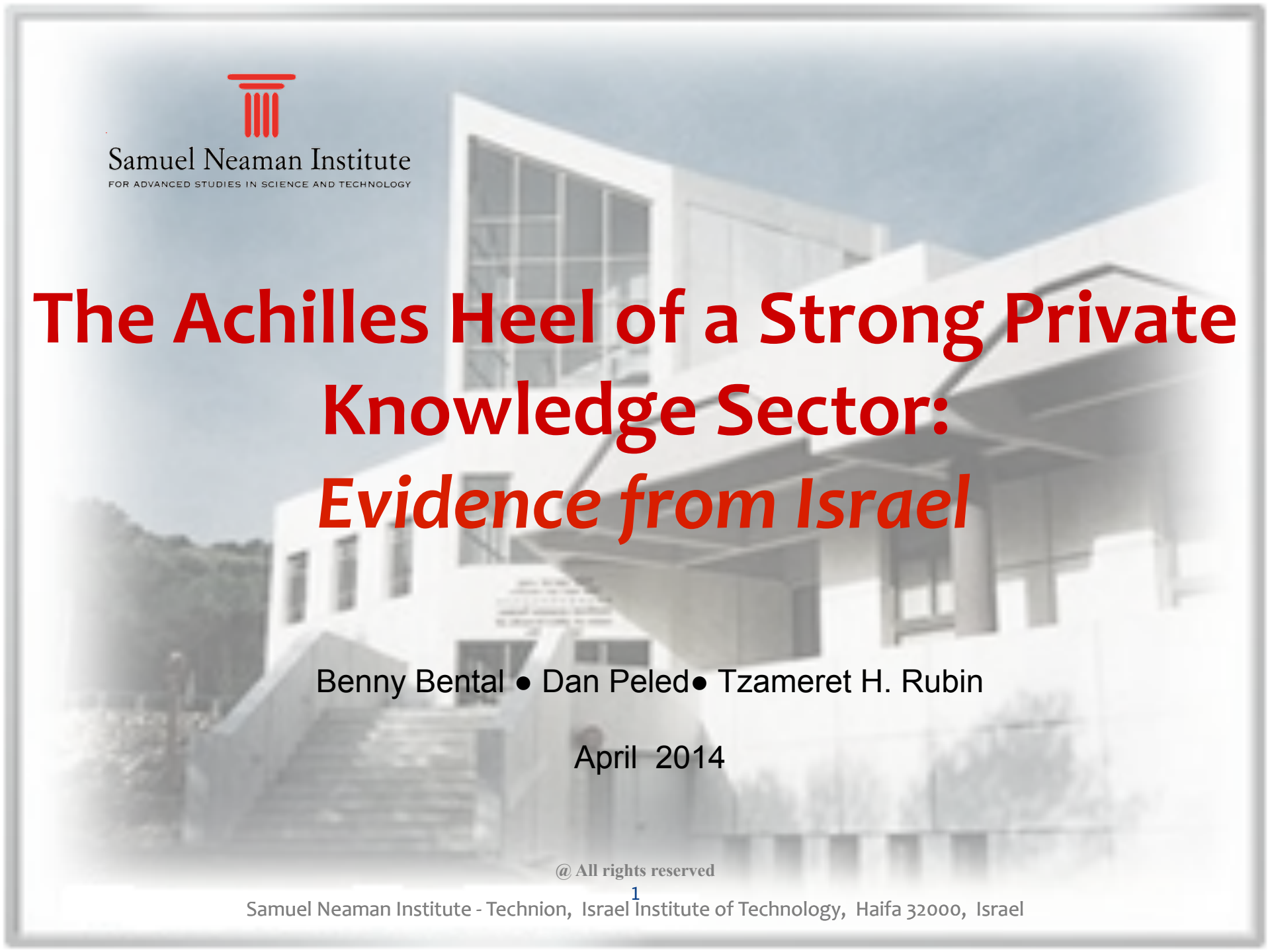

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The Achilles Heel of a Strong Private Knowledge Sector: *Evidence from Israel*

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The bigger picture

We (nations) want to stimulate innovation to create sustainable economic growth, improve citizens wellbeing.

How we do it?
Gov. bridges market failures and support long term innovation investments - one of the mechanism doing so is promoting public R&D. This creates knowledge to 'show the way' and 'educate' the private market by creating outputs such as graduates and knowledge in general (measured in patents, publications etc.)

So??
A flourishing R&D in the private sector is it 'that bad'??

Looks like Israel innovation indicators are leading among OECD countries, so why to question what is going right?

A Global Challenge

Israel is not the only country that asks these questions.
The National Academy of Science (NAS) conducted a comprehensive review of how the U.S. research universities should face the **growing competition**, losing its advantage it had enjoyed since World War II. The **reduction in gov. support**, and technological changes that allows **fast growing countries to 'catch up'** .

The Research Scope

The Israeli National Council for Civilian R&D - a consulting gov. body - have assigned the Technion SNI to examine **'The Israeli research Universities' role in the national R&D system'.**

- Looking at other innovation systems in the world
- **Inputs**
- **Outputs**
- recommendations

INPUTS

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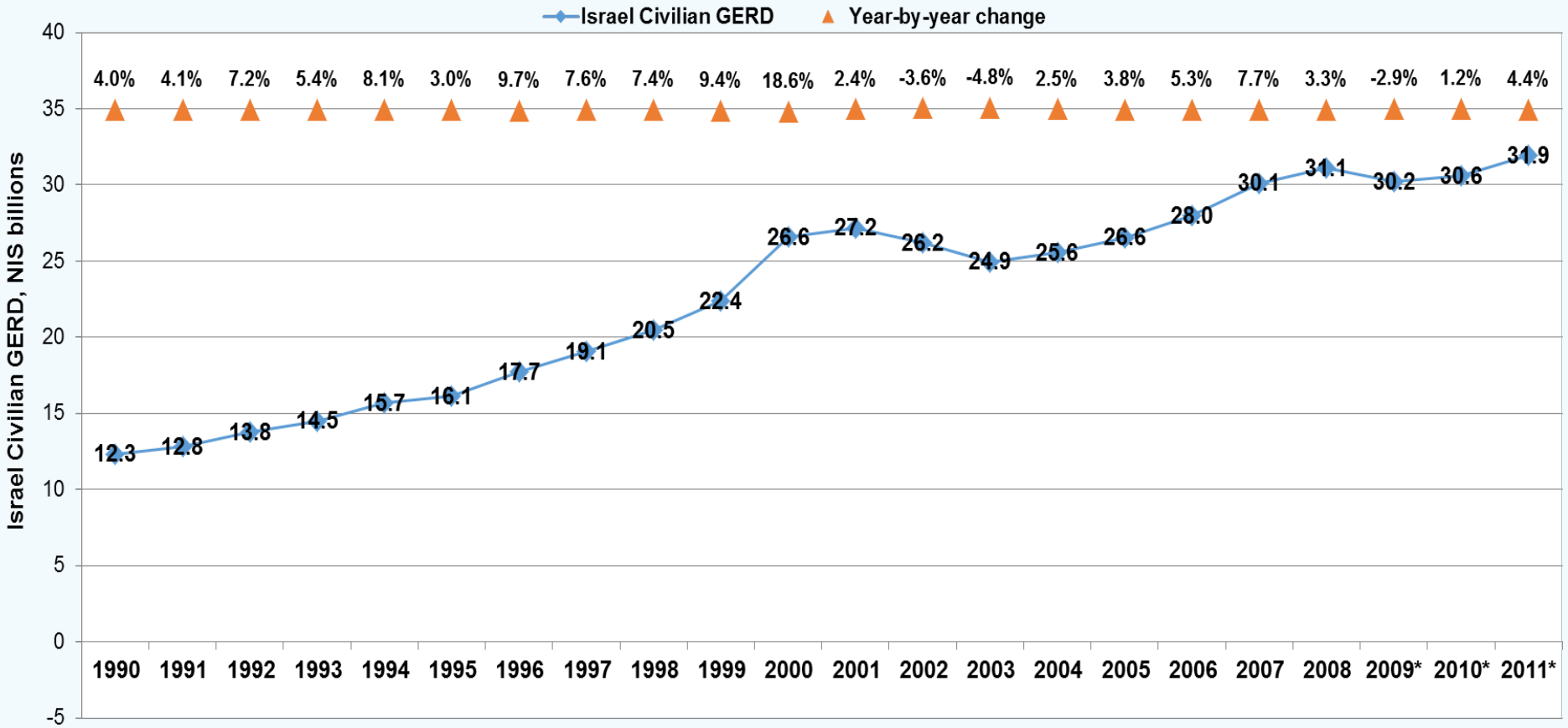
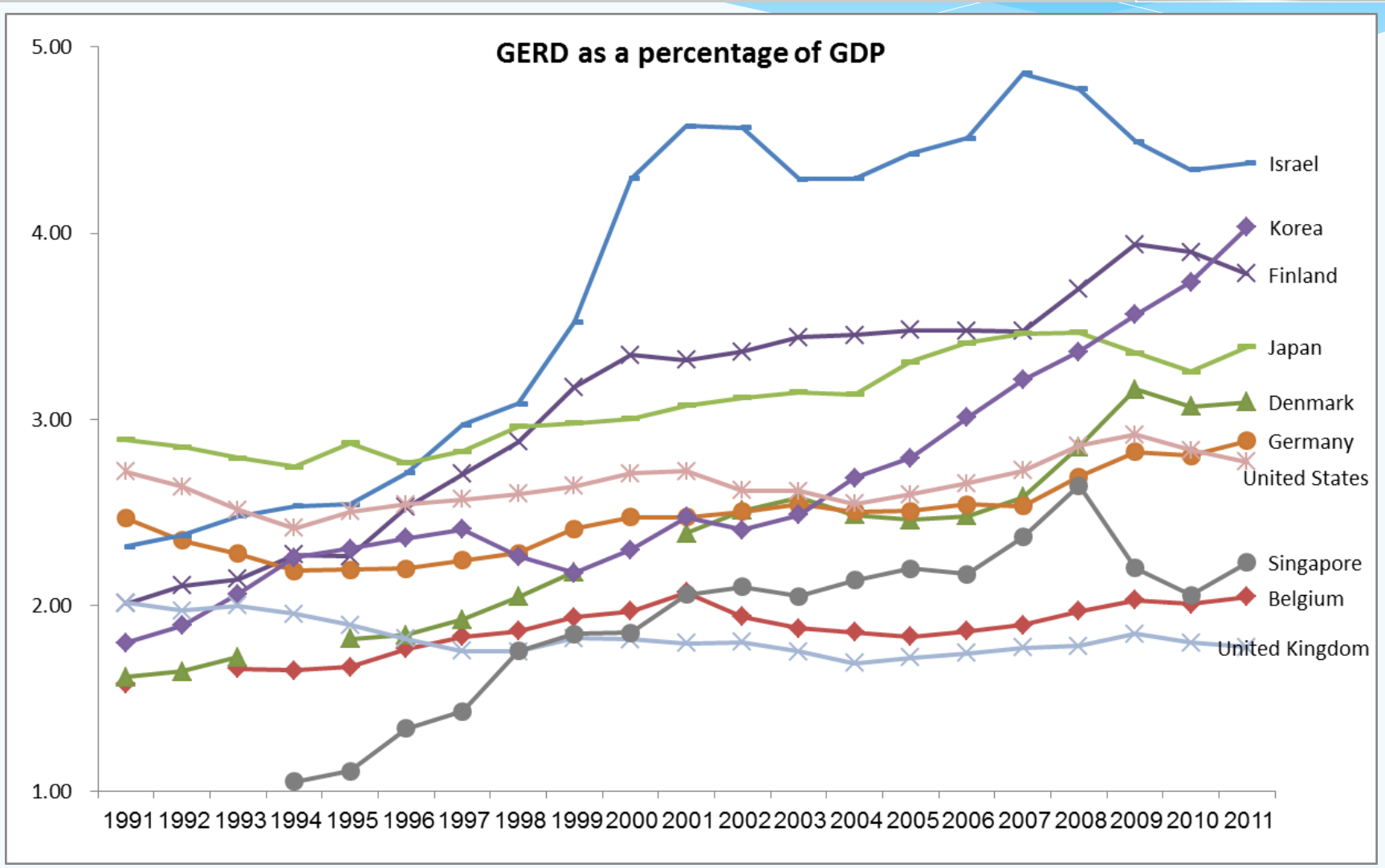
Civilian GERD



GERD/GDP


GERD as a percentage of GDP
5.00
4.00
3.00
2.00
1.00
1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011
Israel
Korea
Finland
Japan
Denmark
Germany
United States
Singapore
Belgium
United Kingdom

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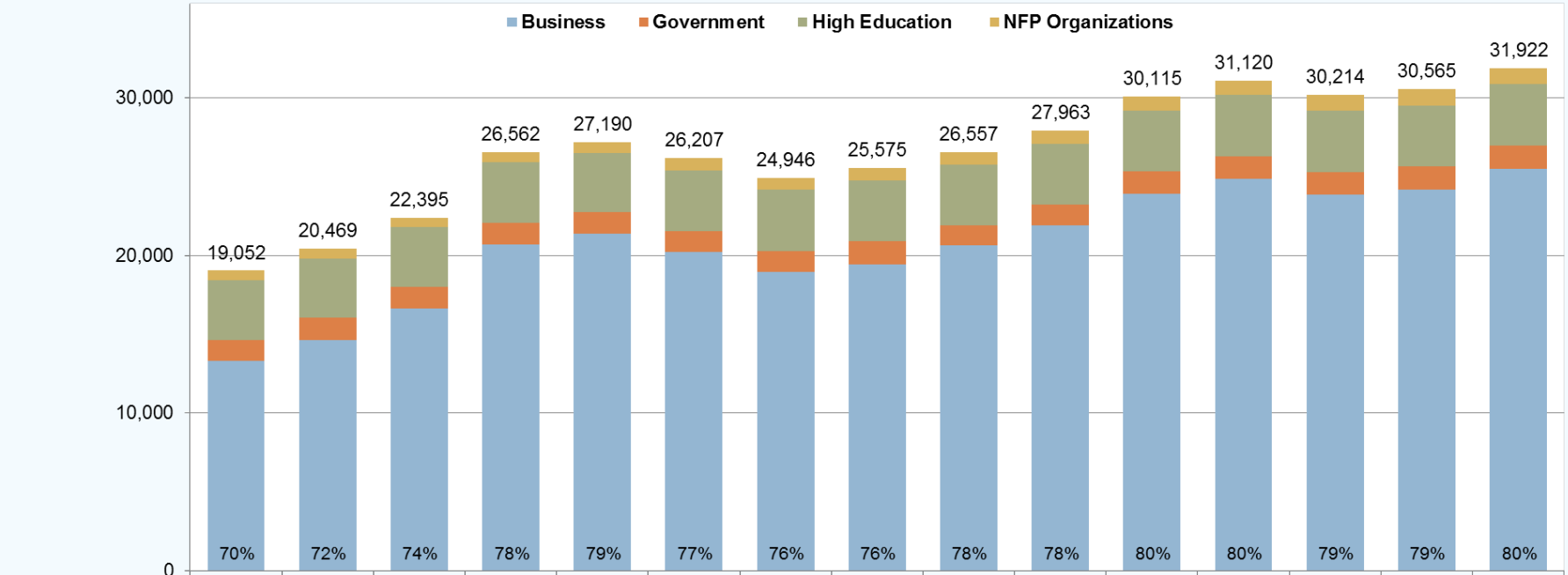
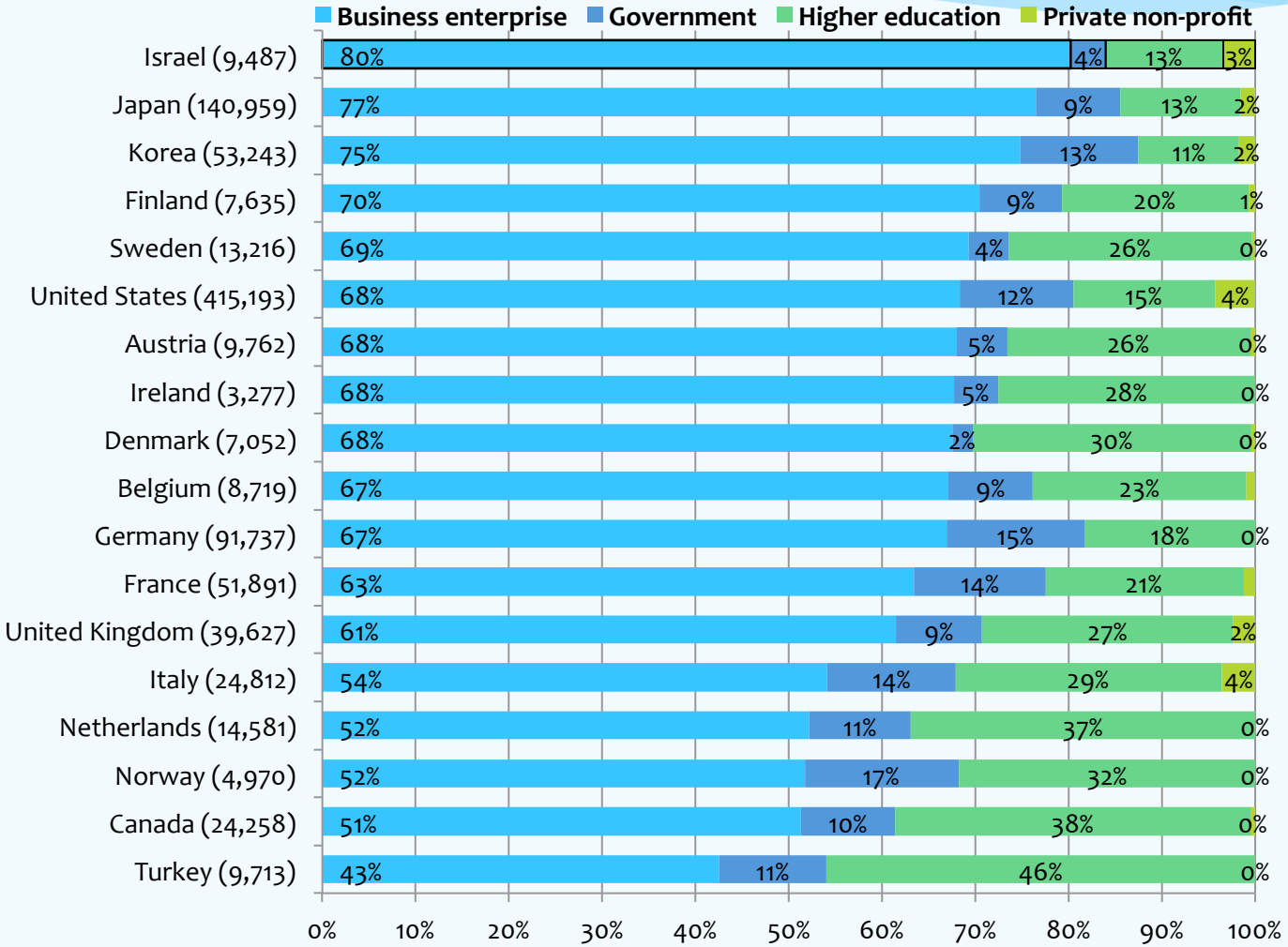
Civilian GERD by Performing Sector Israel



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	*2010	*2011
Total	19,052	20,469	22,395	26,562	27,190	26,207	24,946	25,575	26,557	27,963	30,115	31,120	30,214	30,565	31,922
NFP Organizations	620	657	605	640	659	779	734	814	792	882	903	927	1,001	1,018	1,054
High Education	3,802	3,739	3,779	3,825	3,775	3,851	3,923	3,869	3,848	3,852	3,858	3,916	3,911	3,885	3,888
Government	1,300	1,416	1,363	1,395	1,366	1,344	1,302	1,427	1,277	1,298	1,402	1,407	1,446	1,467	1,475
Business	13,330	14,657	16,647	20,703	21,391	20,232	18,987	19,466	20,641	21,931	23,953	24,870	23,857	24,196	25,505

GERD by Performing Sector, International comparison, 2011



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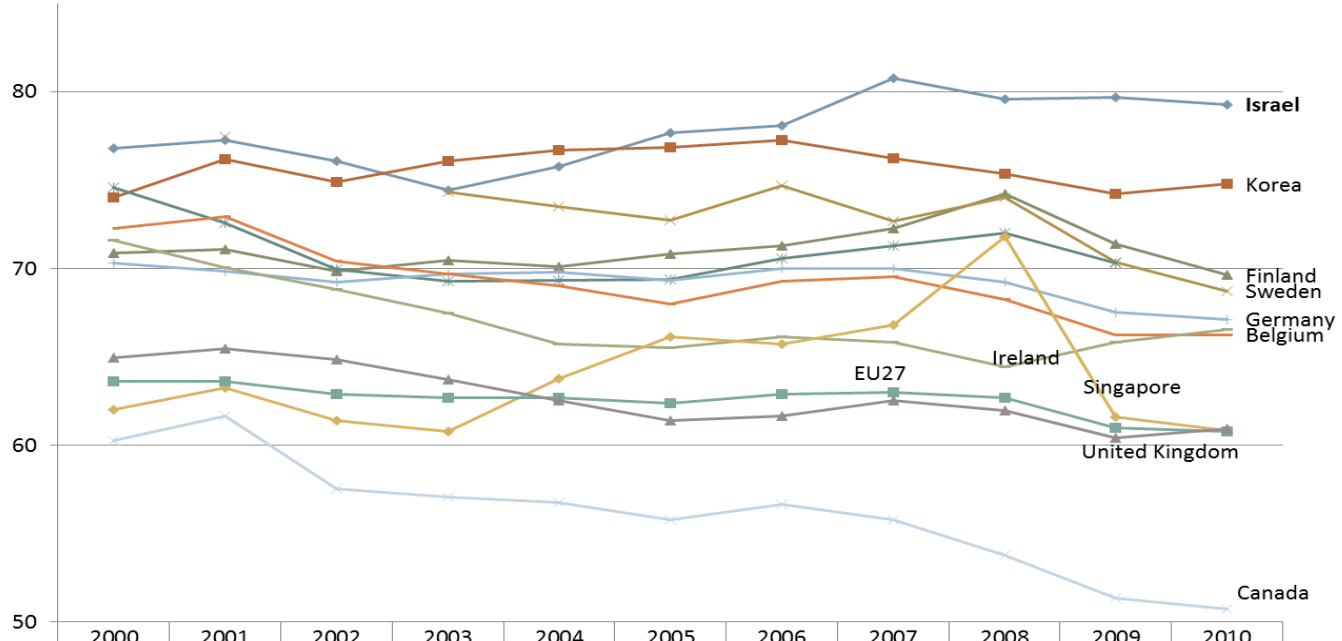
Share of GERD Performed by Business Sector IL vs. other countries



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Israel	76.8	77.3	76.1	74.4	75.8	77.7	78.1	80.8	79.6	79.7	79.3
Korea	74.0	76.2	74.9	76.1	76.7	76.9	77.3	76.2	75.4	74.3	74.8
Finland	70.9	71.1	69.9	70.5	70.1	70.8	71.3	72.3	74.3	71.4	69.6
Sweden		77.5		74.4	73.5	72.7	74.7	72.7	74.1	70.4	68.7
United States	74.6	72.6	70.0	69.3	69.4	69.4	70.6	71.3	72.0	70.3	
Germany	70.3	69.9	69.2	69.7	69.8	69.3	70.0	70.0	69.2	67.6	67.2
Belgium	72.3	73.0	70.4	69.7	69.1	68.0	69.3	69.5	68.3	66.3	66.3
Ireland	71.6	70.1	68.8	67.5	65.7	65.5	66.1	65.9	64.5	65.8	66.6
Singapore	62.0	63.3	61.4	60.8	63.8	66.2	65.7	66.8	71.8	61.6	60.8
EU27	63.7	63.6	62.9	62.7	62.7	62.4	62.9	63.0	62.7	61.0	60.8
United Kingdom	65.0	65.5	64.8	63.7	62.6	61.4	61.7	62.5	62.0	60.4	60.9
Canada	60.3	61.7	57.6	57.1	56.8	55.8	56.7	55.8	53.8	51.3	50.8

GERD by Funding Sector, 2009

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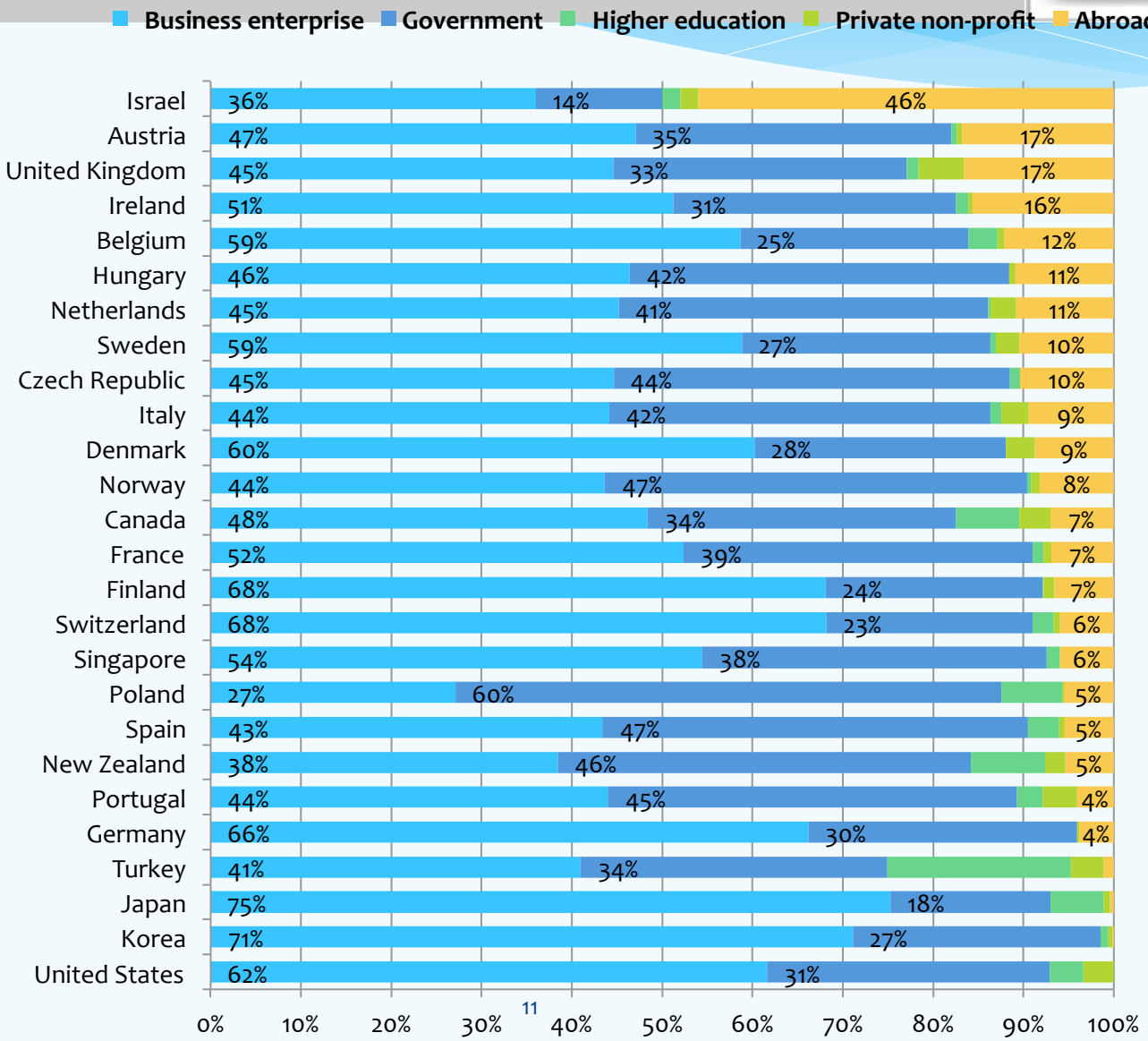

Universities' OUTPUTS

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High Education System performances

- All 7 research Uni. In Israel are in top 500 (ARWU 2013)
- The quality of academic research – ranking among the 40 OECD countries, (top 25% article cited, normalized by the country's GDP), **Israel is ranked fourth among the 40 developed countries**
- The number of triadic patents per Billion $ GDP: Israel 1.68, OECD average 0.42

Methodology I

We wanted to understand if the outputs in the Israeli industries is different than the universities outputs, measured in PCT Patents Applications.

The problem – matching Industry Classification codes ISIC with PCT fields codes.

Solution – using a Lybbert and Zolas concordance - they map the probability of each PCT code to match a specific industry.

We took the universities patents convert them to industry codes, and did the same for private companies patents.

Methodology II

Data: we use PATSTAT data looking at European Patent Office (EPO) in the years 1990-2010.

First , we present **universities patent data relative to the total patents granted** in each of these countries in order **to understand the significance of universities activity within its country.**

Second, we examine the **areas of universities patents in relation to the segments of the business sector** in Israel and each of its benchmarked countries

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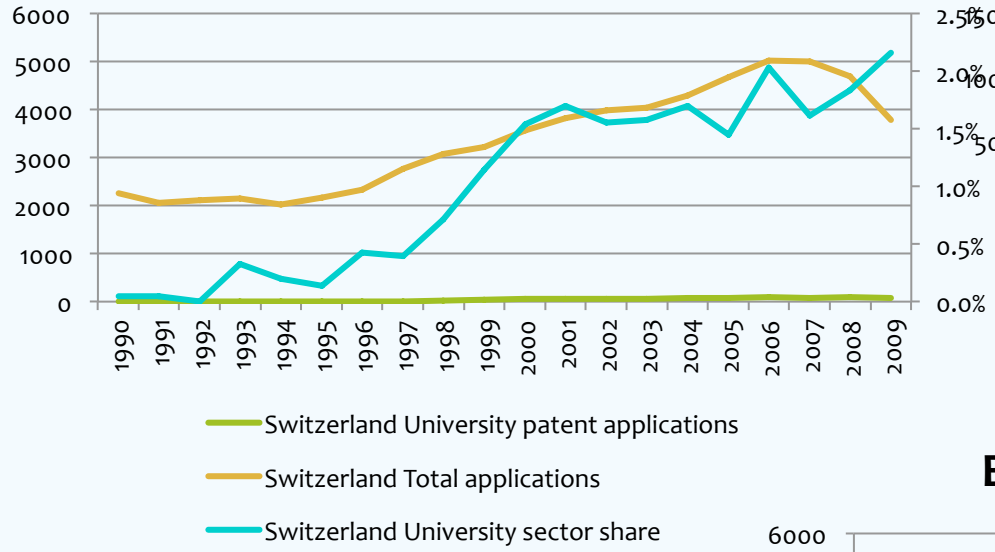
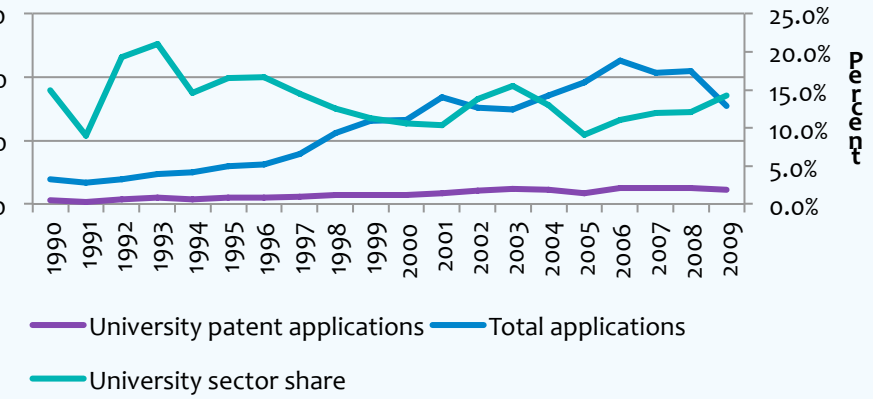
EPO Patents Applications

EPO Patent Applications - CH

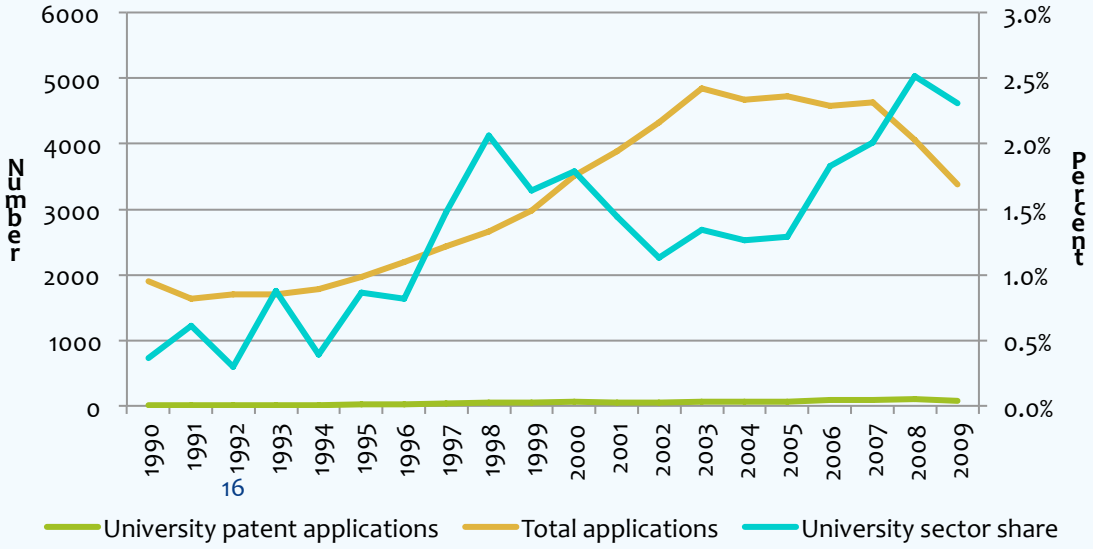


EPO Patent Applications - IL



We attributed **the Israeli significant role of universities in patenting due to the declining government funding of research that 'pushed' the universities to look for other research funding,** where patents are used to secure any commercial process.

EPO Patent Applications - NL



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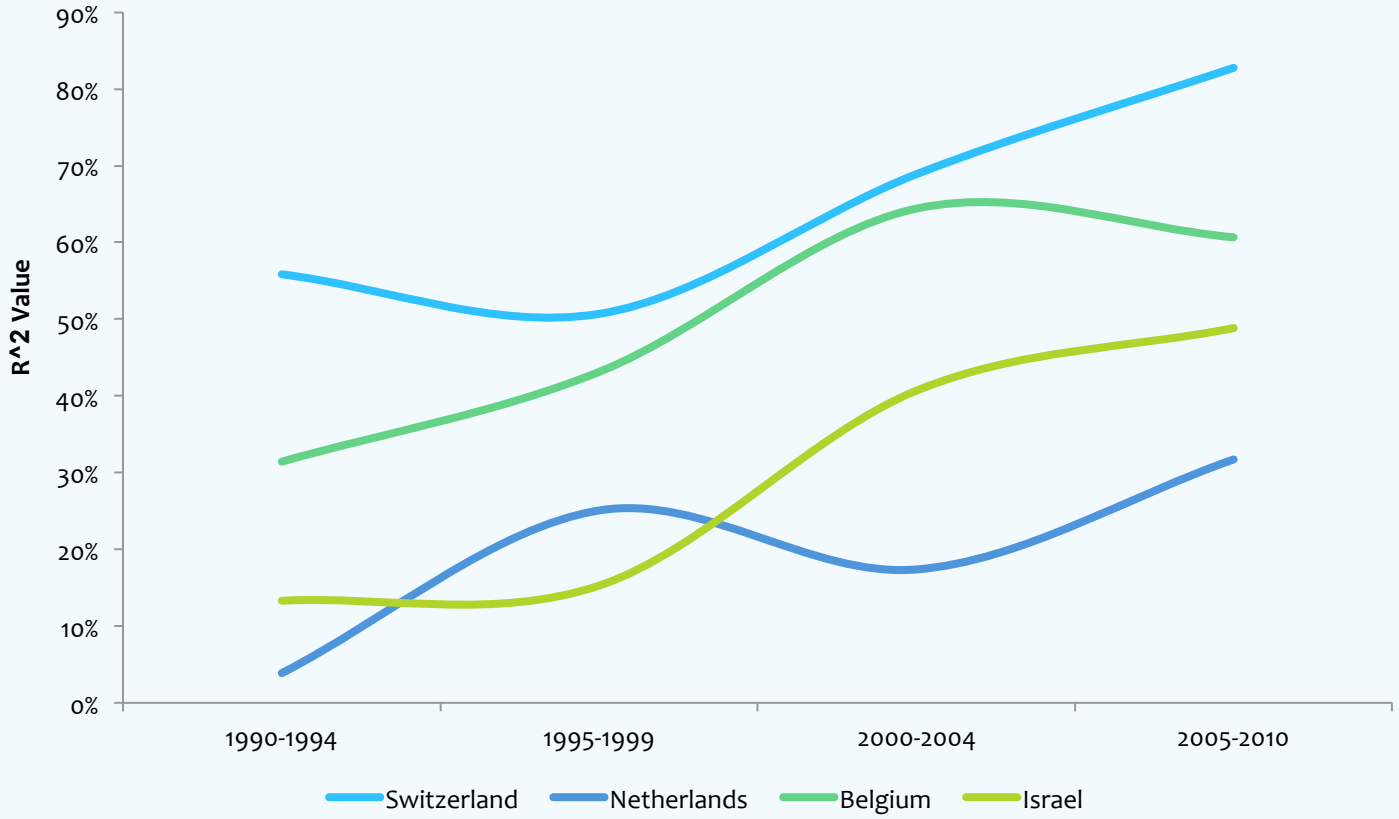
Correlation Along the Years Between a Few Comparable Countries, by using the Concordance



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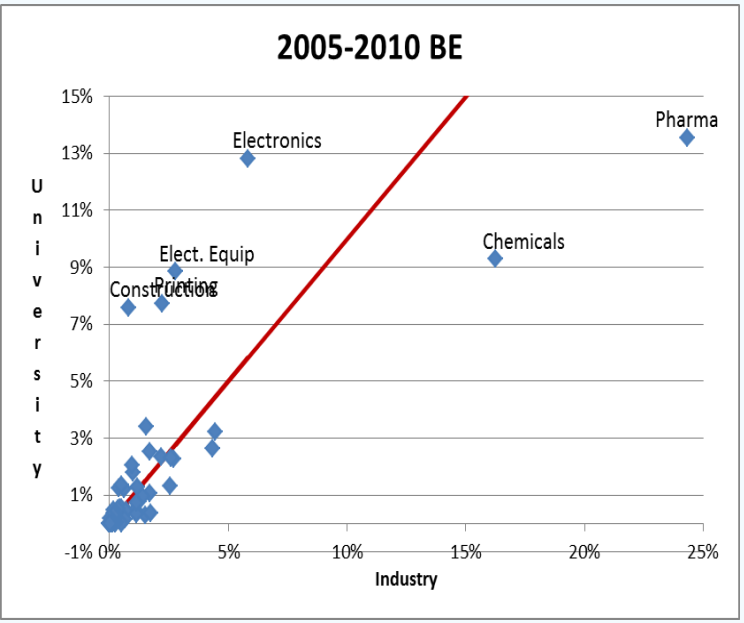
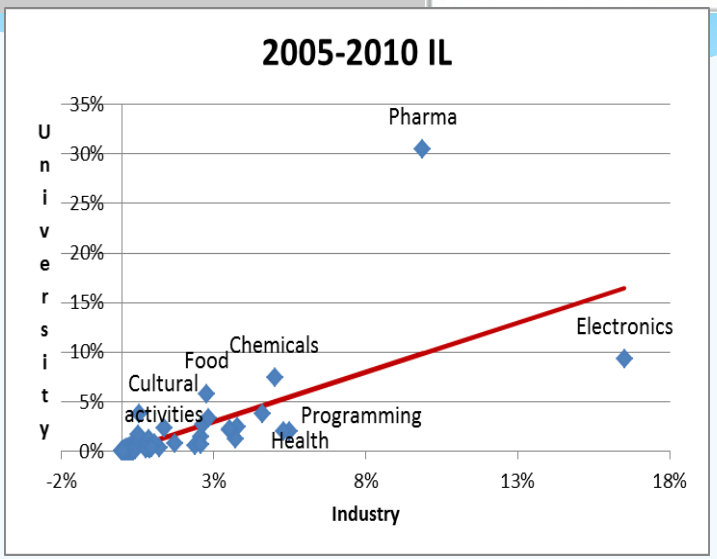
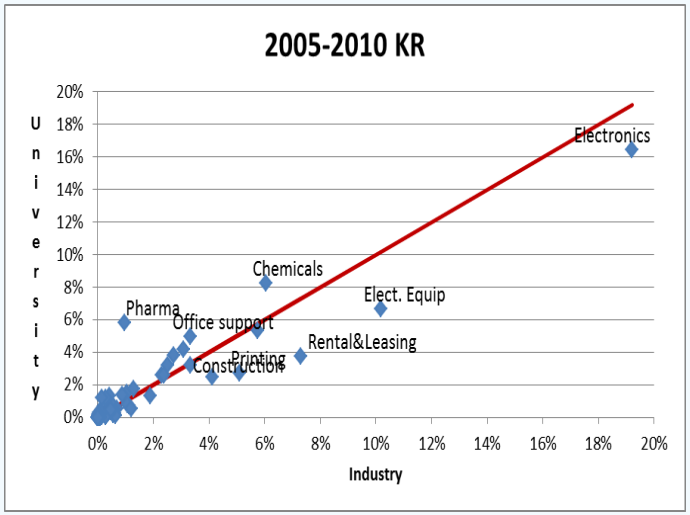
Uni. and Private Sector Patents, Correlations by Field







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Patents Applications Counts

With a dominant private sector in R&D expenditure, if businesses are not aligned with universities fields of research, such gap of knowledge and resources might cause a future problem in the national R&D system in terms of graduates and in terms of the ability to leverage universities knowledge.

The End