

RETURNEE ACADEMIC ENTREPRENEURSHIP IN CHINA

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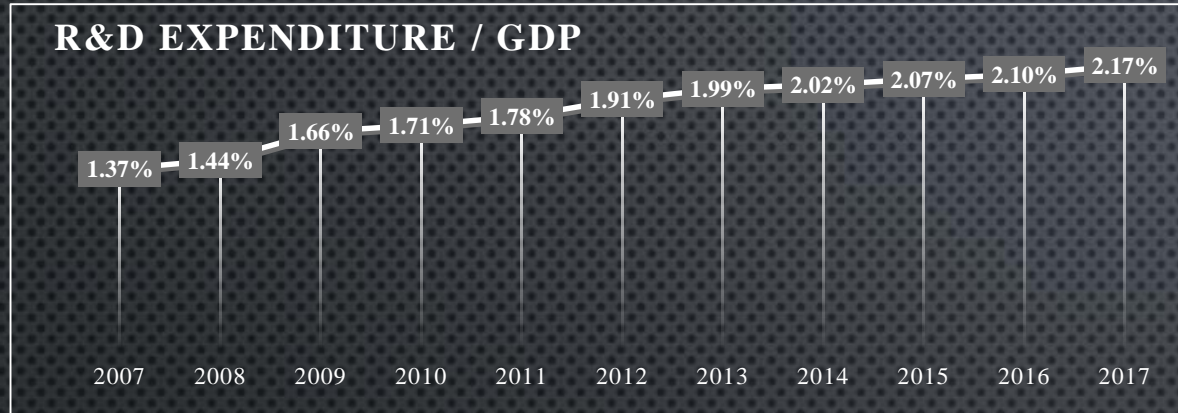
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CHINESE AMBITIOUS PLAN IN 2006

- **China's National Science and Technology Development Plan**, the guideline on medium- and long-term program for science and technology development (MLP) was published by the State Council on Feb 9th , 2006.
- Medium-term Objectives (2020)
 - The MLP calls for China to become an “innovation driven economy” by the year 2020, and a world leader in science and technology (S&T) by 2050;
 - Investment in research and development is expected to reach **2.5 percent of the GDP**;
 - The number of patents granted to Chinese citizens becomes **Top 5** in the world;
 - The number of science and technology articles' citation becomes **Top 5** in the world;
 - ...

TWO YEARS AWAY FROM 2020

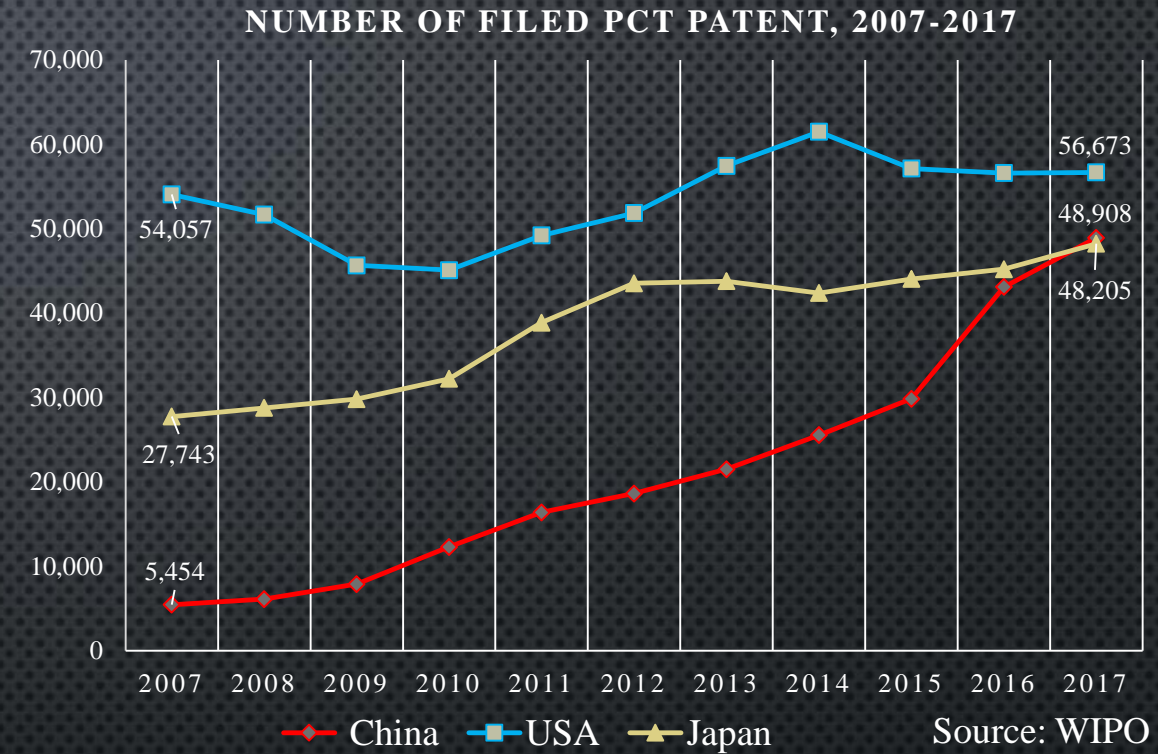


Source: World Bank

Number of Article Citations in 10 year window

	1997-2007	1998-2008	1999-2009	2000-2010	2001-2011	2002-2012	2003-2013	2004-2014	2005-2015	2006-2016	2007-2017
Ranking	13	10	9	8	7	6	5	4	4	4	2

Source: Web of Science



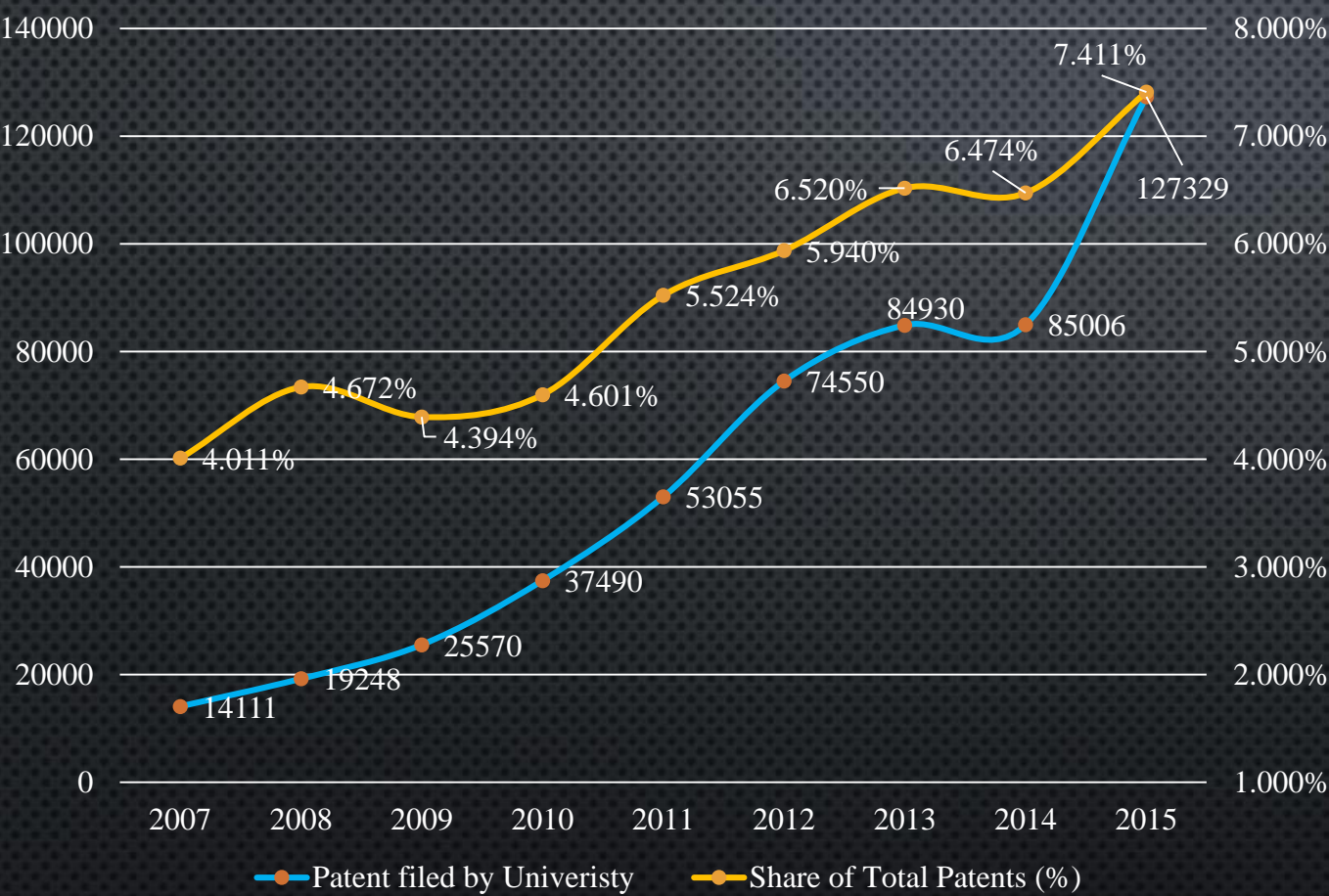
Source: WIPO

- R&D Expenditure / GDP grows from 1.37% in 2007 to 2.17% in 2017
- The number of filed PCT patents reached 48,908 in 2017; surpassed Japan and now No. 2 in the world
- The number of article citations grows from No.13 to No.2 from 2007 to 2017

SCIENCE AND TECHNOLOGY POLICY AFTER 2006

- Academic Engagement and Academic Commercialization
 - **China's National Science and Technology Development Plan:** Universities are not only an important base for nurturing high caliber innovative talents but also a principal player in basic research and original technology innovation activities and a commendable force in technology transfer, and technology spin-off and commercialization.
 - **National People's Congress** (NPC, the Legislature) Revised the Science and Technology Progress Law on December, 2007. Encourage local government support for research cooperation between industry and universities and academic commercialization.
- Repatriate Highly-skilled Professionals and Students back to China:
 - **National Talent Development Plan** issued by the State Council on June 6, 2010, provides a blueprint for creating a **highly skilled national work force** within the next 10 years.
 - The plan outlines 12 major programs for recruiting top talent at home and abroad
 - Attract overseas top talents to return China
 - Encourage oversea students return China to work

GROWING TREND OF ACADEMIC COMMERCIALIZATION

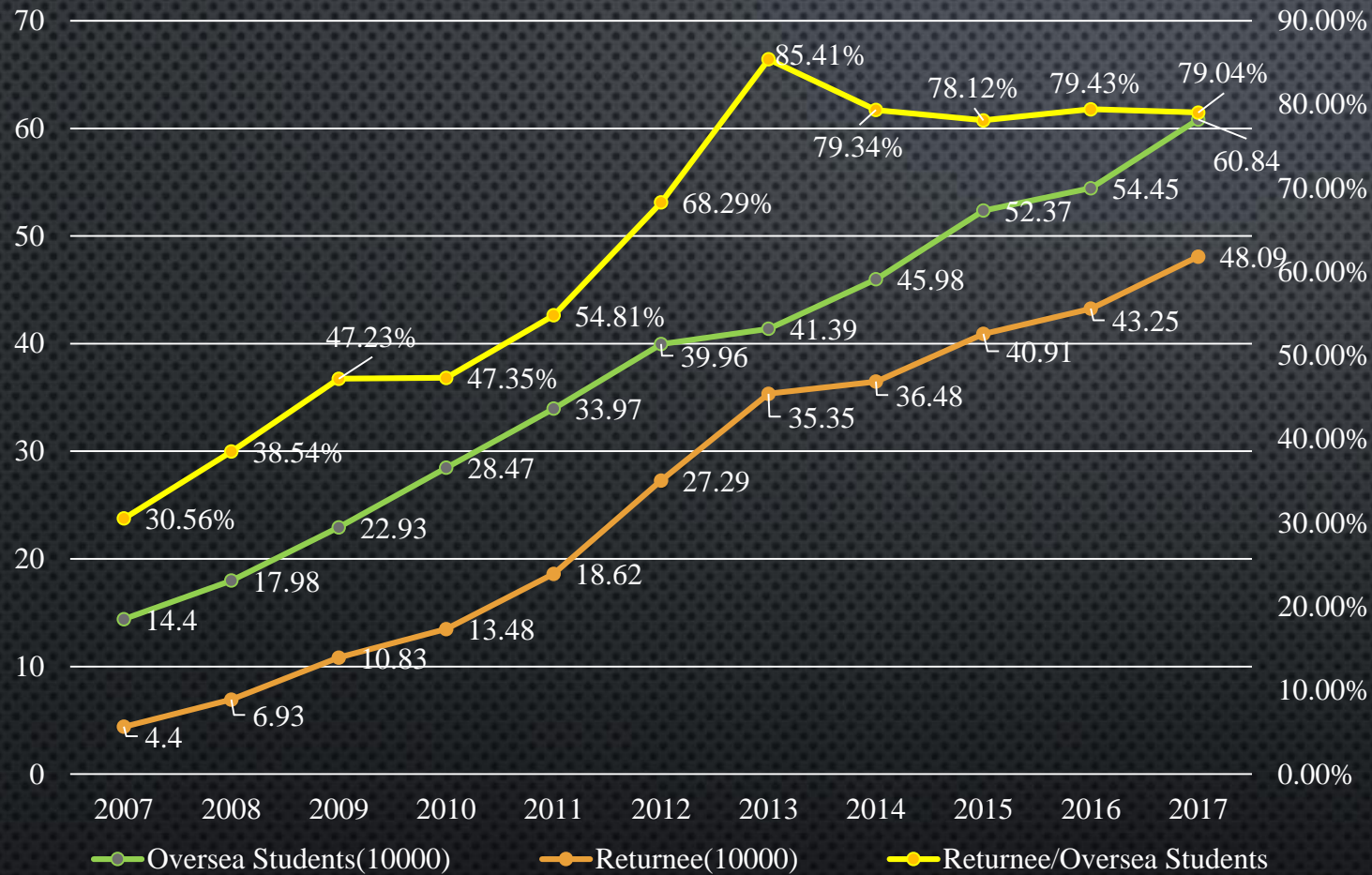


Source: SIPO

Universities are often regarded as holders of important intellectual property that could be leveraged for local/regional development; viewed by policy makers as engines of economic growth.

Since the mid-2000s, to incentivize universities and professors, the Chinese government has emphasized academic commercialization activities in performance evaluations of individual faculty members and universities.

GROWING INTERNATIONAL PROFILE



Source: Ministry of Education

- Universities in emerging economies are attempting to increase their international profiles.
- What is the role of returnee academics in the Third Mission of university?
- Are the returnee academics more likely to get involved in academic commercialization such as entrepreneurship than non-returnee academics?
- Empirical evidence on Academic Entrepreneurship: 507 computer science professors from 42 Chinese universities, 2007 to 2017

THEORY AND HYPOTHESES

- Knowledge Spillover Theory of Entrepreneurship
 - Entrepreneurial activity serves as a conduit for knowledge spillovers to be translated into economic growth and competitiveness. **Entrepreneurial activity tends to be greater in contexts when the stock of knowledge is higher** (Audretsch and Keilbach, 2007, *Journal of Management Studies*).
 - Returnees, especially technically trained ones, are often regarded as important carriers of advanced technological knowhow that is in short in their home country (Qin, 2015, *Research Policy*; Li et al., 2015, *Research Policy*).
 - This is particularly valuable for returnee academics who possess experience with cutting edge technologies at host countries. With higher stock of knowledge, the returnee academics are more likely to start new business than non-returnee academics.

Hypothesis 1: The likelihood of an academic to involve into entrepreneurship increases if s/he has overseas experience (Ph.D. or Postdoc).

HYPOTHESES (CONTINUED)

- Returnees are often regarded as important carriers of advanced technological knowledge. The more time they spend overseas, the returnee are more likely to possess more experience with advanced technological knowledge. Returnee academics with oversea PhD normally spend more time (5-6 years) than postdoc (2-3 years) aboard. Ph.D. experience more holistic, including research, teaching, coursework. More comprehensive training may give more opportunities for cutting edge knowledge.

Hypothesis 2: Returnee academics with a Ph.D. overseas are more likely to start new business than returnee academics with only Postdoc experience overseas.

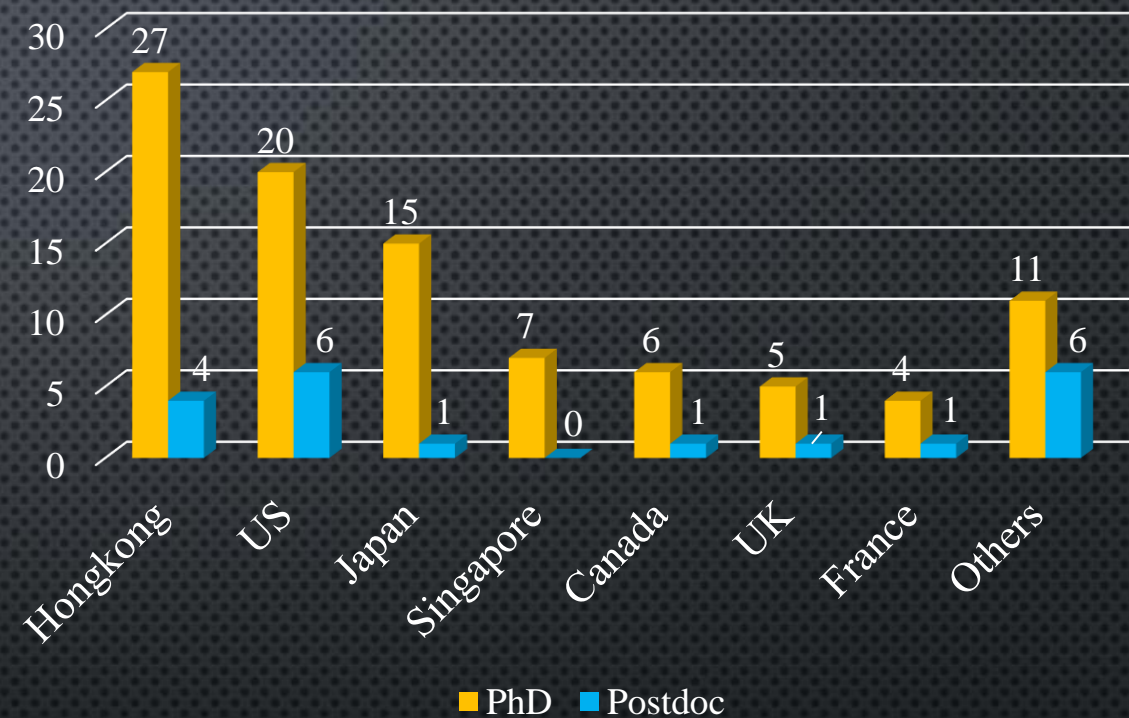
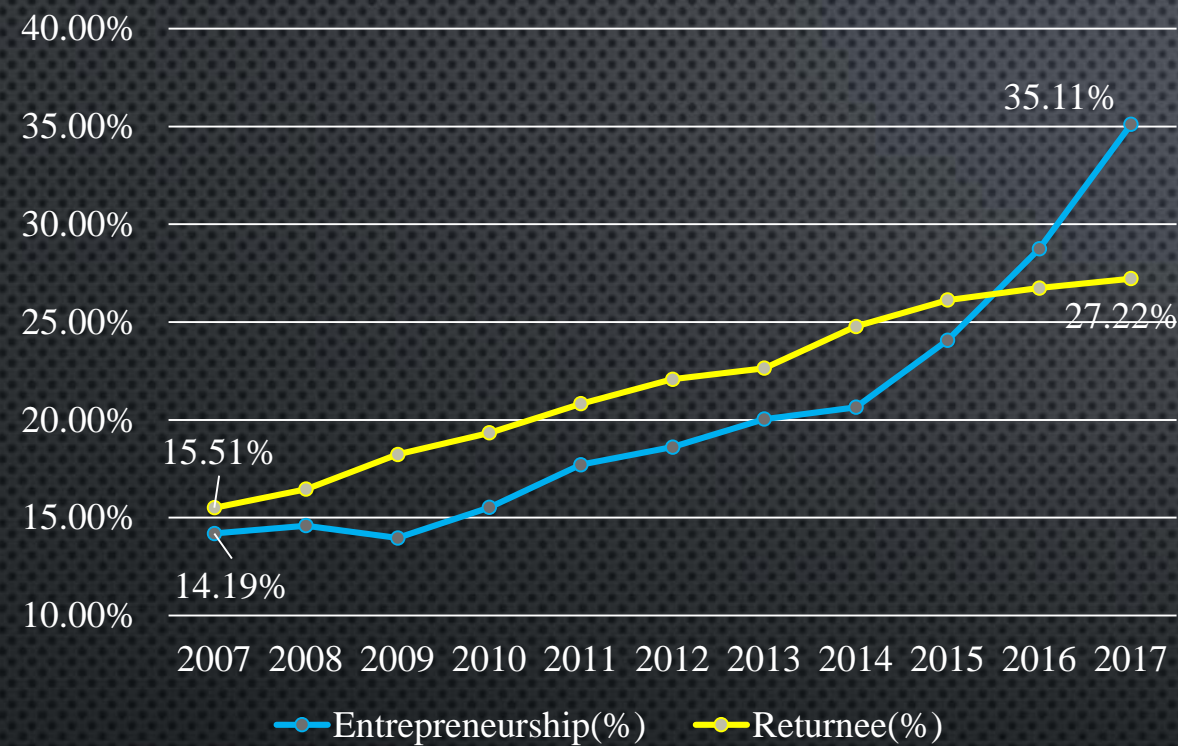
- The economic development gap between the home country and the host country reflects the knowledge gap across countries. The knowledge gap, in turn, may create entrepreneurial opportunities. Returnees from developed countries may have more knowledge-related advantages compared with domestically educated scholars.

Hypothesis 3: The larger the gap in the level of economic development between the home country and the host country, the higher the likelihood that returnee academics get involved into entrepreneurship.

DATA SOURCES

- Identified and collected 5020 computer science scholars' information from 42 research-intensive universities in China. 1156 scholars have provided detailed information in their CVs, personal introductions on host institution websites, and online reports.
- Information on every company registered in China is publicly available and can be accessed via the electronic database "National Company Credit Information System (NCCIS)". This search engine contains information such as company name, type of enterprise, registered address, date of establishment, business scope, **shareholder and top manager information**.
- To identify academic entrepreneurs, we first created two separate lists of names of (i) company shareholders and top managers and (ii) university scholars, and then searched for matches. This allows us to identify faculty members who started up a new company. To further ensure identification, we checked the locations of university and company addresses and the **scholars' research field and company's business scope**. Furthermore, we checked the company's website (founder's information) and the scholar's LinkedIn information.
- 507 scholars from 42 universities during 2007-2017 have been identified in our final sample. 27.22% of these scholars have either received their Ph.D. overseas or have postdoc experience overseas.

EMPIRICAL CONTEXT: RETURNEE ACADEMICS AND ACADEMIC ENTREPRENEURS



In 2007, 14.19% of faculty members were the shareholder or top manager of a company; 35.11% in 2017.

In 2007, 15.51% of faculty members had their PhD or Postdoc overseas; 27.22% in 2017.

EMPIRICAL EVIDENCE: VARIABLES

Dependent Variables:

- *Entrepreneurship* Equals 1 if the scholar has been the shareholder or top manager of a company after the focal year, 0 otherwise.

Independent Variables

- *Returnee PhD* dummy variable, equals 1 if a scholar got their PhD overseas, 0 otherwise.
- *Returnee Postdoc* dummy variable, equals 1 if a scholar was a post-doctoral fellow overseas, 0 otherwise
- *Economic Gap* the ratio of host-country to home-country GDP per capita in a given year

EMPIRICAL EVIDENCE: CONTROL VARIABLES

Individual:

- *Industry* dummy variable, equals 1 if the scholar has prior industry experience before becoming university faculty and 0 otherwise
- *Patent* number of patents a scholar has filed before the focal year
- *Gender* dummy variable, equals 1 if the scholar is a male and 0 otherwise;
- *Age*

University and Region:

- *University Science Park (USP)* the variable is 1 if the university has a science park and 0 otherwise
- *Regional High-Tech Entrepreneurship (High-tech)* number of new technology-based firms per 10000 population in the city where the university is located

ECONOMETRIC MODEL

Because we work with a binary dependent variable and panel data, the Random Intercept Logistic (RE logit) regression model has been applied in the analysis:

$$\pi_{i,t} = \text{Probability}(\text{Entrepreneurship}_{i,t} = 1 | \text{Returnee PhD}_i, \text{Returnee Postdoc}_i, \text{Control Variable}_{i,t}, \mu_t)$$

$$\log \frac{\pi_{i,t}}{1 - \pi_{i,t}} = \beta_1 \text{Returnee PhD}_i + \beta_2 \text{Returnee Postdoc}_i + \beta_3 \text{Control Variable}_{i,t} + \mu_t$$

$\text{Entrepreneurship}_{i,t}$ is the dependent variable where i = scholar and t = time.

The random intercept μ_t represents the combined effect of all omitted time-specific covariates that causes some scholars to be more likely to get involved into entrepreneurship than others

RESULTS: OVERSEA EXPERIENCE ON ACADEMIC ENTREPRENEURSHIP

VARIABLES	Dependent Variable: Entrepreneurship			
	RE Logit	RE Logit	RE Logit	RE Logit
Returnee PhD	7.362*** (2.244)		6.781** (2.797)	6.677** (2.960)
Returnee Postdoc		4.243** (2.067)	-0.111 (2.521)	-2.113 (2.664)
Gender	1.238 (0.841)	1.526* (0.905)	1.237 (0.852)	0.129 (1.014)
Age	1.260*** (0.0472)	1.249*** (0.0538)	1.264*** (0.0447)	0.972*** (0.0440)
Industry	-0.851 (1.233)	-1.441 (1.227)	-0.701 (1.685)	-0.111 (1.676)
Patent	0.0891*** (0.0189)	0.0733*** (0.0146)	0.0738*** (0.0155)	0.0500*** (0.0135)
Returnee PhD*Economic Gap	-0.453 (0.276)	-0.316 (0.221)	-0.492 (0.336)	-0.354 (0.291)
Science Park				0.0410 (1.456)
High-tech				0.0668*** (0.0202)
Constant	-69.34*** (2.011)	-68.69*** (2.296)	-69.43*** (1.930)	-58.16*** (2.678)
Observations	4,508	4,508	4,508	4,001
Number of Scholars	507	507	507	501
Chi ²	885.68***	666.28***	980.34***	600.18***

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

H1: The likelihood of an academic to involve into entrepreneurship increase if academics have overseas experience (**Holds**)

H2: Returnee academics with Ph.D. from overseas are more likely to start new business than returnee academics with only Postdoc experience overseas (**Holds**)

H3: The larger the gap in the level of economic development between home and host country, the higher the likelihood that returnees get involved into entrepreneurship (**statistically insignificant**)

RESULTS: OTHER FACTORS ON ACADEMIC ENTREPRENEURSHIP

VARIABLES	Dependent Variable: Entrepreneurship			
	RE Logit	RE Logit	RE Logit	RE Logit
Returnee PhD	7.362*** (2.244)		6.781** (2.797)	6.677** (2.960)
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- Senior scholars are more likely to involve in entrepreneurship than younger scholars.
- Scholars with higher stock of patents are more likely to start new business.
- Regional entrepreneurship intensity has a positive effect on scholar entrepreneurial activities.

CONCLUSION

- Academics' overseas background has positive effect on academic entrepreneurship.
- Returnee academics with foreign Ph.D. degrees are more likely to start new business than the returnee academics with only Postdoc experience overseas.
- The difference in the level of economic development between home and host country has no statistically significant influence on returnee academic entrepreneurial behavior.
- Senior scholars are more likely to involve in entrepreneurship than younger scholars.
- Scholars with higher stock of patents are more likely to start new business.
- Regional entrepreneurship intensity has positive effect on scholars' entrepreneurial activities.

Thank you!

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