

R&D investment and R&D support for SMEs in Korea

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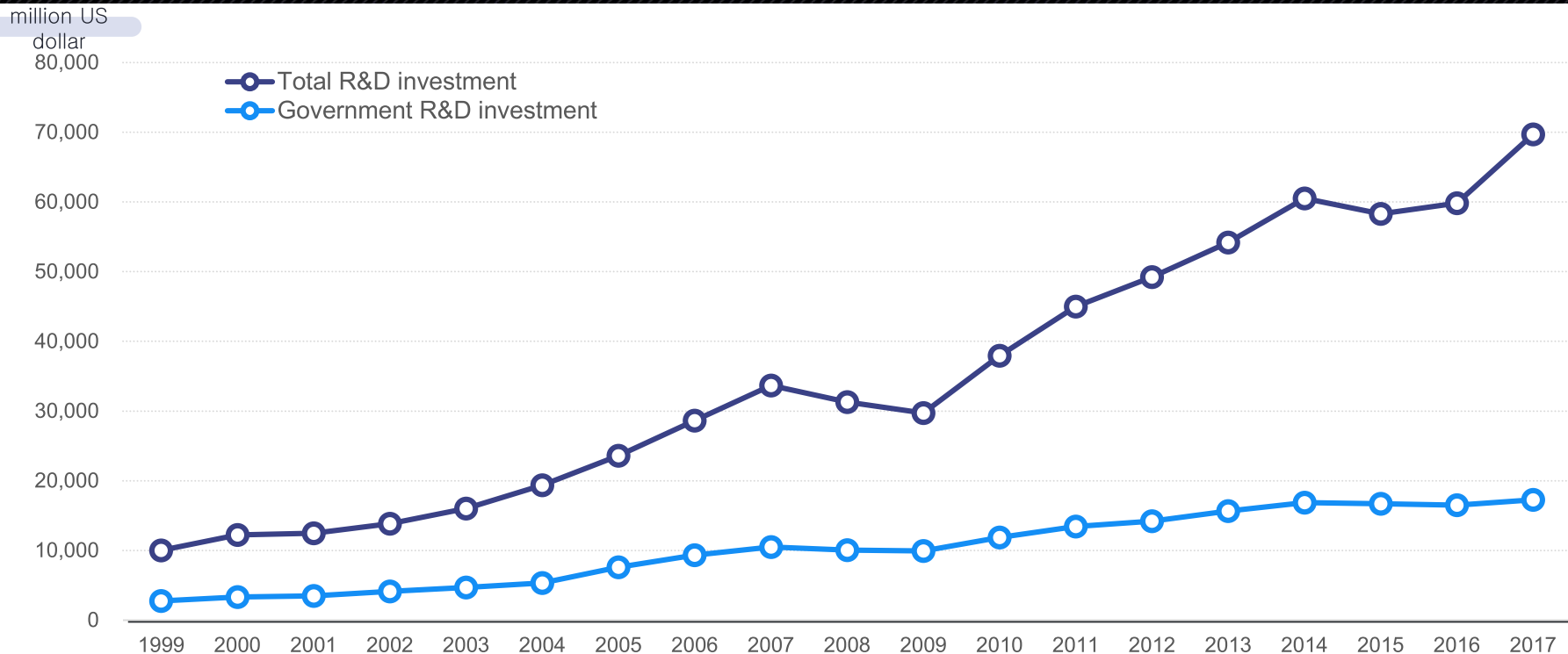
**KISTEP
(Korea Institute of Science and Technology
Evaluation and Planning)**

Total R&D Investment increase trends ('99~'17)

→ Ratio of total R&D investment is 4.55% of GDP('17): 1st among OECD countries

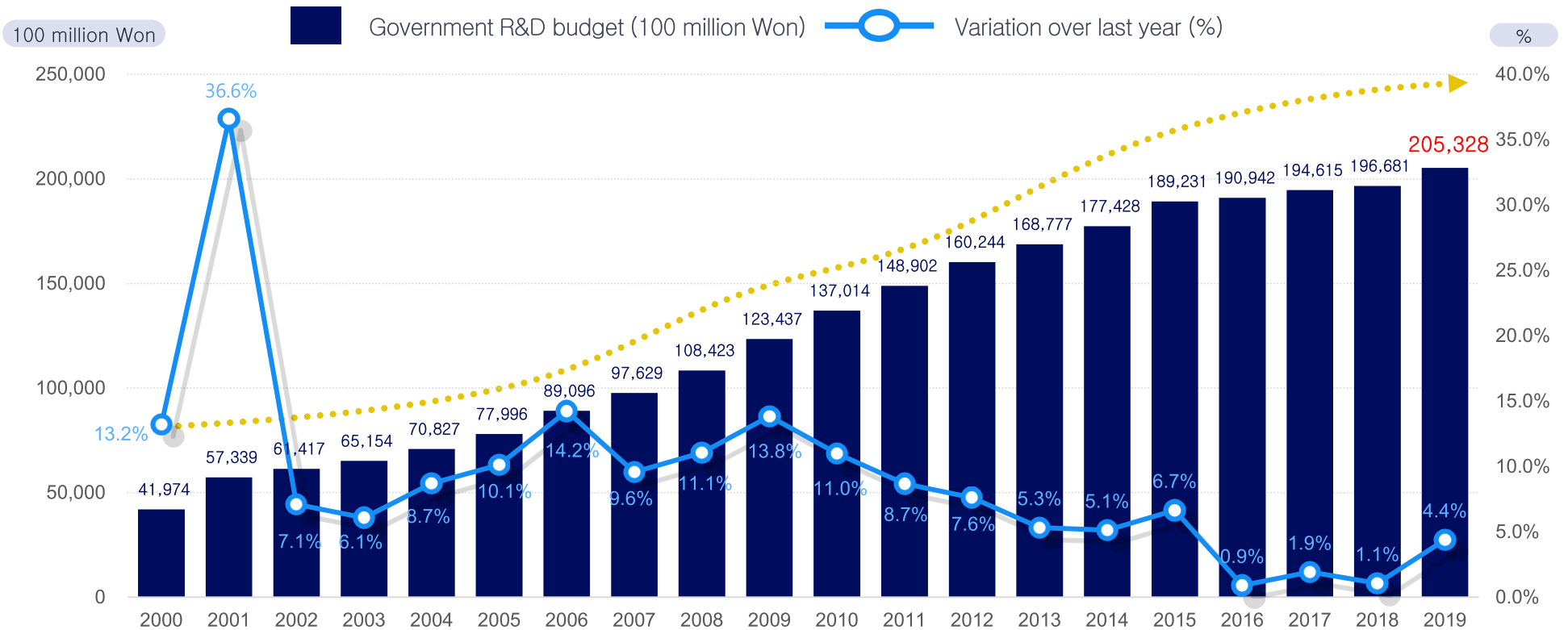
4.55% is composed of private sector (3.43%) and government (1.12%)

Total R&D Investment Vs. Government R&D investment



When government R&D budget amounts to 20 trillion Won('19), performance against investment became rising issue

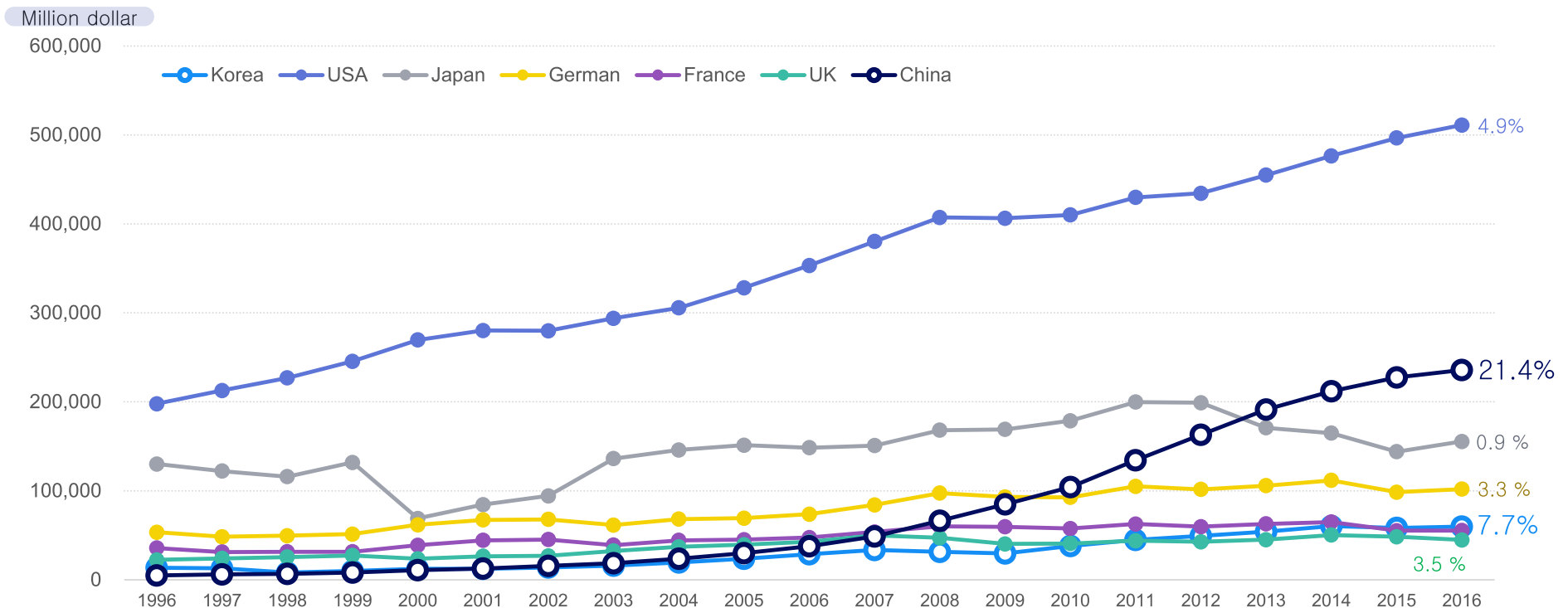
Korea government R&D budget trends



Major countries' total R&D budget is gradually increasing ('99~'16)

➔ Average Annual Increasing Rate : China (21.4%), Korea (7.7%), USA (4.9%), UK (3.5%)

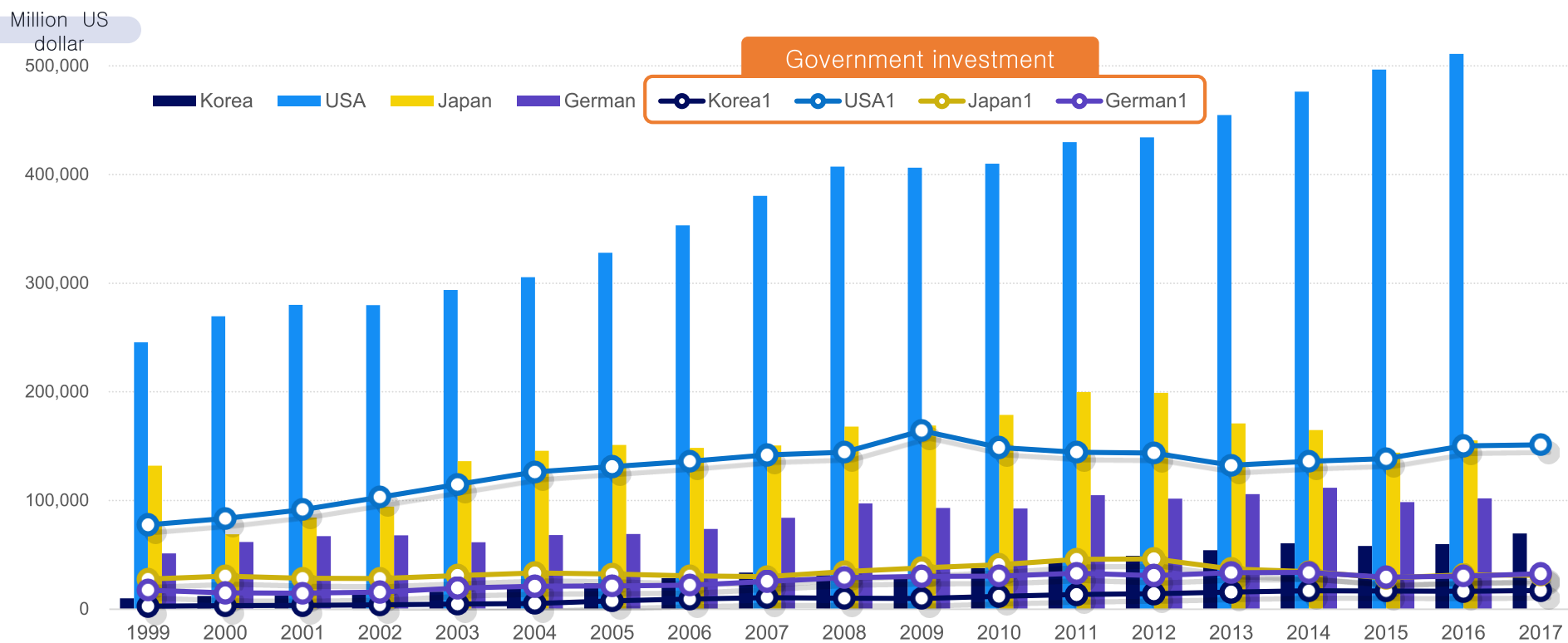
Major countries' total R&D investment trends



The rate of increase of private sector in R&D investment is higher than that of government

→ Korea follows this trend

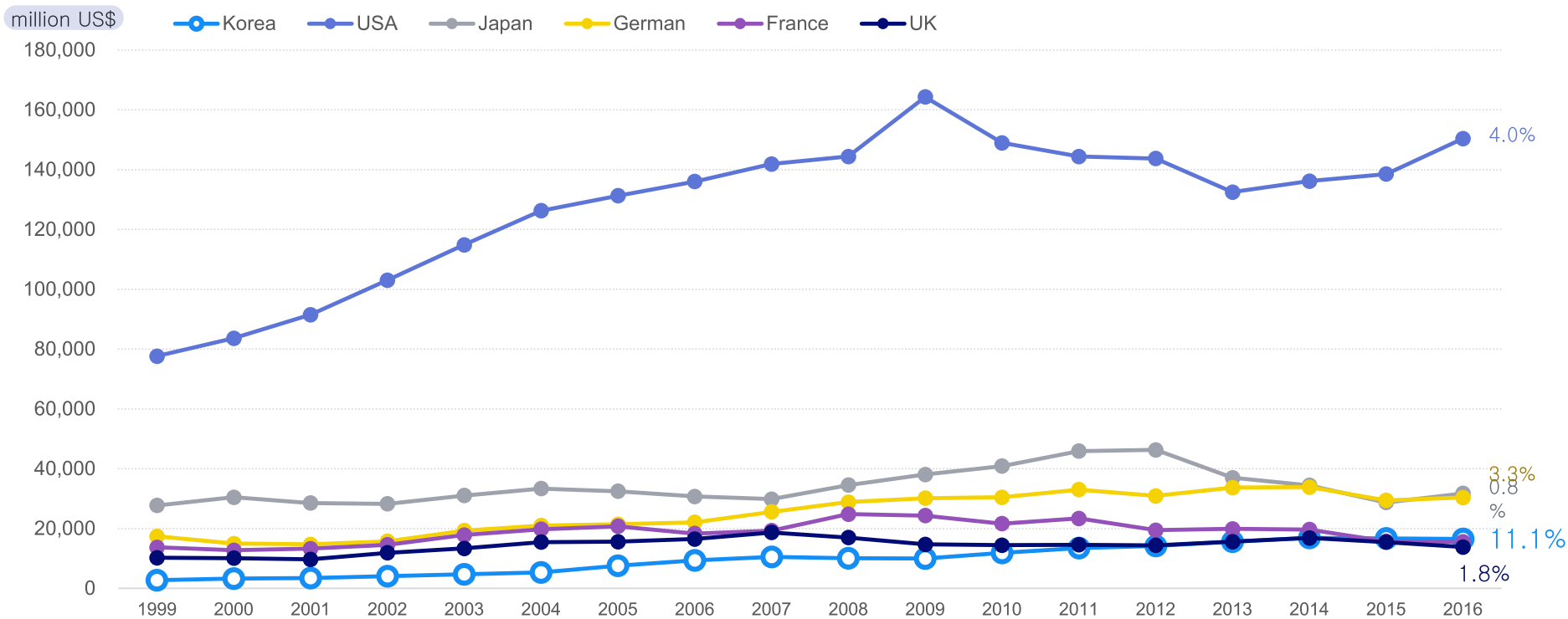
Major countries' private and government investment trends



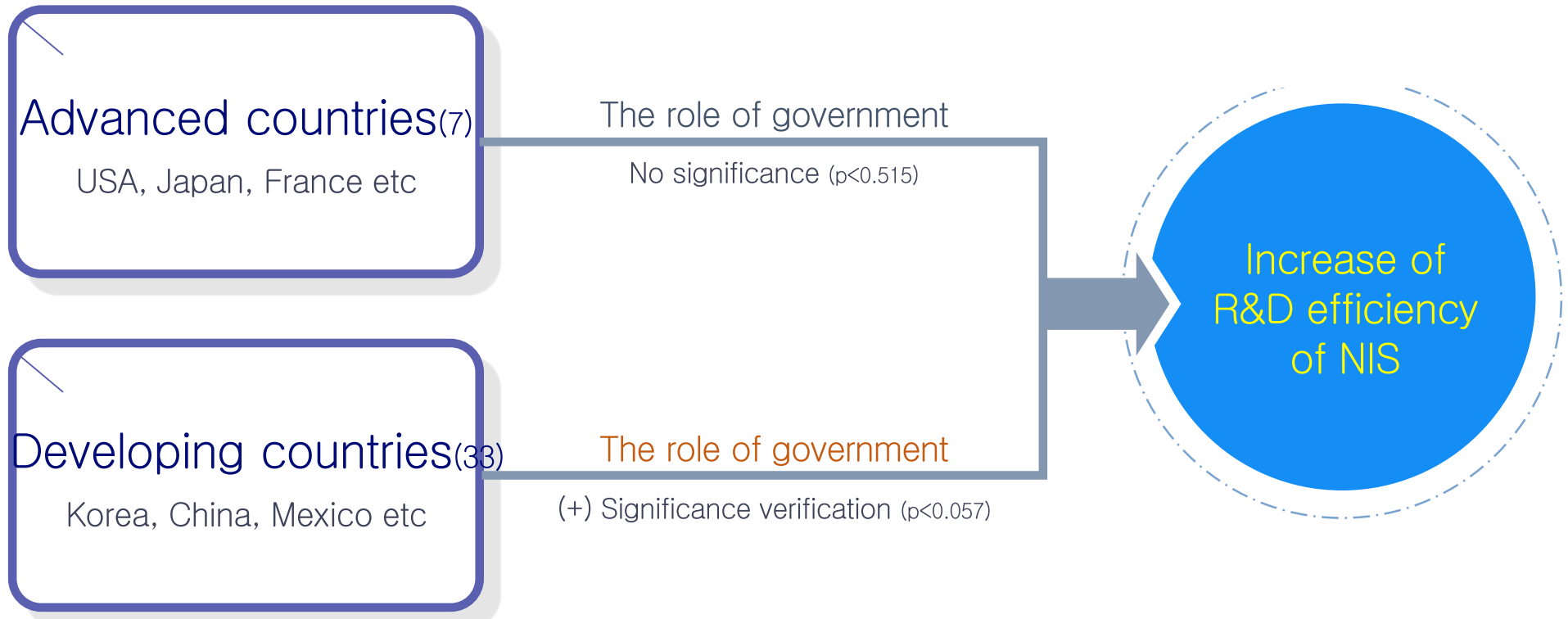
Major countries' government R&D budget is gradually increasing ('99~'16)

➔ Average Annual Increasing Rate: Korea(11.1%), USA(4.0%), German(3.3%)

Major countries' government R&D budget trends



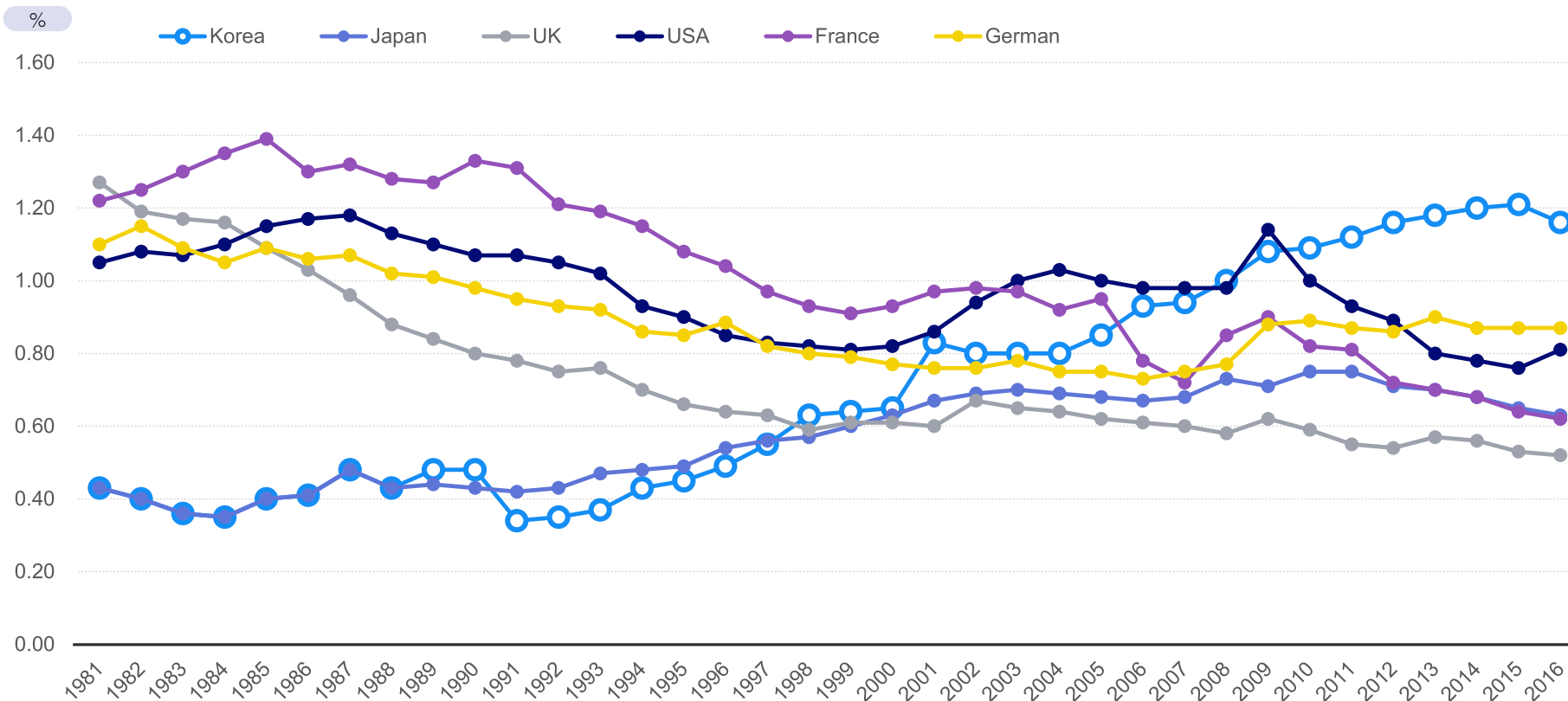
The role of developing countries' government is more important



source KISTEP internal research (2018)

Korea government has ranked 1st since 2010_1.12%('17)

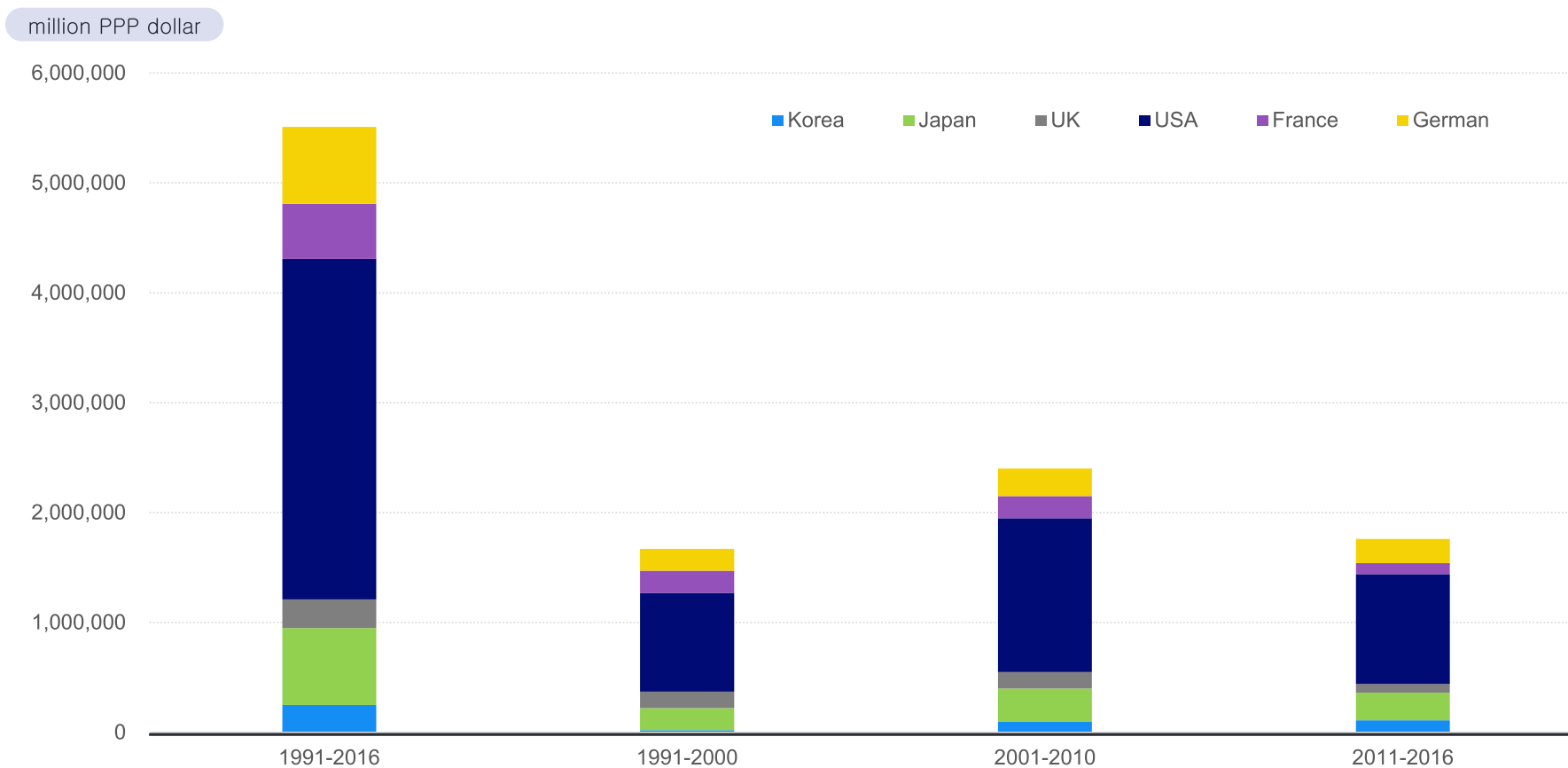
Major countries' government R&D intensity of GDP trends



source OECD, (2018). 「Main Science and Technology Indicators」 2018-1.

R&D investment stock('91~'16년): Korea: 1.0; USA: 12.3; Japan: 2.4; German: 2.3

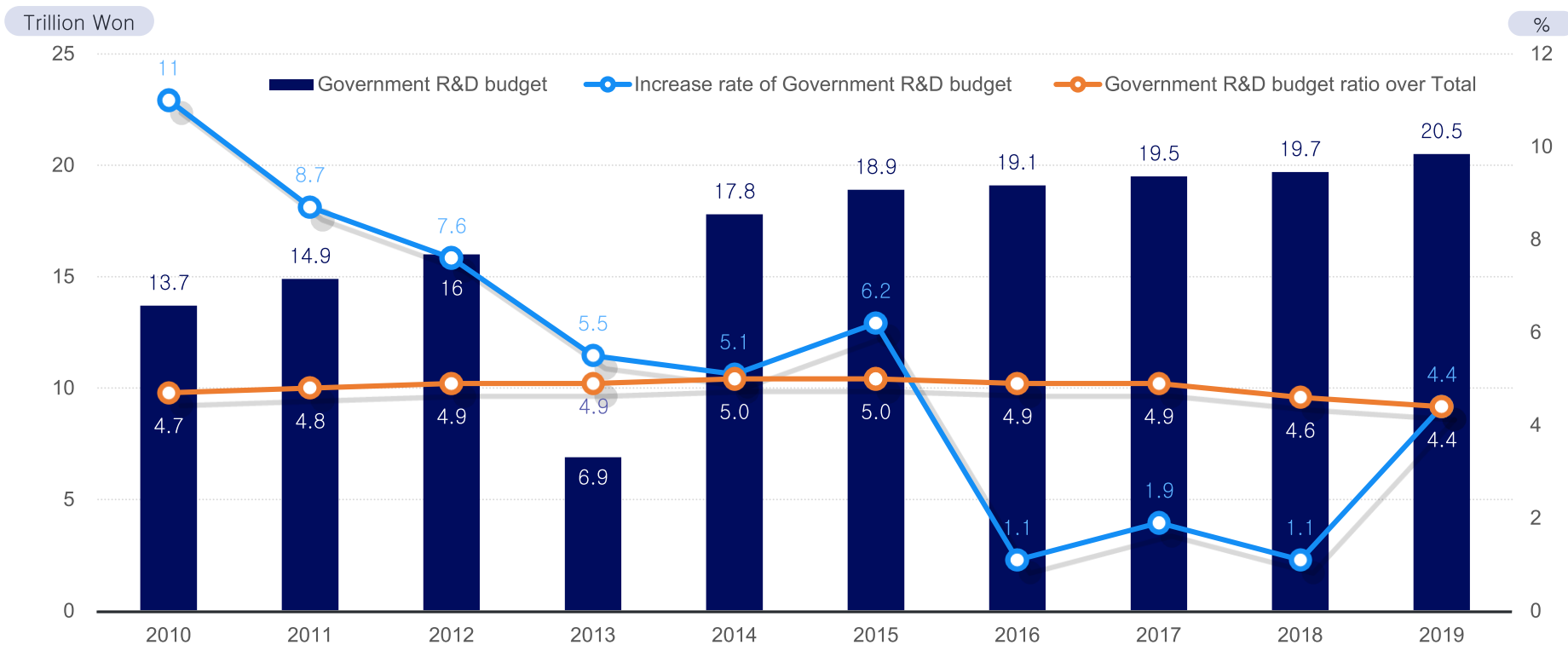
Comparison of major countries' government R&D budget stock



source OECD, (2018). 「Main Science and Technology Indicators」 2018-1.

The ratio of government R&D budget over whole budget was highest in 2014 as 5.0%

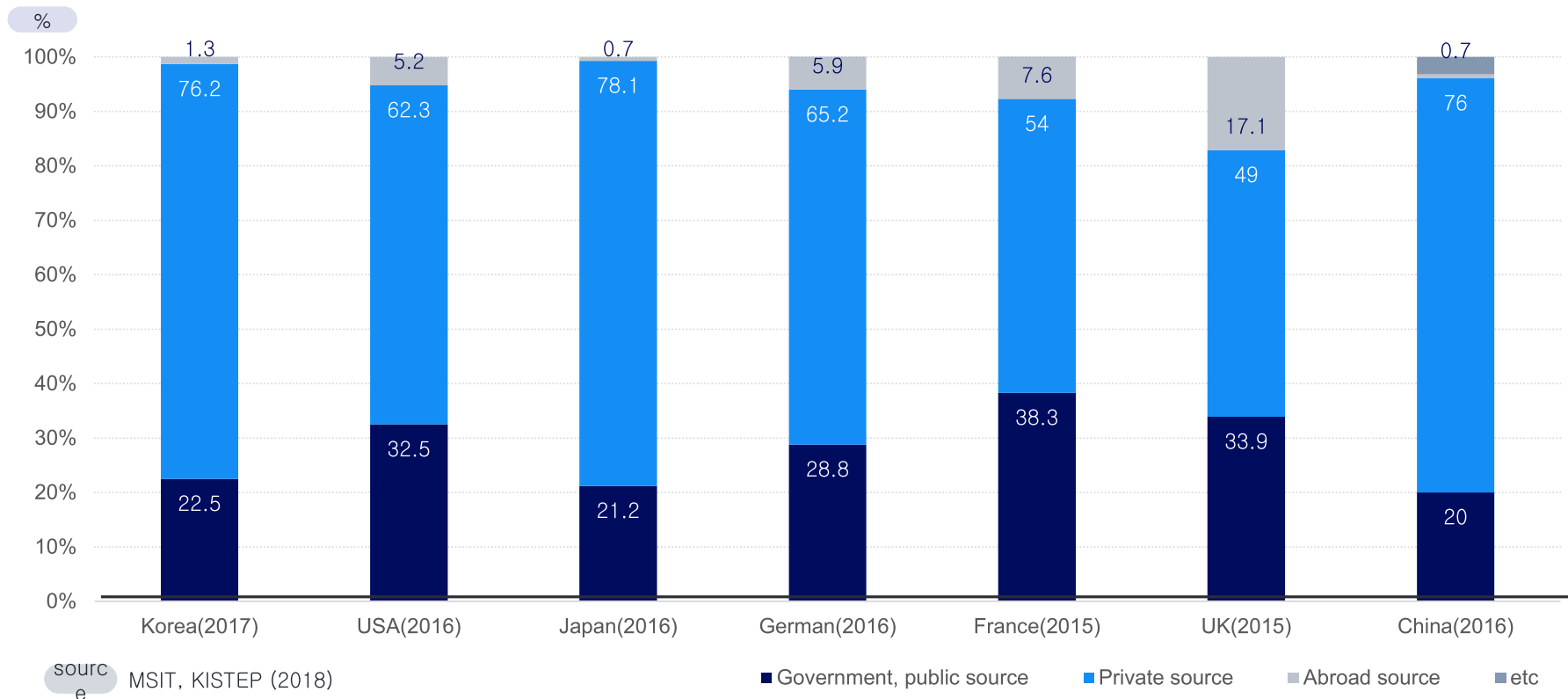
The ratio of government R&D budget trends



Government R&D investment ratio (22.5%, '17) is second lowest level among major countries

→ The highest ratio was 28.7% ('09) and the ratio is getting lower

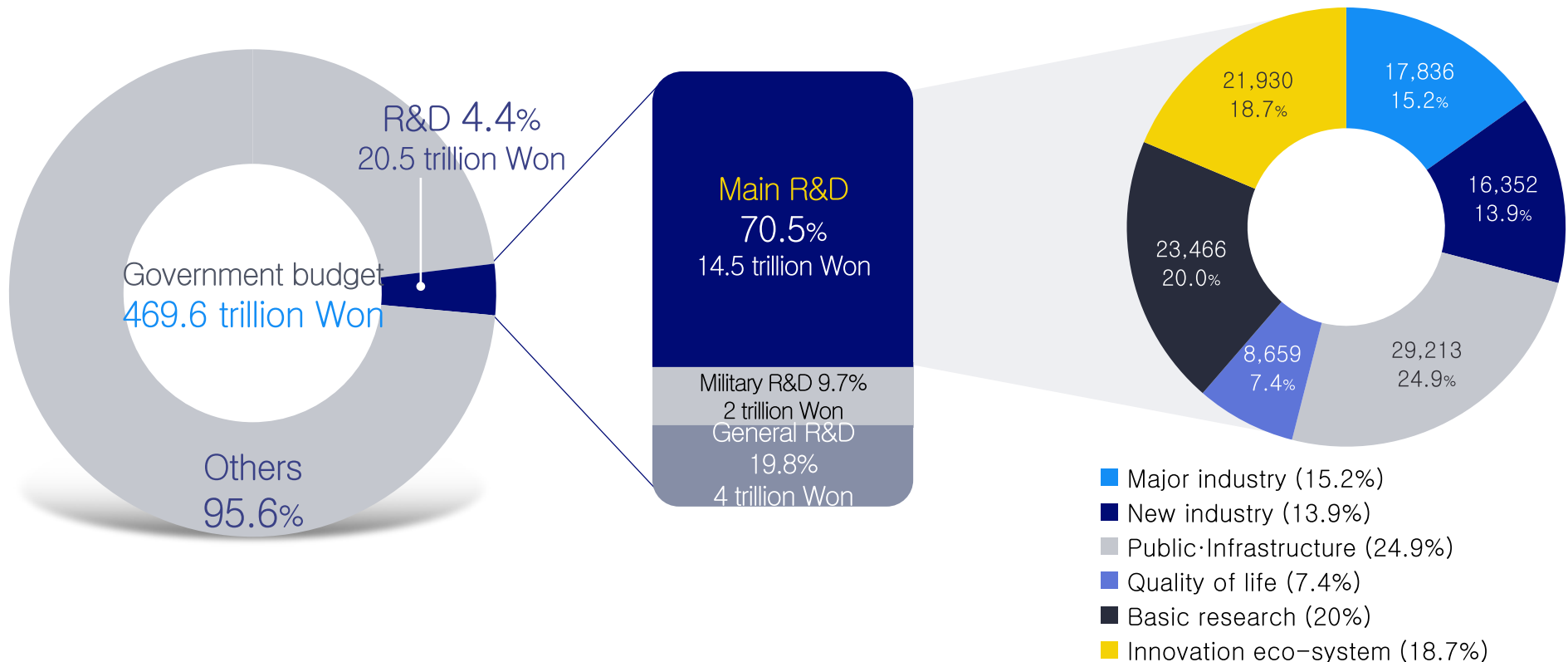
Government and private R&D budget ratio



The ratio of main parts of government R&D budget : 70% (2019)

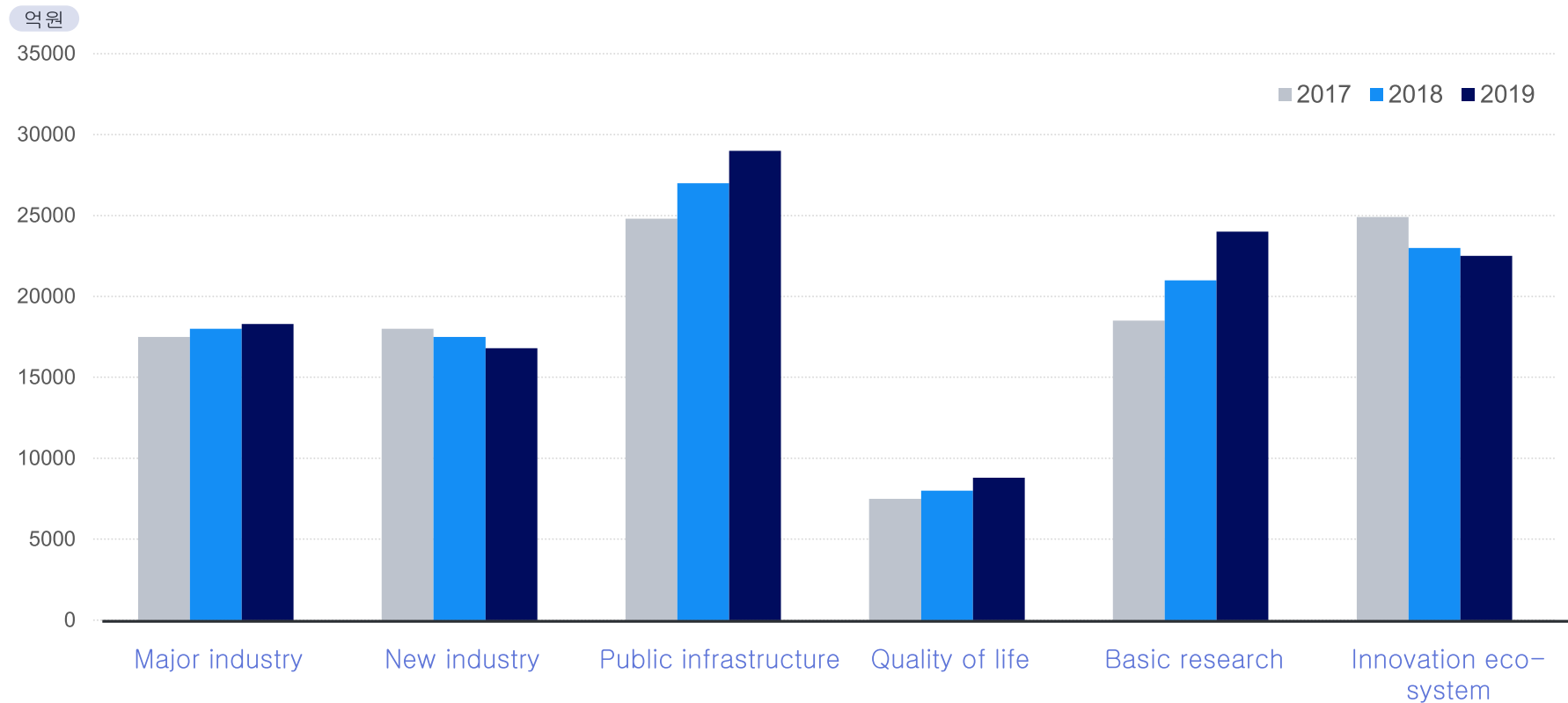
- Public infrastructure (24.9%), Basic research(20.0%), Innovation eco-system(18.7%)
- Innovation eco-system includes region, commercialization, HR and SMEs

Ratio of Government R&D budget parts



Budget in public infrastructure, quality of life and basic research is increasing
– While budget for region is decreasing, support of SMEs is increasing

Composition of government R&D budget trends



The government R&D budget for SMEs : 3.2 trillion Won (2018)

- Ministry of SMEs and Startups(33.8%), KOSBIR(66.2%)
 - * KOSBIR: Korea Small Business Innovation Research Program
- Research budget per project is decreasing from 240(2016) to 190 million Won(2018)
 - * Big company: 1,440 million Won(2018)

Government R&D budget for SMEs

Unit: 100 million Won

Classification	2013	2014	2015	2016	2017	2018
Government	168,771	177,428	189,231	190,942	194,615	196,681
Ministry of SMEs and Startups	8,587	8,850	9,835	9,563	11,172	10,917
KOSBIR	17,282	17,377	19,367	20,703	22,093	21,390
Sum	25,869	26,227	29,202	30,266	33,265	32,307
(Ratio)	(15.3%)	(14.8%)	(15.4%)	(15.9%)	(17.1%)	(16.4%)

The effectiveness of R&D investment in terms of financial performance

- It depends on the used data and methodology
- Positive performance in input additionality and employment performance

Performance of R&D budget for SMEs

Research	Data	Methodology	Input additionality	Output additionality		
				Sales	Employment	Profitability
Case A(2016)	NTIS	PSM	○	○	○	×
Case B(2017)	KOSBIR & MSS	PSM & DID	○	○	○	△
Case C(2018)	NTIS	Matching & DID, Machine learning	○	○	○	-
Case D(2018)	NTIS	Matching & DID, Machine learning	○	×	○	×
Case E(2019)	KOSBIR & MSS	Matching & DID	○	○	○	-

○: positive effect, ×: negative effect, △: no correlation

Accountability of R&D investment

- The limitation of R&D investment increase
- Low quality of performance compared to quantity of performance
 - Dramatic increase in terms of quantitative performance vs. Qualitative level is not satisfactory

Size of R&D investment vs. Direction of investment

- Economic growth through inclusive innovation
- Social problem resolving R&D and participation of people

Performance of R&D subsidiary

- The volume of R&D subsidiary for SMEs increases and positive performance
- Technology level stands still (around 75%) and productivity is below 50% (manufacture, 2015) of big company
 - Shortage of technical professionals

Contribution to national economic growth

- The number of SMEs: 99.9%, Employees: 82.2%
 - The volume of manufacture: 49% (2016)
- Combination of subsidiary (investments and loans) and tax supports

Thank you for your attention

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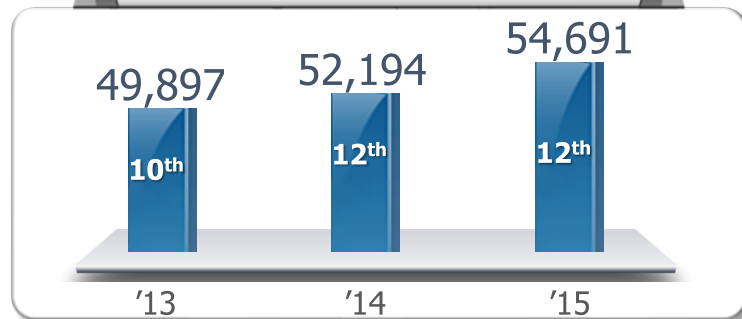
Quantitative performance



It shows the dramatic increase in terms of quantitative performance in Korea

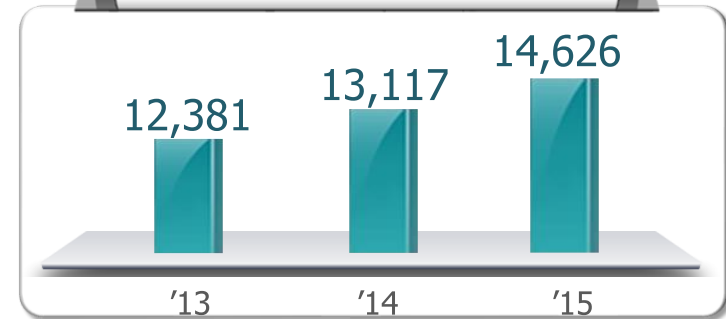
Paper

No. of paper (SCI)



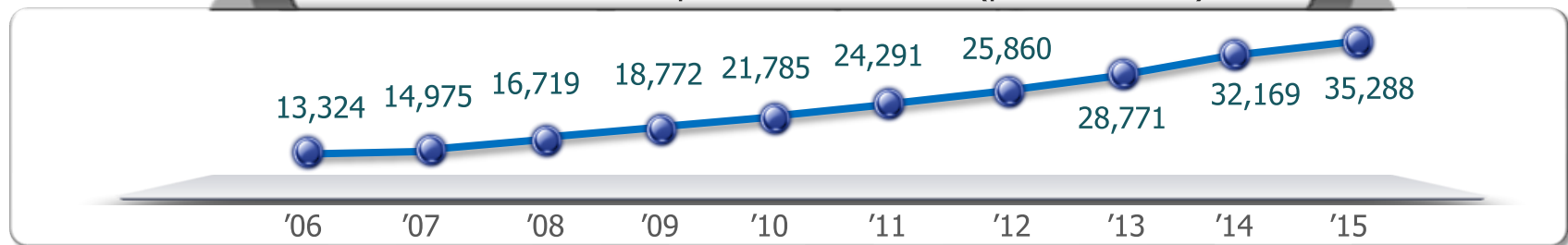
Patent

No. of patent (PCT)



R&D center

No. of corporate R&D centers(private sector)



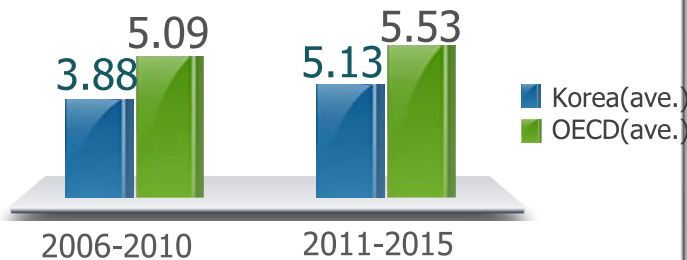
Qualitative performance



Qualitative level is not satisfactory from a viewpoint of productivity and impact.

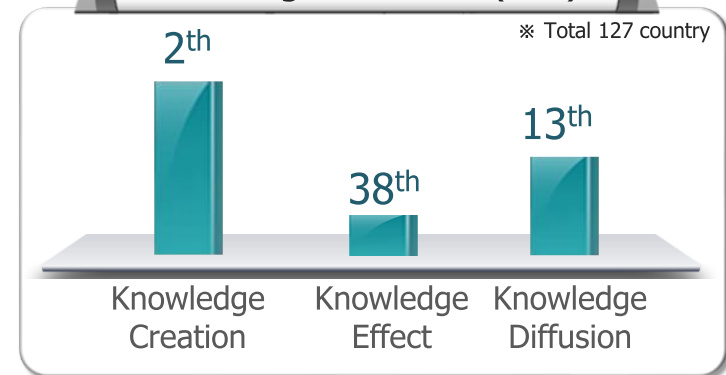
Paper

cited number per paper(ave.)



Knowledge

Index of global innovation(2017) (GII,WIPO)



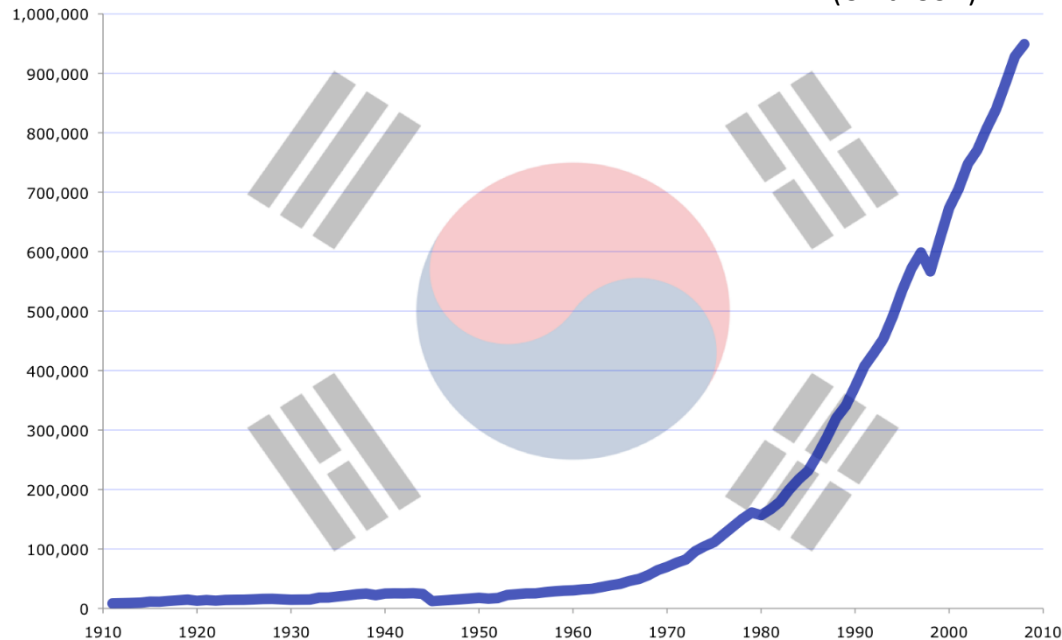
※ KC(no. of paper, patent), KE(commercialization etc.),
KD(export of computer, communication service, etc.)

Economic growth vs. Quality of life

- Korea has achieved compressed economic growth in line with the investment to R&D
- Meanwhile, the quality of life issues were given less priority in the process

South Korea GDP(PPP) Evolution (1911-1990)

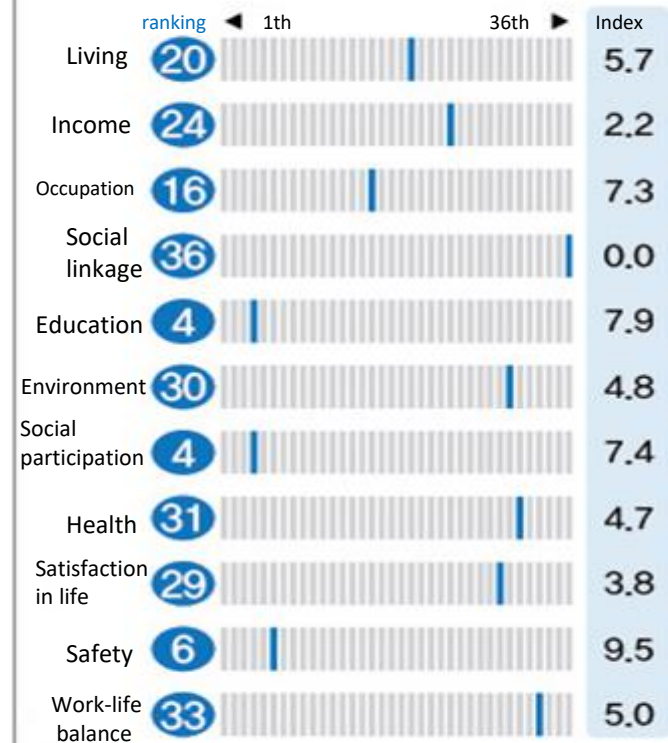
(Unit: USD)



OECD 'A Better Life Index'

Covers 34 OECD members as of 2015 and Brazil, Russia

Korea's Ranking and Index in Major Factors



※Scores nearing 10 means higher levels

Resources / OECD

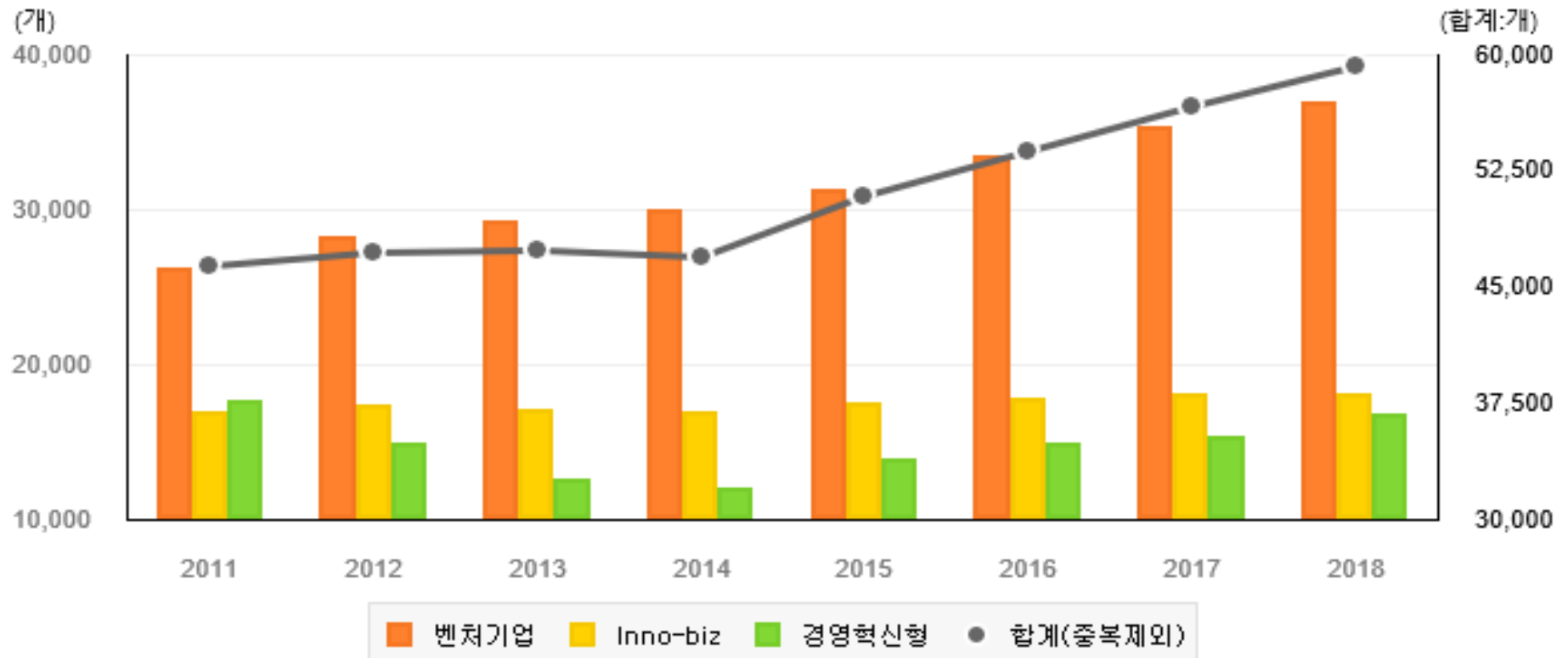
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Innovative SMEs



SMEs

It shows the number of innovative SMEs is gradually increasing

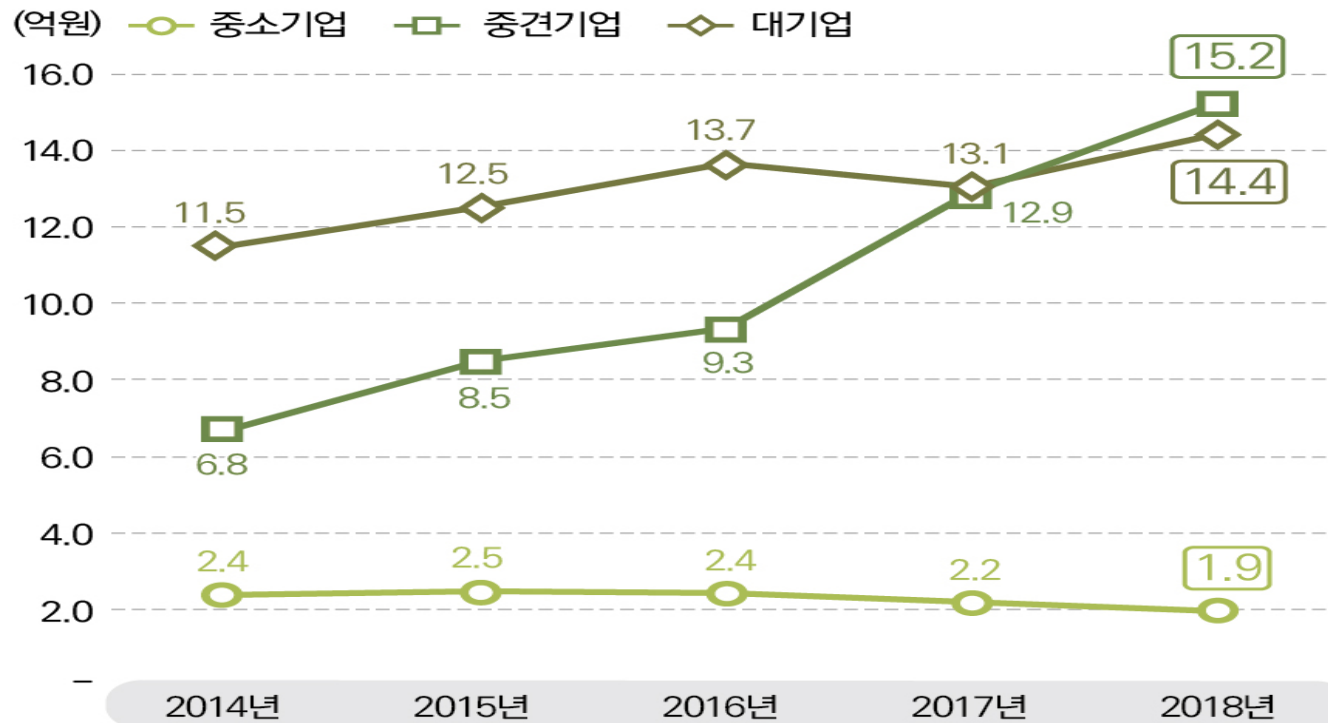


Research budget per project



Research budget per project is small compared to big company

Budget /project



Technology level of SMEs



Technology level of SMEs stands still

TL trends

Classification	2003	2005	2007	2009	2011	2013	2015	2017	2018
TL trends	73.6	75.8	74.6	74.7	74.8	77.5	77.6	75.6	77.6