

Relations of Future Crude Oil Imports between China and India: Competition or Cooperation? –From Perspectives of Crude Oil Import Sources

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Abstract

This paper first analyzed the current situations of, and then discussed the relationship between China's and India's oil imports. The diversification levels of the two countries' oil imports are both changing in order to secure their own overseas oil supply, resulting in expanding overlap between their oil import sources. The regions that make major contributions to oil imports of both China and India are the Middle East, South, and Central America and West Africa. As the similarities of the oil import source distributions of the two countries rise gradually, the Sino-India Competition Index (CI) in the oil market presents a fast growth, from 8.61 in 2006 to 22.49 in 2016. Since further growth of China's and India's oil imports are highly expected, stable oil supply serves the interests of both the countries. China and India mostly import crude oil from regions in complicated geopolitical environments, thus they can work collaboratively to help maintain the political stability of such oil-exporting countries, for the sake of their own oil security. Cooperation can not only avoid the "resource premium" derived from buyers' competition but also strengthen the two countries' friendship and create a win-win situation.

Keywords: Sino-India; Crude oil trade; Diversification; Oil import competition; Energy security

Abbreviations: CI: Competition Index; HHI: Herfindahl-Hirschman Index; CIS: Commonwealth of Independent States

Introduction

Among all fuel sources, the notable dominance of crude oil still holds in a global view. Geopolitical events related to petroleum emerge in endlessly all over the world, and so do conflicts essentially rooted in petroleum resources, owing to the uneven global distribution of this very resource. Former US Secretary of states, Henry Kissinger, once said: "Control oil and you control nations." Hence, for decision makers of all countries, the oil supply security of their own country is significantly crucial. In 2016, 578.7 million and 212.7 million metric tons of oil were consumed respectively by China and India, which correspondingly account for 13.1% and 4.8% of the total consumption of the world. The two countries have ranked 2nd and 3rd in the world in terms of oil consumption, while they are also the 2nd and 3rd largest oil importers, due to their insufficient endowments of petroleum resources. India and China have been making increasing contributions to the stability of the world, from both economic and political perspectives, with the help of their enormous economic growth and advancement in other aspects, and the two have, in fact, become crucial backbones for today's world. However, the strength of such support to the world heavily relies on economic growth, while the economic growth, as enormous as it is, also requires enormous energy consumption.

Predicts that China will exceed the United States and evolve into the world's largest oil consumer in 2030 while Odgaard and Delman [1] forecasted that China's oil consumption growth will increase to half of the total growth of the world by 2035. As for India, it also inevitably increases oil consumption in the future, with a growing economy [2]. Therefore, the two countries are basically facing the same challenges. For China, secured future oil supply leads to energy security [3,4] (while the oil supply security apparently means growing oil import and this is not an easy job. India also formulated its own long-term plan and implemented corresponding strategic deployment in the past few years, with respect to the crude oil security. Via Project Mausam, India

strengthened its relationship between the Middle East and solidified its partnership with major oil producer countries by means of aid and investment [5-7]. In addition, the efforts in developing the new energy industry reduce India's foreign-trade dependency on crude oil [8].

Previous studies have mainly targeted the effects of China's and India's oil demand on the international oil market. In Hamilton's [9] prediction, the growth of two counties' oil import would stimulate the oil price, which was then validated by Li and Lin [10]. The oil price has been continuously climbing up since 2003, thanks to the sharp rise in oil imports of developing countries that grow in a dramatic manner, of which China and India are no doubt two representatives, and this led to the well-known "oil crisis" from 2007 to 2008 [11-14]. In the meantime, opposite opinions have also been shared, stating that the global oil price is outside the effects of China's economic development [15]. Wu and Zhang think that no clear effects of the oil import of China on the Brent oil price can be identified. Furthermore, they state that higher oil prices would to some extent suppress the oil import of China [16].

The competition on oil supply between China and India, as two major drivers of the future global oil consumption [1], have attracted extensive attention. By comparing the potential oil supply crisis in China and India under varied climate scenarios in 2035, van Moerkerk et al. [17] conclude that the crisis risk is smaller in China. Chaturvedi, et al. [18] pointed out the two countries will aggravate their competitions with respect to oil supply and in the severest cases, their bilateral political

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relations may be affected. It is believed that the future development of the oil-trading competition pattern will to a large extent dominated by China and India. Some scholars hold the view that competition exists between the oil imports of China and India in their research of the oil relation between the two countries in a global view [19,20]. However, systematic and in-depth analyses on the competitive relationship between the two countries' crude oil terrain are not seen. Given that it is crucial to understand the role of each country in the global fossil fuel trade, regarding trade security and policy optimization, this paper, based on a brief induction of the oil import sources of China and India of 2006-2016, analyzed the oil relation between the two countries via the Herfindahl-Hirschman Index (HHI) and CI, and provided corresponding countermeasures and suggestions.

Status Quos of China's and India's Crude Oil Imports

China and India, of which the crude oil consumption respectively grow from 224.2 million metric tons in 2000 to 578.7 million metric tons in 2016, and from 106.1 million tons to 212.7 million metric tons, are major oil-consuming countries in the world. Because of the insufficient domestic endowment of petroleum resources, China's dependency on imported crude oil rapidly grows to 65% in 2016, with its climbing oil consumption, and that of India amounts to an even higher level, 81% (Figure 1).

The economic development of both China and India has been accompanied by rocketing oil consumption, since the beginning of the 21st century. In the future, with further economic growth and social wealth accumulation, fast growth in the oil demand of the two countries is inevitable [21], which consequently leads to continuously growing oil imports. Hence, a better understanding of the relation of the source of oil imports between China and India can contribute to more insights into the two countries' oil relation.

Regional level

According to UN trade's data, in 2006-2016, China's crude oil mainly imports from the Middle East, West Africa, Commonwealth of Independent States (CIS) and Central and South America and India's mainly from the Middle East, Central and South America, West Africa and North Africa. The regions that hold top shares of oil exported to both China and India are mainly the Middle East, West Africa and the

South and Central America. In 2006, the ratios of oil imported from the above three regions to the total oil import of India are respectively 72.1%, 12.7%, and 2.4%; those for China are 45.2%, 24.5% and 5.1%. In 2016, the shares of the three regions in India change to 63.5%, 13.3% and 12.7%; those in China are 48.0%, 15.5% and 13.4% (Figures 2 and 3).

National level

From 2000 to 2016, the source of China's oil import increased from 32 to 45, and that of India grew from 17 to 44. As the oil import source of China and India gradually becomes more and more diversified, the overlap of the two countries' oil supplier expands.

At the national level, China's crude oil mainly imports from Russia, Saudi Arabia, Angola, Iraq, Oman, Iran, Venezuela, Brazil, Kuwait, The United Arab Emirates, Columbia, Congo (Burundi), Former Sudan, Vietnam, Australia. The above-mentioned 15 countries accounted for 90.87% of China's total imports in 2016. India's crude oil mainly imports from Saudi Arabia, Iraq, Iran, Nigeria, The United Arab Emirates, Venezuela, Kuwait, Qatar, Malaysia, Angola, Mexico, Brazil, Egypt, Equatorial Guinea, Australia (Figures 4 and 5). The above-mentioned 15 countries accounted for 95.75% of India's total imports in 2016.

In 2006-2016, China mostly imports crude oil from Saudi Arabia, Russia, Angola, Iraq, Oman, Iran, Venezuela, Kuwait, Brazil and the United Arab Emirates (UAE), which totally account for 83.3% of China's total oil import in 2016. As for India, the shares of the crude oil import that the aforementioned ten countries hold amount to 73.9% in 2016. Furthermore, in 2006-2016, the cumulative oil import of China from the ten countries accounts for 78.3% of the total, while that of India equals to 74.5% (Figure 6).

Analysis on China's and India's crude oil import diversification

Source diversification of oil imports is one of the important measures for oil security of oil-importing countries [22,23]. This paper analyzed the diversification level of China's and India's oil imports using the HHI. It also dissected the trend of the diversification evolution and the reason behind the trend and subsequently provided profound discussions on the changes of the oil import strategies of the two countries.

The HHI can be calculated as below:

$$H = 1 / \left(\sum_i x_i^2 \right) \tag{1}$$

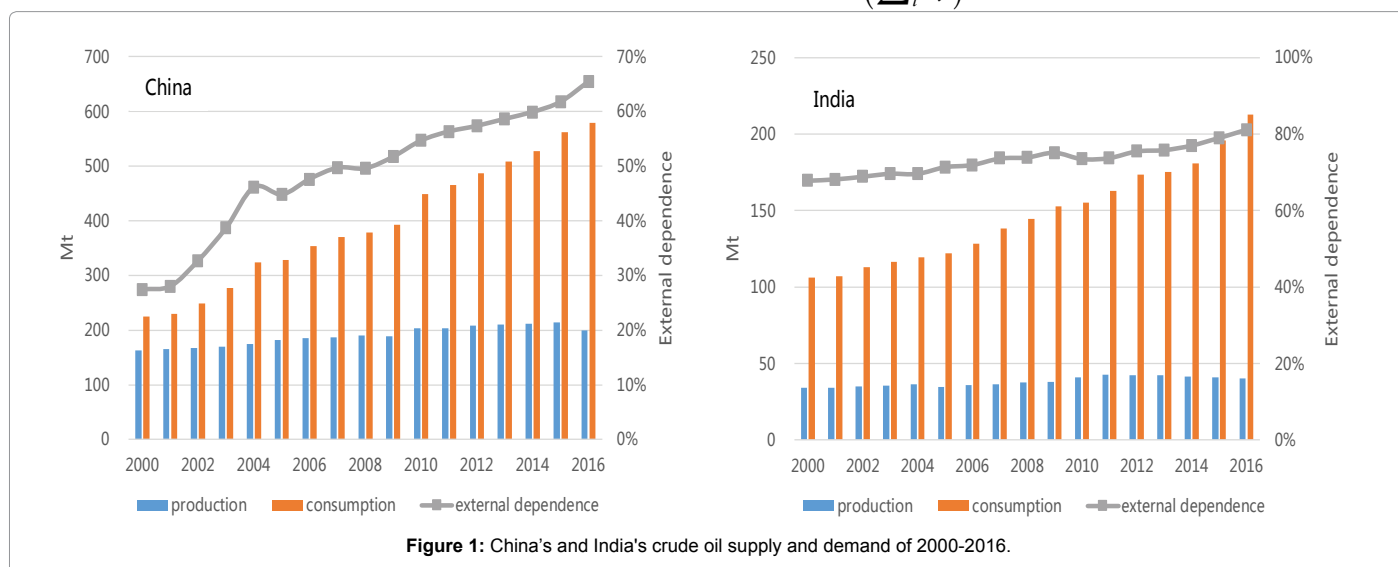
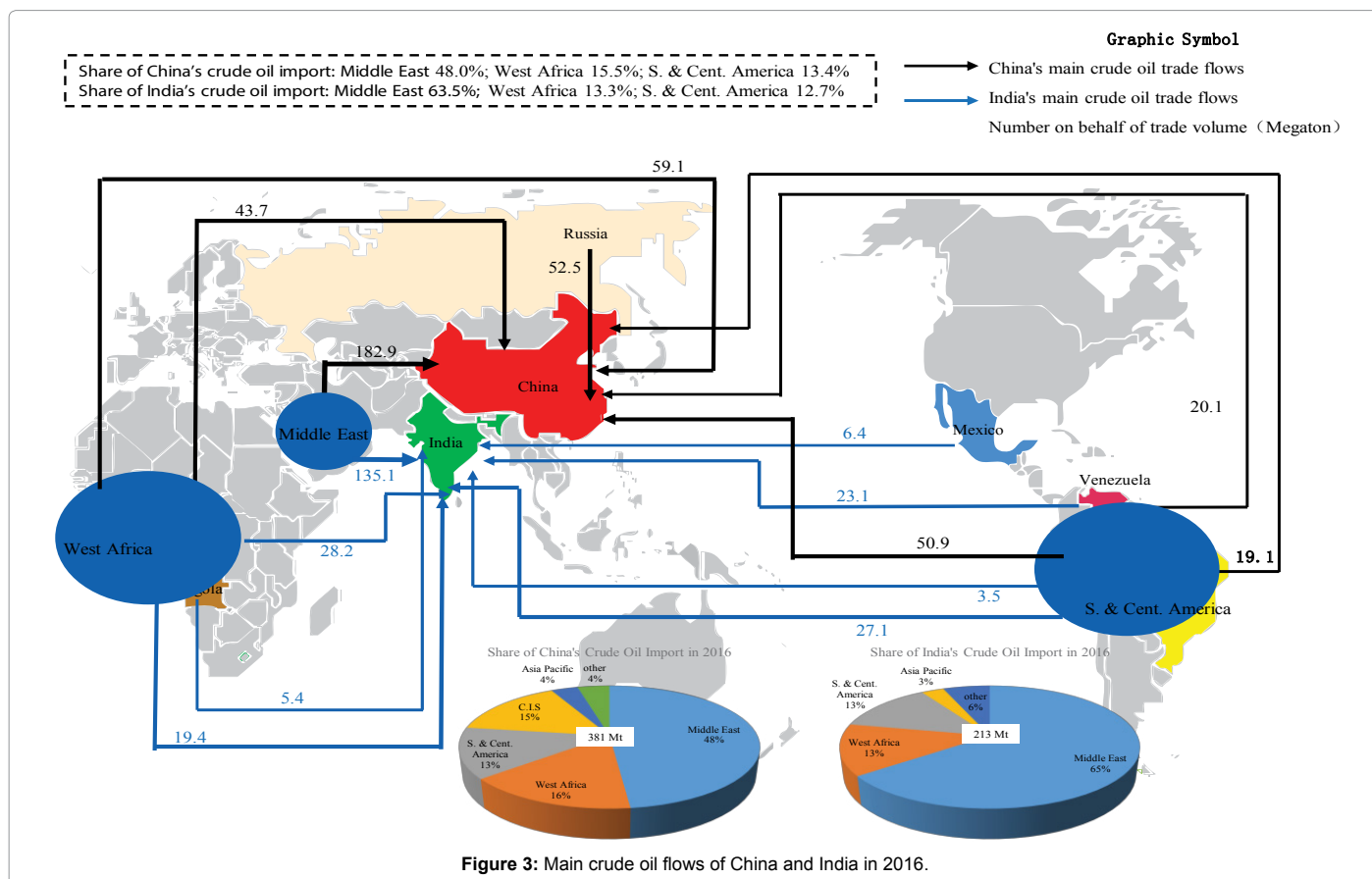
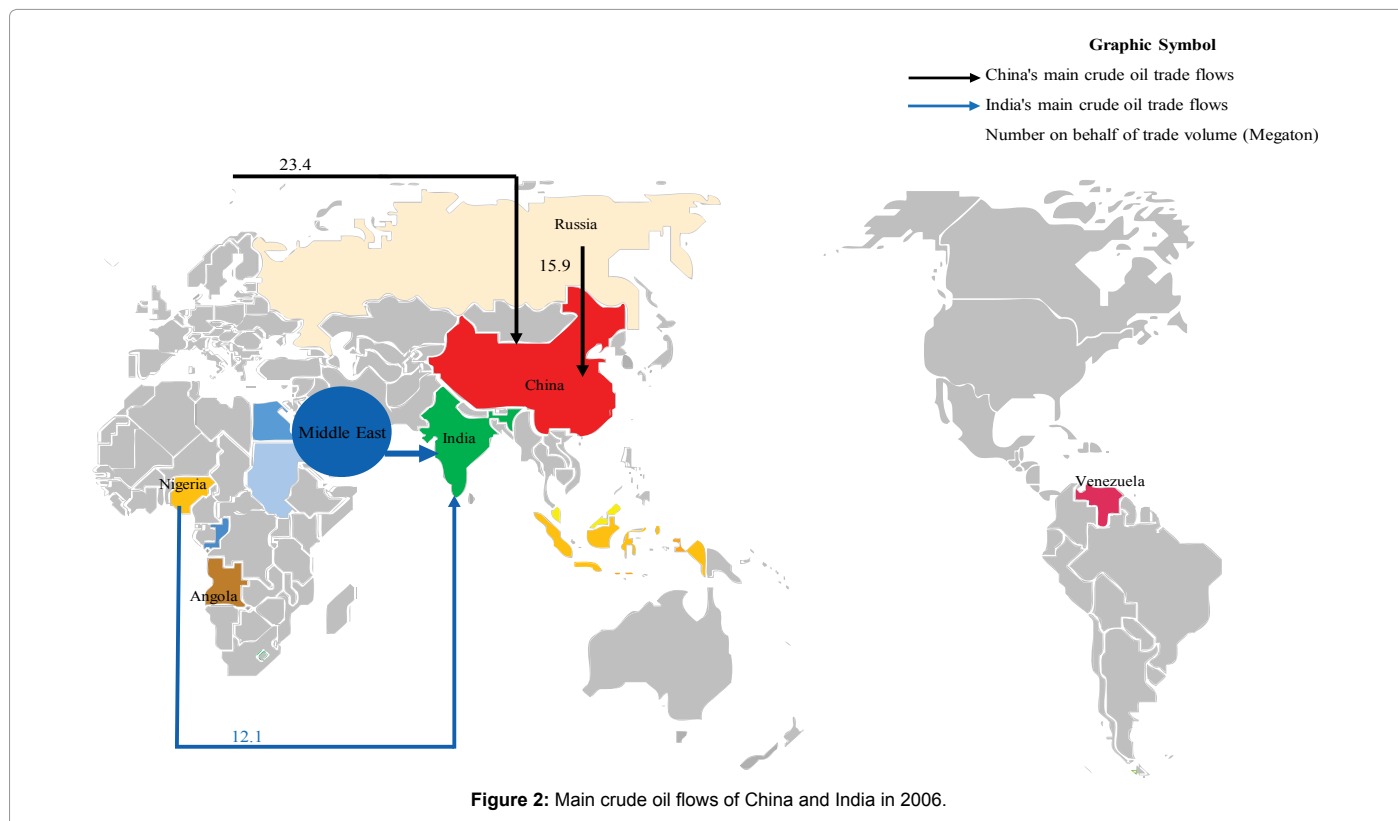
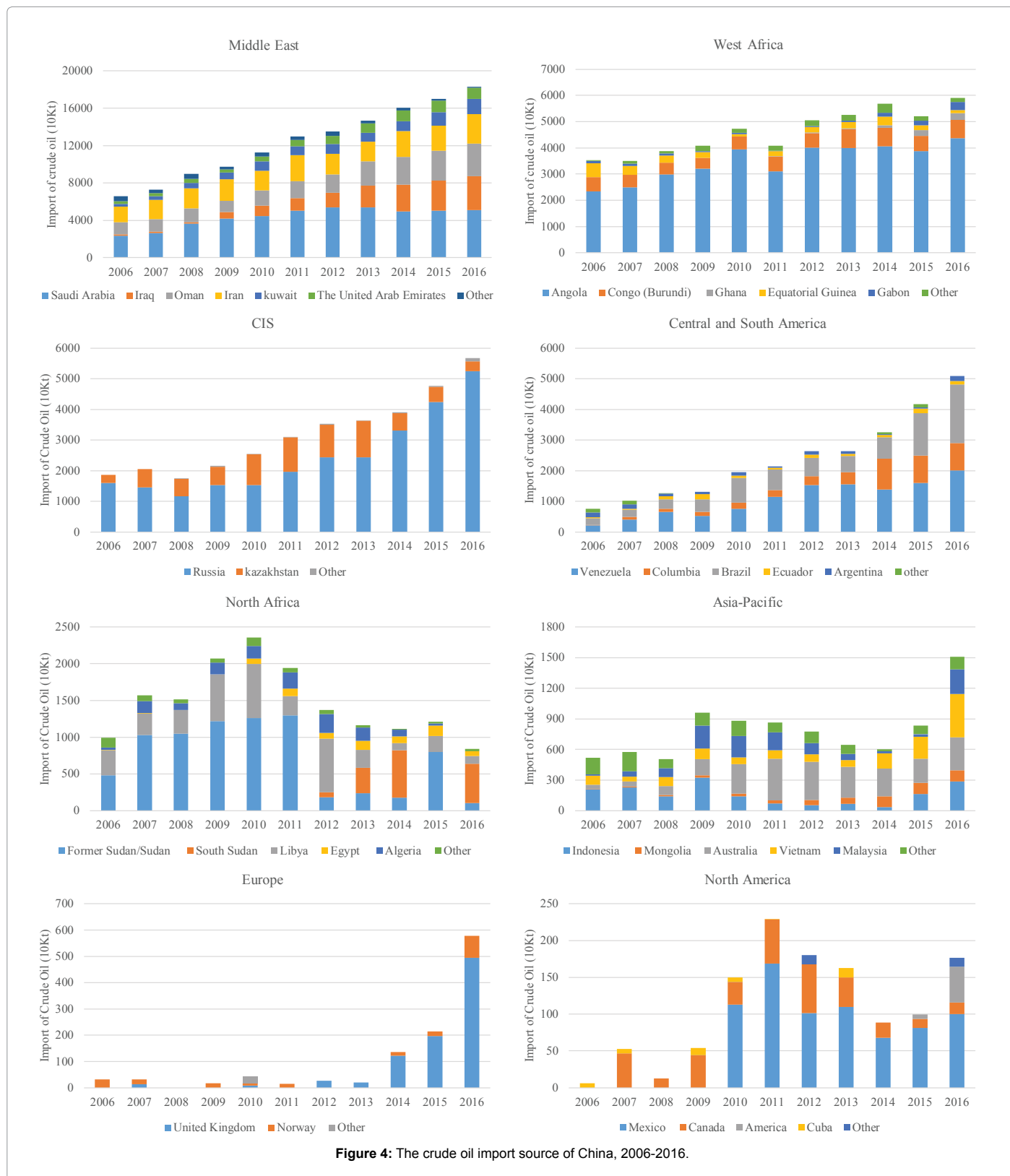


Figure 1: China's and India's crude oil supply and demand of 2000-2016.





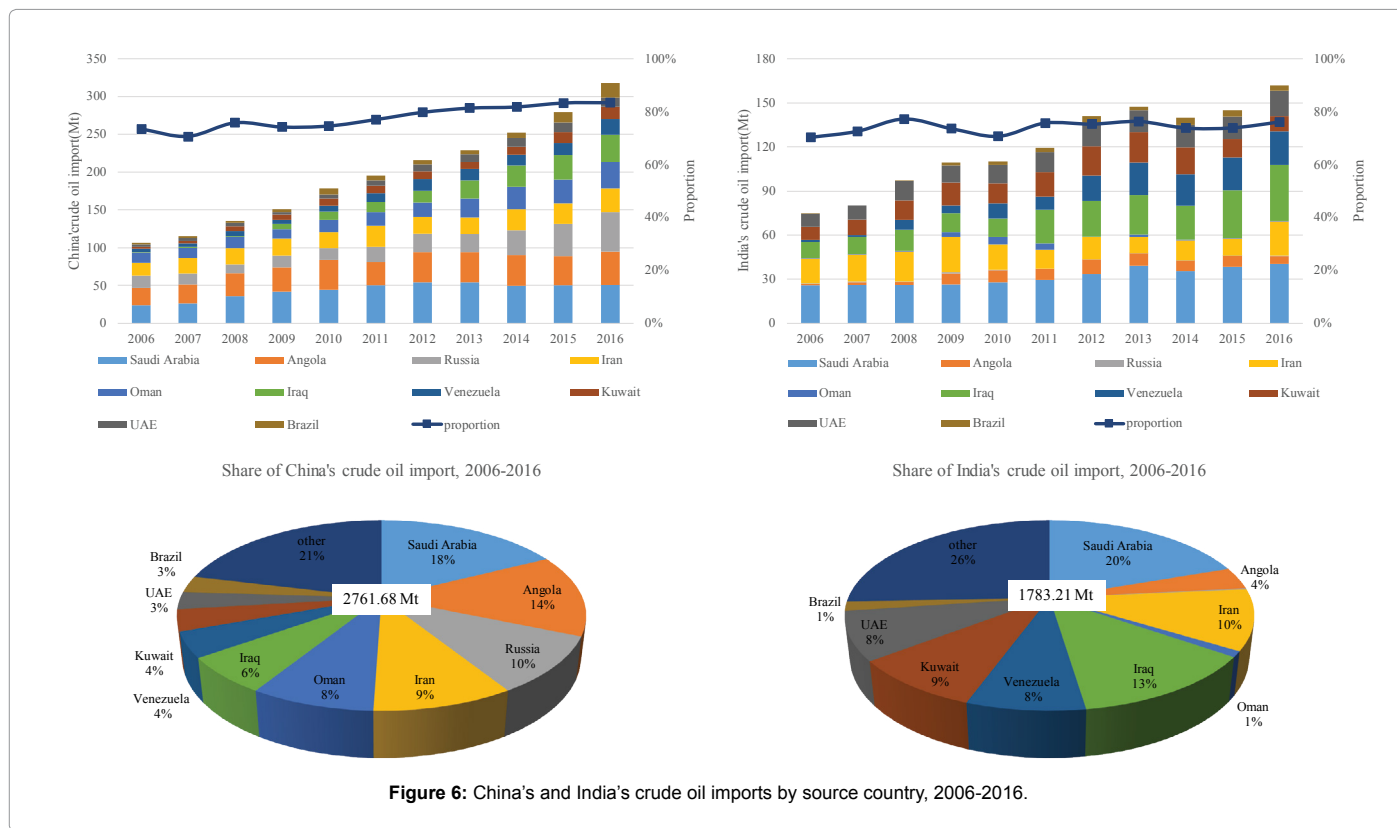
Where x_i stands for the ratio of oil imported from Source i to the total oil import. The HHI is sensitive to the share of a specific import source in terms of the total import and is capable of truly reflecting the

magnitude of import differences between varied sources. A higher HHI represents a higher level of diversification.

For simplicity in analyses, the crude oil import sources of China and



Figure 5: The crude oil import source of India, 2006-2016.



India	2006		2007		2008		2009		2010		2011	
Region	Quantum	Share	Quantum	Share	Quantum	Share	Quantum	Share	Quantum	Share	Quantum	Share
Middle East	7687.18	72.08%	8010.48	72.36%	9108.82	72.42%	10102.85	67.99%	9710.92	62.42%	10636.11	67.39%
S. and Cent. America	173.03	1.62%	169.55	1.53%	672.51	5.35%	893.82	6.02%	1476.54	9.49%	1354.53	8.58%
West Africa	1353.34	12.69%	1583.83	14.31%	1539.95	12.24%	2007.17	13.51%	2740.64	17.62%	2387.35	15.13%
North Africa	348.05	3.26%	438.26	3.96%	337.23	2.68%	683.53	4.60%	722.96	4.65%	549.66	3.48%
Asia-pacific	380.86	3.57%	421.72	3.81%	392.84	3.12%	416.46	2.80%	421.89	2.71%	419.56	2.66%
North America	170.00	1.59%	191.83	1.73%	242.96	1.93%	189.69	1.28%	94.27	0.61%	223.63	1.42%
Europe	15.00	0.14%	29.08	0.26%	0.00	0.00%	114.46	0.77%	96.19	0.62%	33.46	0.21%
CIS	53.92	0.51%	49.77	0.45%	50.86	0.40%	130.89	0.88%	103.44	0.66%	66.55	0.42%
Total	10665.00		11070.00		12578.40		14858.33		15558.39		15784.06	
HHI index	1.86		1.83		1.84		2.05		2.31		2.06	
India	2012		2013		2014		2015		2016			
Region	Quantum	Share	Quantum	Share	Quantum	Share	Quantum	Share	Quantum	Share		
Middle East	11839.90	63.21%	11930.64	61.72%	11015.2	58.16%	11435.86	58.32%	13505.05	63.47%		
S. and Cent. America	2481.26	13.25%	3139.71	16.24%	3354.37	17.71%	2940.79	15.00%	2703.78	12.71%		
West Africa	2703.11	14.43%	2670.34	13.81%	2866.27	15.13%	3198.40	16.31%	2826.56	13.28%		
North Africa	477.05	2.55%	446.85	2.31%	289.70	1.53%	483.06	2.46%	421.11	1.98%		
Asia-pacific	357.92	1.91%	291.52	1.51%	322.89	1.70%	443.17	2.26%	600.41	2.82%		
North America	406.03	2.17%	536.18	2.77%	527.86	2.79%	637.73	3.25%	642.83	3.02%		
Europe	0.00	0.00%	0.00	0.00%	87.54	0.46%	0.00	0.00%	57.25	0.27%		
CIS	252.13	1.35%	197.48	1.02%	180.94	0.96%	96.24	0.49%	140.30	0.66%		
Total	18731.12		19331.65		18940.74		19609.61		21276.51			
HHI index	2.28		2.34		2.54		2.56		2.28			

Table 1: The trend of India's HHI, 2006-2016 (Unit: 10Kt).

India in UN trade's statistics were divided into eight regions, namely the Middle East, South and Central America, West Africa, CIS, Asia Pacific, North Africa, North America, and Europe. It can be concluded from the analysis that the diversification level of India's oil import has been generally pushed up since 2006, owing to the increases of shares of oil imports from the South and Central America and West Africa and decreases of that from the Middle East. The HHI grows from 1.86 in 2006 to 2.28 in 2016, although a reduction is seen in 2016 because of the growth of the Middle East's oil import shares (Table 1).

In contrast, with growing shares of oil imports from the Middle East and reduced shares of the West and North Africa, China's oil import diversification presents a downward trend in 2006-2014. However, due to the fact that oil imports from the CIS and the South and Central America climb up since 2015, the HHI of China's oil import starts to recover (Table 2).

Significant importance has always been attached to the security of oil import by the India government, due to the country's high foreign-trade dependency in oil [24], and diversification of the oil import source is one of the crucial measures India has implemented [25]. It is clear that India, by implementing its diversification strategy, increases its oil imports from the South and Central America and maintains the oil import shares of the West Africa within a specific range in 2006-2016, in order to get over its immoderate reliance of oil on the Middle East. China, compared with India, possesses certain advantages as it can import oil from the former Soviet Union areas, and hence enjoys a higher level of diversification. The shares of oil imported from the South and Central America are also an import factor that affects the change of the HHI of China's oil import (Figure 7).

India's HHI shows an upward trend from 2006 to 2015, the crude oil import proportion of the Middle East is gradually declining, while the proportion of West and Central-South America is increasing

gradually. However, India's HHI dropped significantly in 2016, due to the increasing share of crude oil imported from the Middle East. In the future, if India wants to increase the diversification of its crude oil imports source, it will be an important way for India to reduce its dependence on the Middle East and at the same time increase the crude oil imports proportion of other regions, especially in Central and South America and West Africa. Central and South America and West Africa are the major crude oil imports sources of China, accounting for more than 25% of the total crude oil imports from 2006 to 2016, at the same time, these two regions have always been the key areas for China's oil and gas industry overseas investment. The variations of shares of oil import sources suggest the adjustment of the two countries' oil import strategies.

Analysis on oil import competition between China and India

In 2016, 94.5% of India's total oil import and 98.5% of that of China share the same source countries and regions. As India's oil import sources are increasingly diversified, the overlap between the two countries' import sources gradually enlarges.

Glick and Rose [26] developed an indicator to measure the level of competition between two countries in a specific market in 1999, based on which an index that reflects the degree to which one oil importer competes with another for oil supply from common oil import sources was proposed in this paper. The proposed indicator, the CI captures the direct competition intensity and was defined as below:

$$S_{direct}(ij) = \sum_e \left\{ \left(\frac{M_{ic} + M_{jc}}{M_w} \right) \times \left[1 - \frac{\left(\frac{M_{ic}}{M_i} \right) - \left(\frac{M_{jc}}{M_j} \right)}{\left(\frac{M_{ic}}{M_i} \right) + \left(\frac{M_{jc}}{M_j} \right)} \right] \right\} \times 100\% \quad (2)$$

Where,

$S_{direct(ij)}$ = direct competition intensity between two oil importers, V_i

China	2006		2007		2008		2009		2010		2011	
Region	Quantum	Share	Quantum	Share	Quantum	Share	Quantum	Share	Quantum	Share	Quantum	Share
Middle East	6560.13	45.19%	7276.31	44.60%	8961.64	50.10%	9746.46	47.83%	11276.73	47.12%	13003.41	51.24%
S. and Cent. America	756.90	5.21%	1025.21	6.28%	1268.35	7.09%	1307.20	6.41%	1953.89	8.16%	2143.80	8.45%
West Africa	3553.54	24.48%	3499.14	21.45%	3866.83	21.62%	4072.99	19.99%	4732.57	19.78%	4075.24	16.06%
North Africa	993.94	6.85%	1572.09	9.64%	1516.24	8.48%	2068.91	10.15%	2352.53	9.83%	1939.36	7.64%
Asia-pacific	516.08	3.55%	573.37	3.51%	506.12	2.83%	961.29	4.72%	879.79	3.68%	863.70	3.40%
North America	5.78	0.04%	52.90	0.32%	12.38	0.07%	53.86	0.26%	149.72	0.63%	229.07	0.90%
Europe	0.00	0.00%	13.90	0.09%	0.00	0.00%	0.00	0.00%	35.56	0.15%	0.00	0.00%
CIS	1864.81	12.85%	2052.42	12.58%	1744.16	9.75%	2152.16	10.56%	2542.21	10.62%	3106.67	12.24%
Total	14517.48		16316.18		17888.52		20378.62		23930.87		25376.93	
HHI index	3.67		3.86		3.22		3.50		3.59		3.30	
China	2012		2013		2014		2015		2016			
Region	Quantum	Share	Quantum	Share	Quantum	Share	Quantum	Share	Quantum	Share		
Middle East	13490.49	49.78%	14649.93	52.00%	16058.16	52.07%	17015.91	50.72%	18298.00	48.03%		
S. and Cent. America	2634.56	9.72%	2630.90	9.34%	3248.59	10.53%	4171.68	12.43%	5087.00	13.35%		
West Africa	5058.16	18.67%	5252.26	18.64%	5686.59	18.44%	5208.00	15.52%	5911.90	15.52%		
North Africa	1366.85	5.04%	1162.60	4.13%	1117.03	3.62%	1210.49	3.61%	843.00	2.21%		
Asia-pacific	774.86	2.86%	643.77	2.28%	599.28	1.94%	831.40	2.48%	1509.00	3.96%		
North America	180.22	0.67%	162.76	0.58%	88.39	0.29%	99.82	0.30%	177.00	0.46%		
Europe	26.50	0.10%	20.04	0.07%	121.94	0.40%	197.27	0.59%	49.55	0.13%		
CIS	3522.00	13.00%	3651.93	12.96%	3901.60	12.65%	4770.71	14.22%	5666.55	14.87%		
Total	27097.96		28174.21		30837.77		33549.35		38100.45			
HHI index	3.38		3.16		3.14		3.35		3.64			

Table 2: The trend of China's HHI, 2006-2016 (Unit: 10Kt).

and V_j ;

c =shared oil import source V_c

M_{ic} =oil import of V_i from V_c

M_{jc} =oil import of V_j from V_c

M_w =total global oil trade volume

M_i and M_j respectively refer to the total oil import of V_i and V_j

For a specific shared oil import source V_c , the indicator consists of two measurements. The first refers to the ratio of the competitive oil trade volume from V_c to the world's total oil trade volume. A higher ratio indicates fiercer competition encountered by Oil Importer V_i and V_j . The second characterizes how the oil import sources of the two countries resemble each other, and high levels of similarity lead to strong direct competition.

The CI analysis demonstrates that the two countries' competition over oil supply rapidly intensifies, as the oil import CI presents a fast-growing trend, increasing from 8.86 in 2006 to 22.49 in 2016 (Table

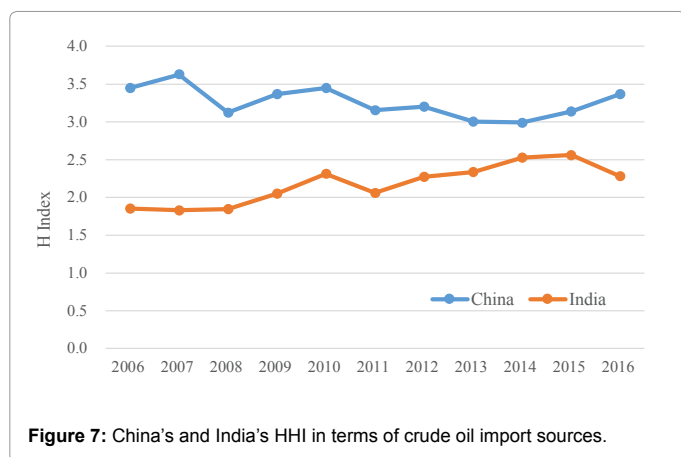


Figure 7: China's and India's HHI in terms of crude oil import sources.

2). From a geographical point of view, the competition over oil supply between China and India mainly occurs in the Middle East, South and Central America, and West Africa (Table 3).

Calculation results of the CI between China and India, on the basis of China's top ten oil import source countries, state that the major competition markets for the two countries are Saudi Arabia, Angola, Iraq, Iran, Venezuela, and Kuwait. It should be noted that the CI over oil supply between the two countries in Russia is continuously climbing up, which suggests that the competition between the two countries in the former Soviet Union areas is gradually intensifying (Tables 4 and 5).

India has implemented a strategy, where it vertically extracted oil supply from Russia, horizontally absorbed oil export of Africa and Southeast Asia and stabilized its shares in the Middle East. With total investment exceeding 20 billion US dollars in hydrocarbon exploration and 465 million US dollars in production, India has set collaboration with 25 countries all over the world in such two fields [27], and Africa and the South and Central America have been considered as the major target regions for India's overseas oil and gas resource development. China and India have both formulated plans to expand their foreign oil supply sources so as to catch up with the increasing demand on oil imports. However, as is plotted in Figure 8, the two countries' plans share notable similarities, and moreover, the overlap still grows.

Discussions on the future Sino-India relation over crude oil

Since 2000, the global crude oil trade structure has been gradually evolving. Developed countries and economies such as Europe, the US, and Japan have gradually reduced their oil imports and correspondingly their shares of total oil import fell. In the meantime, China and India's oil imports rapidly rise, with their substantial economic growth. The

Ssino-ind	2006	2007	2008	2009	2010	2011
	8.86	9.57	11.31	14.07	17.04	17.64
Ssino-ind	2012	2013	2014	2015	2016	
	19.02	20.23	21.74	22.5	22.49	

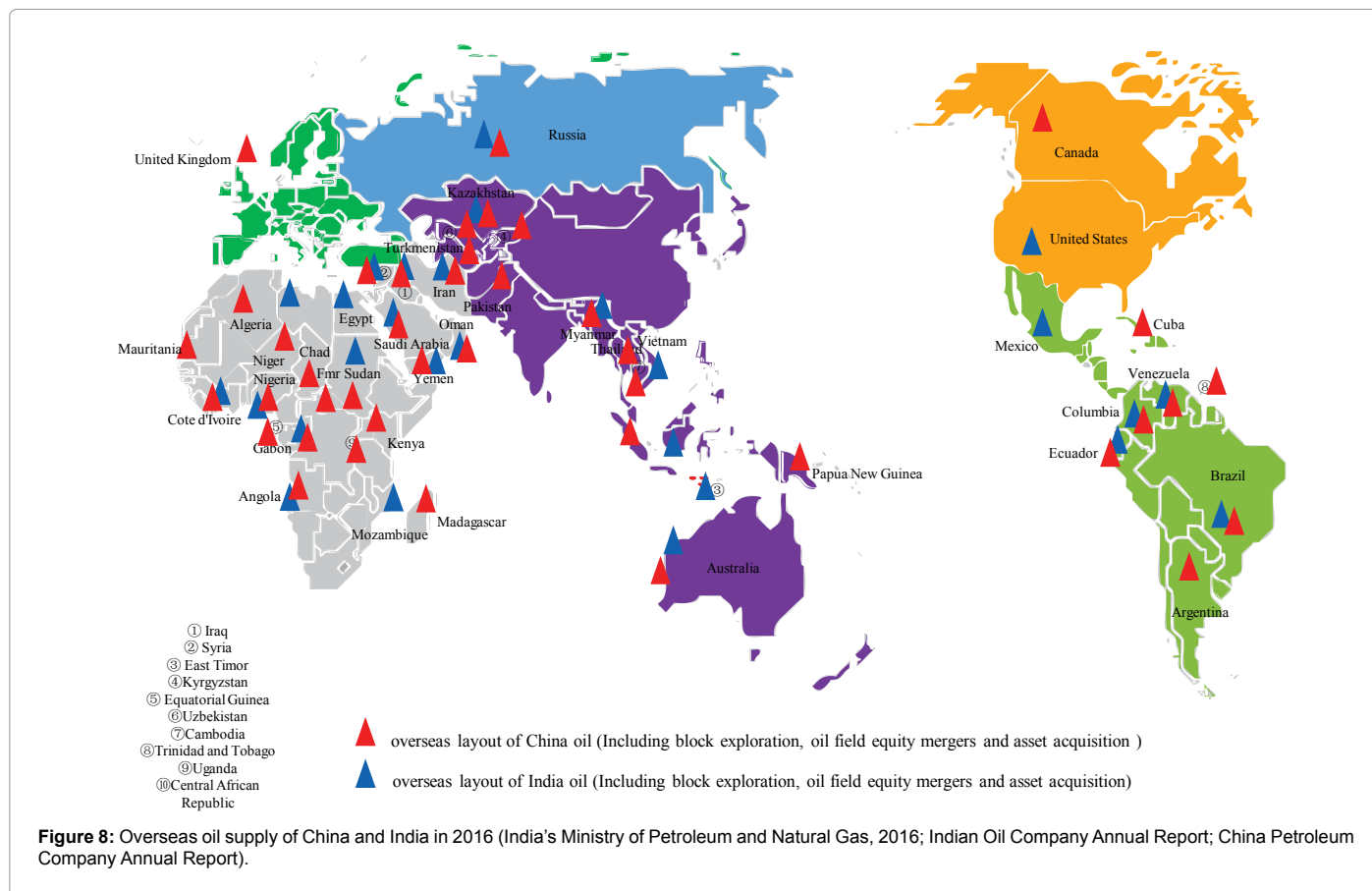
Table 3: CI of oil import between China and India.

Region	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Middle East	5.68	5.88	7.50	8.66	9.63	10.78	11.58	12.94	13.63	13.39	12.94
S. and Cent. America	0.23	0.24	0.85	1.13	1.69	1.83	2.25	2.24	2.62	3.26	3.59
West Africa	1.73	2.05	1.98	2.59	3.75	3.31	3.51	3.59	4.11	4.15	3.81
North Africa	0.45	0.59	0.45	0.91	1.05	0.82	0.64	0.62	0.45	0.70	0.56
CIS	0.08	0.07	0.07	0.19	0.17	0.11	0.37	0.30	0.31	0.16	0.23
Asia Pacific	0.46	0.48	0.43	0.54	0.59	0.59	0.47	0.40	0.46	0.61	0.83
North America	0.00	0.04	0.01	0.04	0.13	0.19	0.14	0.13	0.06	0.06	0.10
Others	0.22	0.22	0.01	0.01	0.03	0.01	0.06	0.02	0.10	0.17	0.43

Table 4: CI of oil import between China and India by region.

Region	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Saudi Arabia	2.08	2.15	3.14	3.35	3.77	4.08	4.31	4.81	4.2	3.91	3.57
Russia	0.58	0.55	0.46	0.63	0.63	0.73	0.85	0.92	1.13	1.31	1.45
Angola	0.14	0.24	0.28	0.98	1.26	1.16	1.33	1.22	1.15	1.18	0.84
Iraq	0.08	0.1	0.14	0.61	0.93	1.05	1.28	2.01	2.38	2.39	2.43
Oman	0.03	0.03	0.09	0.46	0.69	0.64	0.05	0.28	0.11	0.09	0.07
Iran	1.47	1.69	1.8	2.06	1.83	1.86	1.92	1.44	1.95	1.63	2.21
Venezuela	0.15	0.19	0.54	0.47	0.61	0.96	1.28	1.3	1.06	1.14	1.34
Kuwait	0.23	0.27	0.46	0.6	0.8	0.73	0.84	0.76	0.81	1.1	1.18
Brazil	0.06	0	0.02	0.26	0.35	0.44	0.52	0.34	0.59	0.62	0.53
United Arab Emirates	0.25	0.27	0.35	0.27	0.41	0.51	0.7	0.86	0.92	0.91	0.79

Table 5: CI over oil supply between China and India in major source countries.



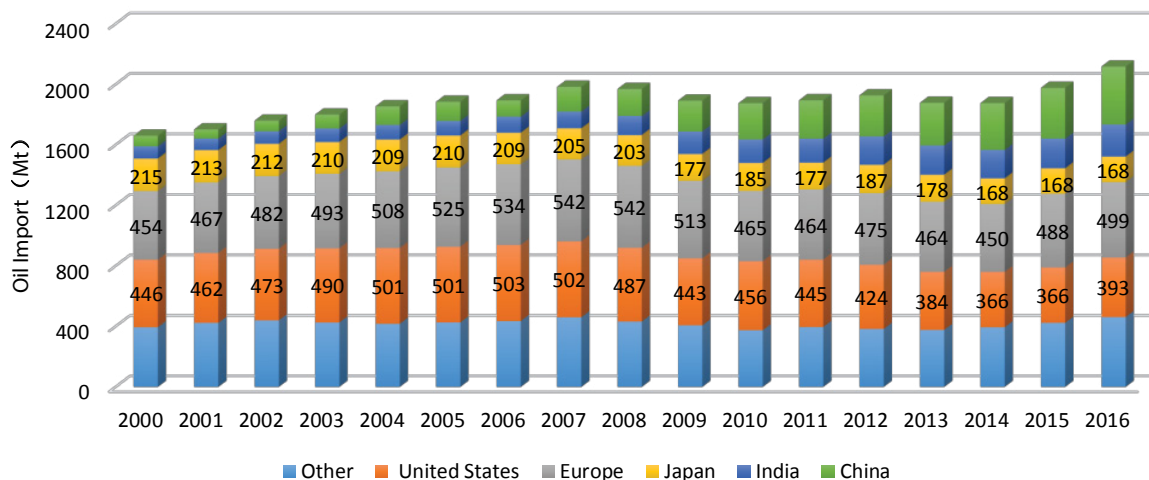
two countries jointly hold 9% of the total oil import of the world in 2000, and the number grows up to 28% in 2016 (Figure 9).

The oil import of the European countries and Japan will continue to decline, as their oil demand reduces. Meanwhile, the implementation of the US's Energy Independence policy, as well as advancement in its shale oil industry, will gradually turn the country into an oil exporter. It is estimated that in 2030, China's oil demand amounts to 700 million metric tons or so [28]. Limited by the domestic resource, China's future peak oil production will be about 200 million metric tons, and this means nearly 500 million metric tons of crude oil is required to be imported in order to meet the demand at that time. India's Planning Commission predicts that by 2030, India's oil consumption will increase to 486 million metric tons or so [29], and the corresponding oil import will be about 400 million metric tons. The ever-growing oil demand of China and India constantly enlarges the gap between oil supply and demand in the Asia Pacific, and hence the global oil export is now leaning towards China and India [30-43].

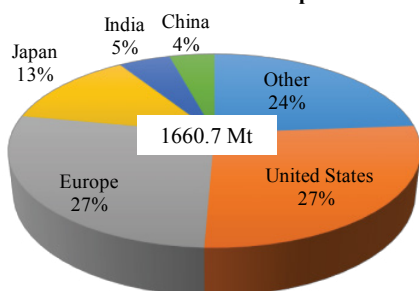
As the oil import sources of the two major oil importers of the world, China and India, share considerable similarities, the competition over foreign oil supply between the two countries tends to aggravate. The case of China's and India's oil companies competing with each other over petroleum resources in Angola and Ecuador in 2003-2004 has blown the opening whistle. Undoubtedly, with the rising oil import of the two countries, the overseas Sino-India relation over crude oil will attract attention from all over the world in the future. If China and India indulge the exacerbation of the competition, the conflict will gradually evolve from competition over resources into

geopolitical issues and even be utilized in a harmful way by other nations. This apparently serves no interest in either China or India. The complex geopolitical situations of major oil import sources of China and India, such as the Middle East, South America, and West Africa, have resulted in the risk of oil security of the two countries [36-53]. Low international oil prices have severely impacted economies of Latin American countries such as Venezuela and Brazil and led to political turbulence. Moreover, the Middle East affairs have become more unpredictable, owing to President Trump's "Energy Independence" and "America First" policies. Competition for overseas oil supply between China and India does not only to some extent raise up the cost of the two countries' access to petroleum resources in foreign countries, but also complicates the geopolitical situations of oil-exporting countries that are already extremely perplexing [32,54,55].

Potentially, oil importers located in the same geographical region can cooperate, since they have common sources of oil imports [33]. Stable and secure overseas oil supply is of great significance to crude oil security of both China and India. Given the high similarity of the two countries' oil import sources and overseas petroleum resource arrangement, they can work collectively to help maintain political stability of the oil import source countries and regions, so as to ensure their own oil supply. A typical cooperation case is in Khartoum, Sudan, where China built a refinery plant, while India constructed a pipeline. The products of the refinery plant can be transported to a neighboring port for export. For China, the "Malacca Dilemma" is a potential risk affecting its oil security [34,56]. To handle this challenge, China has been building oil pipelines in Pakistan and Burma. Nevertheless, India still plays a critical role in these efforts. China can offer permission over



Share of Global Crude Oil Import in 2000



Share of Global Crude Oil Import in 2016

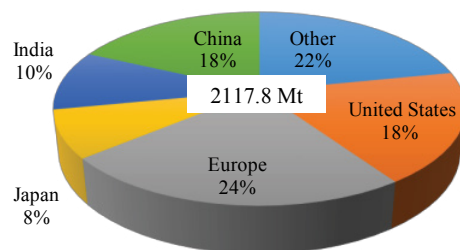


Figure 9: Annual distribution of global oil imports by country.

the India-Russia crude pipeline’s passage through China’s territory, and moreover joint access to the concerned pipelines, in return for India’s support. The Sino-India relation is the most complicated bilateral ties in Asia, which is simultaneously embedded with the common benefit derived from the shared features of the two countries and the vulnerability rooted in the geopolitical competition. Cooperation in ensuring overseas oil supply can be a starting point, from which the two countries can for further deepen collaboration in the energy field, and even in the political field. On the one hand, this avoids “resource premiums” that originate from the competition, and on the other hand, strengthens the friendship of the two countries and creates a win-win situation. It should also be noted that China and India both lack pricing power over crude oil, although they have respectively become the world’s 2nd and 3rd oil importers. A stable proper oil price serves vital interests of both. China and India can collaboratively establish a trading center for crude oil futures, and break the monopoly of developed countries over the oil pricing [56-59].

Conclusion

The global oil market, as “one great pool” as it is, responds to any change in each sector of the market China and India are the largest developing countries in the world, and also influential political giants. They are both characterized by rapid economic growth and corresponding fast energy consumption increase. As neighbors, the two countries shall have the goal of peaceful development, seek common interests and avoid a repeat of events such as the “Doklam Standoff”.

This paper focused on the oil import source of China and India and discussed the relation over crude oil between the two countries. The conclusions are listed below:

1. With the fast-growing oil consumption, both China and India are facing tremendous pressures, in terms of oil supply. For secure oil supply, the diversification level of India’s oil import generally grows, while that of China first declines and then rises. The changes of shares of oil imports from the Middle East and the South and Central America are crucial factors that affect the oil import diversification level, for both of the two countries
2. As India’s oil import sources are growingly diversified, the overlap of source countries between China and India gradually expands, which results in the rising trend of the competition over foreign oil supply between the countries. The CI of the two countries climbs up from 8.86 in 2006 to 22.49 in 2016. The regions with higher CIs over oil supply are the Middle East, South, and Central America and West Africa, while countries presenting top CIs are Saudi Arabia, Angola, Iraq, Venezuela, and Kuwait
3. China’s and India’s oil import sources and overseas petroleum resource arrangement are characterized by high similarities. Their crude oil is largely imported from regions with complicated geopolitical situations. China and India can work collectively to help maintain political stability of the concerned oil-exporting countries and regions, so as to guarantee their own oil security. This can not only avoid the resource premium derived from

the competition but also strengthen the friendship between the two countries and create a win-win situation. In the meantime, the two countries can cooperate in building a trading center for crude oil futures and breaking the monopoly of developed countries over oil pricing, and jointly maintain the oil security and protect the interests of the two countries

4. China and India are now in the medium-to-high speed economic growth, where the demand for resources is doomed to be ever-going. Due to the non-renewable nature of resources, the competition over access to overseas resources tends to gradually intensify, and this is not limited to the petroleum field. Stabilizing the resource supply and price serves the interest of both the two countries and can be an important opportunity for carrying out cooperation

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