

Economic Growth and Gross Domestic Expenditure on R&D in G-7 and BRICS Countries: Long-run Comparative Synergy Analyses



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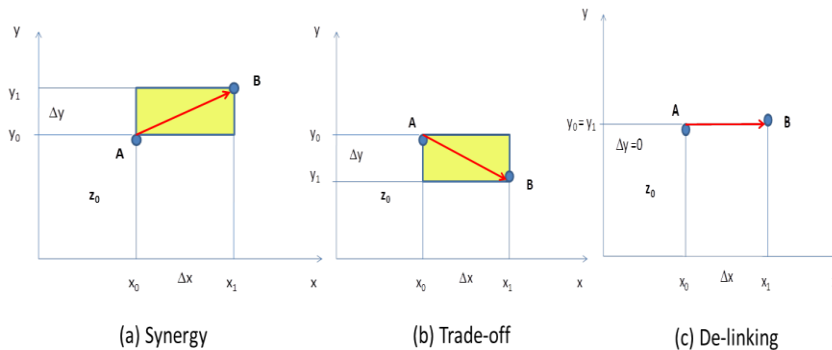
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Background of the study

- The study is based on statistical synergy methodology
- Data from the Wordbank
- G7 countries: USA, Canada Germany, France, UK, Japan and Italy
- BRICS countries: Brazil, Russian Federation, India, China and South Africa
- Focus is on the synergy of GDP-GERD interaction in G7 –and BRICS-economies

Methodological background: Synergy analysis



Maximum synergy can be obtained when relative changes Δx and Δy are equal. In case the change in y i.e. Δy is larger than changes in x i.e. Δx , the quotient must be inverted to estimate potential synergy ratio. Therefore, potential synergy/trade-off between two variables can be measured between -1 to +1. Negative sign indicates trade-off between two variables. In this study we calculate conventional index number of synergy and long-run synergy index.

Synergy analysis background

- Conventional synergy: Economic cycles are not smoothened
- Long-run stabilized synergy: Calculation based on Moving Average of variables to compensate the impacts of economic cycles and smoothen the results in order to reveal the trends

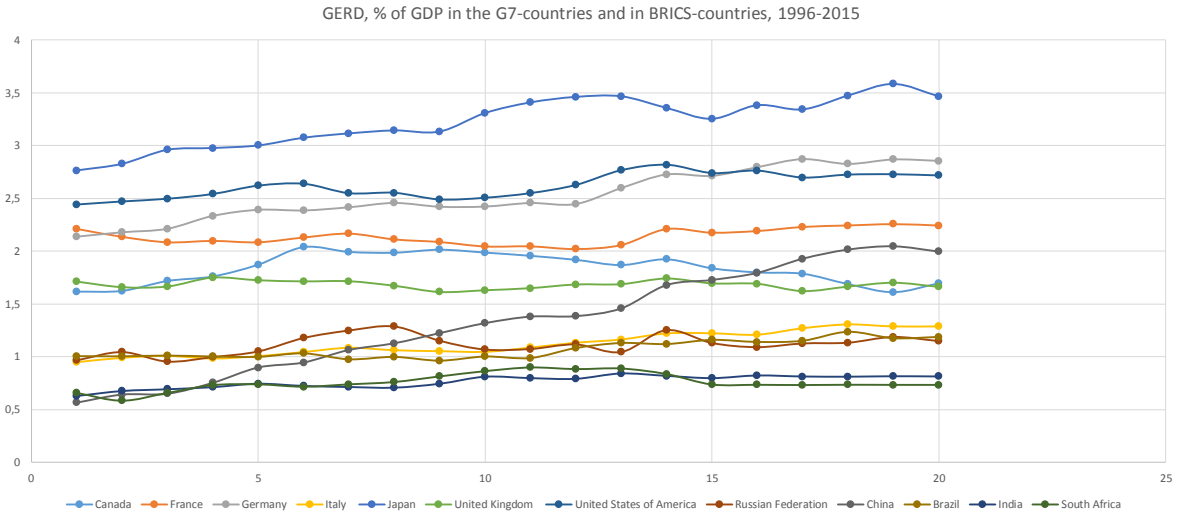
Some benefits of synergy methodology

- It allows us to present explorative analysis of the relationships between key variables (in this case GDP and GERD)
- It allow critical analysis on long-run dynamics of economies
- The synergy methodology provides essential information for economic and social policy-makers
- It is new tool for sustainability analysis
- The evaluation of synergy/trade-off proposed on this paper indicates only possible (potential) causality but, does not infer a causal relationship between the variables
- Typically decision-makers expect that there is positive synergy between GERD and GDP, but finally it is empirical question to evaluate

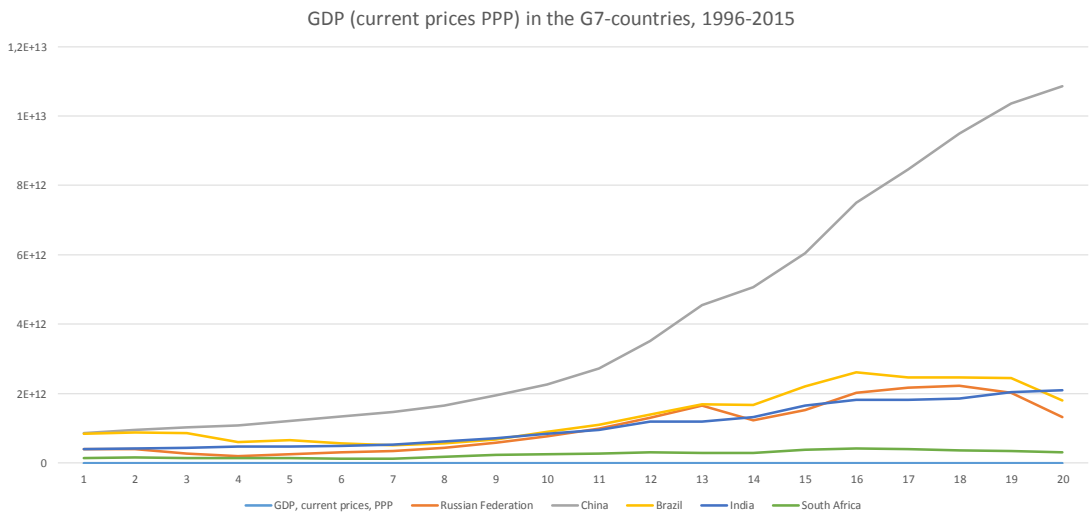
Focus on two powerful economic groups:
G7 – and BRICS -group



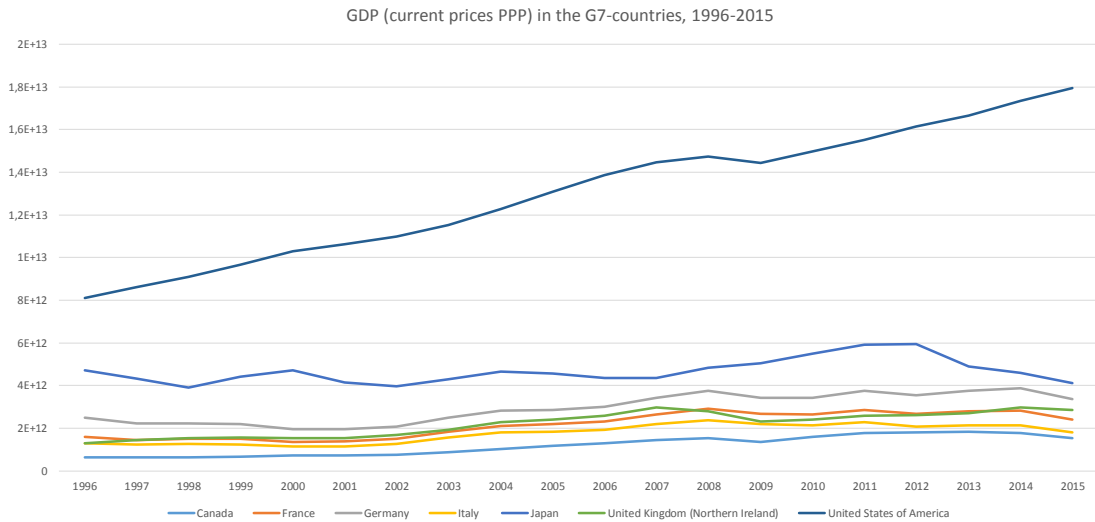
GERD, % of GDP in the G7-countries and in BRICS-countries, years 1996-2015, Source: World Bank 2017



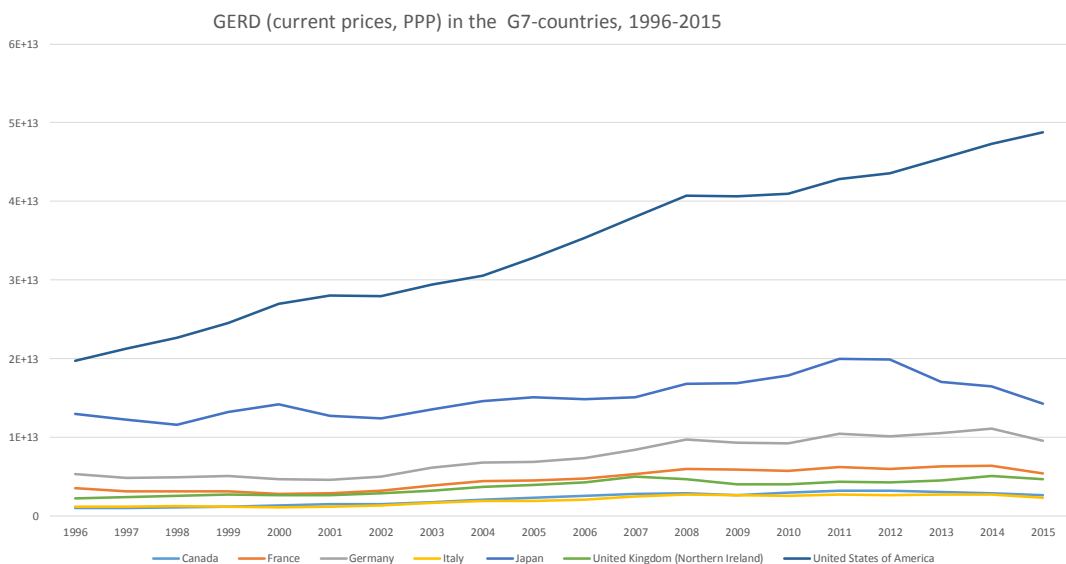
GDP (current prices PPP) in the G7-countries, 1996-2015, source: World Bank



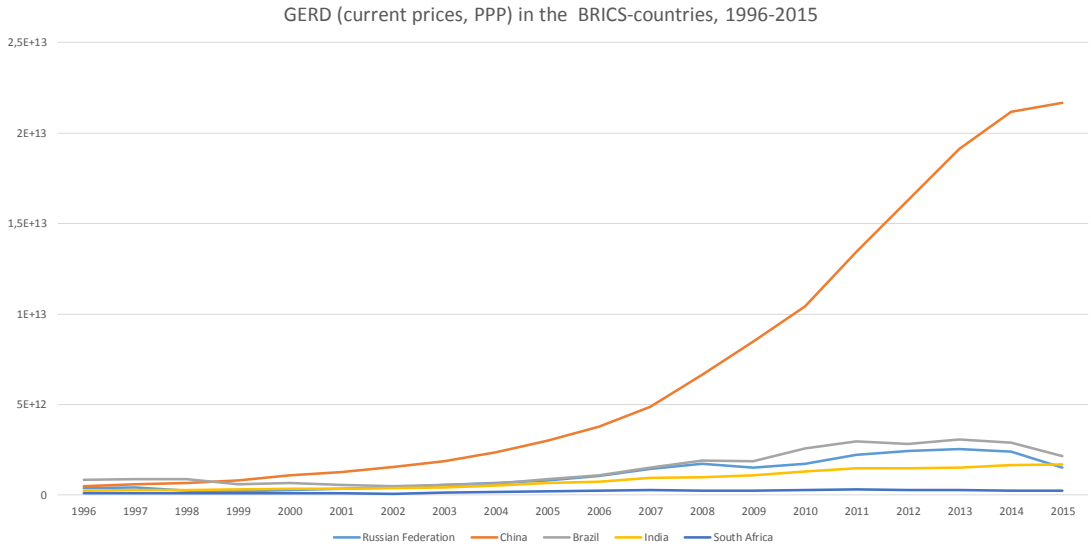
GDP (current prices PPP) in the G7-countries, 1996-2015, Source: World Bank



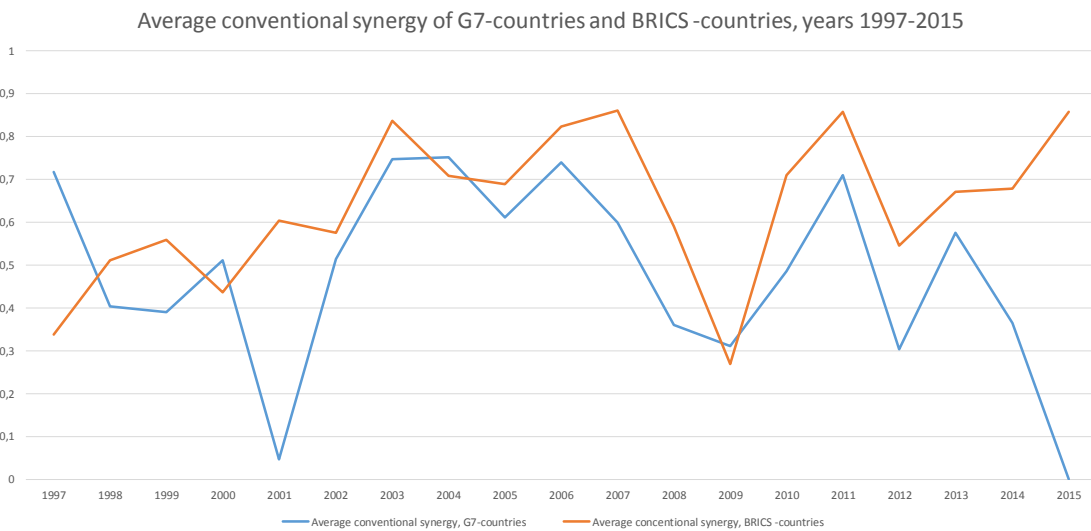
GERD (current prices, PPP) in the G7-countries, 1996-2015, source: World Bank 2017



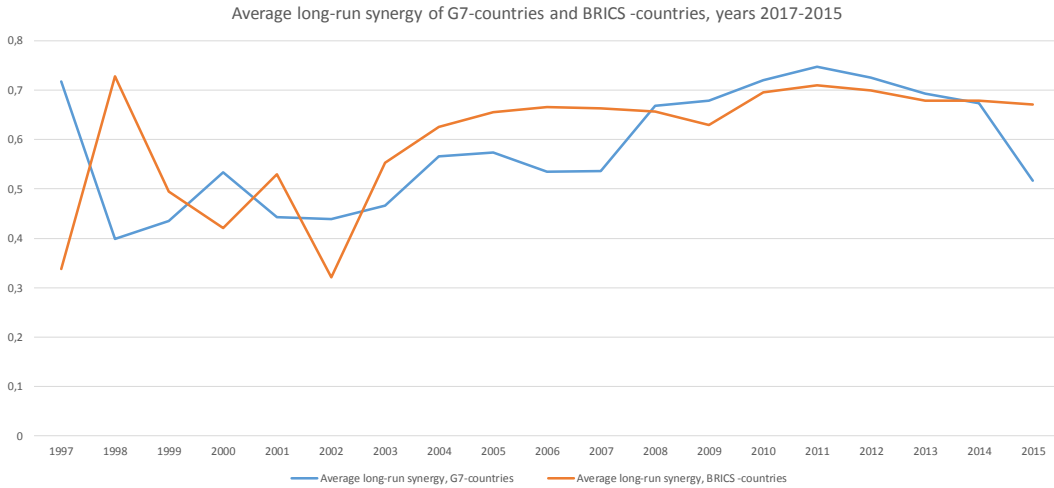
GERD (current prices, PPP) in the BRICS-countries, 1996-2015, Source: World Bank 2017



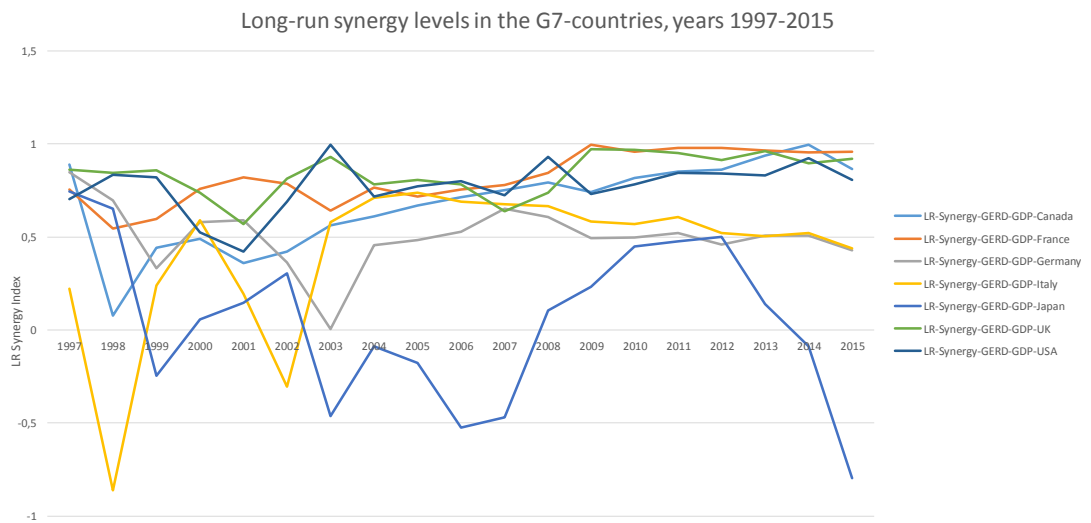
Average conventional synergy of G7-countries and BRICS -countries, years 1997-2015



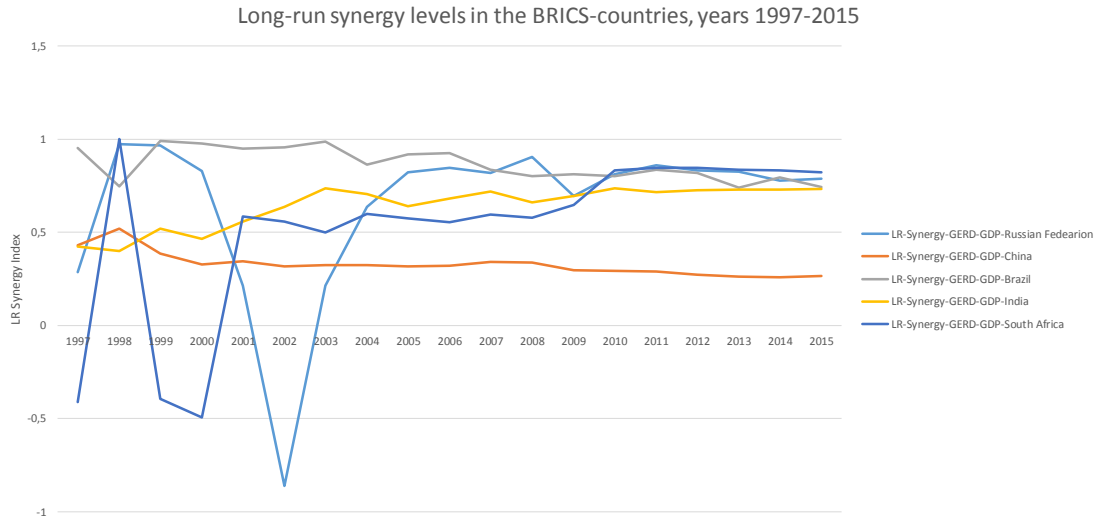
Average long-run synergy of G7-countries and BRICS -countries, years 2017-2015



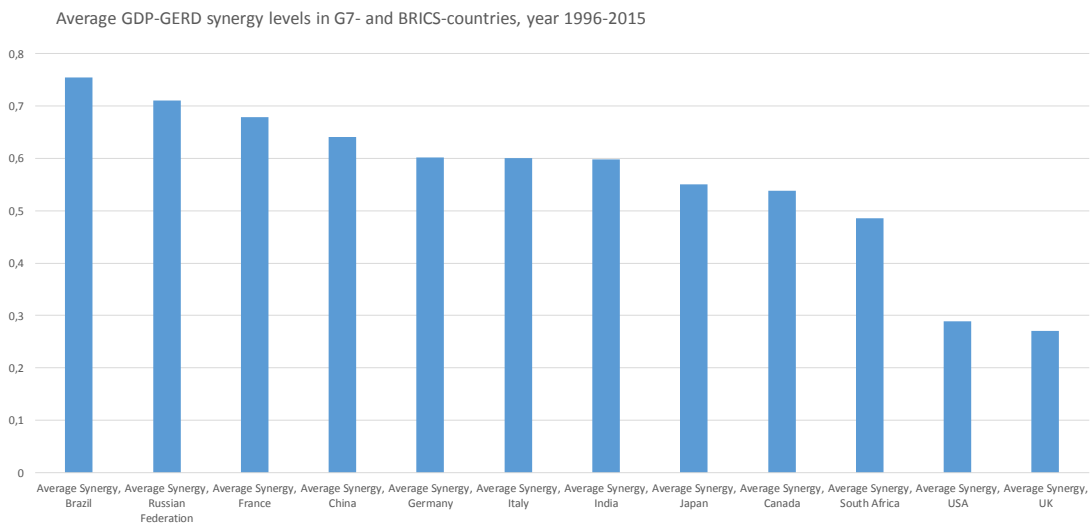
Long-run synergy levels in the G7-countries, years 1997-2015



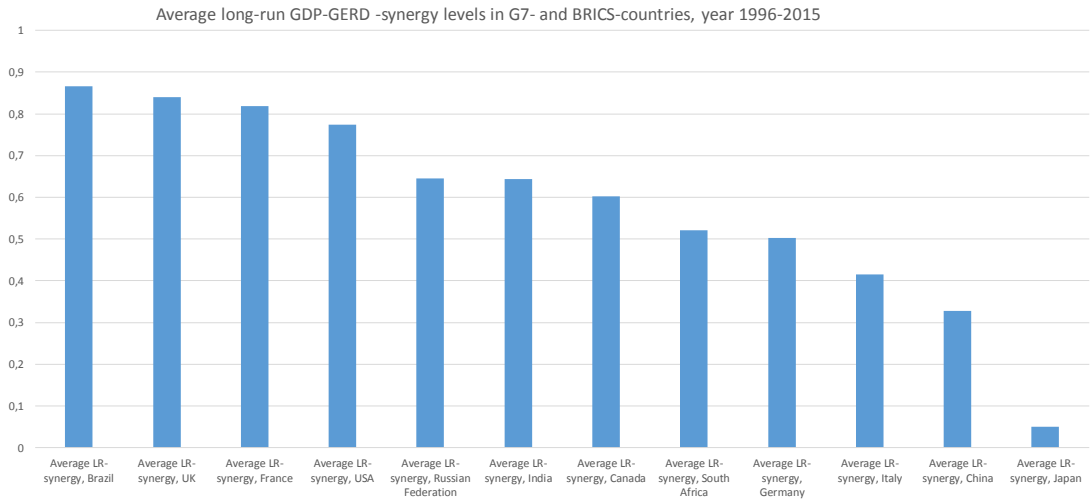
Long-run synergy levels in the BRICS-countries, years 1997-2015



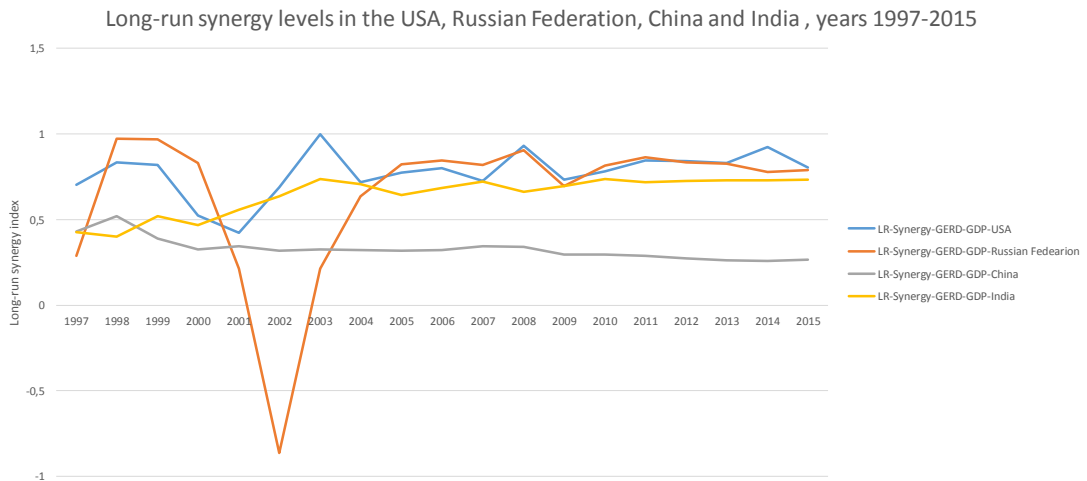
Average GDP-GERD synergy levels in G7- and BRICS-countries, year 1996-2015



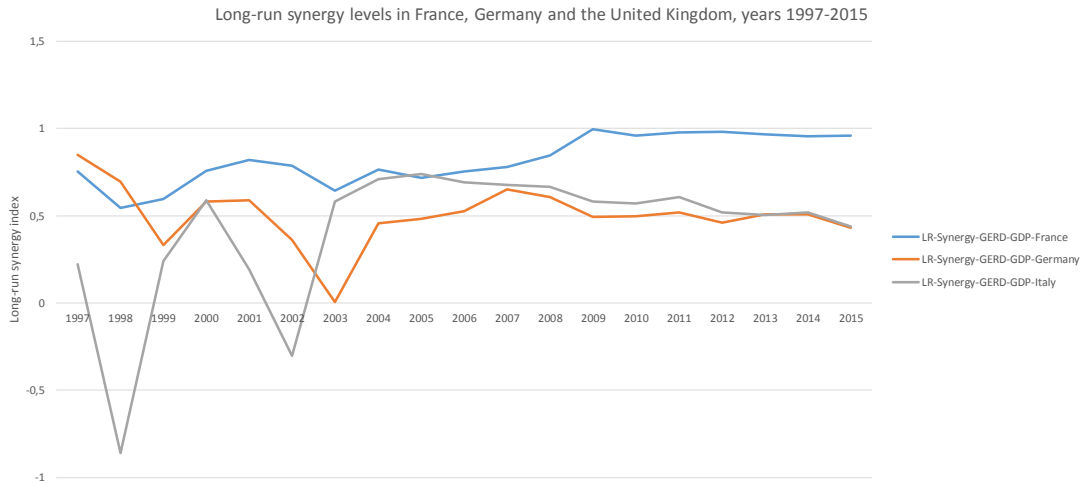
Average long-run GDP-GERD -synergy levels in G7- and BRICS-countries, years 1996-2015



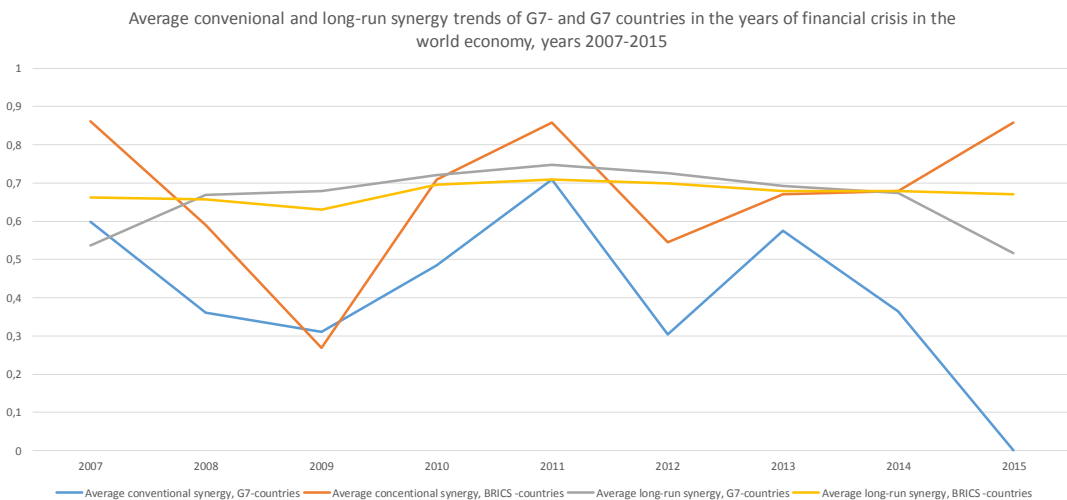
Long-run synergy levels in the USA, Russian Federation, China and India , years 1997-2015



European perspective: Long-run synergy levels in France, Germany and the United Kingdom, years 1997-2015



Average conventional and long-run synergy trends of G7- and G7 countries in the years of financial crisis in the world economy, years 2007-2015



Conclusions

- Synergy analysis provides interesting perspective to global innovation ecosystems. For example we were able to report average GERD-GDP –synergy levels, which inform global decision-makers about success in synergy levels but also failures in synergy levels
- Typically decision-makers expect that there is positive synergy between GERD and GDP, but finally it is empirical question to evaluate. Our study indicates that in some economies there are periods when there is also negative synergy. Synergy levels vary in time.
- Synergy dynamics is different in G7-countries compared to BRICS-countries: Key finding is that after 2002 BRICS-countries have improved their average synergy level compared to G7-countries, and they have now more stable average synergy level compared to G7-countries average level
- Almost all countries have improved synergy levels between GDP and GERD in the long run which indicates harder competition in the field of global innovation ecosystems.
- China has biggest problems among BRICS-countries with its synergy level, surprisingly Brazil is having very high positive synergy level among BRICS-countries

Conclusions

- Japan has the biggest problems among G7-countries with its synergy level, UK, France and USA have highest long-run synergy levels among G7-countries
- Among global players, LR synergy levels of USA, India and Russia do not differ much after 2002 (LR-SI is about +0.75), but synergy level of China remains on lower level (LR-SI is about +0.3) in the period of 2002-2015
- In 2002 Russia had very negative synergy level (LR-SI was -0.86), but Russian Federation improved its performance after this exceptional year. Development to negative direction in long-run synergy started in 1999 although industrial production increased 10% in Russian Federation in years 2000-2002. This special observation requires more attention in the field of global innovation ecosystem research
- Among European G7-group members, France had the best positive LR-synergy level performance in 1997-2015, Italy showed two negative LR synergy breaks in 1998 (LR-SI -0.86) and 2002 (LR-SI -0.30), but it has showed better performance after this year (Average LR-SI +0.60 in 2003-2015)

Thank you for attention!



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