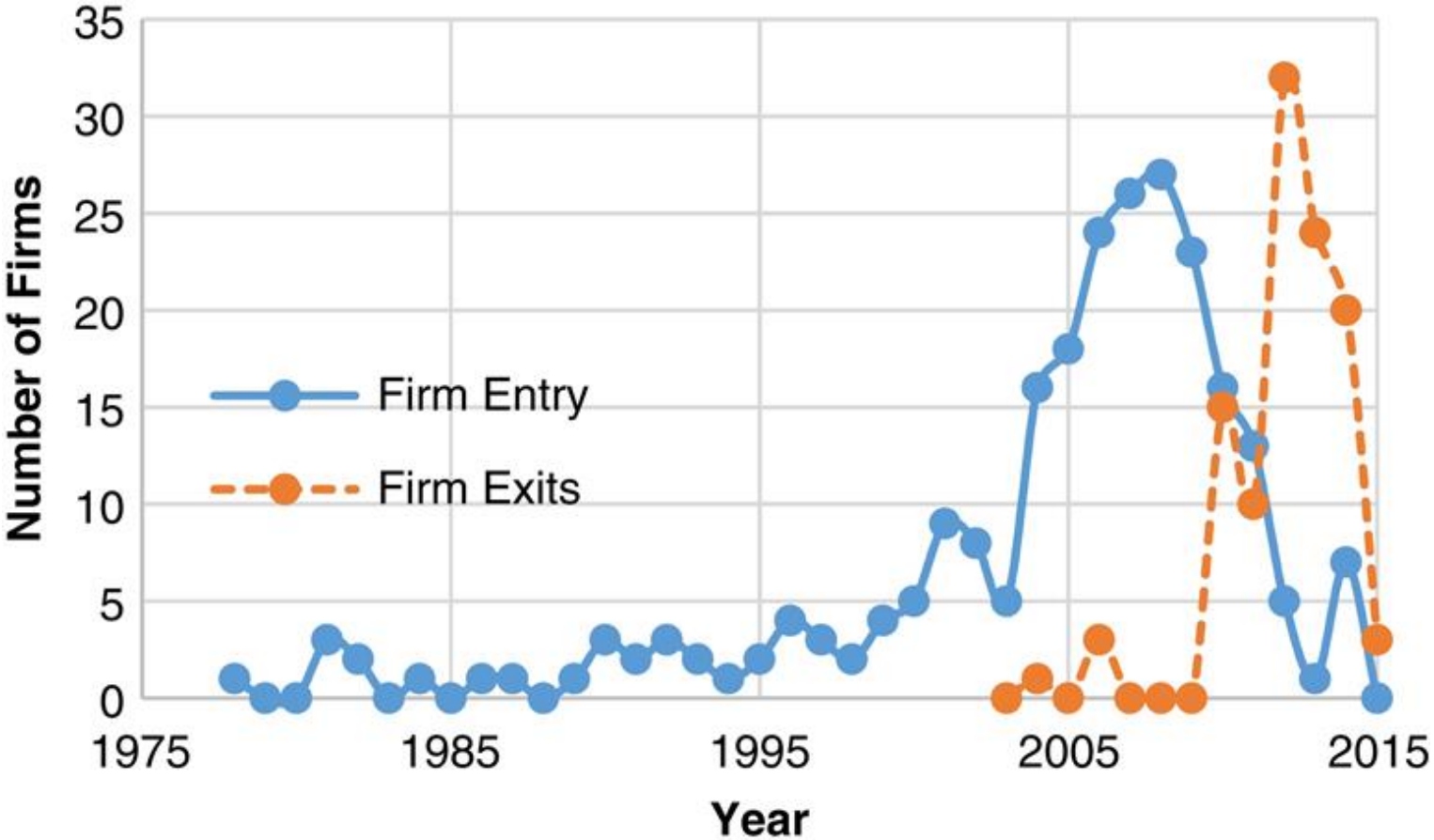
Source:
Fraunhofer ISE

Excludes production from 2010: US Market; Growth: BEE Projects; Growth 2019

The Role of Subsidies in China's PV Surge

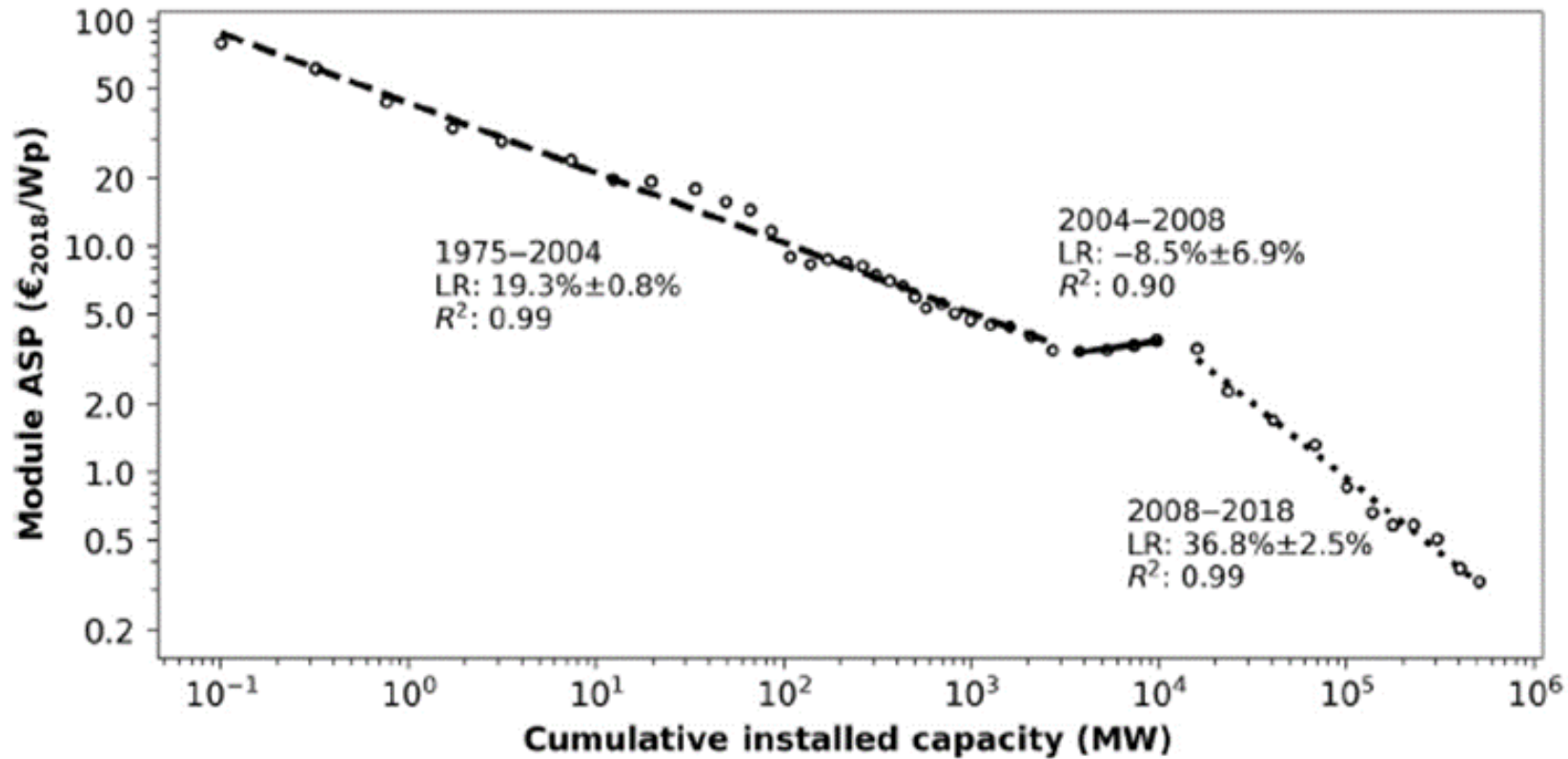
- 2005-2007: inflows of talent, money, and equipment
- 2007-2009: provincial & local govts support export champions
- 2010-2013: central govt backstops consolidation
 - Designation as strategic industry
 - Explosive growth of domestic demand in protected market
 - More than \$40 billion in lines of credit to manufacturers
 - Build-out of supply chain

Firm Entry and Exit in PV Module Manufacturing, 1978-2015



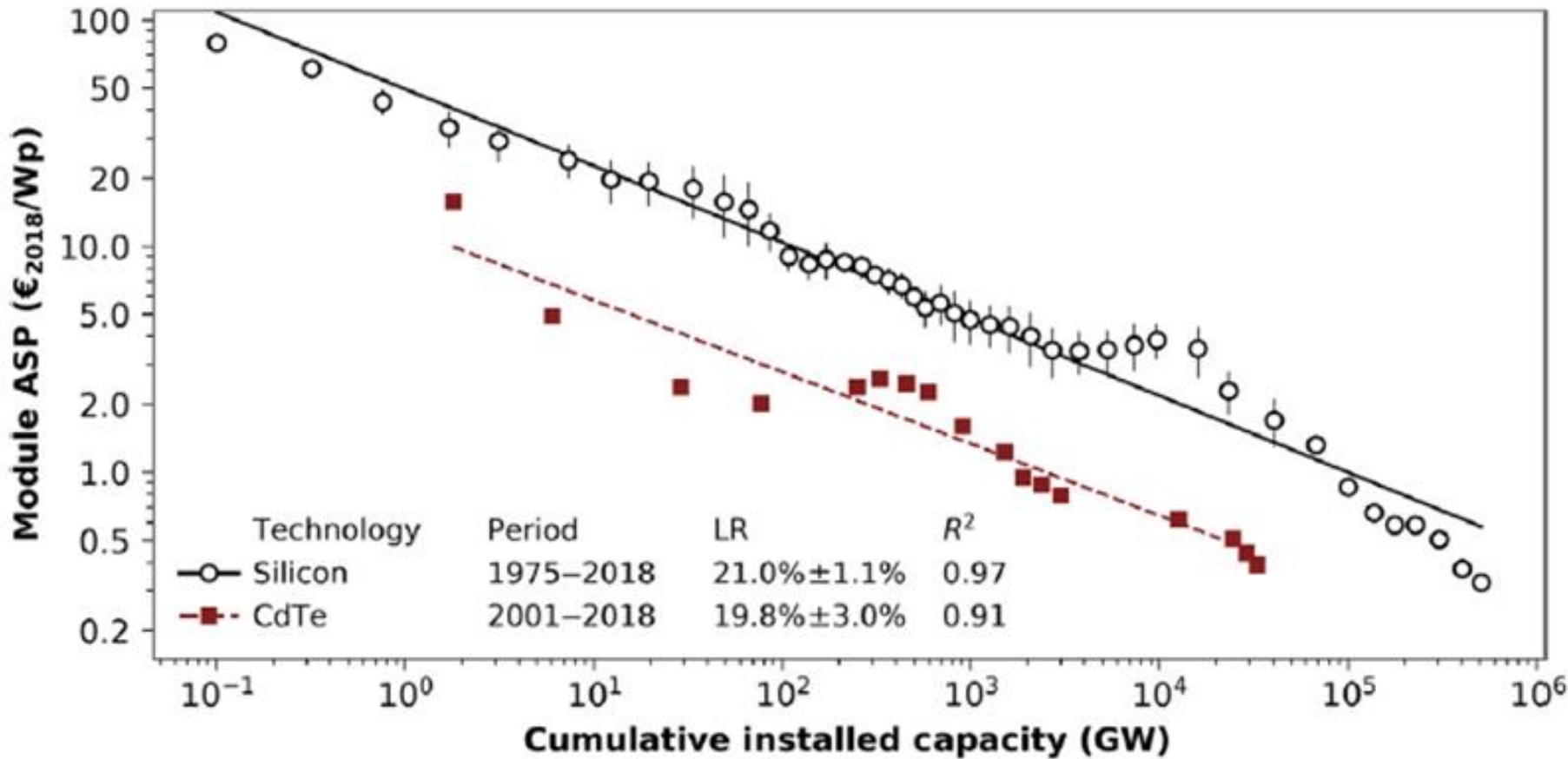
Source: Furr & Kapoor, 2018

“Gift to the World”: Sustained, Rapid Price Declines



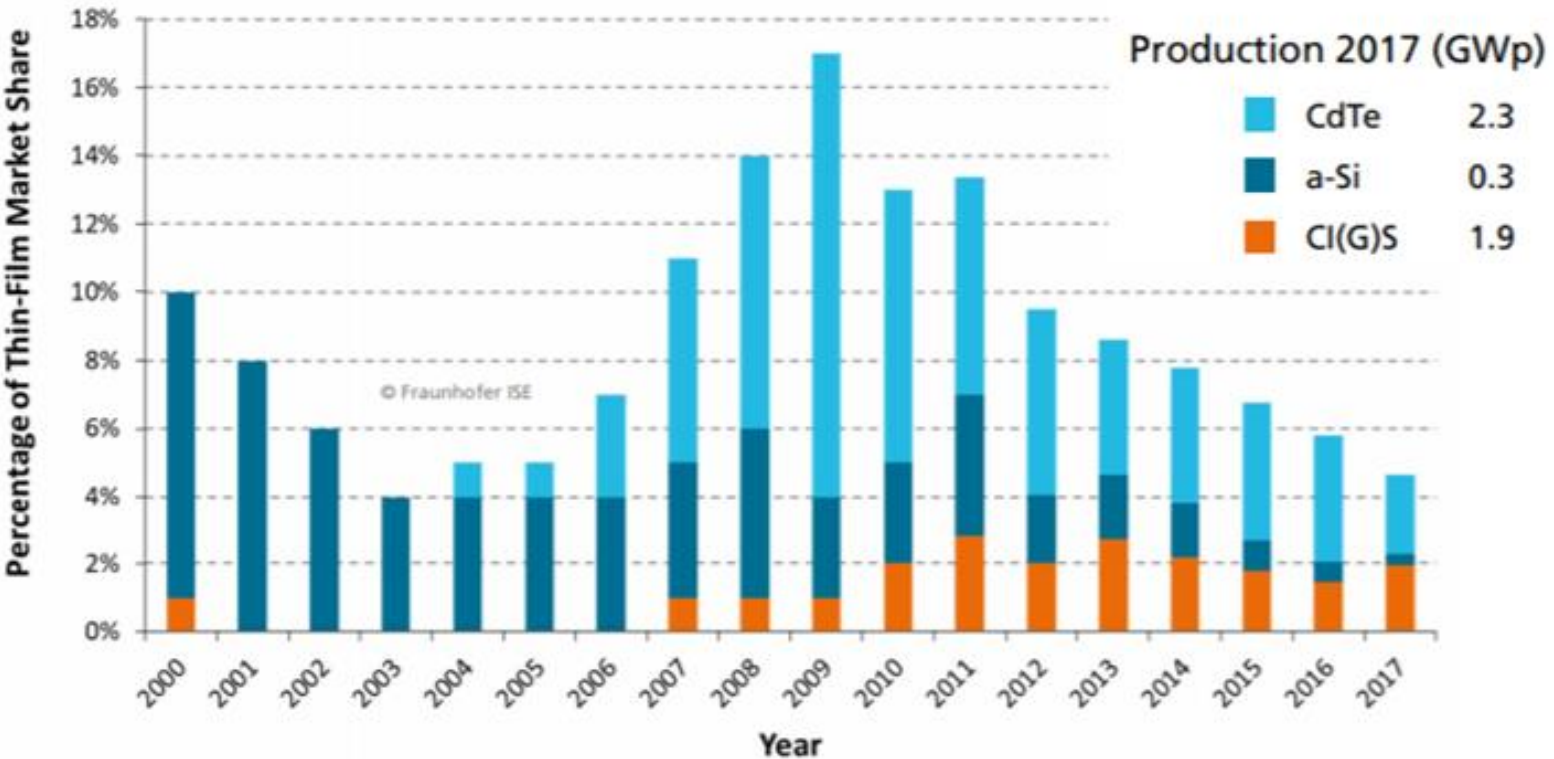
Source:
Louwen & van
Sark, 2020

A Tale of Two Technologies



Source:
Louwen & van
Sark, 2020

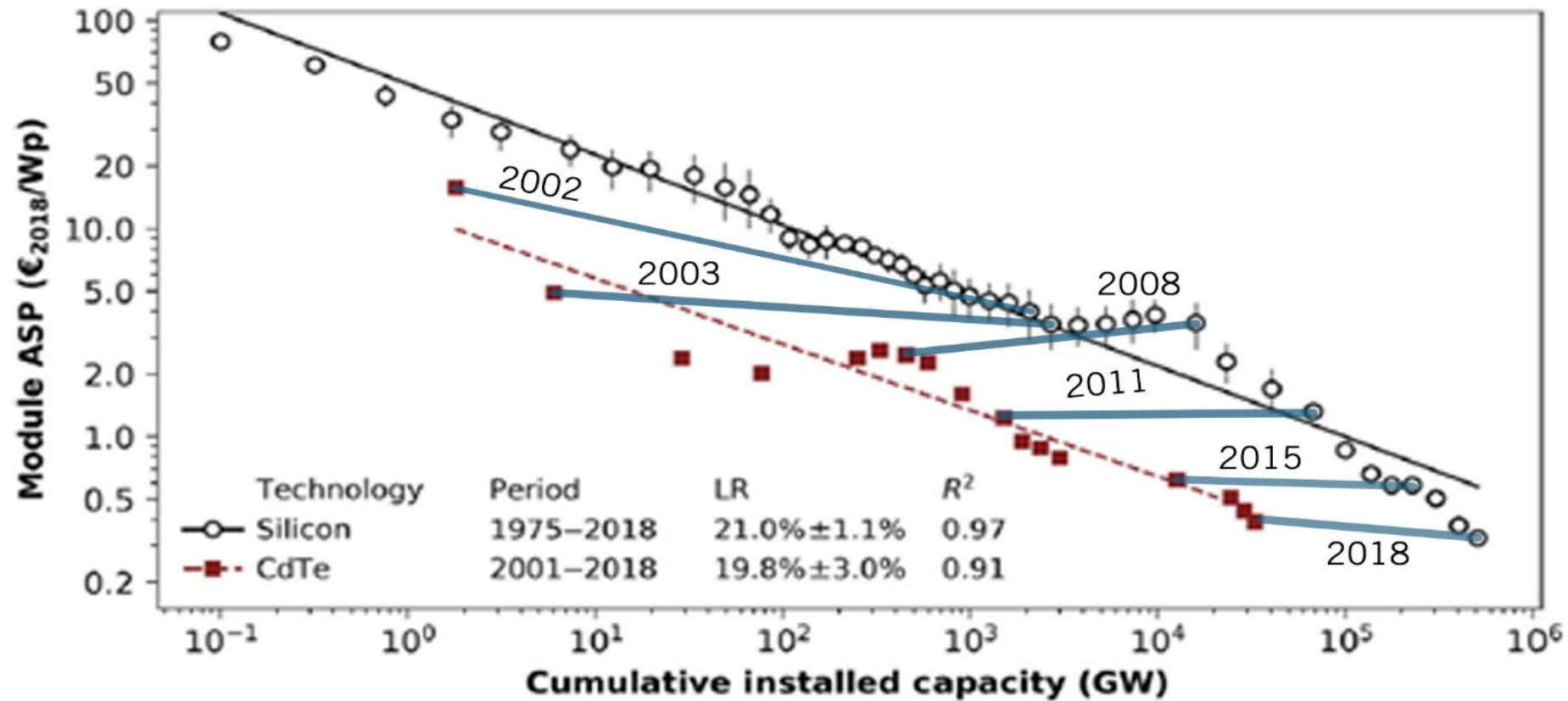
Global Market Share of Thin Film Technologies, 2000-2017



Data: from 2000 to 2010: Navigant; from 2011: IHS. Graph: PSE GmbH 2018

Source:
Fraunhofer ISE

Timing Is Everything



If.... (3 scenarios)

1. CdTe cells had maintained a 10% global market share, or
2. CdTe cells had maintained a 30% market share outside China, or
3. A second firm succeeded in CdTe PV as well as First Solar

...then: “the biggest feel-good story in energy of the past decade could have felt even better.”

Coming Attractions in Climate-tech

- Electric vehicle batteries
- Hydrogen electrolyzers
- Direct air capture devices
- ...

Thank You!

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