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# Scientific research and funding networks between China and the European member states

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# Background 1: Why should we collaborate?

- to access special equipment of facilities
- to access special skills
- to access unique materials
- to be efficient in use of labor
- to be efficient in use of time
- to increase productivity
- to share knowledge

(see more in Beaver and Rosen, 1978, 18 motives for collaboration)

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# Background 2: funding effect

- Funding improves research productivity (Defazio, Lockett & Wright, 2009)

- Funding has a significant positive impact on collaboration (Bozeman & Corley, 2004; Lee & Bozeman, 2005; Defazio, Lockett, & Wright,2009)

- External funding also drives applicants to integrate all kinds of knowledge resources, including finding appropriate collaborators (Katz & Martin, 1997).

- Publications with funding acknowledgments present research with a higher social impact compared to publications without them (Costas & van Leeuwen, 2012; Gök et al., 2015)

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# Background 3: Collaborations between EU & China

✓ **The EU-China Agreement on Cooperation in Science and Technology was signed in 1998, renewed in 2004, and 2009.**

✓ **MoST and DG Research and Innovation signed the Agreement on Implementing the Science & Technology Partnership Scheme (CESTYS) in May 2009.**

✓ **The National Natural Sciences Foundation of China (NSFC) and DG Research and Innovation signed an Administrative Arrangement in March 2010.**

✓ **The 16th EU-China Summit of November 2013…**

✓ **The joint EU-China 2020 Cooperation Strategy…**

**……**

**From China:**

➢**By 2015, China has provided 20,000 scholarships to support Chinese students and scholars to study in European countries.**

➢ **By 2015, 10,000 scholarships to support EU students and scholars to study in China.**

**……**

**From Europe:**

➢**the strategic document "A Long-Term Policy for China-Europe Relations", issued in 1995, demonstrated Europe's intention to cooperate with China (European Commission, 1995).**

➢**Erasmus Mundus scholarships sponsored 2,000 Chinese students in 2012.**

➢**Marie-Curie programme supported 959 Chinese participations.**

**……**

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# Background 4: collaboration results

- In the first three years of the 7th Framework Programme for Research and Technological Development (FP7), Chinese researchers were the third most allocated-to recipients of funding amongst non-European researchers (European Commission, 2010).
- 383 participations of Chinese organisations in 274 collaborative research projects and a total EU contribution of 35.24 million euros (2007-2013).
- China remains a key partner country in Horizon 2020. By 2015, 227 applications from China were presented in 187 eligible proposals, with 60 participations of Chinese organisations in 33 main listed projects (European Commission, 2015).
- The number of collaborated publications between China and the EU28 in 2014 was more than 7 times as high as that in 2000, from 2,535 to 19,241.

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# Research Questions

- What are the main funding sources of the China-EU collaborated publications?
- What is the relationship between joint funding and collaborative research?
- Does the earlier scientific collaboration drive joint funding proposals, or vice versa?

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# Data collection and Methodology

- Thomson Scientific's Science Citation Index Expanded (SCI-E) & Social Sciences Citation Index (SSCI), 2008-2014.
- Co-publications at national level, between China and 28 EU member states
- Funding resources – *drawn from funding organizations*:
  a) China
  b) European Union (e.g. framework programmes, Horizon 2020 etc.)
  c) individual European countries (e.g. national strategic programmes and bilateral programmes with China.)
- Funding data provided by the European Commission's datawarehouse ECORDA:
  - the 7th framework programme (FP7) and the early phase of Horizon2020 (H2020)
  - covering the years 2007 until 2015
  - in total 1618 funding proposals jointly written by China and European countries

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# Data collection and Methodology

$$\begin{bmatrix} P_{1,1,t} & P_{1,2,t} & \cdots & \cdots & \cdots & P_{1,29,t} \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ P_{29,1,t} & \cdots & \cdots & \cdots & \cdots & P_{0,29,t} \end{bmatrix}$$

***Main variables:***

❖Joint publications
- - joint publications_funded by China
- - joint publications_funded by the EU
- - joint publications _funded by individual EU countries

❖Joint FP7 and H2020 proposals
- - funded proposals
- - unfunded proposals

***Control variables:***

❖EU membership time group
❖Geographical distance (measured by km)
❖Languages

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# Results: Collaboration intensity and funding structure

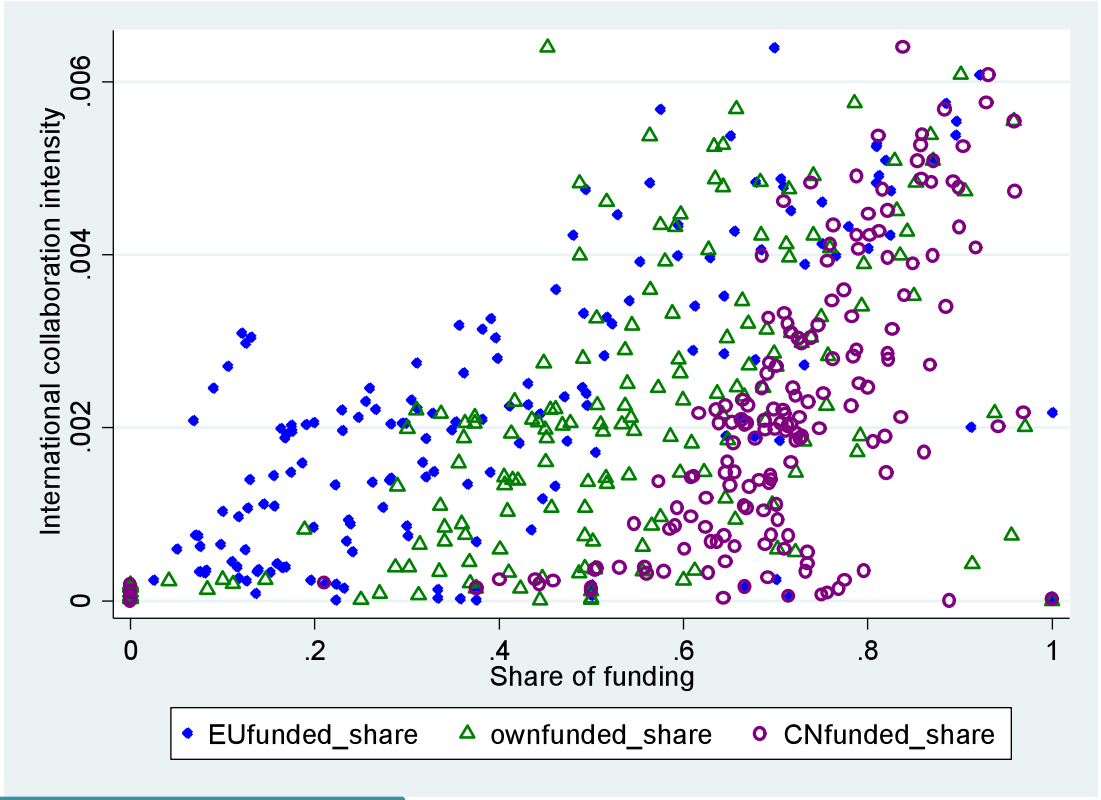
**Correlation between joint publication intensity and funding share (2009-2014)**

81,996 joint publications (2009-2014)

77% (62,928 articles) funding acknowledgement

89% (55,840 articles) Funded by CN or EU

80% (44,881 articles) CNfunded
47% (26,301 articles) individual EU country funded
13% (7,086 articles) EUfunded



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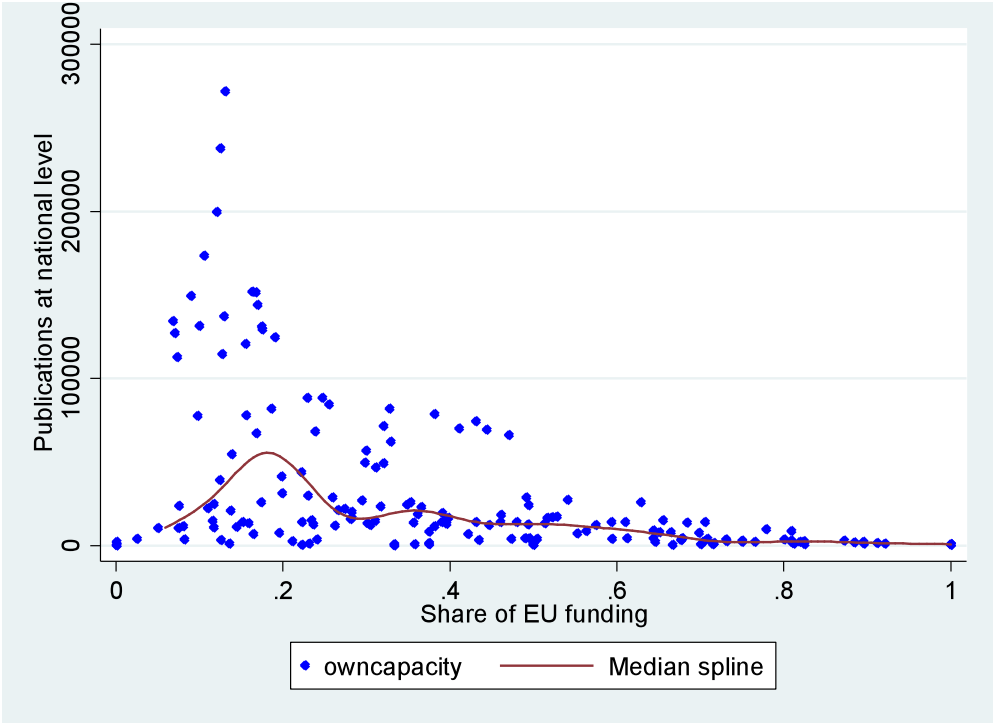
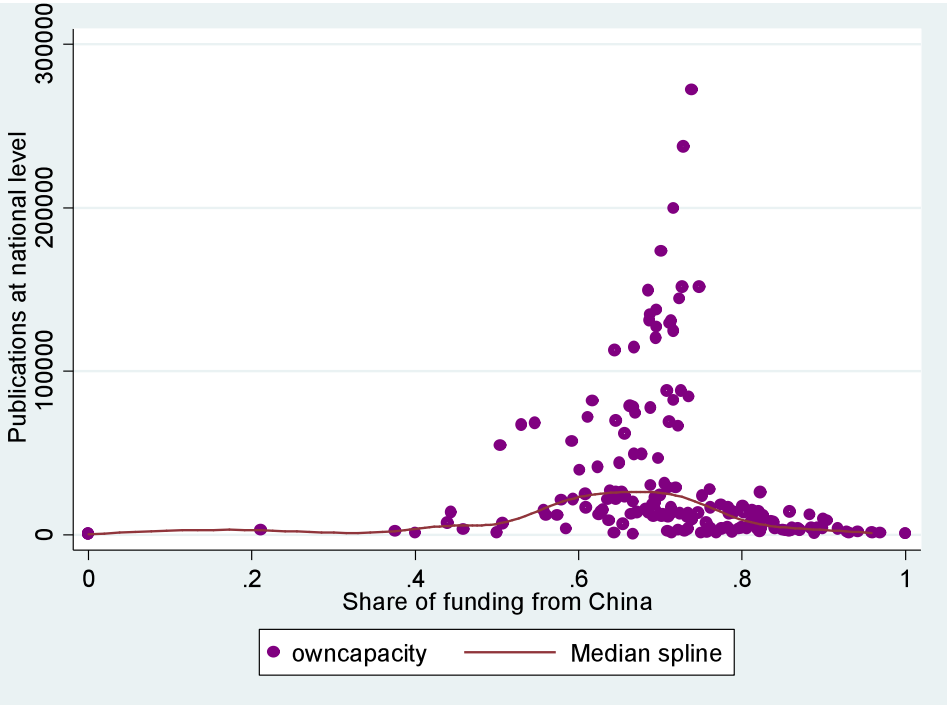
# Results: Research capacity & funding resources

**correlation between own research capacity and share of EU funding (2009-2014)**




**correlation between own research capacity and share of funding from China (2009-2014)**



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# Question

What is the relationship between joint funding and collaborative research?

Funded projects ➔ joint publications ?

Unfunded projects ➔ joint publications?

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# Results: Effect of funding and co-publications - multiple regression quadratic procedure (MR-QAP)

| | model 1 | model 1a | model 1b | model 1c |
|---|---|---|---|---|
| DV | joint publications (2011-14) | joint publications _funded by China (2011-14) | joint publications _funded by the EU(2011-14) | joint publications _funded by individual EU countries(2011-14) |
| Intercept | 0 | 0 | 0 | 0 |
| | 15.346 | 90.712 | 256.760 | 183.840 |
| FP7&H2020 funded projects (2007-10) | -0.304** | -0.368** | 0.079 | -0.078 |
| | -27.567 | -24.283 | 1.778 | -3.724 |
| FP7 &H2020 unfunded proposals (2007-10) | 1.138*** | 1.177*** | 0.831*** | 0.974*** |
| | 38.026 | 28.671 | 6.934 | 17.145 |
| EU membership time group | -0.086*** | -0.094*** | -0.083** | -0.094*** |
| | -276.557 | -220.403 | -67.245 | -160.530 |
| geographical distance | 0.009 | -0.001 | -0.083 | -0.011 |
| | 0.009 | -0.001 | -0.020 | -0.006 |
| language | -0.006 | -0.010 | -0.005 | -0.007 |
| | -22.849 | -28.574 | -4.355 | -14.400 |
| R-sqr | 0.739 | 0.701 | 0.748 | 0.794 |
| N | 812 | 812 | 812 | 812 |

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# Question

Does the earlier scientific collaboration drive joint funding proposals?

Joint publications➔ joint funding proposals?

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# Results: Effect of funding and co-publications - multiple regression quadratic procedure (MR-QAP)

| | model 2 | model 2a | model 2b |
|---|---|---|---|
| DV | joint FP7&H2020 proposals (2007-15) | joint FP7&H2020 funded projects (2007-15) | joint FP7 &H2020 unfunded proposals (2007-15) |
| Intercept | 0 | 0 | 0 |
| | 2.337 | 1.964 | 0.373 |
| *Earlier stage* Jointpub (2003-06) | 1.443** | 1.443** | 1.429** |
| | 0.357 | 0.089 | 0.268 |
| *Later stage* Jointpub (2007-10) | -0.740 | -0.793 | -0.716 |
| | -0.107 | -0.028 | -0.078 |
| EU membership time group | 0.227*** | 0.285*** | 0.206*** |
| | 54.778 | 17.107 | 37.671 |
| geographical distance | 0.185* | 0.138 | 0.199* |
| | 0.013 | 0.002 | 0.011 |
| language | 0.038 | 0.039 | 0.037 |
| | 10.677 | 2.712 | 7.965 |
| R-sqr | 0.661 | 0.572 | 0.682 |
| N | 812 | 812 | 812 |

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# Dicussions and conclusions

Funding from China ⟹ the *volume increase* of joint CN-EU publications.
Funding from the EC ⟹ the *integration* of European Union.

Failed FP7 (H2020) proposals ⟹ the joint research output;
obtaining funded research opportunities from China

Existing literature indicates that *scientific collaboration between different regions in the European Union has a minor effect on acquiring FP funding* (Hoekman et al, 2013). Our results show that in the process of collaborating with China, the scientific collaborations in earlier years – rather than in later years – have a positively stronger effect on joint funding proposals.

EU integration issue: member states are still fond of working on joint FP7 or H2020 projects with partners that joined the EU at similar time (mostly between the "old" members). But in the wider range – i.e. conducting joint scientific publications, European countries have been greatly integrated, in particular between "old" and "new" members.
This supports the findings on collaboration network between "old" and "new" EU member states (Wang, Wang & Philipsen, 2017)

In relation to Chinese-EU 28 collaboration, language barrier and geographical distance do not seem to be important in impeding scientific collaborations.

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# Thanks for your attention!
# &
# Comments?