

# Russia's State Capitalism and its Transition to a Knowledge Economy

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# Structure

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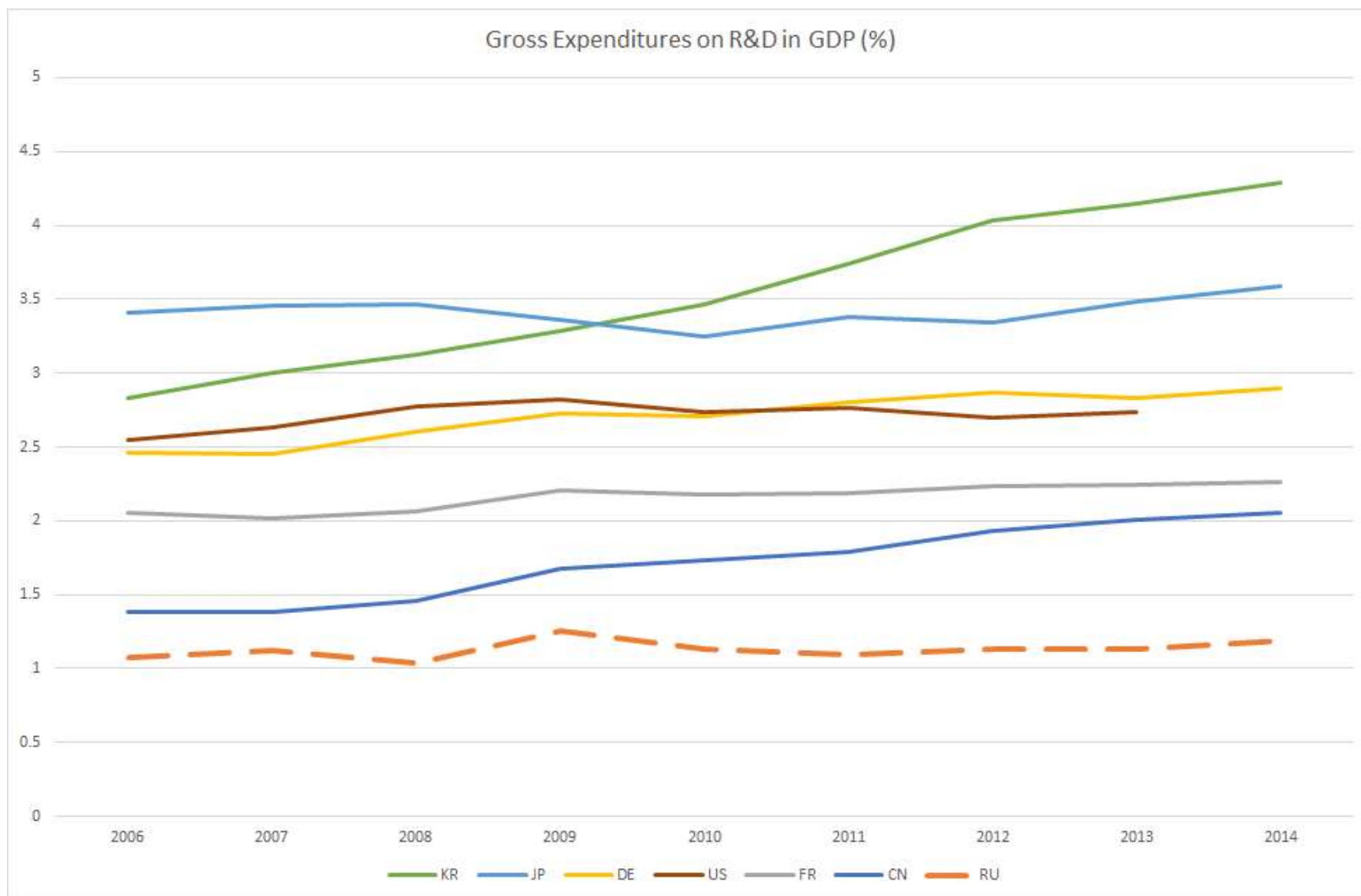
# 1. Motivation

- After the Crimea incident, Russia seems to be more isolated from a “Western” world.
- Under the condition of the globalized world, the competences in the science and technology (S&T) would decide competitiveness of the country.
- In the field of the S&T the importance of the international collaboration has become more and more important.
- How does Russia cope with these situations?

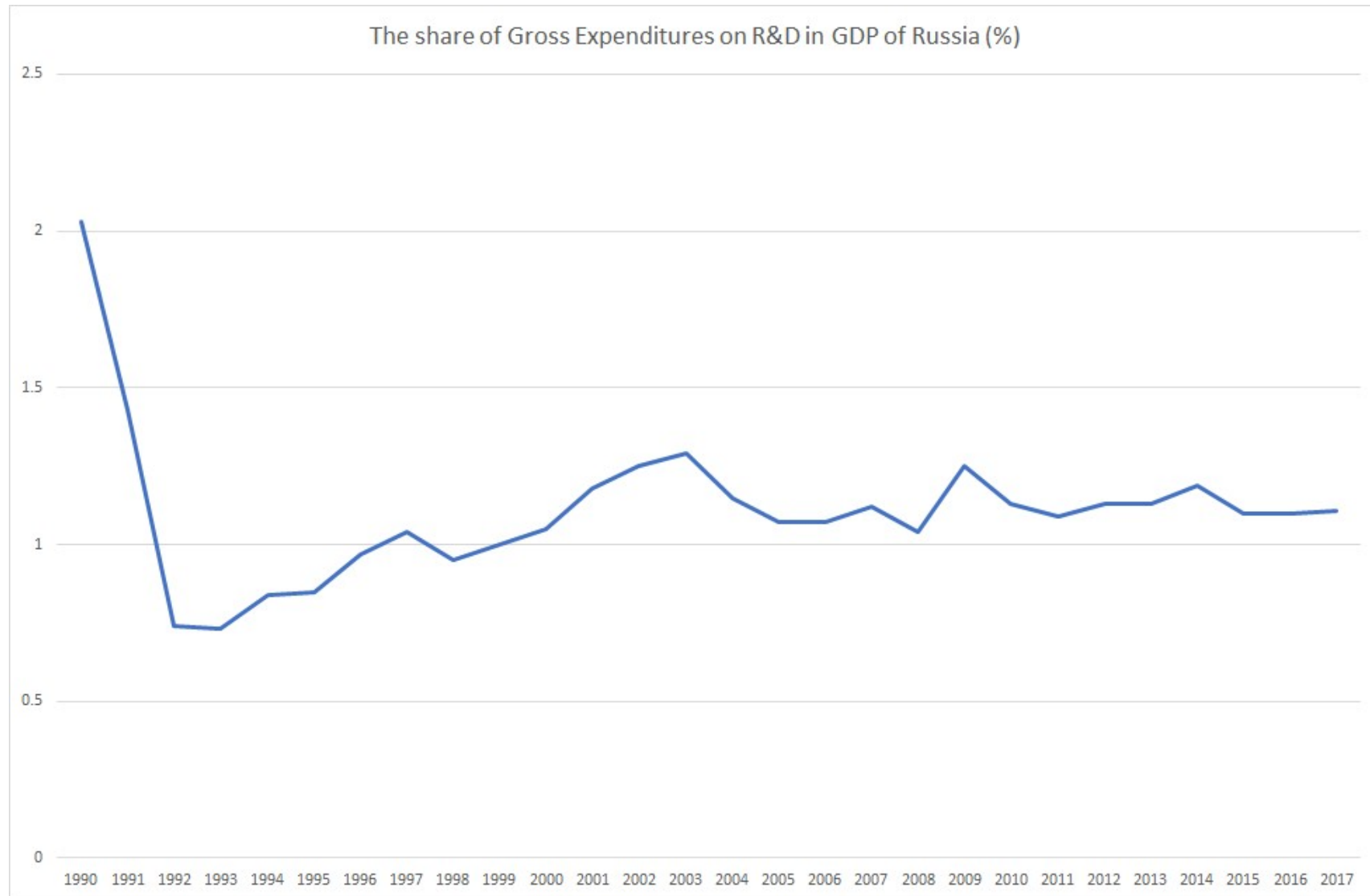
## 2. Literature review & data

- Balzer (2016) clarifies reasons behind Russia's dire situation concerning S&T area that the government has an incoherent policy with insufficient budget resources. A lot of young and talented students go abroad, and the institutions of higher education fail to attract them.
- Tsuda (2018) showed a relatively high share of government expenditures on S&T (67.6% in 2013), which contradicts with a high share of Private sector of Japan and China, 75.7% and 74.6% respectively.

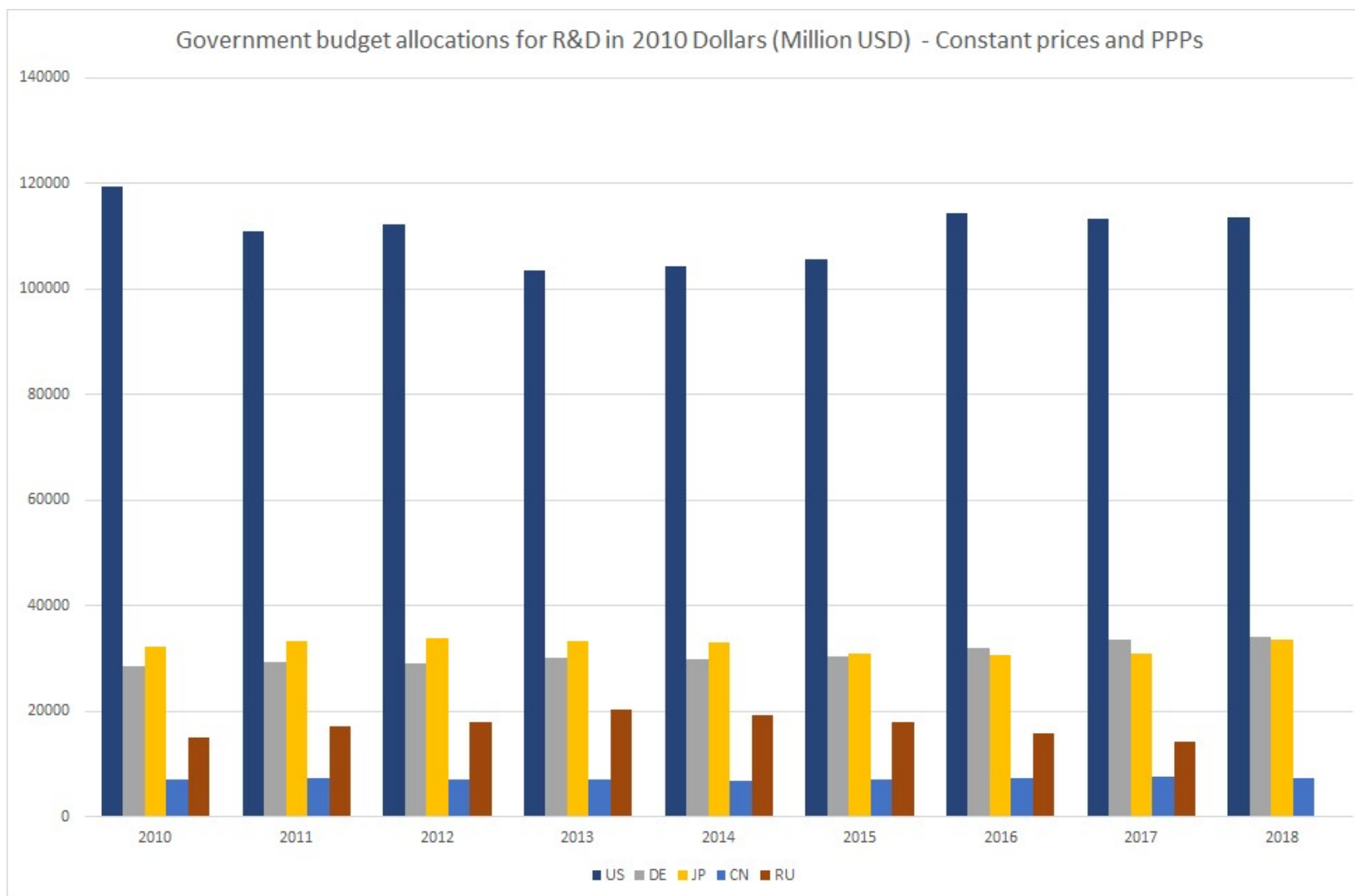
## 2. Literature review & data



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- Kulikov (2016) argues that government-led approach to promote scientific researches in Russia has build a social relation of “*Lordship and Bondage*.” Lack of democracy does not lead to the relations on the base of the business attitudes.
- Vorontnikov (2019) reports that Western sanctions and counter-sanctions of Russian government after Crimea incident have curtailed potential collaborations with foreign researchers.

# 3. Method

- A country's competitiveness in S&T nearly equals to a power to produce articles.
- We utilize Murakami and Igami (2019) to calculate country's power to produce articles in S&T.
  - To compare total number of articles in Russia
  - To compute international involvement score
  - To estimate competitiveness of Russian S&T sector

### 3. Method: Total # of articles

Order of the number of the articles

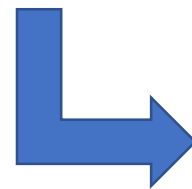
2011-2013				2013-2015			2015-2017		
	Country	Total	Index	Country	Total	Index	Country	Total	Index
1	US	327664	11.56	US	347171	11.15	US	363836	10.21
2	CN	187113	6.60	CN	250412	8.04	CN	312600	8.78
3	DE	92783	3.27	DE	97790	3.14	UK	105497	2.96
4	UK	89033	3.14	UK	96328	3.09	DE	103657	2.91
5	JP	77094	2.72	JP	77203	2.48	JP	78747	2.21
6	FR	65969	2.33	FR	69268	2.22	FR	72863	2.05
7	IT	56116	1.98	IT	61783	1.98	IT	66099	1.86
8	CA	54677	1.93	CA	58823	1.89	IN	65003	1.83
9	IN	49182	1.74	IN	57546	1.85	CA	62525	1.76
10	ES	48708	1.72	KR	53114	1.71	KR	57073	1.60
14	NL	31744	1.12	NL	34301	1.10	NL	36528	1.03
15	RU	28345	1	RU	31141	1	RU	35618	1
16	TW	25667	0.91	IR	27666	0.89	IR	33078	0.93
46	UA	4882	0.17	UA	4794	0.15	UA	4498	0.13
100	BF	278	0.01	UZ	305	0.01	ZM	363	0.01

Russia's # of articles kept increasing but Russia can not improve its order of 15<sup>th</sup>.

### 3. Method: international involvement score

Russian articles' share involved by international scholars

Total	No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8	No.9	No.10
2001-2003	DE 27.5%	US 24.7%	FR 12.4%	UK 9.5%	JP 8.2%	IT 7.9%	SE 5.4%	PL 5.2%	NL 4.6%	CH 4.3%
2003-2005	DE 26.9%	US 25.7%	FR 13.3%	UK 10.3%	IT 8.5%	JP 8.4%	PL 5.6%	NL 5.1%	SE 5.1%	CH 4.8%
2005-2007	DE 27.1%	US 26.6%	FR 14.5%	UK 11.2%	IT 9.3%	JP 8.0%	PL 5.8%	CH 5.4%	NL 5.1%	ES 5.1%
2011-2013	DE 28.0%	US 27.3%	FR 16.9%	UK 14.0%	IT 11.3%	ES 9.5%	CN 8.6%	PL 8.2%	JP 7.7%	CH 7.5%
2013-2015	US 27.5%	DE 26.6%	FR 15.9%	UK 14.4%	IT 11.2%	CN 9.7%	ES 9.3%	PL 8.3%	JP 7.7%	CH 7.3%
2015-2017	US 27.2%	DE 26.1%	FR 16.1%	UK 14.8%	IT 11.3%	CN 11.2%	ES 9.1%	PL 8.0%	JP 7.8%	CH 7.2%



Country's score

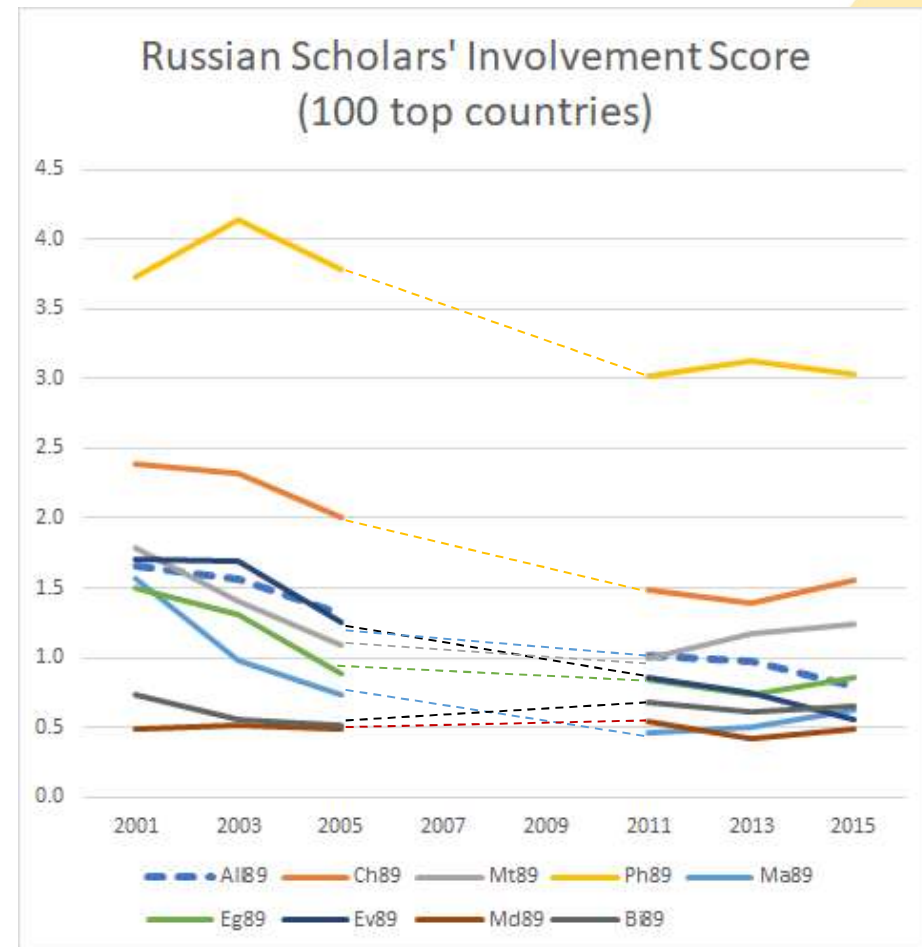
E.g. No.1 = 10

No.2 = 9

	US	CN	DE	JP
2001	9		10	6
2003	9		10	5
2005	9		10	5
2011	9	4	10	2
2013	10	5	9	2
2015	10	5	9	2

# 4. Analysis: Int'l involvement score

- Russia's score kept declining in almost all sectors.
- Russia has a strong advantage in Physics, but its score also has a downward trend, i.e. one pt. in 8 years.
- Chemistry sector lost one pt. in 10 years, as a second-best sector in Russia.
- These facts coincide with the number of the Nobel laureates.

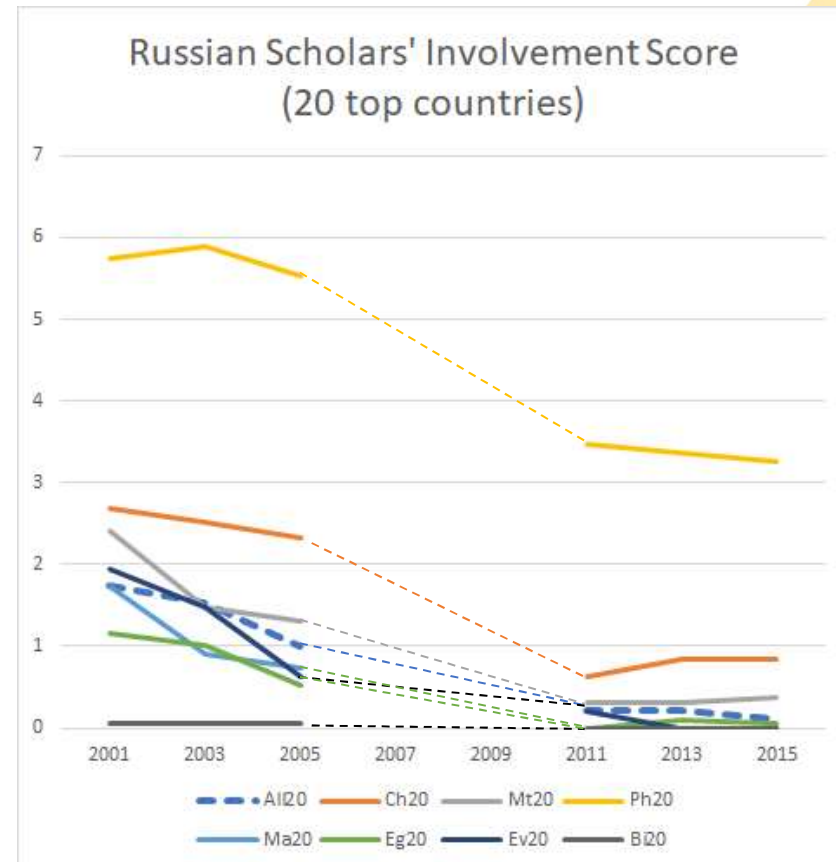
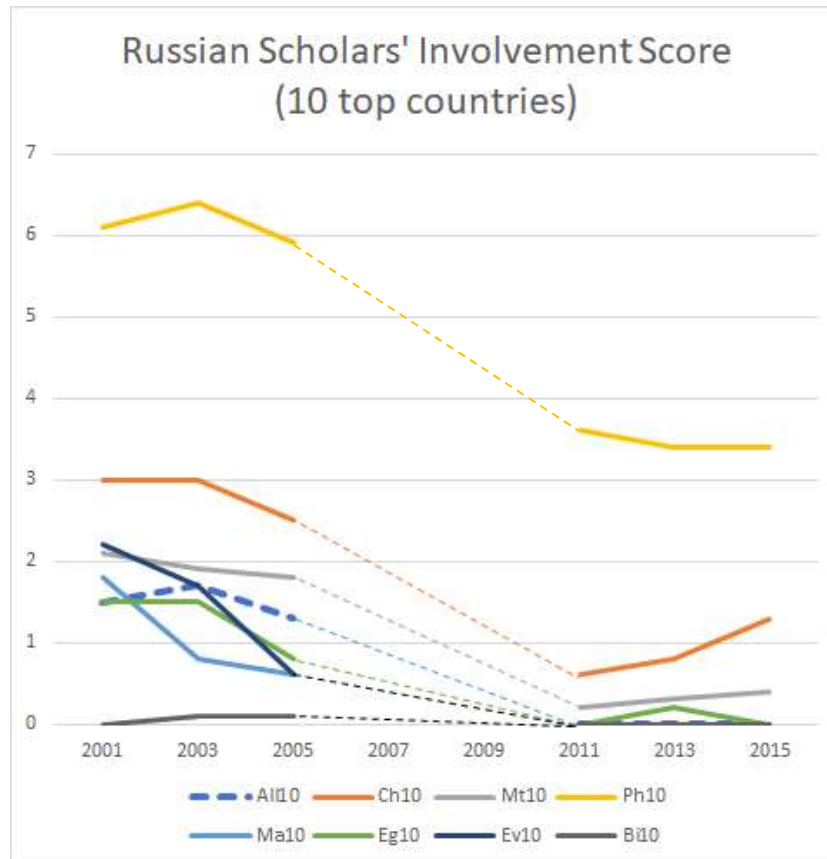


Number of the Russian (Soviet) Nobel laureates

	before 1946	1946-55	1956-65	1966-75	1976-85	1986-95	1996-2005	2006-19
Phys	0	0	6	0	1	0	3 (1)	1 (4)
Chem	0	0	1	0	(1)	0	0	0
Bio/Med	2	0	0	0	0	0	0	0

Number in parenthesis shows laureates of Russian expatriot.

## 4. Analysis: Int'l involvement score



- Russia seems to have no fundamental changes to stop it decreasing its competitiveness. Russia insulated from Top 10 or 20 most productive countries of the world.
- Its advantages in physics & chemistry drastically deteriorated. Russia lost 2 pt. in 8 years.

# 4. Analysis: Int'l involvement score

- Should its involvement score be higher if that country has a bigger power to produce articles?
- **No!**
- Rank of UA in chemistry does not necessarily prove its higher competitiveness, since each score reflects interrelation between two countries. RU and UA had a century-old collaboration, which might result in relatively high score.

A country's involvement in 8 sectors of Russia

Chemistry	US	CN	DE	JP	UA
2001-2003	9		10	2	6
2003-2005	9		10	3	4
2005-2007	9		10	3	6
2011-2013	9	4	10		7
2013-2015	9	5	10	1	7
2015-2017	9	7	10		4
Material	US	CN	DE	JP	UA
2001-2003	9		10	6	7
2003-2005	9		10	7	5
2005-2007	9		10	7	4
2011-2013	9	6	10	3	7
2013-2015	9	6	10	3	7
2015-2017	9	8	10	4	5
Physics	US	CN	DE	JP	UA
2001-2003	9		10	6	
2003-2005	9		10	6	
2005-2007	9		10	5	
2011-2013	9	3	10	1	
2013-2015	9	4	10	1	
2015-2017	9	5	10	1	
Math	US	CN	DE	JP	UA
2001-2003	10		9	1	
2003-2005	10		9		
2005-2007	10		9		
2011-2013	10		9		
2013-2015	10	4	9		
2015-2017	10	6	7		

Engineering	US	CN	DE	JP	UA
	10		9	7	2
	10		9	7	
	10	3	9	7	
	8	5	10	1	
	9	6	10	2	
	10	6	9		
Environmen	US	CN	DE	JP	UA
	10		9	6	
	10		9	6	
	10		9	6	
	10	1	9	6	
	10	4	9	6	
	10	6	9	4	
Medical	US	CN	DE	JP	UA
	10		9		
	10		9		
	10		9		
	10		9		
	10		9		
	10		9		
Biology	US	CN	DE	JP	UA
	10		9	6	
	10		9	5	
	10		9	4	
	10	6	9		
	10	6	9	4	
	10	6	9		

## 4. Analysis: $RCA_a$ , Competitive power index

- We invented a new index reflecting a country's power to produce articles. Borrowing from practices of economics of int'l trade, we use the idea of Revealed Comparable Advantage (RCA).
- As  $RCA_t$ , i.e., RCA of a country's competitive advantage in int'l trade is defined as  $(Ex - Im)/(Ex + Im)$ , which should occupy between from -1 to 1,  $RCA_a$ , i.e., RCA of a country's competitive power to produce articles could be defined as the difference between two countries score should be divided by the sum of two countries' scores.

## 4. Analysis: RCA<sub>a</sub>, Competitive power index

Russian Scholars' involvement in UA

	2001	2003	2005	2011	2013	2015
All	8	8	8	10	10	10
Chemistry	9	9	9	10	10	10
Material	8	8	8	8	9	9
Physics	8	8	8	10	10	10
Math	5	2	3	6	7	7
Engineeri	9	6	7	8	8	9
Environme	9	10	9	10	10	10
Medical	7	7	7	7	9	7
Biology	7	7	6	9	9	9

UA's involvement in Russia

	2001	2003	2005	2011	2013	2015
All						
Chemistry	6	4	6	7	7	4
Material	7	5	4	7	7	5
Physics						
Math						
Engineeri	2					
Environment						
Medical						
Biology						

Russia's RCA<sub>a</sub> vis-à-vis UA

	2001	2003	2005	2011	2013	2015
All	1.0	1.0	1.0	1.0	1.0	1.0
Chemistry	0.2	0.4	0.2	0.2	0.2	0.4
Material	0.1	0.2	0.3	0.1	0.1	0.3
Physics	1.0	1.0	1.0	1.0	1.0	1.0
Math	1.0	1.0	1.0	1.0	1.0	1.0
Engineeri	0.6	1.0	1.0	1.0	1.0	1.0
Environme	1.0	1.0	1.0	1.0	1.0	1.0
Medical	1.0	1.0	1.0	1.0	1.0	1.0
Biology	1.0	1.0	1.0	1.0	1.0	1.0

- Russia's S&T power overwhelms Ukraine, even if there are a few sectors Ukraine enjoys competitiveness.

## 4. Analysis: RCA<sub>a</sub>, Competitive power index

Russia's RCA<sub>a</sub> vis-à-vis US

	2001	2003	2005	2011	2013	2015
All	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Chemistry	-0.4	-0.5	-0.5	-1.0	-1.0	-1.0
Material	-0.5	-0.8	-0.8	-1.0	-1.0	-1.0
Physics	-0.3	-0.3	-0.4	-0.6	-0.6	-0.8
Math	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Engineering	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Environment	-0.5	-0.8	-1.0	-1.0	-1.0	-1.0
Medical	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Biology	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0

Russia's RCA<sub>a</sub> vis-à-vis CN

	2001	2003	2005	2011	2013	2015
All				-1.0	-1.0	-1.0
Chemistry				-1.0	-1.0	-1.0
Material				-1.0	-1.0	-1.0
Physics	1.0	1.0	1.0	0.3	-0.1	-0.3
Math					-1.0	-1.0
Engineering			-1.0	-1.0	-1.0	-1.0
Environment				-1.0	-1.0	-1.0
Medical						
Biology				-1.0	-1.0	-1.0

Russia's RCA<sub>a</sub> vis-à-vis DE

	2001	2003	2005	2011	2013	2015
All	-0.2	-0.3	-0.4	-1.0	-1.0	-1.0
Chemistry	-0.1	-0.1	-0.1	-0.4	-0.3	-0.3
Material	-0.2	-0.3	-0.3	-0.7	-0.5	-0.5
Physics	-0.1	-0.1	-0.1	-0.3	-0.3	-0.3
Math	-0.2	-0.6	-0.8	-1.0	-1.0	-1.0
Engineering	-0.1	-0.4	-0.6	-1.0	-1.0	-1.0
Environment	-0.3	-0.4	-0.5	-1.0	-1.0	-1.0
Medical	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Biology	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0

Russia's RCA<sub>a</sub> vis-à-vis JP

	2001	2003	2005	2011	2013	2015
All	-0.3	-0.3	-0.3	-1.0	-1.0	-1.0
Chemistry		-0.2	-0.5		-1.0	
Material	-0.5	-0.4	-0.4	-1.0	-1.0	-0.6
Physics	0.1	0.1	0.1	0.6	0.6	0.6
Math	-1.0					
Engineering	-0.4	-0.4	-0.6	-1.0		
Environment	0.0	-0.1	-0.5	-1.0	-1.0	-1.0
Medical						
Biology	-1.0	-1.0	-1.0			

- These 4 tables identify Russia's rapidly losing competitive power in producing scientific articles.

## 5. What we found

1. Russia's policy on S&T has been inefficient and social organizations cannot cope with the globalized competition.
2. The share of the articles published by Russian scholars has been decreasing.
3. Russia cannot catch up with the trend of international collaborations to produce articles, even in their most competitive areas such as physics and chemistry. More and more researches go to the collaboration with less developed countries such as Ukraine.

## 5. What we found

4. Russia's S&T are becoming dominated by powerful nations, recently even China.
5. While China seems to have successful outcomes in S&T, this does not necessarily reflect its government inputs, but rather strong demands from private sector.
6. Russia's State Capitalism seems to be inadequate to be a successful knowledge economy and needs fixing. That requires overall changes in social structures.

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