Patenting in China and India

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November 2, 2017

CIP-India

Research Questions

- How active are patent seekers in each country?
- How do foreign businesses view the market?
- How do domestic businesses view their own markets?
- Do different entity types view the markets differently?
- What are the underlying sources of different outcomes?
- What role does policy play?

Data

- Patents only one, and imperfect, measure of innovation
- Derwent Innovation patent database + OECD + World Bank
- WIPO classification: mutually exclusive technology domains
- Latest available document for any patent
- Determining domicile of assignee
- Unassigned between 2-3 per cent
- January 1, 2000 to December 31, 2016

Patent Applications

Biotechnology
Computer Technology
Digital Communication
Environment Technology
Food Chemistry
Microstructure & Nano
Pharmaceuticals
Telecommunications

Patent Applications

	Domestic	
	China	India
Biotechnology	49.76	10.02
Computer Technology	32.95	10.57
Digital Communication	24.17	8.36
Environment Technology	65.24	16.97
Food Chemistry	84.79	21.78
Microstructure & Nano	53.85	20.72
Pharmaceuticals	67.37	25.82
Telecommunications	28.11	8.35
	%-age of domestic to all applications	

Patent Applications

	Universities	
	China	India
Biotechnology	26.29	4.98
Computer Technology	9.90	1.83
Digital Communication	5.85	1.27
Environment Technology	18.15	3.82
Food Chemistry	12.43	8.52
Microstructure & Nano	37.66	16.44
Pharmaceuticals	10.25	4.59
Telecommunications	5.77	1.27

%-age of domestic university to all applications

Patent Applications

	Commercial	
	China	India
Biotechnology	13.65	3.41
Computer Technology	18.70	6.64
Digital Communication	15.24	4.64
Environment Technology	31.44	5.19
Food Chemistry	37.41	7.70
Microstructure & Nano	9.17	2.57
Pharmaceuticals	20.08	14.02
Telecommunications	17.54	3.99
	%-age of domestic commercial to all applications	

Patent Applications

	China	India
Biotechnology	1.93	1.46
Computer Technology	0.53	0.28
Digital Communication	0.38	0.27
Environment Technology	0.58	0.74
Food Chemistry	0.33	1.11
Microstructure & Nano	4.11	6.40
Pharmaceuticals	0.51	0.33
Telecommunications	0.33	0.32

Ratio of domestic university to domestic commercial applications

Patent Applications

	Domestic		Universities		Commercial			
	China	India	China	India	China	India	China	India
Biotechnology	49.76	10.02	26.29	4.98	13.65	3.41	1.93	1.46
Computer Technology	32.95	10.57	9.90	1.83	18.70	6.64	0.53	0.28
Digital Communication	24.17	8.36	5.85	1.27	15.24	4.64	0.38	0.27
Environment Technology	65.24	16.97	18.15	3.82	31.44	5.19	0.58	0.74
Food Chemistry	84.79	21.78	12.43	8.52	37.41	7.70	0.33	1.11
Microstructure & Nano	53.85	20.72	37.66	16.44	9.17	2.57	4.11	6.40
Pharmaceuticals	67.37	25.82	10.25	4.59	20.08	14.02	0.51	0.33
Telecommunications	28.11	8.35	5.77	1.27	17.54	3.99	0.33	0.32
	%-age of domestic to all applications		%-age of domestic university to all applications		%-age of domestic commercial to all applications		Ratio of domestic university to domestic commercial applications	

Speed of Entry (Days)

	Foreign	
	China	India
Biotechnology	353	990
Computer Technology	337	831
Digital Communication	338	895
Environment Technology	339	839
Food Chemistry	346	937
Microstructure & Nano	346	935
Pharmaceuticals	355	1025
Telecommunications	339	893

Speed of Entry (Days)

	Foreign Universities	
	China	India
Biotechnology	337	1002
Computer Technology	297	932
Digital Communication	304	837
Environment Technology	308	947
Food Chemistry	322	992
Microstructure & Nano	332	964
Pharmaceuticals	346	1009
Telecommunications	315	821

Speed of Entry (Days)

	Foreign Commercial	
	China	India
Biotechnology	355	990
Computer Technology	338	825
Digital Communication	339	894
Environment Technology	340	831
Food Chemistry	348	934
Microstructure & Nano	347	934
Pharmaceuticals	356	1029
Telecommunications	339	890

Speed of Entry (Days)

	Foreign		Relative
	China	India	Rate
Biotechnology	353	990	35.61
Computer Technology	337	831	40.55
Digital Communication	338	895	37.82
Environment Technology	339	839	40.46
Food Chemistry	346	937	36.91
Microstructure & Nano	346	935	36.98
Pharmaceuticals	355	1025	34.67
Telecommunications	339	893	37.96
			China over India

Speed of Entry (Days)

	Foreign		Relative	Foreign Universities		Relative	Foreign Commercial		Relative
	China	India	Rate	China	India	Rate	China	India	Rate
Biotechnology			35.61			33.68			35.91
Computer Technology			40.55			31.87			40.97
Digital Communication			37.82			36.33			37.87
Environment Technology			40.46			32.50			40.96
Food Chemistry			36.91			32.45			37.23
Microstructure & Nano			36.98			34.42			37.19
Pharmaceuticals			34.67			34.29			34.62
Telecommunications			37.96			38.34			38.10
			China over India			China over India			China over India

Speed of Entry (Days)

	Foreign		Relative	Foreign Universities		Relative	Foreign Commercial		Relative
	China	India	Rate	China	India	Rate	China	India	Rate
Biotechnology	353	990	35.61	337	1002	33.68	355	990	35.91
Computer Technology	337	831	40.55	297	932	31.87	338	825	40.97
Digital Communication	338	895	37.82	304	837	36.33	339	894	37.87
Environment Technology	339	839	40.46	308	947	32.50	340	831	40.96
Food Chemistry	346	937	36.91	322	992	32.45	348	934	37.23
Microstructure & Nano	346	935	36.98	332	964	34.42	347	934	37.19
Pharmaceuticals	355	1025	34.67	346	1009	34.29	356	1029	34.62
Telecommunications	339	893	37.96	315	821	38.34	339	890	38.10
			China over India			China over India			China over India

Market Importance

Relative to India's 100 days, when does a patent application from abroad reach China

Biotechnology

Computer Technology

Digital Communication

Environment Technology

Food Chemistry

Microstructure & Nano

Pharmaceuticals

Telecommunications

Market Importance

Relative to India's 100 days, when does a patent application from abroad reach China

	All Foreign	Domestic
Biotechnology	35.61	27.93
Computer Technology	40.56	30.29
Digital Communication	37.82	30.65
Environment Technology	40.46	23.54
Food Chemistry	36.91	24.66
Microstructure & Nano	36.98	33.74
Pharmaceuticals	34.67	31.12
Telecommunications	37.96	27.61

Market Importance

Relative to India's 100 days, when does a patent application from abroad reach China

	Universities	
	Foreign	Domestic
Biotechnology	33.68	28.79
Computer Technology	31.83	16.08
Digital Communication	36.33	20.38
Environment Technology	32.50	26.01
Food Chemistry	32.45	45.09
Microstructure & Nano	34.42	147.11
Pharmaceuticals	34.29	31.78
Telecommunications	38.34	11.02

Market Importance

Relative to India's 100 days, when does a patent application from abroad reach China

	Commercial	
	Foreign	Domestic
Biotechnology	35.91	28.92
Computer Technology	40.90	35.06
Digital Communication	37.87	38.71
Environment Technology	40.96	20.20
Food Chemistry	37.23	24.24
Microstructure & Nano	37.19	26.38
Pharmaceuticals	34.62	32.91
Telecommunications	38.10	31.44

Market to Foreigners

FIRST APPLICATION IN COUNTRY

	Foreign		Universities		Commercial			
	China	India	China	India	China	India	China	India
Biotechnology	25.05	2.40	13.79	0.44	11.12	1.71	1.24	0.26
Computer Technology	40.51	10.57	8.33	0.07	31.97	9.98	0.26	0.01
Digital Communication	47.91	11.78	6.23	0.04	41.22	9.77	0.15	0.00
Environment Technology	20.33	6.12	8.98	0.12	11.14	5.02	0.81	0.02
Food Chemistry	8.43	3.17	3.24	0.13	5.07	2.63	0.64	0.05
Microstructure & Nano	27.66	4.45	21.61	0.51	5.94	3.60	3.64	0.14
Pharmaceuticals	12.89	3.02	5.47	0.28	7.29	2.29	0.75	0.12
Telecommunications	35.80	8.52	5.51	0.07	29.95	6.55	0.18	0.01

%-age of foreign to all applications	%-age of foreign university to all applications	%-age of foreign commercial to all applications	Ratio of foreign university to foreign commercial applications

Market to Domestics

FIRST APPLICATION IN COUNTRY

	Domestic		Universities		Commercial			
	China	India	China	India	China	India	China	India
Biotechnology	48.49	9.08	25.73	4.66	13.19	2.87	1.95	1.62
Computer Technology	31.15	1.79	9.74	6.30	17.26	2.00	0.56	3.15
Digital Communication	23.30	8.10	5.71	1.26	14.64	4.51	0.39	0.28
Environment Technology	64.48	16.14	18.00	3.76	31.15	4.63	0.58	0.81
Food Chemistry	84.25	17.77	12.32	8.19	37.19	4.25	0.33	1.92
Microstructure & Nano	52.50	20.21	37.26	16.27	8.31	2.23	4.48	7.31
Pharmaceuticals	65.95	23.40	9.95	4.29	19.37	12.08	0.51	0.35
Telecommunications	26.99	8.02	5.66	1.24	16.73	3.82	0.34	0.33

%-age of domestic to all applications	%-age of domestic university to all applications	%-age of domestic commercial to all applications	Ratio of domestic university to domestic commercial applications

Discrimination (1/2)

Years from application to grant: CHINA

	Coefficient	Standard Error	t	P>|t|
Foreign	2.29	0.01	440.39	0.00
Number of independent claims	0.12	0.00	92.30	0.00
Wordcount per independent claim	0.00	0.00	-19.14	0.00
Number of technogical domains	0.24	0.01	34.07	0.00
Constant	2.29	0.01	264.29	0.00

Discrimination (1/2)

Years from application to grant: CHINA

	Coefficient	Standard Error	t	P>|t|
Foreign	2.29	0.01	440.39	0.00
Number of independent claims	0.12	0.00	92.30	0.00
Wordcount per independent claim	0.00	0.00	-19.14	0.00
Number of technogical domains	0.24	0.01	34.07	0.00
Constant	2.29	0.01	264.29	0.00

Years from application to grant: INDIA

	Coefficient	Standard Error	t	P>|t|
Foreign	0.26	0.04	6.85	0.00
Number of independent claims	-0.02	0.01	-3.97	0.00
Wordcount per independent claim	0.00	0.00	-8.04	0.00
Number of technogical domains	0.25	0.10	2.43	0.02
Constant	5.47	0.11	50.15	0.00

Discrimination (2/2)

Years from application to grant: CHINA

	Coefficient	Standard Error	t	P>|t|
Foreign	1.75	0.02	99.87	0.00
Number of independent claims	0.12	0.00	91.73	0.00
Word count per independent claim	0.00	0.00	-19.12	0.00
Number of technological domains	0.09	0.01	11.01	0.00
(Number of domains)*(Foreign)	0.48	0.02	32.02	0.00
Constant	2.45	0.01	245.24	0.00

Discrimination (2/2)

Years from application to grant: CHINA

	Coefficient	Standard Error	t	P>|t|
Foreign	1.75	0.02	99.87	0.00
Number of independent claims	0.12	0.00	91.73	0.00
Word count per independent claim	0.00	0.00	-19.12	0.00
Number of technological domains	0.09	0.01	11.01	0.00
(Number of domains)*(Foreign)	0.48	0.02	32.02	0.00
Constant	2.45	0.01	245.24	0.00

Years from application to grant: INDIA

	Coefficient	Standard Error	t	P>|t|
Foreign	-0.84	0.30	-2.84	0.01
Number of independent claims	-0.02	0.01	-4.02	0.00
Word count per independent claim	0.00	0.00	-8.06	0.00
Number of technological domains	-0.68	0.27	-2.55	0.01
(Number of domains)*(Foreign)	1.09	0.29	3.75	0.00
Constant	6.42	0.27	23.36	0.00

R&D Expenditure

GDP, PPP USD Bn

R&D, %age of GDP

R&D Expenditure

	2014	
	CHINA	INDIA
GDP, PPP USD Bn	17,630	7,277
R&D, %age of GDP	1.95	0.85

R&D Expenditure

	2014		2015	
	CHINA	INDIA	CHINA	INDIA
GDP, PPP USD Bn	17,630	7,277	18,829	7,823
R&D, %age of GDP	1.95	0.85	1.98	0.85

R&D Expenditure

	2014		2015		2016	
	CHINA	INDIA	CHINA	INDIA	CHINA	INDIA
GDP, PPP USD Bn	17,630	7,277	18,829	7,823	20,015	8,410
R&D, %age of GDP	1.95	0.85	1.98	0.85	1.98	0.85

R&D Expenditure

	2014		2015		2016	
	CHINA	INDIA	CHINA	INDIA	CHINA	INDIA
GDP, PPP USD Bn	17,630	7,277	18,829	7,823	20,015	8,410
R&D, %age of GDP	1.95	0.85	1.98	0.85	1.98	0.85
GERD, PPP USD, Bn	344	62	373	66	396	71

R&D and Human Capital

Year
2000
2005
2010
2015

R&D and Human Capital

Year	China	India
2000	0.90	0.74
2005	1.31	0.81
2010	1.71	0.82
2015	2.07	0.63

Gross domestic expenditure on R&D as % of GDP

R&D and Human Capital

Year	China	India	China	India
2000	0.90	0.74	547.30	110.05
2005	1.31	0.81	856.85	135.30
2010	1.71	0.82	902.96	156.64
2015	2.07	0.63	1176.58	215.85
	Gross domestic expenditure on R&D as % of GDP		Researchers (including PhD students) in R&D (per million people)	

I·D·F

THANK YOU