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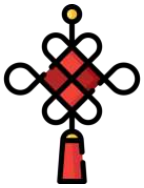


Ciudad de México, 2020

Brazil-China oil cooperation: bilateral trade, FDI, construction projects and loans (2000-2018)

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INTRODUCTION

An analysis over the Sino-Brazilian economic relations over the last two decades indicates that a new product became one of the most traded between the countries and also attracted Chinese investments and loans to Brazil: crude oil.

From 2000 to 2018, Chinese imports from Brazil have grown nearly 14,000%, reaching US$ 16.2 billion. Brazil became one of continental China`s refining industry main suppliers, surpassing other traditional oil exporters, such as Iran, Kuwait and Venezuela, and China consolidated itself as Brazil`s top sale destination, toppling the US.

Capital followed this trade boom and has come in the form of foreign direct investments (FDI) and loans. Between 2006 and 2018, Chinese oil companies (COC) directed at least US$ 22.4 billion of overseas investments to the South American country – the second biggest receiver –, mostly in the form of M&As, greenfield projects, engineering services and oil pipeline constructions. The upstream sector was the preferred destination, yet the middle and downstream ones were not neglected. China`s top oil corporations – namely Sinopec, CNPC, Sinochem, CNOOC and PetroChina – are now all present in Brazil. These companies are locally supported by several Chinese oil service and engineering contractors, including Jiangsu Asian Star Anchor Chain, BGP, Shandong Kerui Petroleum Equipment, Guangdong Zhenrong Energy and others.

Concomitantly, no less than US$ 33.95 billion in credit lines were pactuated mainly between China's policy banks, China Development Bank (CDB) and China's Export-Import Bank (CHEXIM), and Brazil`s biggest national oil company (NOC), Petrobras, in most of the cases in the modality of energy-backed loans (EBL). Other Chinese financial institutions, like Bank of China, ICBC, Sinosure, CIC and including the Shanghai-based multilateral bank New Development Bank equally started to fund local oil firms, helping to make Brazil China`s biggest oil finance partner.

Reasons for this exponencial growth are multifaced and describe an economic complementarity between both countries. In a few words, Brazil has the fossil fuel

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resources that China lacks and needs, whislt China possesses the financial means to sponsor their exploration and further exports. Between 2000 and 2018, Chinese oil demand has increased 283%, and the country ended up accounting for 14% of the world`s consumption. Its relatively scarce resource endowment led it to become the world's largest crude oil buyer – 20% of global one –, with imports representing 70% of its total oil consumption.

Conversely, in the same period, Brazil saw its national crude production growing 212% and its exports, 6000%, the fastest pace in the entire globe. All of this is thanks to the discovery of huge untapped oil reserves in a zone never explored before: pre-salt area. Due to difficulties involved in its exploration, since it is located far off the coast and deep into the ocean, Petrobras had the technical means to do it, but lacked the financial, which China was eager to provide. Besides, the country was in need of new export markets, since the USA, with its booming shale gas production, gradually refrained backed off from being a major crude buyer of many nations.

It is important to highlight that, besides the market orientation of most of the oil transactions, there is a political component attached to them. This comes from the Chinese quest for energy security, pushing its policy banks to negotiate oil-backed loans, which aims at guaranteeing long-term supply channels in line with the country`s economic developments and sustainable environmental needs (IEA, Oil 2017: analysis and forecasts to 2022, 2017, p. 28). Some of the credit lines given to Brazil were agreed in times of global crisis and severe financial distress of the Petrobras, a situation that has put away most of the traditional financiers. A mutual desire to establish a pragmatic and long-term partnership between both countries was also a crucial element in the investments and loans` negotiation process.

Furthermore, the increasing importance of Chinese imports and growing share of Chinese companies in Brazil`s oil exploration and production (E&P) give thought to some strategical calculations. Brazil and China oil cooperation indeed features several areas of synergy and mutual benefit, but there are also challenges. Behind the economic complementarity exists an asymetric interdependence. While China`s share of Brazil`s crude exports was of 56% in 2018 and of Petrobras, nearly 70%, Brazilian oil share in China`s total imports was 0.8%.

In sum, this chapter focuses on analyzing Brazil-China oil cooperation in its four pillars: trade, investments (as FDI), construction projects and loans. There is already some literature about these subjects, usually analyzing separately one or two of these topics. There are likewise databases tracking Chinese investments and funds directed to Brazil. As an innovative contribution to the ongoing research on these matters, this chapter looks beyond the values involved during overseas acquisitions or announced as new projects and dive into investments done after the completition of these transactions, so as to draw a better picture of China's activities and impacts. Two sources are highighted: the values

invested by COCs as part of the minimum exploratory program ("programa exploratório mínimo", henceforth PEM) and in R&D.

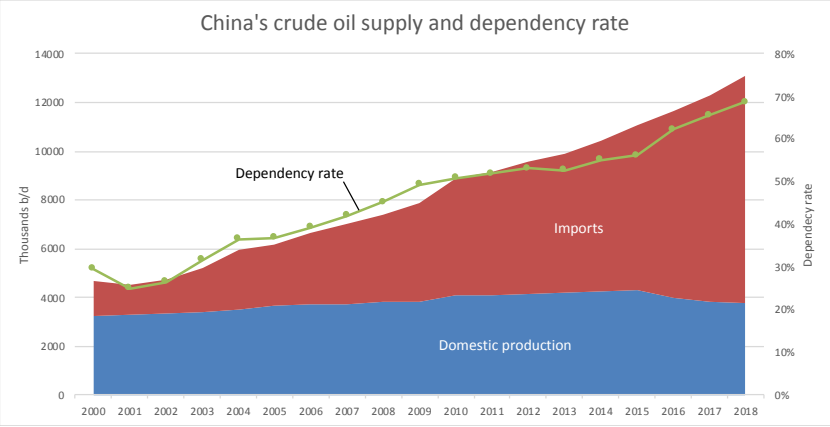
PART 1: Bilateral trade

Chinese crude oil demand

Pushed by a development model based upon investments, mainly infrastructure and urban building, and in production, headed by heavy industries, Chinese economy burgeoned in the last two decades and kept an accelerated growth pace (Kong, Drivers Behind Chinese Development Finance for Energy Worldwide, 2019, p. 28). China`s GDP expanded in everage 9.1% an year, including an average of 10.3% in the first decade of the twenty-first century, followed by a slowdown in the last few years – average of 7.8% –, ending the two decades with a 6.9% growth in 2018, a high rate when compared with the size of its economy – US$ 13.6 trillion (WorldBank, World Bank Data, 2019).

The fast pace of the economic growth has caused an intensive comsumption of raw materials, especially oil, and has led the country to become the world's largest commodities consumer and importer (Kong, Drivers Behind Chinese Development Finance for Energy Worldwide, 2019, p. 28) (Liu, 2015, 页 28). China became a net importer of oil, natural gas, and coal in 1993, 2007, and 2009, respectively. Energy comsumption has also skyrocketed, by 2008 China have become the world's largest energy consumer (Vasquez, China, Oil, and Latin America: Myth vs. Reality, 2018, p. 4) and in 2018 it consumed 22% of global energy (IEA, World Energy Balances Overview 2019, 2019, p. 7).

TABLE



Source: Author`s calculations based on the British Petroleum Statistical Review of World Energy 2019 for domestic production and on Trade Map (2000-2018) for imports. One ton is equal to 7.33 barrils. The measure of import dependency rate is: total imports/productions supplied (or total consumption) multiplied by 100 (Skinner, 1995, p. 1).

Between 2000 and 2018, Chinese oil demand has increased 283% – average of 14.9% yearly –, from 4,7 to 13,5 mbd, accounting for around 37% of the global growth in oil consumption. The per-capita energy usage of oil has increased 2.5 times since 2000 (WorldBank, World Bank Data, 2019). In 2003, China became the world`s second largest consumer of oil, after the USA, a position that it keeps until nowadays. China was responsible for roughtly 14% of the world`s consumption in 2018, comparing to 6% in 2000 (BP, 2019). It is interesting to point out that this crude oil demand expansion happened despite the fact that, in 2017, the commodity accounted for around 20% of the country's energy matrix, which is still heavily based on coal (IEA, World Energy Balances Overview 2019, 2019, p. 19).

This growing share of the world`s consumption, which characterizes China as a "demand game changer" to some especialists (CEBRI, 2018, p. 9), has affected the global market in different ways. According to some analysts, China's expanding oil demand indirectly helped global oil prices – as well as of other products – to reach historical peaks, a phenomenon usually refered as commodity boom. From 2008 to 2014, oil costs were roughly three times as high as in the years before, but from 2015 on it was back to the rates seen ten years ago. Among others, the main reasons would be China`s slowdown economy after 2012 and the availability of non-traditional energy resources, such as shale gas and pre-salt oil. When North America, Europe and other developed countries were suffering the effects of the 2008 financial crisis and saw their growth rates shrink, the fact that China has kept its high GDP growth for a while has helped to sustain petroleum`s high prices (Hogenboom, 2017, p. 173).

While China's oil consumption surged, its production lagged behind. Although the country`s proven reserves have augmented substantially in the period – 70% – and reached 25,9 billion of barrels, the 11th largest reserves in the world, surpassing Qatar for example, oil production, although nowadays the 7th biggest in the world, has not grown in the same speed and even decreased since 2016, reaching 3,8 mbd in 2018 (BP, 2019).

To keep pace with this fast energy consumption growth, coupled with China`s relative scarce resource endowment in comparison with its big population (it has less than 2% of the world`s proven oil reserves), it had no other option than to resort to the global energy markets. It surpassed the USA in September 2013 as the world's number one net importer of petroleum (IEA, Update on Overseas Investments by China's National Oil Companies Achievements and Challenges since 2011, 2014, p. 10) and in 2015 as the world's largest crude oil importer (6.2 mbd). It is worthy to remember that the Asia Pacific Region surpassed North America as the world`s biggest consumer of oil early in 2006, this due to mainly the expressive growth of Chinese demand (Liu, 2015, 页 28).

In 2018, China represented 20.2% of the global petroleum imports, a sharp increase comparing to the 3.9% in 2000. Excluding 2001, the country`s percentage of world imports

increased year by year. Moreover, China also saw foreign supplies accounting for almost 70% of its total oil consumption in 2018 (9.3 mbd of imports), a historical record and a sharp increase comparing to 2000, when the country`s imports were almost seven times smaller (30% or 1.4 mbd). Once again, excepting 2001, the dependency rate grew annualy (ITC, 2019).

This sharp increase in oil imports dependency rate has raised Chinese leaders` brows, and energy security started to be considered China's rapid economic growth "bottleneck" (Cui, Zhongguo yu baxi nengyuan hezuo: xianzhuang, tiaozhan yu duice [Energy Cooperation between China and Brazil: challenges and countermeasures], 2015, 页 46) (Xu, Shixi zhongguo yu baxi de zhanlue huoban guanxi: yi shiyou hezuo wei li [An Analysis of the Strategic Partnership between China and Brazil: take oil cooperation as an example], 2017, 页 34) (Wu Y. , 2019, 页 4). International cooperation became a new moto and clearly a top political priority, related even with the survival of the regime (Hogenboom, 2017, p. 173). The Chinese government has published two energy white papers: China's Energy Conditions and Policies (2007) and China's Energy Policy (2012). In the first one, it is highlighted the importance of taking three measures so as to build a stable, economical, clean and safe energy supply system: expansion of domestic production; improvement of energy efficiency, conservation and cleaniness; and encouragement of international energy cooperation (StateCouncil, China's Energy Conditions and Policies, 2007). The second paper similarly stresses the need to promote a scientific, technological and environmentally conscious development in the area, to expand nation supply and market competition and, like the previous document, preaches the reinforcement of global collaboration and, most importantly, the diversification of supply channels (StateCouncil, China`s Energy Policy 2012 , 2012).

The same concerns about the country`s energy security and the growing dependence on foreign oil were voiced in other official documents, such as the Five-Year Plans for Energy Industry Development (FYP). In the last two ones, there is the explicit dual goal of reducing imports and increasing production (NEA, Guowuyuan guanyu yinfa nengyuan fazhan "shierwu" guihua de tongzhi [Notice of the State Council on Printing and Distributing the "Twelfth Five-Year Plan" for Energy Development], 2013) (NEA, Nengyuan fazhan "shisanwu" guihua ["13th Five-Year Plan" for Energy Development], 2016). In the 12th FYP, covering the period 2011 to 2015, "energy security" was written ten times and there is a target of capping of oil import dependency rate at 61% by 2015 – the rate was of 56% by the end of that year.

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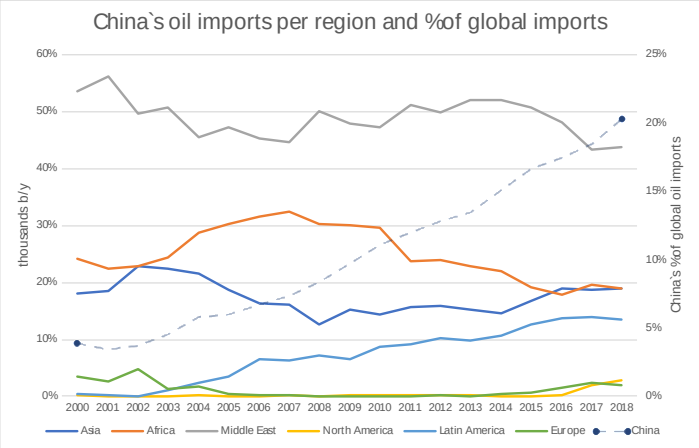


Sources: Author`s calculations based on data from Trade Map (2000-2018).

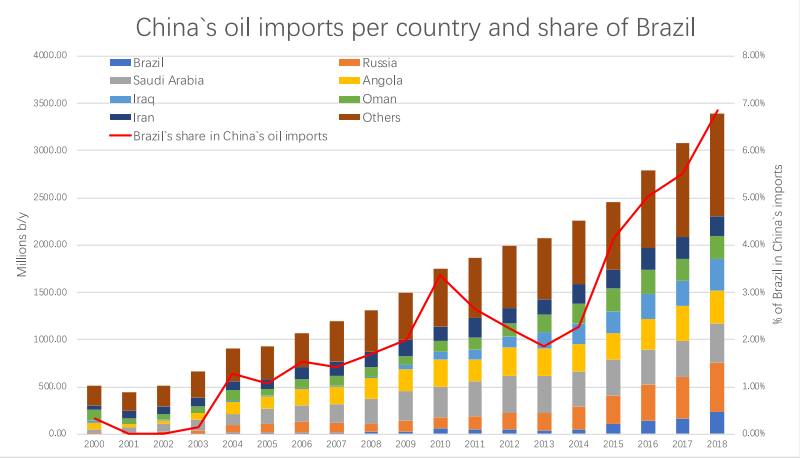
Indeed, diversification of sources became one of the main principles and policies of China`s energy diplomacy since the beginning of the new century and deserved detailed analysis of various academic works (Vasquez, China, Oil, and Latin America: Myth vs. Reality, 2018, p. 4) (Hogenboom, 2017, p. 173) (Cui, Zhongguo yu baxi nengyuan hezuo: xianzhuang, tiaozhan yu duice [Energy Cooperation between China and Brazil: challenges and countermeasures], 2015, 页 48) (Becard & Macedo, 2014, p. 149) (Xu, Shixi zhongguo yu baxi de zhanlue huoban guanxi: yi shiyou hezuo wei li [An Analysis of the Strategic Partnership between China and Brazil: take oil cooperation as an example], 2017, 页 34) (Liao, 2015, p. 90) (Cui, Zhongba nengyuan hezuo qianjing zhanwang [Prospects for China-Brazil Energy Cooperation], 2017, 页 16) (Vasquez, China's Oil and Gas Footprint in Latin America and Africa, 2019, p. 3) (Wu W. , 2019, p. 23). Some authors equally say that this broadening of oil partners – and consequently expansion of imports – was also intended to diversify the country`s energy matrix, in which the dependency on coal ought to be diminished (Leao & Puty, 2018, p. 2).

Over the last two decades, the Middle East was China's largest source of imported crude, with Saudi Arabia the largest supplier. However, in recent years, China has been diversifying its oil imports, in order to improve its energy security and diversify risks (Xu, Shixi zhongguo yu baxi de zhanlue huoban guanxi: yi shiyou hezuo wei li [An Analysis of the Strategic Partnership between China and Brazil: take oil cooperation as an example], 2017, 页 34). It is worth saying that the region was the only singularly mentioned in the country`s both energy white papers, where the stability of oil producing and exporting

nations is regarded as a global concern, so as to avoid geopolitical conflicts that affect the world's energy supply (StateCouncil, China`s Energy Policy 2012 , 2012).

The Middle East is still China`s main crude oil supplier notwithstanding, its percentage has been decreasing over the years. In the beginning of the new century, it represented 54% of China`s crude oil imports and progressively decreasing over time, although with some oscilations, and ended 2018 with 44%. Another region that saw its participation diminish was Africa – from 24% to 19% –, a continent where economic, policitical and social unrest has equally influenced its crude exports and the oil`s international price. Asia and Europe have kept almost the same rate over time – from 18% to 19% and from 4% to 2% respectively. The only two regions that have experienced upward variations in their percentages were North America and Latin America. Both started the period with insignificant numbers of exports towards China and ended it with 3% and 14% of the country`s imports` share (ITC, 2019). This phenomenon reflects China`s strategy of intentionally moving their operations, investments, equity share agreements, service contracts and government-backed loans to more politically stable places, such as Organization for Economic Cooperation and Development (OECD) members and several South American nations, although the majority of the foreign assets are still situated in conflict-burdened Middle East and Africa (Wu W. , 2019, p. 25). Both still represent 63% of China`s imports, comparing to 78% in 2000 (ITC, 2019). This reduction was clearly replaced by the American continent, where there are large untapped energy potential and relative stable political environments compared with those in conventional territories (Wu W. , 2019, p. 23). More specifically, the commercial exploration of shale gas in the USA and the discovery of huge reserves of oil in the Brazilian pre-salt area have changed the oil industry in the last few years and that represent the new frontier of oil production`s future expansion.

TABLE: China`s main oil importers



Sources: Author`s calculations based on data from Trade Map (2000-2018).

Breaking up the analysis and focusing on the partner countries, there are some quite interesting phenomena. Russia has become China`s top oil partner, accounting for nearly 15% in 2018, up from 2% in 2000, surpassing Saudi Arabia, which comes in second with 13%, compared to 8% two decades ago. Angola, Oman and Iran – third, fifth and seventh places respectively – also saw their shares decreasing, differently to Iraq, Brazil and Kuwait – ranking fourth, sixth and eighth. Venezuela, which has the largest oil reserves in the world and has become one of China`s main oil exporters, saw its percentage oscilating in the last few years, due to a few years of negative growth of exports towards the Asian nation, and accounted for 4% in 2018. It is worth mentioning that Venezuela has represented more than half of the region's supply to China in the past, a position that is now occupied by Brazil (ITC, 2019).

In this process of diversifying oil imports in recent years, China has been strengthening its partnership with countries outside the Organization of the Petroleum Exporting Countries (OPEC), such as Russia, Oman and Brazil (EIA, More Chinese crude oil imports coming from non-OPEC countries, 2017). Although OPEC countries still made up most (56%) of China's 9.3 mbd of crude oil imports in 2018, their percentage peaked in 2012 – 68%. They represented 41% in 2000. Crude oil from non-OPEC countries made up 65% of the growth in China's imports between 2012 and 2016 (ITC, 2019).

TABLE: China`s oil imports from Brazil (2000-2018)

Year	*US$ million*	*Million b/y*	*% of Total*	*Annual Growth ($)*	*Annual Growth (mb/y)*	*Brazil`s position*
2000	43.7	1.67	0.32	-	-	27
2001	0	0	0	-100%	-100%	33
2002	0	0	0	-	-	32
2003	21.7	0.91	0.14	-	-	30
2004	422.9	11.56	1.28	1851%	1175%	14
2005	455.8	9.85	1.06	8%	-15%	16
2006	891.9	16.29	1.53	96%	65%	15
2007	979.4	16.97	1.42	10%	4%	16
2008	1,886.9	22.15	1.69	93%	31%	14
2009	1,610.6	29.74	1.99	-15%	34%	13
2010	4,233.7	58.99	3.36	163%	98%	10
2011	4,875.6	49.16	2.64	15%	-17%	12
2012	4,653.9	44.33	2.23	-5%	-10%	12
2013	3,791.0	38.43	1.86	-19%	-13%	13
2014	4,881.5	51.42	2.27	29%	34%	13
2015	5,307.2	102.41	4.15	9%	98%	9
2016	5,992.4	140.41	5.03	13%	38%	8
2017	9,176.7	169.25	5.50	53%	21%	7
2018	16,204.9	231.79	6.85	77%	37%	6

Source: Author`s calculations based on data from Trade Map (2000-2018). The last three colunms are calculated with the volume traded.

In this process of diversifying oil imports and diminishing dependence on Middle East and Africa, Brazil has been becoming an increasingly crucial player in China's energy mix. Among its top oil suppliers, Brazil`s crude exports have multiplied in the last few years – alongside with the Russian ones. Differently to all the other major exporters, China`s imports from Brazil consistently increased year by year, with slightly negative oscilations over the time. From 1.7 million barrels per year (mby) in 2000 to 231.8 mby in 2018, or from US$ 43.7 millions to US$ 16.2 billion. In volume terms, there was a growth of nearly 14,000% in the period; in some years, the imports doubled, such as in 2009/2010 and 2014/2015; 2013`s imports of 38 mby were roughly multiplied by six in five years. Moreover, from almost 0% of China`s global petroleum imports in 2000, Brazil`s participation oscilated mostly upwards until 2010, when it started to decreased. From 2013 on, it restarted an impressive upward tendency, ending 2018 with a share of 7%. Comparing China`s trade with the its other big suppliers, oil trade figures with Brazil are still relatively small, but the imports growth was the fastest one among all China`s partners and the potential for more expansion is substantial (ITC, 2019).

Brazil`s position in China`s top suppliers ranking was also upgraded. Between 2000 and 2003, it varied around 30th place. From 2004 and 2014, it oscilated around the 13th place. In 2010, Brazil became the country`s tenth biggest partner, dropped the group a year latter for four years and from 2015 on reconquered its position, ending the period at the seventh place. Brazil now ranks higher than some China`s traditional oil importers, such as Iran, Kuwait and Venezuela (ITC, 2019). It is worthy saying that Brazil`s current proven oil reserves are only 16%, 25% and 8.6% of the reserves of these countries repectively (or 155.6, 101.5 and 303.3 billion barrels) (BP, 2019).

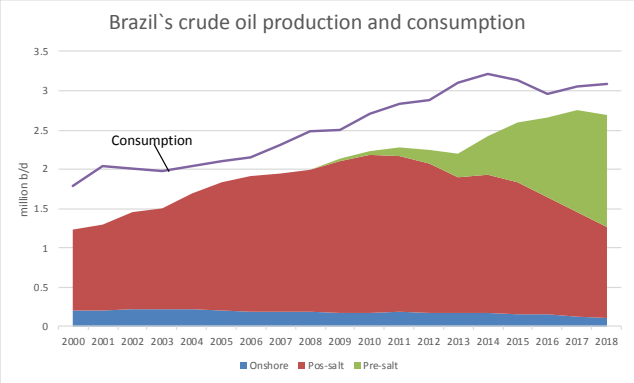
An interesting feature to observe is that the variation of the crude oil`s price over time – which, as mentioned above, was partially influenced by China`s high economic performance in the last two decades – has influenced significantly Brazil`s revenues (Hogenboom, 2017, p. 173). In the 2004-2008, 2010-2013 and 2017-2018 periods, the oil`s growing value resulted in greater extra revenues from Brazil`s crude exports than the direct effect of increased export volumes to China. In some years, the reduction of imports from Brazil was followed by higher profits (such as in 2005 and 2011), and vice-versa (2009, 2014-2016). Accordingly, sometimes, revenues did not decrease in the same pace of the volumes imported (2009 and 2012) or increased more than the quantities (2004, 2006-2008, 2010, 2017, 2018) (ITC, 2019).

Brazil`s crude oil production and exports

A key element to explain the flourishing oil trade between Brazil and China in the last few years is the complementary of both countries` sector. Whilst Chinese oil consumption and imports skyrocketed in the last two decades – and nation production lagged behind –, Brazilian production and exports burgeoned in the same period. Likewise, China has the world`s second largest crude oil refining industry, while Brazil is a historical importer of refined oil (OPEC, OPEC Data Download, 2019).

Indeed, Brazil`s oil production has consistently augmented over time, which even allowed the country to achieve self-sufficiency in crude oil in 2006, i.e. exporting more than importing petroleum (IEA, The Energy Situation in Brazil, 2006, p. 3). Between 2000 and 2018, national production grew 212%, an average of 4.3% per year, from 1.3 mbd to 2.7 mbd, the fourth fastest growth in the world. In some years, it grew at a double-digit pace, such as in 2002, 2005 and 2014 (ANP, Estatísticas, 2019). Brazil`s percentage in global oil production increased as well, from 1.7% to 2.8% in the period. Brazil was the tenth largest producer in the world in 2018 and Latin America’s top oil producer since 2015, in front of traditional oil exporters or bigger reserves countries, like Venezuela. This is a completely different picture from 2000, when it was the 17th producer and 3rd in its region (OPEC, OPEC Data Download, 2019).

TABLE



Source: Author`s calculations based on data from Brazil`s National Agency of Petroleum, Natural Gas and Biofuels (ANP, in Portuguese) for production and from British Petroleum Statistical Review of World Energy 2019 for consumption.

Likewise, induced by greater internal production, exports have also kept an upward and faster pace over time. In the same period, Brazilian world exports increased faster than the production, from 0.02 mbd to the historical record of 1.1 mbd, an impressive growth of around 6000% – the fastest one in the entire globe or an average of 27.4% annually. Brazil`s percentage in global oil exports increased as well, from less than 0.1% to 2.5% in the period. In 2018, Brazil was the 15th largest exporter and the 3rd in Latin America, behind Venezuela and Mexico, whose production is lower than the Brazilian one (OPEC, OPEC Data Download, 2019).

This growth of oil production and exports was caused by not only increasing investments of national and foreign companies in Brazil`s upstream oil and gas projects, but also by one of the discoveries that, alongside with shale gas, has shaken the oil market in the last few years: pre-salt oil. In August 2005, the first traces of sub-salt oil were found at the Santos Basin, at the block BM-S-10 or Parati (ANP, Petróleo e Estado, 2016, p. 239). In June 2006, Petrobras announced the discovery of huge untapped oil reserves in an area hitherto not explored by other nations – below the salt area – and which is located at 300 km off the coast, from 5,000 to 7,000 meters deep in the Atlantic Ocean (Petrobras, Petrobras confirma descoberta de óleo leve na bacia de Santos, 2006). The Tupi field – BM-S-11, labelled Lula afterwards – was regarded the biggest discovery since 2000, before there was only the Kashagan field in Kazakistan (Jia, 2009, 页 40).

These new reserves' estimates have changed a lot, but some optimistics believe that it might contain from 50 (Ribeiro, 2008) up to 176 billion barrels of a lighter, better and more commercially valuable oil than the heavy Brazilian one (Gandra, 2015). In any scenario,

Brazil might enter in the future, in the group of few countries that possess huge reserves of petroleum and gas (ANP, Petróleo e Estado, 2016, p. 238).

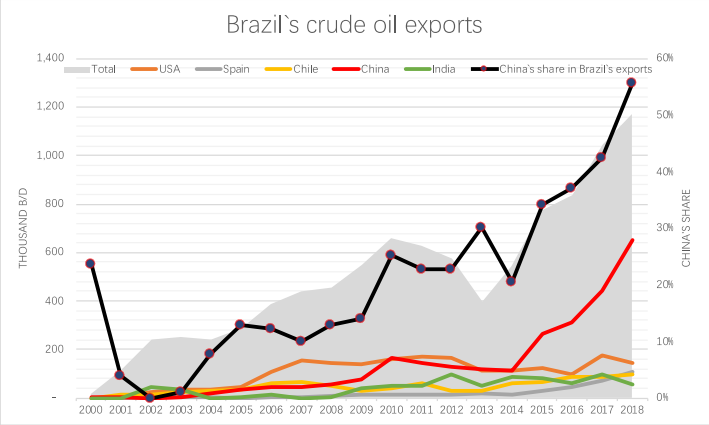
To fulfill these predictions, some hurdles had – and have – to be overcome since the inicial production in September 1st, 2008 (Petrobras, Início de produção na camada de pré-sal, 2008). Firtly, logistics challenges are huge. The new sites are far from the coast and deep into the ocean. Transportation of people becomes more defying. Secondly, financial costs are higher, since the new oil is of harder extraction, specially because it is located below a thick – 2,000 meters in average – and hard to penetrate salt layer. Thirdly, technological breakthroughs are necessary (Petrobras, Tecnologias pioneiras do Pré-sal [Pre-salt`s pioneer technologies], 2015). Among these three obstacles, the second one has seemed to be the most defiant, for reasons to be discussed in the sections below.

With the new discoveries, Brazil`s crude proven reserves have grown over time, from 8.5 to 13.4 billion of barrels between 2000 and 2018, currently 96% of those are offshore (ANP, Anuário Estatístico 2019, 2019). Accordingly, Brazilian reserves percentage of the global ones has kept roughly the same 0.8%, but they grow from the 18th to the 14th rank of the largest ones (BP, 2019). The biggest changes, as explained above, happened in the production and exports. In 2000, Brazil exported only 0.6% of its national production, a value that increased to 40% in 2018 (ITC, 2019).

This growth would not be possible without the pre-salt layer. Although the national oil exports figures are not differentiated by origin, it is reasonable to believe that exports` features would reflect those of the national production, in other words, most of the exports` growth might have come from the expansion of the pre-salt production, although the post-salt layer has equally increased, but at a different speed.

From 2008 until 2018, pre-salt area production increased from 0.007 mbd (0.4% of the national production) to 1.4 mbd (53%), a growth of almost 20,400%. At the same time, post-salt production augmented from 1 mbd to 1.2 mbd and has been decreasing since 2010, when it reached the peak of 2 mbd. Finally, onshore production decreased from 0.2 mbd to 0.1 mbd (BP, 2019).

TABLE



Source: Author`s calculations based on data from Trade Map (2000-2018).

As mentioned in the section above, the rhythm of Brazil`s crude exports towards China was faster than to any other nation. China became Brazil`s main oil export destination in 2010 and again from 2013 on, surpassing the United States, which was the Brazilian main export market since 2004. As seen in table 6, Brazil`s total exports growth after 2013 were paralelled by a similar export impetus towards the Asian country. China`s share of Brazil`s crude exports has augmented over time, from close to 0% in the beginning of the new century to 56% in 2018 (ITC, 2019).

Other Brazil`s main destination markets – USA, Spain, Chile and India – did not experience such a remarkable expansion, although kept incrementing their imports from Brazil over the years. In terms of percentage of Brazilian exports, the Asia-Pacific region increasing participation, headed by China, has obscured the other regions` proportion, which decreased in the period. Historically, the American continent was the main destination of the country`s oil, especially Central and South America, although the US was the top market for several years. Africa and Middle East were never relevant partners. Europe`s importance has oscilated over time. Until 2009, Central and South America received most of Brazilian crude exports, followed by North America. From 2010 on, Asia-Pacific took the leading and in 2017 started to receive more than half of total exports (ITC, 2019).

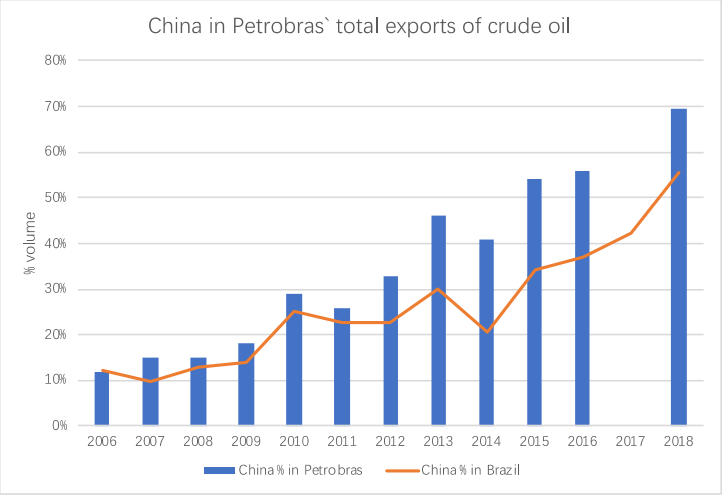
It is interesting to observe that the expansion of the bilateral oil trade has evolved pari passu with the advance of the total bilateral commerce, but oil figures increased faster than the total ones. On the one hand, bilateral total trade increased 3,897% between 2000 and 2018, from US$ 2.8 billion to US$ 111 billion. On the other hand, bilateral oil trade augmented from US$ 43.7 million to US$ 16.2 billion, or 37,043%, a growth almost ten times faster than the other one. Moreover, during this period, the commodities share in

China`s imports from Brazil has risen significantly, mainly dominated by soy beans and iron ore. However, over time, a third commodity entered the group: crude oil (Alves, 2013, p. 114). Oil became the third major product in China`s import basket from Brazil, representing 22.3% of the total US$ 64.2 billion bought in that year, comparing to 3.3% in 2000. Accordingly, Brazilian oil share in China`s total imports raised from 0.02% to 0.8% (ITC, 2019).

This crude trade growth becomes even more remarkable when one remembers that China has recently started to import oil from Brazil. In a short historical brief, during the 1980s, Brazil imported oil from China and, in turn, exported petrochemical products industrial assets and steel (Xu, Shixi zhongguo yu baxi de zhanlue huoban guanxi: yi shiyou hezuo wei li [An Analysis of the Strategic Partnership between China and Brazil: take oil cooperation as an example], 2017, 页 43). In the end of the decade and in 1990s, oil disappeared from the bilateral trade and reappeared again in 2000, but from then flowing in the opposite direction (Xu, Shixi zhongguo yu baxi de zhanlue huoban guanxi: yi shiyou hezuo wei li [An Analysis of the Strategic Partnership between China and Brazil: take oil cooperation as an example], 2017, 页 49).

The same recent tendency of concentration of Brazilian exports towards China is seen in companies that operate in Brazil, being such the case of the national biggest oil corporation Petrobras. It is historically the country`s main producer, representing almost 80% of the total market in 2018, although this rate has been decreasing in recent times, when other national and mostly foreign oil companies started to buy more assets in Brazil. From 2006 on, the Asian nation`s portion of the company`s exports has raised from 12% to nearly 70%, with the volumes increasing after 2010 and substantially after 2015 (Petrobras, Annual Report 2018, 2018) (Petrobras, Annual Report 2016, 2016) (Petrobras, Annual Report 2015, 2015) (Petrobras, Annual Report 2014, 2014) (Petrobras, Annual Reports 2013, 2013) (Petrobras, Annual Report 2012, 2012) (Petrobras, Annual Report 2006, 2006). It is interesting to point out that the company`s dependency rate relating to China was always higher than the country`s one, which suggests that the other oil companies that produce and export oil from Brazil might have a more diversified market mix, dependending less on the Asian country.

TABLE



Source: Author`s calculations based on the percentages shown at Petrobras` annual reports, which have no data available for the 2000-2005 period and for 2017.

Talking about dependency still, some South American countries, such as Ecuador and Venezuela, have a much higher dependence on China, oil is their main commodity export to the Asian nation. Brazil is a different case, the oil sector is one among various shared economic interests with China (Hogenboom, 2017, p. 208).

Due to this China`s overwhelming share in Brazil`s crude exports, the complementarity mentioned in the beginning of this section receives different colors according to the distinct authors. On the one hand, Chinese scholars tend to see it as a natural complementarity, which establishes a win-win scenario for both countries (Xu, Shixi zhongguo yu baxi de zhanlue huoban guanxi: yi shiyou hezuo wei li [An Analysis of the Strategic Partnership between China and Brazil: take oil cooperation as an example], 2017, 页 34) (Wu Y. , 2019, 页 1) (Cui, Zhongba nengyuan hezuo qianjing zhanwang [Prospects for China-Brazil Energy Cooperation], 2017, 页 19) (Cui, Zhongguo yu baxi nengyuan hezuo: xianzhuang, tiaozhan yu duice [Energy Cooperation between China and Brazil: challenges and countermeasures], 2015, 页 46). On the other hand, Brazilian researchers also highlight the benefits of the partnership, but also stress the asymmetry of the numbers and the overdependence of the country`s exports to China (Becard & Macedo, 2014, p. 145) (CEBRI, 2018, p. 8).

The exponencial growth of Petrobras`s oil exports to China from 2015 on can also be partially explained by legal changes in China`s oil and gas market. Until the end of 2014, only state-owned refineries were allowed to import petroleum. In an attempt to increase competition in the sector, the government started to allow private independent refiners –

also known as “teapots” – to access directedly the foreign market, granting them import quotas (Rosito, 2017, p. 10). These refiners represent around 25% of the country`s refining capacity, approximately 3 mbd. They comprise more than 50 medium and small refineries concentrated in Shandong province, northeastern of China. In June 2019, 41 plants were allowed to import oil with a quota of more than 2,5 mbd. 19 of these 41 refineries are partners of Petrobras (Petrobras, China é o nosso principal destino das exportações de óleo cru, 2019) and are increasingly buying from the company, such as the Hengli Group (Reuters, 2018). These refineries have a special interest in Brazilian pre-salt oil, because it is low sulfur, such as the one from Angola, fitting these refineries requirements (Tan & Alper, 2018).

With this new market opportunity, Petrobras inaugurated crude oil storage tanks at Qingdao Port, capital of Shandong, allowing it to improve its negotiation margins in the spot market (Egues, 2019). These tea pots represented around one-third of the oil sold by Petrobras to Chinese costumers (Petrobras, home Blog Fatos e Dados home busca China é o nosso principal destino das exportações de óleo cru, 2019).

Although the numbers of the Petrobras` exports are not public, it is reasonable to say that this legal amendment has directly influenced not only the company`s exports, in which China`s percentage has passed from 41% to 54% in 2014/15 and then 69.5% in 2018, but also Brazil`s total exports. As showed in the section above, in 2015, China`s imports from Brazil grow 98% in 2014/15, the same rate in 2009/2010.

Other reasons can also explain this growth of bilateral oil trade. Major Chinese efforts to grow and diversify its energy imports matched with Brazil`s appetite to find new export markets. In this process, US shale gas revolution and its subsequently decrease of oil imports led Brazil as well as other Latin American countries, such as Venezuela, to diversify its export partners, Asia and especifically China became a new reliable destination. In addition, the hunger for capital in corporations like Petrobras and Chinese oil companies’ investments in Brazil, which will be studied in detail in the following sections, have equally helped to boost bilateral oil ties.

Last but not least, apart from crude oil, some analysts suggest that both countries are also complementary in refined oil (Xu, Shixi zhongguo yu baxi de zhanlue huoban guanxi: yi shiyou hezuo wei li [An Analysis of the Strategic Partnership between China and Brazil: take oil cooperation as an example], 2017, 页 35) (Zhou, 2017, 页 29) (Zhang, 2017). On the one hand, Brazil refinery capacity and throughput, although the eighth and the eleventh biggest ones respectively (OPEC, OPEC Data Download, 2019), do not match the internal demand – the seventh largest in the world –, making it dependent on imports, which usually have the USA as the biggest supplier in the last few years. The USA is also the biggest exporter and consumer of oil in the world. On the other hand, China has the second biggest refining industry in the world and has idle capacity in the refining sector (BP, 2019, p. 27),

its exports of refined oil are concentrated in the Asia-Pacific region. Albeit Brazil`s imports of refined oil from China are small, 0.06% of Brazil`s total imports and 0.02% of China`s global exports, China could potentially supply greater quantities of Brazil`s demand. Some Chinese oil companies are interested in the Brazilian market, CNPC sold refined oil to Brazil for the first time in 2015 (Zhang, 2017) and its exports are reported to be increasing over time (Aizhu, 2018).

PART 2: Chinese OFDI and construction projects in Brazil

Chinese OFDI and construction projects in Brazil

Besides conventional oil trade, China has made use of overseas investments in various forms, such as M&As, participation in public oil fields` auctions, engineering services, oil pipeline constructions and oil-backed loan deals – to be analyzed in the next section –, to satisfy its mushrooming demand for petroleum, increase its oil corporations`s internationalization, among other objectives. This section describes Chinese oil companies` activities in Brazil, debates the reasons for these investments and presents an estimative of the amount of dollars spent.

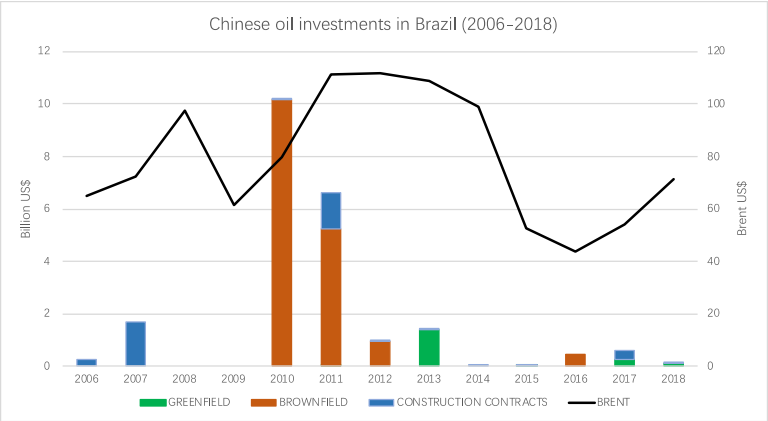
It is not an easy task to analyze cross-boundary investments. For their private, fluid and multiple-origins nature, it is difficult to track them and make an accurate estimation of their numbers. In the case of Chinese investments in Brazil, it is not different. According to each institution, estimatives can vary considerably, so as their sources and methodologies. The China-Mexico Studies Center (Cechimex), Boston University`s Global Development Policy Center, Brazil-China Business Council (CEBC), Brazilian Ministry of Economy, Brazilian Central Bank, Aid Data and Heritage Foundation have all made efforts to follow and dissect Chinese outbound foreign direct investments (henceforth COFDI).

This section aims at presenting a complementary and, hopefully, far-reaching database of COFDI in Brazil`s oil sector that supplements the work that has been done by the above-mentioned organizations. Besides their info, it makes use of academic articles, reports of policy-advising institutions and oil firms, media accounts, interviews with representatives from government, companies, civil society organizations and experts. However, given the difficulty of finding investment information, the figures here should only be taken as showing tendencies, an estimation, intrinsically incomplete, rather than as absolute data.

Most importantly, this section resorts to reports disclosed by the National Agency of Petroleum, Natural Gas and Biofuels (ANP) to check the projects and the numbers, with the ambition of presenting a more accurate picture of the Chinese oil companies' activities in the country. ANP is the governmental organ responsible for executing the national policies for the sector, supervising more than 110 thousand firms in Brazil, in the upstream

(exploration, extraction and production, or E&P), middlestream (transportation, storage and wholesale marketing of crude oil) and downstream (oil refining and distribution) areas (ANP, Institucional, 2019).

This examination has made possible to better track the investments, whose figures are actually higher than the hitherto known (AEI & Heritage, 2019) (RedALC-China, 2019). Moreover, it was also able to identify what became known as "zombie deals", transactions which were announced and are usually cited in reports and analysis, but in reality never happened. In addition, besides the bonuses paid during auctions, this paper also considers the values invested by Chinese oil companies as part of the minimum exploratory program ("programa exploratório mínimo", PEM). PEM corresponds to a set of exploratory activities that must be performed by the concessionaire or contracted firm during the exploration phase of the oil well[2] (ANP, Programa Exploratório Mínimo, 2019). After auctioning oil blocks, the company has to present a plan of investments aiming at examining the economic and production viability of the asset, an obligation that is supervised by ANP[3]. Furthermore, it is also included the amounts disbursed in research and development (R&D), another obligatory condition of ANP to concessionaires. Both PEM and R&D are normally not taken into account by other academic works and reports.



SOURCE: Author`s calculation based on multiple sources. The numbers for Sinopec consider only its share at Petrogal (30%) and Repsol Sinopec (40%).

COCs` opening project in Brazil was in 2006, more than a decade after their first ventured overseas in 1993, investing in oil production in Thailand, Canada and Peru (IEA, Update on Overseas Investments by China's National Oil Companies Achievements and

[2] In this work, the fees to participate in ANP`s auction are also included in the calculations. In some cases, they surpassed millions of dollars.

[3] In the end of the exploration phase, if the oil block is considered economically viable, it it is done a declaration of commerciality ("declaração de comercialidade") and the concessionaire will present a development plan ("plano de desenvolvimento"), with measures and financial investments to be taken place, in order to extract oil from the field. Unfortunately, this plan is not made public.

Challenges since 2011, 2014, p. 6). From then until 2018, according to own verifications, Chinese investments in Brazil`s oil sector are estimated in US$ 22.3 billion between 2006-2018, being US$ 18.5 billion related to the flux of confirmed Chinese FDI – in which it is included the values of PEM and R&D – and US$ 3.8 billion to infrastructure plans, construction projects and other service contracts, mostly EPC (engineering, procurement, and construction).

COFDI and construction projects` values have oscilated considerably over time. On the one hand, COFDI started in 2007 with small numbers and reached their peak in 2010, with more than US$ 10 billion. They reached US$ 5.2 billion, US$ 947 million and US$ 1.4 billion in 2011, 2012 and 2013 respectively, but have no projects in 2008, 2009 and 2014. On the other hand, construction contracts and service projects started in 2006 and peaked in 2011 with more than US$ 1 billion. However, no projects happened in 2008, 2009 – like COFDI – and 2016.

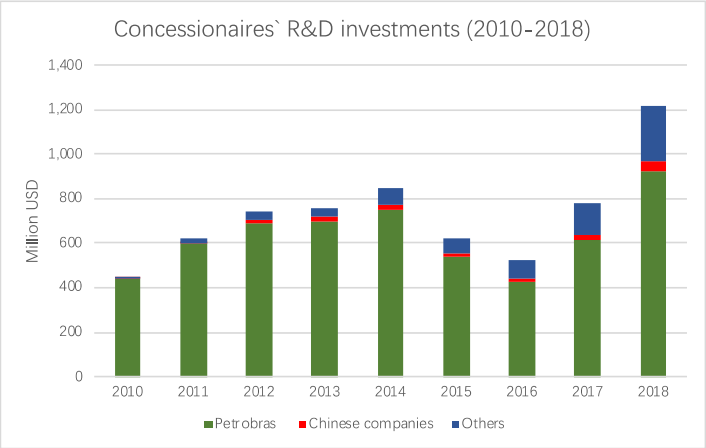
Interestingly, putting these numbers in a broader picture and comparing with Chinese investments and construction contracts in the oil and gas sector around the world until 2018 – US$ 259 billion, according to the American Enterprise Institute –, Brazil received almost 9% of the total, ranking second just after Canada. Until CNOOC`s acquisition of the Canadian energy company Nexen in December 2012, Brazil was the largest destination for Chinese energy investments.

The majority of the FDI are brownfield – US$ 16.8 billion –, reflecting somehow the business opportunities that the 2008 crisis and Brazil's internal economic situation brought to COCs. Most of these projects are between 2010-2012 and some in 2016. In comparison, greenfield cases are less in number – US$ 1.8 billion – and less sparsed in time, with disbursements concentrated in 2013 and 2017-2018.

Analyzing the numbers presented by companies, Sinopec was responsible for US$ 15.7 billion (70% of the total), followed by Sinochem with nearly US$ 3.1 billion (9%), CNPC with US$ 850 million (4%) and CNOOC with US$ 791 million (3.5%). In global terms, Brazil represented roughly 17% of Sinopec`s world investments (which totaled US$ 91.2 billion), 37% of Sinochem`s (US$ 8.4 billion), 1% of CNPC`s (US$ 105.3 billion) and 2% of CNOOC`s (US$ 43.2 billion) (AEI & Heritage, 2019).

Sinopec`s projects in Brazil are all brownfield or construction services. Sinochem only focused in M&A as well. In contrast, CNPC and CNOOC were involved just in greenfield projects.

TABLE:



Source: Author`s calculations based upon data from ANP. The numbers for Sinopec consider only its share at Petrogal (30%) and Repsol Sinopec (40%).

It is revealing that, besides the values invested in M&A, auction`s bonuses and PEM, another component of COC`s FDIs in Brazil that has not been present in the current literature analysis is the investments in R&D. According to Brazilian law and ANP`s regulations, each concessionaire is obliged to separate part of its portfolio to R&D. Alongwith the growth of COC`s FDIs in the country, the amount disbursed in R&D has raised pari passu. From around US$ 1 million in 2010, when COCs desimbarked in Brazil`s E&P sector, quantities augmented to US$ 44 million in 2018. This is still a relatively small percentage of the total US$ 1.2 billion and five times smaller than IOC`s part – US$ 248 million. Moreover, of these US$ 44 million from COCs, Sinopec`s companies accounted for two-thirds, Sinochem almost another one-third, and CNOOC and CNODC with tiny ratios.

Reasons for Chinese oil investments

Reasons for this exponential growth of Chinese oil companies` (henceforth COC) investments – and oscilations over time – are multifold. Primarily, the announcement of the discovery of huge oil reserves in the pre-salt zone in late 2006 certainly has prompted China`s going out policy to open a new chapter in the bilateral oil cooperation. From then on, with a promising expansion of the national oil market in the coming decades, Brazil would offer what China wanted to access: (i) natural resources to import, (ii) strategic assets to explore, (iii) economic opportunities to its engineering and machinery companies to grasp, (iv) technologies to acquire and develop, (v) and capital to its financial institutions to provide – to be discussed in the next section (Wu W. , 2019, p. 25) (Rosito, 2017, p. 14)

(Liao, 2015, p. 89) (Vasquez, China's Oil and Gas Footprint in Latin America and Africa, 2019, p. 5) (Schutte & Debone, 2017, p. 96) (Leao & Puty, 2018, p. 2) (IEA, Update on Overseas Investments by China's National Oil Companies Achievements and Challenges since 2011, 2014, 页 40) (Gopal, Pitts, Zhongshu, Gallagher, Baldwin, & Kring, 2018, p. 3).

Firstly, after the pre-salt area became one of the two new frontiers of oil production`s future expansion, Brazil became a very promising long-term oil source and emerged as a viable alternative in China's oil diplomacy (Xu, China`s Strategic Partnerships in Latin America: case studies of China`s oil diplomacy in Argetina, Brazil, Mexico and Venezuela, 1991-2015, 2017, p. 50) (Almeida & Consoli, 2014, p. 1). The country indeed started to attract world attention with its oil exploration potentialities. As mentioned before, some studies predict that subsalt reserves could contain as much as 176 billion barrels of oil. According to the International Energy Association (IEA) projections, with the new discoveries coming into the market, Brazil might become the fastest growing oil producer outside the Middle East in the future. Its oil production could reach 5.7 mb/d by 2035, making it the world`s sixth largest oil producer – it was the 10th one in 2018 (Husar & Best, 2013, p. 14). At the same year, IEA believes that offshore oil production will correspond to 13% of the world's oil supply and one third of it will come from Brazil (Cui, Zhongguo yu baxi nengyuan hezuo: xianzhuang, tiaozhan yu duice [Energy Cooperation between China and Brazil: challenges and countermeasures], 2015, 页 47).

Secondly, conscious that the fulfillment of all these expectations would require surmounting investments, the COCs saw a new opportunity to expand their possessions of oil and gas acreage overseas (IEA, Update on Overseas Investments by China's National Oil Companies Achievements and Challenges since 2011, 2014, p. 13) (Jia, 2009, 页 40). They were motivated to do this for a no number of motives. A commonly discussed topic is that, when they started their international expansion in the middle of the 2000s as part of the Going Up strategy, the best acreage in non-risky areas was in the hands of Western companies. As "latecomers", they were left with no choice other than to invest in countries or projects considered politically, socially, economically or geologically riskier or demanding, sometimes even overpaying in foreign acquisitions (Vasquez, China's Oil and Gas Footprint in Latin America and Africa, 2019, p. 16) (Hogenboom, 2017, p. 179) (Wu W. , 2019, p. 25). Some argue that, qualitatively different from their western counterparts, COCs tend to have behave distinctively in terms of risk tolerance and location choices. Causes might come from their state-owned nature, in which the political agenda embebed in energy security concerns somehow influence their commercially-driven investment decisions (Hogenboom, 2017, p. 208), the political and financial backing offered by the Chinese government (Wu W. , 2019, p. 36) and the governmental control on national oil retail prices, which squeezes the profit margins (Wu W. , 2019, p. 34). In any case, pre-salt oil exploration, although a challenge in financial and technological terms, was not yet

dominated by other international oil companies (henceforth IOC) and, then, open to international competition.

COC invested heavily in Brazil in 2010 and 2011 and less intensively in 2012 and 2013, always in brownfield projects, except the Libra field auction in 2013. Numbers reached lower levels in 2014 and 2015 and restarted to increase from 2016 on. However, they began to be involved in a bigger number of greenfield projects and auctions.

These oscilations demonstrate that COC`s investments are not an isolated phenomenon, but instead have followed trends in the world oil market and in Brazil's political and legal evolution. When the oil prices were going up, they speeded up their movements inside China and abroad, which became more conservative when the prices went down in 2014 and 2015. For instance, COC`s world investments dropped 80% in 2014 in a year-on-year basis (IEA, Oil 2017: analysis and forecasts to 2022, 2017, p. 60). Similarly, they have shut down fields, slowed down drilling activities and kept on hold some projects in China, which were restarted from 2017 on, when oil prices initiated an ascending trend (IEA, Oil 2017: analysis and forecasts to 2022, 2017, p. 10).

Interestly, some partially attribute this slowdown to a national anti-corruption campaign in China that has put some COC`s activities around the world in scrutinity (Vasquez, China's Oil and Gas Footprint in Latin America and Africa, 2019, p. 6).

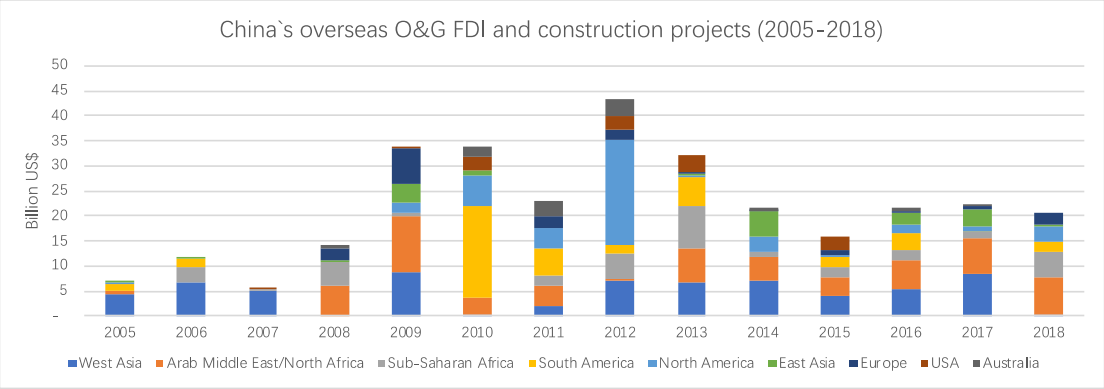
Moreover, with the 2008 global financial crisis outbreak and the subsequent drop of oil prices and shortage of lending capital, most IOCs were compeled to cut down costs and sell some assets. Pocket-full COCs took advantage of this opportunity and bought oil & gas areas with reduced prices all over the world (Hogenboom, 2017, p. 202). In 2015, more than 20 COCs had invested in close to 200 oil and gas projects in 54 countries. China's total overseas oil production was of 3.1 mbd in 2016, a few times bigger than the 0.7 mbd in 2009. That represents 26% of total domestic demand and 41% of national crude imports (IEA, Oil 2017: analysis and forecasts to 2022, 2017, p. 60). Latin America was not an exception in this global expansion and Brazil has hosted most of the deals of the region (Alves, 2013, p. 117). Spanish and Portuguese companies Repsol and Galp respectively transferred part of their activities in the country to their Chinese counterparts (Vasquez, China, Oil, and Latin America: Myth vs. Reality, 2018, p. 7). Without any governmental support of any side or any special favour from Petrobras, COCs made use of M&As to tap into Brazilian oil reservoirs, including the subsalt zone (Alves, 2013, p. 112).

Furthermore, as discussed in the former section, like the oil imports, another trend was to move away from riskier parts of the globe that underwent political instability, ethnic tensions, security breaches and oil production disruptions (Vasquez, China's Oil and Gas Footprint in Latin America and Africa, 2019, p. 7). Some events in the Middle East, Africa and Central Asia made their business atmosphere more challenging: the Arab Spring, civil

wars in Syria and Libya, Iraq`s volatile environment, conflicts between Sudan and the newly independent South Sudan and inside South Sudan, terrorist threats in Nigeria and U.S. and Europe`s sanctions on Iran`s oil and gas industry, because of its nuclear program (IEA, Update on Overseas Investments by China's National Oil Companies Achievements and Challenges since 2011, 2014, p. 27). As a consequence of some of these, there were kidnapping and murders of Chinese citizens in Nigeria, evacuation in South Sudan (IEA, Update on Overseas Investments by China's National Oil Companies Achievements and Challenges since 2011, 2014, p. 31) and reversal of contracts in Niger and Chad (IEA, Update on Overseas Investments by China's National Oil Companies Achievements and Challenges since 2011, 2014, p. 34). Exports from Sudan and South Sudan to China dropped to zero in 2012, when both disputed oil resources (EIA, China: Overview, 2015).

These events and disruptions in oil production and exports have made COCs more cautious and eager to diversify its portfolio towards more politically stable investment climates. Brazil emerged as an ideal candidate as well as other Organisation for Economic Cooperation and Development (OECD) member countries (IEA, Update on Overseas Investments by China's National Oil Companies Achievements and Challenges since 2011, 2014, p. 7).

TABLE



Source: Author`s calculation based on data from the Heritage Foundation, which only includes transactions over US$ 100 million.

In fact, the numbers of overseas investments demonstrate this diversification push made by COCs. From 2010 on, COCs have started to allocate more resources to regions other than Middle East and Africa. South and North America became hot destinations, followed by East Asia and Europe and then USA and Europe. In South America, in the whole period, Brazil received more than half of the funds.

It is also true that the devaluation of the Brazilian currency also let Brazilian assets to become more attractive to foreign eyes (Ferreira, Santos, & Neves, 2019, p. 996) (Cui, Zhongba nengyuan hezuo qianjing zhanwang [Prospects for China-Brazil Energy Cooperation], 2017, 页 16). Between 2011 and 2018, the Real devaluated around 130%, making overseas investments in the country much cheaper (Investing, 2019). This condition coupled with the difficult financial situation of some companies in the countries, such as Petrobras – which will be discussed in detail later – has given a chance to COC purchase resources at a cheap (Leao & Puty, 2018, p. 3).

Brazil's political and legal changes over time have equally influenced the foreign investment landscape. After the discovery of the pre-salt fields, Brazil passed a law in 2012 that introduced the production-sharing contract (PSC) in all new auctions in the new subsalt oilfields, created the state-owned company Pré-sal Petróleo S.A. to participate in these auctions and established a minimum participating share of 30% for Petrobras in all pre-salt consortia (Husar & Best, 2013, p. 14). This move is usually pictured by Chinese scholars as a nationalism one (Cui, Zhongguo yu baxi nengyuan hezuo: xianzhuang, tiaozhan yu duice [Energy Cooperation between China and Brazil: challenges and countermeasures], 2015, 页 49) (Cui, Zhongba nengyuan hezuo qianjing zhanwang [Prospects for China-Brazil Energy Cooperation], 2017, 页 19) (Wu Y. , 2019, 页 5).

From 2016 on, a series of legal and policy changes started to attract more foreign investors to Brazil`s oil sector, therefore opening a "window of opportunities" for COCs, according to some scholars (Cui, Zhongba nengyuan hezuo qianjing zhanwang [Prospects for China-Brazil Energy Cooperation], 2017, 页 18) (Hogenboom, 2017, p. 202) (Zhou, 2017, 页 30) (Zhong, Zhu, & Sun, 2016, 页 86) (Leao & Puty, 2018, p. 3) (IEA, Oil 2017: analysis and forecasts to 2022, 2017, p. 55) (Xu, Shixi zhongguo yu baxi de zhanlue huoban guanxi: yi shiyou hezuo wei li [An Analysis of the Strategic Partnership between China and Brazil: take oil cooperation as an example], 2017, 页 37). Labor law was reformed and flexibilized, Petrobras's mandatory minimum 30% operating stake in unlicensed pre-salt acreage was removed – although the company kept preferential rights – and the local content requirements were lessened. For instance, between the 5th and the 13th Bidding Rounds of Exploration Oil Blocks in 2003 and 2015 respectively, the average local content requirement in the exploration and development phases was of 74% and 82%. In the 14th and the 15th Rounds – 2017 and 2018 –, this requisite dropped to 39% and 18% in the exploration phase and to 43% and 30% in the development one (ANP, Resultado das Rodadas de Licitações de Blocos Exploratórios, 2019).

TABLE: Brazil`s Bidding Rounds for Oil Blocks (1999-2018)

2018	*15th Bidding Round for Exploration and Production of Oil and Natural Gas*
	5th Production Sharing Bidding Round
	4th Production Sharing Bidding Round
2017	*14th Bidding Round for Exploration and Production of Oil and Natural Gas*
	3th Production Sharing Bidding Round
	2th Production Sharing Bidding Round
	4th Bidding Round - Areas with Marginal Accumulations
2015	*13th Bidding Round for Exploration and Production of Oil and Natural Gas*
	3th Bidding Round - Areas with Marginal Accumulations
2013	*12th Bidding Round for Exploration and Production of Oil and Natural Gas*
	11th Bidding Round for Exploration and Production of Oil and Natural Gas
	1th Production Sharing Bidding Round
2008	*10th Bidding Round for Exploration and Production of Oil and Natural Gas*
2007	*9th Bidding Round for Exploration and Production of Oil and Natural Gas*
2006	*2th Bidding Round - Areas with Marginal Accumulations*
2005	*7th Bidding Round for Exploration and Production of Oil and Natural Gas*
	1th Bidding Round - Areas with Marginal Accumulations
2004	*6th Bidding Round for Exploration and Production of Oil and Natural Gas*
2003	*5th Bidding Round for Exploration and Production of Oil and Natural Gas*
2002	*4th Bidding Round for Exploration and Production of Oil and Natural Gas*
2001	*3th Bidding Round for Exploration and Production of Oil and Natural Gas*
2000	*2th Bidding Round for Exploration and Production of Oil and Natural Gas*
1999	*1th Bidding Round for Exploration and Production of Oil and Natural Gas*

Source: ANP.

The government has equally speeded up the oil blocks bidding schedule, opening more opportunities to national, international and Chinese oil corporations (IEA, Oil 2017: analysis and forecasts to 2022, 2017, p. 55) (Cui, Zhongba nengyuan hezuo qianjing zhanwang [Prospects for China-Brazil Energy Cooperation], 2017, 页 19). Only in 2017 and 2018, it organized seven bidding rounds – the same number of rounds between 2007 and 2015 –, scaling up IOCs and COCs` investments in Brazil. In these two years, 422 blocks were offered and 177 were auctioned (ANP, Resultado das Rodadas de Licitações de Blocos Exploratórios, 2019).

It is interesting to highlight that these new legal changes faced opposition from nationalist voices that historically have expressed concerns about the involvement of COCs. Hostility to Chinese investments and products in the past has already prompt the then-President Dilma Rousseff to publicly warn against “dumb xenophobia” anti-Chinese protests against Chinese firms participation in pre-salt auctions (Winter & Stauffer, 2013) (Hogenboom, 2017, p. 200).

This kind of manifestation usually derives from the state nature of COCs. Although these are market oriented and tend to put profit as their main pursuit, their foreign arms are indeed registered at international stock markets, one cannot overlook the existence of state

influence, since they are state-owned enterprises (henceforth SOEs). COCs are expected to fulfill China`s overall objectives established in the country's five-year plans (Wu W. , 2019, p. 29), and the central administration plays an important role in oil sector's strategic planning, personnel nomination and other important issues (Wu W. , 2019, p. 23). General managers are still appointed by the Department of Organization of the Communist Party of China and the State-owned Assets Supervision and Administration Commission of the State Council (SASAC), a government special commission responsible to oversee the activities of SOEs. In this sense, COCs` executive-directors are mostly ranked at minister level and, therefore, carry out commercial and political roles (Hogenboom, 2017, p. 180). Moreover, COCs` foreign investments of over US$ 30 million must be ratified by the National Development and Reform Commission (NDRC) and those over US$ 200 million require approval by the State Council (Wu W. , 2019, p. 35). The complex relationship between COCs and the Chinese state makes less clear if they actually compete with each other abroad – they face little competition in the protected domestic oil sector –, and whether their investments are made independently of any political influence (Hogenboom, 2017, p. 209).

It must be said that some evidences show that COCs are driven more by commercial interests (Vasquez, China, Oil, and Latin America: Myth vs. Reality, 2018, p. 2). As showed above, in the period of decreasing oil prices, they pulled back their investments nationally and internationally, which were reassumed when the rates showed upward vitality. On the contrary, some other indications also demonstrate that political and pragmatical aspects might conduct their behavior, since they invested in Brazil in moments of socioeconomic crisis and political instability (Rosito, 2017, p. 10).

Thirdly, with a booming oil production with great prospects for the future, Brazil needed and will need investments in all the oil supply chain, being naturally an opportunity to Chinese engineering contractors and machinery companies, whose products and services` exports expanded exponentially in the last years in all energy fields, usually tied to the participation of Chinese firms in other countries` power projects (Kong, Drivers Behind Chinese Development Finance for Energy Worldwide, 2019, p. 47). Indeed, as to be discussed in detail below, COC`s investments in Brazil, although concentrated in the upstream sector, also diversified itself to other ones, including construction of floating production storage and offloading units (FPSOs), port logistics etc (Leao & Puty, 2018, p. 24). As a matter of fact, engineering services served as a gateway to Sinopec`s – and to all COC`s – entrance in the country in 2006, with the Gasene project.

As a matter of fact, Brazil`s economic situation also helped to boost COCs` investments. The countries` GDP growth declined every year from 2010 to 2016 – except in 2012 – and saw negative rates in 2009, 2015 and 2016. Indeed, these last two ones were the worst recession in three decades (WorldBank, 2019). Coupled with a corruption scandal investigated by the Car Wash Operation that has pushed all the domestic oil industry into a

crisis, the economic slowdown has let many Brazilian shipyards into bankruptcy, which were also negatively affected by the flexibilization of local content requirements (Leao & Puty, 2018, p. 27). This relaxation has made the requirements for FPSO design, equipment and construction to decrease from 40% in the bid round from 2005 until 2015 to 25% later (IHSMarkit, 2019, p. 20). These requirements were indeed an obstacle to the expansion of Chinese machine manufacturers` exports towards Brazil. CNPC`s decision to invest in the oil industry equipment maker Bomcobras was seen by some as an option to meet these requirements in future bidding rounds (Husar & Best, 2013, p. 16).

TABLE: FPSOs of Petrobras built and under construction in China (2000-2018)

FPSO	CHINESE SHIPYARD	STATUS
Cidade de Ilhabela	CXG and Dynamac (Singapure)	Operational. Partially build abroad.
Cidade de Mangaratiba	COSCO and BOOMESC	Operational. Partially build abroad.
Cidade de Marica	CXG and Dynamac (Singapure)	Operational. Partially build abroad.
Cidade de Saquarema	CXG and Dynamac (Singapure)	Operational. Partially build abroad.
Cidade de São Paulo	COSCO and BOOMESC	Operational. Partially build abroad.
Cidade de Niterói	COSCO	Operational. Entirely build abroad.
Cidade de Santos	COSCO	Operational. Entirely build abroad.
Angra dos Reis	COSCO	Operational. Entirely build abroad.
Itaguaí	COSCO and BOOMESC	Operational. Partially build abroad.
Caraguatatuba	DSIC, MES (Japan) and Keppel (Singapure)	Operational. Entirely build abroad.
Campos de Goytacazes	COSCO, BOOMESC and Jutal	Operational. Partially build abroad.
P-63	COSCO	Operational. Partially build abroad.
P-67	COSCO Dalian and COOEC	Operational. Partially build abroad.
P-68 (Berbigão)	COSCO Dalian	Operational. Partially build abroad.
P-69	COSCO Dalian and BJC (Thailand)	Operational. Partially build abroad.
P-70 (Atapu 1)	COSCO Dalian, COOEC and BJC (Thailand)	Operational. Partially build abroad.
P-71	COSCO Dalian and YCRO	Operational. Partially build abroad.
P-75	COSCO Dalian, DSIC and BJC (Thailand)	Operational. Partially build abroad.
P-76	COSCO Dalian	Operational. Partially build abroad.
P-77	COSCO Dalian, DSIC and BJC (Thailand)	Operational. Partially build abroad.
Guanabara (Mero 1)	COSCO Dalian	Under construction.
Carioca (Sépia)	COSCO Dalian and BOOMESC Tianjin	Under construction.
Sepetiba (Mero 2)	CMHI (Nantong) and BOOMESC Tianjin	Under construction.
Almirante Barroso (Búzios 5)	COSCO Dalian	Under construction.

Sources: Petrobras.

Analyzing the number of FPSOs built by Chinese shipyards seems to be a good evidence of how Chinese engineering contractors have grasped the opportunity open by Brazil`s economic crisis and legal changes. Between 2000 and 2018, 20 out of the 39 FPSOs that Petrobras contracted the partial or integral construction abroad were done in Chinese dockyards, a tendency that was intensified in the second decade of the period. Since 2014, almost all Petrobras` awarded FPSOs were partially or integrally built or converted in Chinese yards (IHSMarkit, 2019, p. 47). In 2018, there were still four platforms under construction in China.

With the discovery of the pre-salt oil fields, Petrobras announced in 2008 an ambitious plan to contract ten new FPSOs, two of them would be leased and eight would be owned by the company (Petrobras, Contratação de FPSO para o pre-sal, 2008). However, the new internal conditions led the firm to review its strategy and even to incur in losses, such as the case of the FPSOs P-72 and P-73 (Petrobras, Demonstrações financeiras 2018, 2019, p. 65).

In 2013, the Chinese dockyard COSCO – the main China constructor for Petrobras – inaugurated its activities in Brazil`s FPSO newbuild market assuming the construction of the P-67 hull, after the Brazilian contractor Engevix yard was soaked into crisis (IHSMarkit, 2019, p. 27). COSCO was and is also equally involved in the manufacture of other units, 19 in total, such as P-63, Cidade de Sao Paulo and Cidade de Mangaratiba (Fitch, 2019, p. 33).

Engevix was also unable to deliver the FPSOs P-69 and P-71. It was not the only one that underwent financial problems and had to relinquish its contracts to Chinese counterparts. The consortium Integra, made by companies Mendes Junior and OSX, did not fulfill all its obligations related to the FPSOs P-67 and P-70 (Petrobras, P-69 entra na fase de conclusão das obras em Angra dos Reis, 2017) (Sinaval, 2015), and the Inhauma yard, controlled by the the consortium made by Queiroz Galvão, Iesa and Tecna, experienced difficulties with the units P-75, P-76 e P-77 (Petrobras, Destaques Internacionais, 2014) (Valle, 2014).

It is worth mentioning that the contraction even before the crisis and the transfer of some FPSO construction plans to China has helped Chinese yards increase their learning curve rapidly. These were almost exclusively dealing with Brazilian projects until 2014, but started to progressively expand their activities to Central America and West Africa (IHSMarkit, 2019, p. 48).

All the economic crisis underwent in Brazil notwithstanding, Brazil became the main source of FPSO demand, and Petrobras, the world’s largest FPSO buyer, a condition that it might keep in the years following this article (IHSMarkit, 2019, p. 44). Furthermore, the new local content norms might keep Chinese dockyards predominance in the building or conversion of FPSO`s hull in the future (IHSMarkit, 2019, p. 20).

Fourthly, over the years, Petrobras has acquired leading technology expertise in ultra/deep water drilling, an area in which COCs historically lacked experience and were willing to gain technical know-how (Husar & Best, 2013, p. 13) (IEA, Update on Overseas Investments by China’s National Oil Companies Achievements and Challenges since 2011, 2014, p. 16) (Kong, Drivers Behind Chinese Development Finance for Energy Worldwide, 2019, p. 48) (Xu, Shixi zhongguo yu baxi de zhanlue huoban guanxi: yi shiyou hezuo wei li [An Analysis of the Strategic Partnership between China and Brazil: take oil cooperation as

an example], 2017, 页 37) (Cui, Zhongguo yu baxi nengyuan hezuo: xianzhuang, tiaozhan yu duice [Energy Cooperation between China and Brazil: challenges and countermeasures], 2015, 页 48) (Zhou, 2017, 页 31). The difference of capabilities of both sides was immense. In 2015, Brazil possessed 172 registered patents of deep-sea exploration technology, and China, only 9 (Liu, 2015, 页 28). Interestingly, when Petrobras was still in the early process of developing this expertise in the 1980s, it signed a technology transfer agreement with CNOOC for offshore exploration in China (Xu, China`s Strategic Partnerships in Latin America: case studies of China`s oil diplomacy in Argetina, Brazil, Mexico and Venezuela, 1991-2015, 2017, p. 53). Besides, Chinese academic institutions established also cooperation agreements with Brazilian counterparts. For instance, in 2009, Tsinghua University and Federal University of Rio de Janeiro jointly formed a techonological partnership to research, among other subjects, deep-water oil exploration (Leao & Puty, 2018, p. 26).

Sinopec was the most interested in access this knowledge, but was not successful in the early partnership attempts with Petrobras (Husar & Best, 2013, p. 31). Unable to develop the required top-end drilling skills in the short term, COCs resorted to buy equity from other players in Brazil or to participate in bidding rounds alongside with other technologicaly-speaking more mature oil companies (Alves, 2013, p. 122).

Sinopec`s move to buy 40% of Repsol in 2010 and 30% of Petrogal in 2011 were in line with its determination in absorbing ultra/deep-water drilling (Schutte & Debone, 2017, p. 100). The second acquisition allowed the Chinese company to equally access the sub-salt oil area, another of its targets.

Chinese oil investments and construction contracts in Brazil

The first and most successful Chinese oil company in Brazil is Sinopec, whose confirmed FDIs and service projects accumulated US$ 16.9 billion until 2018. As early as March 2004, it started negotiations with Petrobras and signed a cooperation agreement to develop projects together in different sectors (Ripardo, 2004). In september of the same year, both companies signed a memorandum of understanding (henceforth MOU) to construct the Southeast-Northeast Interconnection Gas Pipeline (Gasene, in portuguese) (Wertheim, 2004) and in 2005 the Chinese corporation formally established its Brazilian branch company (MonitorMercantil, 2019). In 2006, Sinopec was contracted to build the first of the three sections of the pipeline – Gascav –, from Cabiúnas (RJ) to Vitória (ES), with 300 km of extension; the total cost was of US$ 239 million (Petrobras, Assinatura do contato para construção do gasoduto Cabiúnas-Vitória, 2006). In December 2007, it assumed the responsibility to construct also the third section – Gascac –, between Cacimbas (ES) and Catu (BA), with 946 km and an estimated price of US$ 1,661 billion (Petrobras,

Petobras dará início à construção do terceiro trecho do Gasene, 2007). The pineline was inaugurated in 2010, with the presence of the presidents of both nations (OE, 2011).

After the Gasene project, Sinopec established itself as a service contractor of Petrobras and other Brazilian companies. A few examples are the contracts for construction of a mineral pipeline for Samarco in 2011 (US$ 400 million), the Petrobras` terminal of regasification in Bahia state (TRBA) in 2012 (US$ 48.8 million) (A&M, 2018) and the Fertilizer Unit III (UFN3) in Tres Lagoas (MS) in 2013 (US$ 1.2 billion). The last two ones ended in disagreement and judicial litigation (Globo, Petrobras suspende contrato de projeto de fertilizantes de R$ 2,3 bi, 2014) (Polito, 2018). In total, Sinopec`s contracts with local corporations amounted to US$ 3.4 billion.

The Gasene deal guaranteed a good foundation for Sinopec in Brazil – and CDB as well, since it financed part of the project (Alves, 2013, p. 116) –, although it did not receive any oil supply contract in return – as it happened in the future – and had to abide by local norms that require a minimum of 75% of the project's goods and services acquired inside the country (Xu, China`s Strategic Partnerships in Latin America: case studies of China`s oil diplomacy in Argetina, Brazil, Mexico and Venezuela, 1991-2015, 2017, p. 54). However, it helped to established a partnership with Petrobras that latter expanded to the upstream sector, where it was interested to invest since the onset, especially after the discovery of pre-salt reservoirs.

Sinopec is not alone as a provider of services to local oil companies. Other Chinese firms, such as BDG Brasil, Jiangsu Asian Star Anchor Chain (JASAC) and Shandong Kerui all are active in the market. This last one established a joint-venture with the local counterpart Potencial Engenharia (51% and 49% respectively) submitted the best proposal to continue the construction of Petrobras` natural gas processing unit (UPGN) at Comperj, in a contract of US$ 590 million (Valor, 2017).

Sinopec`s confirmed FDIs are all brownfield, few in numbers, but big in value: US$ 12.3 billion. In October 2010, it acquired 40% of the Spanish company Repsol`s assets in Brazil for US$ 7.1 billion and created the joint-venture Repsol-Sinopec (G1, Repsol anuncia compra de 40% da filial brasileira pela chinesa Sinopec, 2010)[4]. CNOOC was also active during the bidding process, but was not successful (Husar & Best, 2013, p. 24). This was Sinopec`s second biggest transaction ever outside China, after only the company`s acquisition of Addax Petroleum one year before (AEI & Heritage, 2019). Repsol landed in Brazil in 1997 and, from 2010 on, with the new capital injection, started to focus its activities in the upstream sector, especially in its oils fields in the Santos Basin (Lapa and Sapinhoa) (Schutte & Debone, 2017, p. 99) (Repsol-Sinopec, 2019) (Vasquez, China, Oil,

[4] Repsol has continued to act as an independent company in Brazil after the joint-venture.

and Latin America: Myth vs. Reality, 2018, p. 11). In 2018, it is the fourth biggest oil producer in Brazil (ANP, Anuário Estatístico 2019, 2019).

In 2011, Sinopec obtained 30% of the Portuguese firm Petrogal Brasil and its numerous assets for US$ 5.2 billion and started to have access to potentially important areas, such as the pre-salt Lula field, where it guaranteed a participation of 3% (Mercopress, 2012). It became the first Chinese NOC to have access to the pre-salt zone. Petrogal was Brazil`s third biggest oil producer in the end of 2018.

Under these two companies, Sinopec started to be involved in greenfield projects, winning some auctions in Brazil. Besides, with these two large M&As and subsequent bets in auctions, Sinopec became the leading Chinese NOC in terms of number of assets and oil production in Brazil (ANP, Anuário Estatístico 2019, 2019).

Furthermore, Sinopec got also a 20% participation in the Northeast situated exploration blocks BM-PAMA-3, PAMA-M-192 and PAMA-M-194 from Petrobras (Globo, Petrobras faz primeira descoberta em parceria com chinesa Sinopec, na Bacia Pará-Maranhão, 2011), as part of the General Agreement of Technological Cooperation, signed by both companies during former president Dilma Rousseff visit to China, in April 2011 (Schutte & Debone, 2017, p. 100). However, it returned the first one back to the Brazilian firm in 2016 (Bitencourt, 2016). None of the transactions' costs was publicized.

Sinopec has equally announced plans to enter Brazil`s downstream sector. In 2013, it signed a letter of intent with Petrobras to discuss the Premium Refinery I project, in Maranhão state (Globo, Petrobras e Sinopec avaliam parceria para refinaria no Maranhão, 2011). After the Brazilian firm downsized its investment plans as a consequence of its financial restrictions, Sinopec was reported in 2017 to be still interested in advancing the idea (Ordoñez, 2017).

TABLE: % of Sinopec companies in Brazilian oil blocks/fields

	Pre-salt					*Pos-salt*													
Sinopec`s companies	Entorno de Sapinhoá	Norte Carcará	Uirapuru	Lula	Lapa e Sapinhoá	BM-S-7	BT-SEAL-13*	Albacora Leste	BM-POT-51*	BM-PEPB-1, 2 e 3	BT-POT-29*/32/36*	POT-T-699	AM-T-84	BM-C-33 C-M-539	Carcará (BM-S-8)	PAMA-M-192 e 194	BM-S-21/24 e C-M-791	BM-POT-16/17 e BM-ES-31	ES-M-414	BM-S-50/51 e S-M-619/623
Repsol-Sinopec	25 %				25 %	37 %		10 %											11 %	20 %
Sinopec																20 %				
Petrogal		20 %	14 %	10 %			50 %		50 %	20 %	50 %	50 %	40 %	35 %	17 %		20 %	20 %		

SOURCE: Author`s calculations based on ANP`s data. (* operador)

CNPC is another NOC that has invested huge sums in Brazil, where its confirmed FDIs are estimated in US$ 850 million. Although started to prospect opportunities in the country as early as 2005, when it signed a MOU with Petrobras to foster joint cooperation projects (Petroquímica, 2005), only in October 2013 it made its biggest shot, which was participating in the Libra field auction, the first one of the pre-salt era (G1, Brasil: Petrobras, Shell, Total e chinesas CNPC e CNOOC explorarão campo de Libra por 35 anos, 2013). CNPC – operating always through its subsidiary CNODC – and CNOOC`s consortium with Petrobras, Total and Shell offered the best conditions and won the then regarded largest oil reserve in Brazil, overshadowing other groups in which Repsol-Sinopec and Petrogal took part. Their involvement is considered a landmark in Brazil-China oil cooperation, in that for the first time Chinese NOCs engaged in a greenfield E&P project, participating in an auction process; before that, they all entered in Brazil through M&As. Besides, this was both companies` inaugural joint investment in the world, although they have already cooperated separately with Sinopec in other projects (Becard & Macedo, 2014, p. 151) (Hogenboom, 2017, p. 199). Moreover, CNPC joined hands with Petrobras again in another pre-salt area and joined the winning consortium of the Peroba field (20% stake) in late 2017 (Petrobras, Annual Report 2017, 2017)[5].

Most of CNPC`s investments in the world are in the upstream sector nonetheless, it has started its activities in Brazil in 2011 with the joint-venture Bomcobras (Bomcobras), between its subsidiary Baoji Oilfield Machinery Company (Bomco) and the Brazilian firms Brasil China Petróleo (BRCP) and Asperbras, each ownning 34%, 33% and 33% respectively of the new enterprise. Its objective is to supply equipment for land and sea-based oil exploration, like mud pumps, drillings pipes and towers, cranes and probes (Husar & Best, 2013, p. 16). This was in line with the NOC strategy to expand activities to middle and downstream international assets (Zhang, 2017).

In the end of 2011, Bomcobras invested USD 73.6 millions to build a factory of probe oil tools in the Bahia state (Macauhub, 2011). Moreover, in 2016, it announced investments in the Ceará state`s Export Processing Zone of Pecém, in the same area that the also Chinese Guangdong Zhenrong Energy said it would build a refinery (Falcao, 2017). Another refinery project, this time at the Petroquimical Complex of Rio de Janeiro (Comperj), was the objective of a MOU signed with Petrobras in 2017, which established a comprehensive partnership beween the companies (Petrobras, Formamos aliança estratégica com a CNPC, 2017). In 2018, this partnership was extended with another agreement, in which it was decided a participation of 20% of CNPC in oil fields at the

[5] Out of the period of analysis of this paper, in December 2019, CNPC won the auction of two pre-salt fields, Aram and Buzios. This last one is expected to have huge reserves of oil and to be one of Brazil`s biggest producers in the near future.

Marlim cluster (Petrobras, Definimos com a cnpc o modelo de negocios para a parceria estrategica no comperj e no cluster de marlim, 2018).[6]

According to the above-mentioned strategy, CNPC`s largest subsidiary PetroChina concluded the partial acquisition (30%) of TT Work in 2018, formerly part of the Brazilian group Total (JC, 2018). No values publicized. It is worth highlighting that, five years before, the company took advantage of Petrobras` disinvestment plans and bought its possessions in Peru for US$ 2.6 billion and became the Andean country biggest oil producer (OTempo, 2014).

TABLE: % of COCs in Brazilian oil blocks/fields, except Sinopec

	Pre-salt				*Pos-salt*				
	PP1	PP3		PP5	M&A		BID9	BID13	BID14
Companies	Libra	Alto de Cabo Frio Oeste	Peroba	Pau Brasil	BM-ES-37/39	Peregrino	C-M-529/530	REC-T-153	ES-M-592
CNODC	10%		20%						
CNOOC	10%	20%		30%					100%*
Sinochem					10%	40%	40%		
HLJW								100%*	

SOURCE: Author`s calculations based on ANP`s data. BID refers to the number of the pos-salt auctions, and PP, of the pre-salt auctions. (* operador)

Sinochem has confirmed FDIs of almost US$ 3.1 billion. It is worth mentioning its purchase of 40% of Statoil share in the Peregrino field for US$ 3.07 billion in 2010 (Estadao, 2010) and in the blocks C-M-529 e C-M-530 in the Pitangola field, whose amount and data are unknown. Sinochem`s disbursement values in the 10% acquisition of five exploration blocks from Perenco in the beginning of 2012 are not public (Sinochem, Sinochem Acquired Working Interest in Five Exploration Blocks offshore Brazil, 2012). Three of them were sold afterwards also for unknown price. There is one announced FDI that never came to life. In 2013, the firm declared that purchased Petrobras' stake (35%) in Block BC-10, also known as "Parque das Conchas", for US$ 1.5 billion in cash (Sinochem, Sinochem Acquires Non-operating Stake in Deepwater Oil Field in Brazil from Petrobras, 2013). Yet, this transaction has no record in ANP`s files, being a typical example of "zombie deal".

[6] Out of the period of analysis of this paper, in December 2019, Petrobras declared that the economic feasibility study showed that the refinery project was not feasible and ended the partnership with CNPC. It announced expenses of US$ 5 million until the end of the partnership.

CNOOC totalized US$ 791 million in confirmed FDIs. Its first and biggest shot was joining the winning consortium of the Libra field (10%), like CNPC. After it, it was part of two more pre-salt winning associations with minority stakes and, in 2017, took a pioneering step among Chinese NOC, buying alone the pos-salt block ES-M-592, being, then, its only operator, another innovation. Until then, Chinese companies operating alone in Brazil – Petrogal and Repsol-Sinopec are not included – have obtained just up to 40% of the fields and with non-operational roles.

TABLE: NOCs FDI and service projects in Brazil 2006-2018 (millions of US$)

NOCs	Peregrino (40%)	C-M-527 e 530 blocks	ES-M-592 block	Pau Brasil	Alto de Cabo Frio Oeste	Libra (10%)	Itaipu (20%)	Bomcobras	UFN3	Repsol (40%)	Petrogal (30%)	Samarco	Gasene	TRBA	Uranium	Norte Carcará	Entorno de Sapinhoá	Several projects	TOTAL
Sinopec									994.5	7111	5190	400	1900	48.8	31.2	58.4	6.2	1097.7	16837.5
CNPC						691.5	133.1	25.2											849.8
CNOOC			12.9	55.7	31.1	691.5													791.2
Sinochem	3070	-																	3070
HLJW																		2.6	2.6
CIC																		441.2	441.2
JASAC																		123.7	123.7
Sh. Kerui																		301	301
BDG																		32.5	32.5

SOURCE: Author`s calculations based on data from ANP, Petrobras and Chinese NOCs reports, media accounts and others. The value in US$ reflects the exchange rate of the day of the transaction and the participation (%) of the NOC in the project.

Last but not least, the Chinese group HLJW is active in Brazil through its local joint-venture Tek Oleo e Gas. It owns an onshore oil block in the Northeast of the country and won alone two more in 2017 in the same region, but failed to fulfill the ANP`s conditions and is undergoing an administrative punitive process.

Another institution that took advantage of Petrobras` disinvestment plans is CIC Capital Corporation, a subsidiary of China Investment Corporation (CIC). It joined an international investment fund that bought 90% of Petrobras` Nova Transportadora do Sudeste (NTS), which administrates more than two thousand kilometers of gas pipelines in Brazil`s Southeast region (Petrobras, http://www.petrobras.com.br/fatos-e-dados/aprovada-venda-de-participacao-na-nova-transportadora-do-sudeste.htm, 2016).

TABLE: COC`s oil production in Brazil (2011-2018; mby)

	2011	2012	2013	2014	2015	2016	2017	2018
Sinopec	1.67	1.92	3.0	6.0	11.1	15.0	19.4	20.5
Sinochem	3.8	9.0	10.1	10.9	10.6	9.2	9.8	9.0
CNODC	0.0	0.0	0.0	0.0	0.0	0.0	0.039	0.9
CNOOC	0.0	0.0	0.0	0.0	0.0	0.0	0.039	0.9
Others	763.0	743.5	725.2	806.1	868.0	894.6	926.8	912.8

Source: Author`s calculations based upon data from ANP. The numbers for Sinopec consider only its share at Petrogal (30%) and Repsol Sinopec (40%).

All these investments in Brazil`s upsteam sector has secured not only a big share in the Brazilian volume of recoverable oil reserves, but also an increasing participation of COCs in the national oil production. Between 2011 and 2018 – the period with available data –, they have scaled up their part in the total, from 5.5 mby to 31.4 mby – 0.7% to 3.3% respectively –, a growth of 571% and an accumative number of 153.2 million of barrels in eight years. In comparison, other oil companies in Brazil saw their numbers expanding 120% in the period.

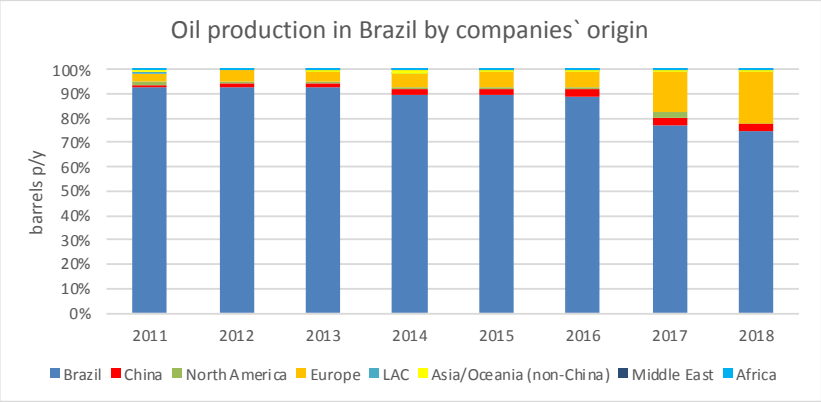
Sinopec`s production is the one that expanded the most, from 1.67 mby to 20.5 mby – or 0.2 to 2.2% –, astonishing 1227% in eight years. It has already extracted 78.6 million of barrels, more than half of the total produced by COCs. This fast advance in a relatively short period of time is a result of the company`s agressive expansion in the country in the last few years, as discussed above. Its companies Petrogal and Repsol Sinopec were the 13th and the 10th biggest producers respectively in 2011, ending 2018 as the third and the fourth largest producers in Brazil.

Sinochem is the second biggest Chinese producer in Brazil. Its production accumulated 72.7 million of barrels of oil and has varied from 3.8 mby to 9.0 mby, expanding 237% in the period. This rythym reflects equally the pace of its investments, which are more concentrated in the early years of the firm in the country. Its position in the national ranking oscilated over time and it kept its original seventh position in 2018.

Lastly, CNOOC and CNODC are latecomers comparing to its sister companies and only started producing in 2017, as a result of entering into production of the pre-salt Libra field. Their numbers are still small, 39,732 and 927,426 barrels in 2017 and 2018 each firm – altogether 1.9 million of barrels – or 0.1% of the national figures in 2018 each one. However, their production grew 2336% in only two years and is expected to augment in the near future. Although both firms as still 16th and the 17th largest producers, they might enter the top ten group soon, with its investments in the sub-salt starting to operate, including some important ones made after the period of analysis of this text. Pre-salt fields have

higher productivity than pos-salt ones, extracting thousands of barrels per day. This is one of the reasons of the fast expansion of Sinopec`s production as well.

TABLE: Oil production in Brazil by companies` origin (2011-2018; bpy) [WAITING CONFIRMATION OF COMPANIES` NATIONALITIES]



Source: Author`s calculations based upon data from ANP. The numbers for China consider only the shares of Sinopec at Petrogal (30%) and Repsol Sinopec (40%).

Although COCs still represent a small bit of the total production, the fact that their expansion happened in a relatively short spam of time necessarily triggers the attention of analysts from the private and public sector. Yet, it is relevant to put this phenomenon in a broader picture, comparing their performance with other NOCs and IOCs operating in Brazil. Dividing the concessionaires per region of the globe, one sees some interesting aspects. In relative terms, NOCs – in which Petrobras is incomparibly the biggest one – have their share of the national production decreasing consistently over the years, from XX% to XX% of the total production. In contrast to NOCs, European IOCs have seized well the opportunities brought by E&P investments in Brazil and have their share of the country`s production augmenting significantly, from XX% to XX%. In comparison, COCs enlarged their portion from XX% to XX%.

It is worthy to say that the decreasing sums of the NOCs equally reflect the fact that several new foreign players entered the Brazilian market recently, mostly due to the discovery of new, vast and untouched oil fields. Additionally, due to the crisis that hit hard NOCs, some of them bankrupt or sold their assets. Others, such as Petrobras, had to reconsider its previous mid and long-term forecasts. Its production has oscilated substantially and have even decreased in several years, like in 2012, 2013, 2017 and 2018, postponing formers expansion plans and the financial recovery of the company and of the national oil sector as a whole. In a context of severe capital scarcity, Petrobras saw

international partnerships – technological, operational, financial – as a way to help it overcome some obstacles and invest in the pre-salt area, attracting more IOCs to Brazil. In this process, it has joined hands with several COCs – as detailed above –, which kept investing in the country even in moments of economic and political uncertainty (Rosito, 2017, p. 10).

PART 3: Brazil-China oil finance cooperation

Chinese oil finance in Brazil

The financial part of the bilateral oil cooperation also became increasingly important in the last few years. As in the other pillars, there seems to be an evident complementarity here: China`s large financial reserves and appetite to use them to help its companies and at the same time secure regular supply of oil matched with Brazil`s oil wealth, its need for capital to exploit it and new markets to export (Hogenboom, 2017, p. 173) (Zhou, 2017, 页 29) (Vasquez, China's Oil and Gas Footprint in Latin America and Africa, 2019, p. 2).

Like the OFDI and the constructions projects, Chinese policy banks, commercial banks and multilateral financial institutions that China is part of started to provide loans to Brazilian companies in 2007, and in 2009 inaugurated a new modality of credit, the energy-backed loans (EBL) or oil-backed loans. From 2007 to 2018, according to the author`s calculations, Chinese financial institutions lended as much as US$ 33.95 billion to Brazilian firms, but of this total only US$ 29.85 billion was actually disbursed. There was a total of 13 loans, and Petrobras was the main benefactor, only one credit line – the first one – did not go directly to it. Moreover, out of the total amount of disbursed loans, US$ 17 billion is related to loan-for-oil mechanisms, and US$ 5 billion has Chinese content requirements.

TABLE: Chinese oil financing in Brazil (2007-2018)

YEAR	LENDER	BORROWER	US$ MILLION APPROVED	US$ MILLION DISBURSED	EBL?	Chinese content?	DURATION
2007	CDB	BNDES	750	750	No	No	-
2009	CDB	Petrobras	10000	7000	Yes	Yes	10
2013	BOC	Petrobras	1000	1000	-	-	-
2014	CDB	Petrobras	3000	3000	No	-	10
	BOC	Petrobras	500	500	-	-	-
2015	CDB	Petrobras	3500	3500	No	Yes	10

	CDB	Petrobras	1500	1500	No	Yes	10
	ICBC Leasing	Petrobras	2000	1000	No	-	10
2016	CHEXIM	Petrobras	1000	900	-	-	3
	CDB	Petrobras	5000	5000	Yes	No	10
2017	CDB	Petrobras	5000	5000	Yes	No	10
2018	NDB	Petrobras	200	200	No	No	4
	BOC	Petrobras	500	500	-	-	5

Source: Author`s calculations based on data from Petrobras.

Chinese policy banks China Development Bank (CDB) and Export-Import Bank of China (CHEXIM) were the ones that have provided most of the funds. CDB has lended US$ 25.75 billion in the period, US$ 25 billion directly to Petrobras and US$ 750 million to the Brazilian Development Bank (BNDES), with whom it has joined hands to finance Petrobras` Gasene pipeline, built by Sinopec, as discussed in the sector above. CDB was also responsible for all the energy-backed loans and all the credit lines with Chinese content clauses. In contrast, CHEXIM has only one loan in Brazil: US$ 1 billion to Petrobras in 2016, of which US$ 900 million was effectively used (Petrobras, Demonstrações financeiras 2018, 2019, p. 73). It is related to supply contracts for equipment and goods that Petrobras has already signed with Chinese companies (Petrobras, Credit Facility with China Exim Bank, 2016).

Chinese commercial banks Bank of China (BOC) and ICBC have equally strengthened ties with Brazilian NOCs. BOC has a total of US$ 2 billion in three different loans, and ICBC, through its subsidiary ICBC Leasing, equally offered US$ 2 billion to Petrobras, but only half was used. This transaction was aimed at leasing two Petrobras` FPSOs – P-52 and P-57 – to the bank, but only the first ended being negotiated (Petrobras, Contrato de Financiamento com o ICBC Leasing, 2015) (Petrobras, Desembolso do contrato de financiamento com o ICBC Leasing, 2016). ICBC Leasing equally signed a US$ 1.08 billion sale and lease-back deal with Schahin Engineering during President Xi Jinping's visit to Brazil in 2014, but this contract ended up being cancelled, after the company filled bankruptcy (SRI, 2015). Besides, the BRICS` New Development Bank (NDB), which is based in China, has given a loan of US$ 200 million. This credit line targets upgrading two refineries of the company, so as to meet local environmental legislation (NDB, 2018).

It is equally important to put the Brazil-China oil loans into a broader picture, so as to understand its global scale. Resorting to data from the China's Global Energy Finance, a database developed by Boston University`s Global Development Policy Center, Chinese policy banks CDB and CHEXIM have provided roughly US$ 90.4 billion in oil finance

from 2000 to 2018 to the whole world (US$ 244.2 billion in all energy areas), with Latin America receiving US$ 48.3 billion (Gallagher, China's Global Energy Finance, 2018). Considering the numbers for approved loans disclosed in this text, Brazil would represent approximately 33% and 62% of the global oil credits.

Reasons for Chinese oil loans to Brazil

All the numbers above unquestionably put Brazil in a prominent position as China`s main oil finance partner. Reasons for such a proeminence are multi-fold and each side has its own interests. From the Chinese perspective, to some extent what drives Chinese banks do not differ much from the motivations of COCs` investments in the country and in others parts of the world, as discussed above. Yet, in the case of loans, since the great majority came from policy banks and went to a company which 60% of the common shares is controlled by the Brazilian state (Petrobras, Shareholding Structure, 2019), the commercial side of the transactions also gives room to political and strategic considerations, mostly linked with the interests of the Chinese state. This made clear its objectives in two white papers about energy (StateCouncil, China's Energy Conditions and Policies, 2007) (StateCouncil, China`s Energy Policy 2012 , 2012).

In short, the motives behind China`s loans to Brazil could be condensed in four aspects: search for financial opportunities, build a political partnership with Brazil, support the internationalization of COCs and secure regular crude exports towards China (Kong & Gallagher, Globalizing Chinese energy finance: the role of policy banks, 2017, p. 10) (Gopal, Pitts, Zhongshu, Gallagher, Baldwin, & Kring, 2018, p. 3).

In saying so, firstly, financing Petrobras and its oil production expansion plan is a business opportunity to make use of CDB`s and CHEXIM`s increasing development finance resources over the last years. Policy banks must ensure a dual aim: being commercially successful while also attending the broader objetives and the national development strategies of the Chinese state (Hogenboom, 2017, p. 181) (Hiratuka & Deos, 2019, p. 229) (Kong, Drivers Behind Chinese Development Finance for Energy Worldwide, 2019, p. 24). And in the last few years, the guarantee of financial return and economic profitability of loans and investment projects has been receiving increasingly attention from decision makers (Hogenboom, 2017, p. 198). In this cost-effectiveness analysis, Petrobras` expanding exploration of huge untapped subsalt reserves in the near future somehow gives higher assurance of repayment, particularly pondering the its decreasing extraction costs over the years, which declined to less than US$ 7 per barril (Petrobras, Com 16 plataformas e mais de 150 poços, pré-sal da Bacia de Santos é hoje um dos polos de produção mais competitivos do setor, 2019). In addition, comparatively to other Chinese oil partner countries, Brazil offers a solidly based rule of law legal system,

institutional estability, experienced players both in the public and private sectors and, most importantly, one of the fastest expanding exceeding production capacities outside OPEC, whose members mostly have had an unstable socio-political context over the last years, as debated above (Liao, 2015, p. 94). Brazil became an interesting diversification opportunity. Furthermore, giving credit to oil companies like Petrobras equally helps to diversify, increase rentability and counteract depreciation risks of China's huge foreign exchanges reserves, which are to a great extent invested in US Treasury` bonds, whose yields are historically low, and promote the RMB internationalization (Wu W. , 2019, p. 28) (Kong, Drivers Behind Chinese Development Finance for Energy Worldwide, 2019, p. 48) (Kong & Gallagher, Globalizing Chinese energy finance: the role of policy banks, 2017, p. 10).

Secondly, these oil loans can be considered also part of a desire to build a long-term diplomatic strategic partnership with Brazil. Both countries have elevated their relationship to a "Global Strategic Partnership" in 2012 – the "Strategic Partnership" was launched in 1993, the first one between developing countries – and have amplified their cooperation to several fields in the last decade. The Chinese diplomatic discourse and local academy usually picture these credit lines as a mutually beneficial mechanism and a model of south-south cooperation, since they diminish developing countries` dependence on developed nations as well (Cui, Zhongguo yu baxi nengyuan hezuo: xianzhuang, tiaozhan yu duice [Energy Cooperation between China and Brazil: challenges and countermeasures], 2015, 页 47) (Cui, Zhongba nengyuan hezuo qianjing zhanwang [Prospects for China-Brazil Energy Cooperation], 2017, 页 19) (Xu, Shixi zhongguo yu baxi de zhanlue huoban guanxi: yi shiyou hezuo wei li [An Analysis of the Strategic Partnership between China and Brazil: take oil cooperation as an example], 2017, 页 35) (Wu Y. , 2019, 页 1). Moreover, considering that some loans were granted in periods of serious fiscal crisis, coupled with corruption scandal and debt crunch, and when most of other international lenders were reluctant to provide funds, a political calculus, a pragmatical reckoning and the desire of a long-term relationship might have influenced considerably the decision-making process of Chinese policy banks (Schutte & Debone, 2017, p. 101) (Rosito, 2017, p. 10).

Indeed, because of China`s growing dependence on the external market to satisfy its internal energy demands, it had no option other than fostering closer cooperation between governments, especially in an area that historically suffers greater interference of the public sector in most of the countries. With this aim, the country has established several bilateral dialogues and cooperative mechanisms with energy-rich nations and made this objective clear in its two white papers on the topic. Brazil was distinctively mentioned in the 2012 document as one its main partners (StateCouncil, China`s Energy Policy 2012 , 2012). Both countries established a subcommission on energy affairs in 2007, in which the ministries of energy of each side meet regularly. It is under the umbrella of the China–Brazil High-Level Cooperation and Commission (COSBAN).

Also, in all joint declarations of visits of Heads of State and of Government from 2009 on mention the relevance of the bilateral collaboration in oil. Equally, the Joint Action Plans 2010-2014 and 2015-2021 and the Ten-Year Cooperation Plan 2012-2021 all have chapters dedicated to petroleum.

Additionally, most of the credit lines were decided during bilateral visits of both countries` leaders, in a government-to-government model in which package deals with several agreements, investments and/or loans are announced. For instance, both 2016 and 2017 CDB`s loans and the 2016 CHEXIM`s one result from a Cooperation Agreement between CDB and Petrobras signed during Premier Li Keqiang`s visit to Brazil, in May 2015 (Petrobras, Assinamos acordo de financiamento de US$ 10 bilhões com o CDB, 2016). The 2009 loan was agreed during President Lula visit in May 2009, when CDB, Sinopec, Petrobras and BNDES signed several contracts (Xinhua, 2009).

Thirdly, financing Petrobras fits the policy banks` target of fostering the internationalization of COCs. Under the Going Global initiative umbrella, both CDB and CHEXIM made their development finance became increasingly global, as a way to improve COC`s physical, contractual, commercial and tehnological access to energy around the world (Kong, Drivers Behind Chinese Development Finance for Energy Worldwide, 2019, p. 46) (Hiratuka & Deos, 2019, p. 222) (Xu, China`s Strategic Partnerships in Latin America: case studies of China`s oil diplomacy in Argetina, Brazil, Mexico and Venezuela, 1991-2015, 2017, p. 54) (Fitch, 2019, p. 87). In this sense, Brazil could not be out of this strategy, because of its favourable prospects in terms of acquisition of valuable upstream assets, market opportunities for construction projects and machinery selling, access to new techniques, among others.

It is true that the 2008 on global financial crisis gave a push to COCs interests in Brazil, and CDB and CHEXIM substantially improved their support to COCs in tandem with the credit crunch in the international financial markets (Alves, 2013, p. 122). The numbers of COCs disbursements in the country showed in the section before illustrates well this situation. In fact, when the worldwide monetary crunch forced traditional western multilateral institutions, such as the World Bank, the Inter-American Development Bank and the US Export-Import Bank to restrict their activities, Chinese banks grasped the opportunity and became the largest lenders to developing countries in the world, providing roughly US$ 244.2 billion until 2018 in energy related loans, mostly to fossil fuel extraction projects (Gallagher, Kamal, Jin, Chen, & Ma, 2018, p. 1) (Ma, Gallagher, & Bu, 2019, p. 1) (Kong & Gallagher, Globalizing Chinese energy finance: the role of policy banks, 2017, p. 7) (Gopal, Pitts, Zhongshu, Gallagher, Baldwin, & Kring, 2018, p. 16) (Myers & Gallagher, 2019). The serious economic situation notwithstanding, Chinese development banks` loans were even more attractive, since they do not impose macroeconomic policy conditions (Hogenboom, 2017, p. 198).

A recurrent instrument of policy banks to increase the COCs` footprint in other countries was inserting Chinese content clauses in the loan agreements. Under these estipulations, the contracting companies would need to use part of the credit received to buy components made by Chinese manufacturers. It is believed that this mechanism is present in all CDB`s and CHEXIM`s deals (Brito, Nunes, & Pita, 2016), although the conditions are not always made public for contractual reasons and to avoid negative repercussion in the local society and media and opposition from workers' unions (Alves, 2013, p. 108).

In the case of Brazil, at least four lendings have this requirement. Out of the 2009 CDB`s US$ 10 billion loan, US$ 3 billion was destined to be used with Chinese contractors. The percentage was reduced to 30% to be in accordance with at that time stringent local content regulations in Brazil (Alves, 2013, p. 121). Petrobras decided to not withdraw this part of the loan. The two 2015 CDB`s loans equally include a clause that 60% of the total US$ 5 billion must be spent in Chinese products and services (Xu, Shixi zhongguo yu baxi de zhanlue huoban guanxi: yi shiyou hezuo wei li [An Analysis of the Strategic Partnership between China and Brazil: take oil cooperation as an example], 2017, 页 36). This obligation was confidential until it was leaked and publish by a Brazilian newspaper, sparking a divergence between Petrobras and ANP, which is responsible for assuring the compliance with local content regulations (Brito, Nunes, & Pita, 2016) (Alves, 2013, p. 108) (Vasquez, China, Oil, and Latin America: Myth vs. Reality, 2018, p. 12). Petrobras was obliged to make a public statement acknowledging the existence of the requirement, after a request by the Securities and Exchange Commission of Brazil (Petrobras, Esclarecimento sobre Notícias: Condicionamentos ao Empréstimo com o Banco de Desenvolvimento Chinês, 2016). CHEXIM offered four NOCs funds to buy Chinese equipment and only one was released: the US$ 1 billion to Petrobras (Hogenboom, 2017, p. 201) (Petrobras, Credit Facility with China Exim Bank, 2016). It is believed that part of the decision to reallocate the construction of some FPSOs to Chinese shipbuilders derives from the necessity to comply with these requirements (Rosa, 2017).

Lastly, access to Brazilian upstream assets is not only an investment opportunity, but also a strategic move. Brazil`s expanding national production and exports fits well in China`s quest for energy security, allowing its economy to potentially keep its accelerated growth pace in the future. Therefore, Chinese policy banks have operated in two fronts: offering easy financing options to foster COCs` access to natural resources in the country and working closely to the Brazilian government and its main oil company Petrobras to guarantee newer and stable oil supply channels (Wu W. , 2019, p. 33). As part of this strategy, China resorted to energy-backed loans.

The loan-for-oil mechanism consists tipically in a trilateral long-term loan agreement between a Chinese policy bank – the financer –, an IOC – the oil supplier – and a COC – the oil buyer. Although each contract has its own features, the credit line is usually not

repaid in kind, by through the proceeds of oil sales, whose value is deposited into the borrower's account with the lending institution. A contract is signed with a COCs, which will buy a specific number of barrels of oil per day during the period of the deal at an agreed-upon price, which is not necessarily fixed and can follow the oscilations of international crude oil prices (Alves, 2013, p. 101) (Wu W. , 2019, p. 27).

According to Alves, Chinese oil-backed loans to not liberal and centralised institutional settings tend to emphasise access to acreage over oil imports (Alves, 2013, p. 124). The 2009 loan seems to illustrate this case, since after its signing Sinopec was offered a 20% stake in two oil blocks in northern Brazil – BM-PAMA-3 and BM-PAMA-8 –, in a transaction whose numbers were not disclosed (Alves, 2013, p. 117).

Oil-backed loans are not a Chinese invention, they were quite common in the 1990s among Western banking institutions. After the global financial meltdown in 2008–2009, they became again a useful economic statecraft instrument that knit together the interests of the policy banks and the COCs, since they limit lending risks, protect imports against oil price and exchange rate fluctuations and secure continuous flows of oil from oil-rich countries whose credit ratings sunk down (Alves, 2013, p. 100) (Wu W. , 2019, p. 26) (Hogenboom, 2017, p. 180). It is estimated that about 40% of all China's loans are backed by oil sales (Gallagher, Kamal, Jin, Chen, & Ma, 2018, p. 317). Besides Brazil, several oil-rich countries signed such agreements with China, namely Russia, Venezuela, Turkmenistan, Angola, Kazakhstan, Ecuador, Bolivia and Ghana, all of them suffering from the shrinkage of world credit and the fell of oil prices (IEA, Oil 2017: analysis and forecasts to 2022, 2017, p. 14) (Vasquez, China's Oil and Gas Footprint in Latin America and Africa, 2019, p. 11).

In such a mechanism, Petrobras signed three contracts, namely the 2009, 2016 and 2017 loans. The 2009 one was of US$ 10 billion and is conditionned to the sales of 150,000 barrels a day (bd) in 2009 and 200,000 bd between 2010 and 2019 to Sinopec`s subsidiary UNIPEC Asia Co. Ltd (Fitch, 2019, p. 86). In January 2018, the company pre-paid the residual balance of this contract, ending the oil sales` commitment (Petrobras, Demonstrações financeiras 2018, 2019, p. 78).

The other two loans were part of a term sheet signed with CDB in February 2016 (Petrobras, home Blog Fatos e Dados home busca Assinamos acordo de financiamento de US$ 10 bilhões com o CDB, 2016). The 2016 one is of US$ 5 billion and establish the preferential supply of 100,000 bd, in compliance with market conditions, for a period of 10 years, to China National United Oil Corporation – subsidiary of CNPC –, China Zhenhua Oil Co. Ltd. e Chemchina Petrochemical Co. Ltd – subsidiary of ChemChina (Petrobras, Assinamos contratos comerciais e com o Banco de Desenvolvimento da China, 2016). The 2016 loan has the same value and condition, but the Chinese oil buyer is Unipec Asia Co. – subsidiary of Sinopec (Samora, 2017). In December 2019, Petrobras paid in advance the

2017 loan (Petrobras, Petrobras informa sobre pré-pagamentos de dívidas com o China Development Bank , 2019).

TABLE: Petrobras` exports to China according to EBL`s requirement (barrels a day)

	Petrobras exports (EBL)	Years	National exports to China	% of EBL
2009	150,000	2009	73,704	-
2010-2016	200,000	2010	160,856	-
		2011	136,457	-
		2012	124,869	-
		2013	114,611	-
		2014	106,940	-
		2015	252,309	79%
		2016	296,433	67%
2017	300,000	2017	422,814	71%
2018-2019	200,000	2018	623,511	32%
2020-2026	100,000	2019-2026	-	-

Source: Author`s calculations based on data from Petrobras and ANP.

With these three contracts, CDB has guaranteed a stable annual flux of Brazilian oil to China over the years. Calculating the number of barrels that Petrobras was bound to sell in each year and taking into consideration pre-payments made, one concludes that the company should have supplied 150 thousand of barrels per day (tbd) in 2009, 200 tbd between 2010 and 2016, 300 tbd in 2017, 200 tbd in 2018 and 2019, and 100 tbd from 2020 on.

In the company`s reports, the quantities exported to China yearly are not disclosed, just the percentage of the country in the company`s annual sales, what makes difficult to assess the exact amount of oil it is selling to its biggest partner and the impacts of the EBLs in the company`s and the country`s total sales to China and to the world. The sole option is to compare the amounts especified in the loans with the total Brazilian exports per year, so as to estimate the percentage of the contractual numbers in the national oil trade with China. In doing so, one concludes that between 2009 and 2014, Petrobras may have not reached its exports` goals, since the national exports to China were smaller than the minimun volumes required. In the next years, however, the targets might have been achieved, and the EBLs would represent 79%, 67%, 71% and 32% of the total exports from 2015 to 2018, respectively. Nonetheless, it is possible that Petrobras may have not reached their obligations in some of these years (Trevisan, 2017).

Interestingly, as a possible impact of the EBLs in the country`s total exports, it is worth to mention that in the years that the loans were approved, Brazil`s exports to China grew 203%, 88% and 95% in 2009-2010, 2016-2017 and 2017-2018 respectively.

Chinese banks and Petrobras financial cooperation

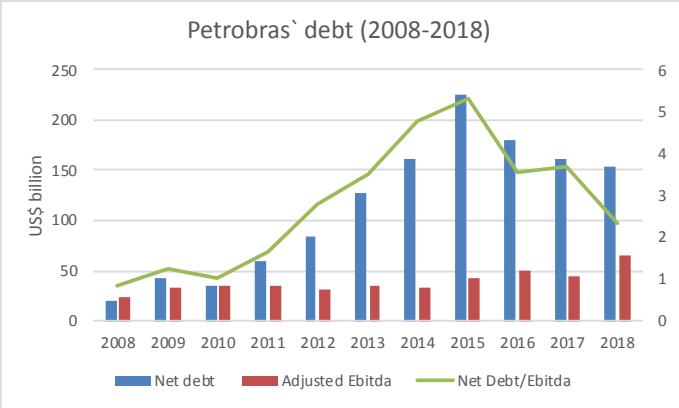
The Brazilian government and Petrobras saw in the cooperation with Chinese banks three benefits: finance the company`s investment plans – mainly in the pre-salt area –; a helping hand to balance its accounts in moments of financial distress and international economic crisis; and an alternative market to absorb its increasing crude exports.

Firstly, back in 2007-2008, Petrobras` biggest challenge was – and still is – to explore its vast pre-salt oil reservoirs, which are more expensive, because they are in deep waters offshore. According to the company`s 2008-2012 Strategic Investment Plan, US$ 65 billion were necessary to be expent in E&P in that years, an increase of 32% to the former plan (Petrobras, Plano de Negócios 2008-2012, 2007). The 2009-2013 document revised the amount of capital necessary in the E&P sector, predicting disbursements of US$ 105 billion during that period. The company had the technological skills to undertake this subsalt endeavor, but lacked the necessary financial support and started to look for funding in the domestic and international markets. However, the outbreak of the 2008 global crisis made its prospects dim. World financing waned and oil prices fell in free fall, putting into question the profitability of the pre-salt fields` exploration. Alves says that, after an unsuccessful trip to the USA and Japan in November 2008, Petrobras' CEO, José Sérgio Gabrielli, made a stop in Beijing to meet the then CDB president, and both agreed a loan of US$ 10 billion (Alves, 2013, p. 116) (Fitch, 2019, p. 87).

Secondly, Beijing has become an important alternative market to the company`s swelling exports (Wu W. , 2019, p. 27) (Xu, China`s Strategic Partnerships in Latin America: case studies of China`s oil diplomacy in Argetina, Brazil, Mexico and Venezuela, 1991-2015, 2017, p. 54) (Rosito, 2017, p. 10) (Hiratuka & Deos, 2019, p. 223). At the same time that China was consolidating itself as Brazil's main crude buyer, the USA, the country`s historically main oil partner, was decreasing its purchases from Brazil and other Latin American countries, much due to its booming shale gas production. From 2000 to 2009 and in 2011 and 2012, USA was the chief destination of the Brazilian oil. Between 2006 and 2013, the USA absorbed a bit more than one-fourth of Brazil`s exports. Conversely, China surpassed the USA in 2010 and from 2013 on. It must be said, however, that in absolute terms, in the last few years, China imports much more oil from Brazil than the USA, because the exported volumes are higher (ITC, 2019).

Thirdly, from 2009 on, besides the prolonged effects of the financial crunch, Petrobras has started to face more serious problems, especially when the Car Wash Operation`s corruption investigation started at that year. From 2014, national investigators found a huge scheme of mismanagement, money laundering and illegal payments in the company, which ended up being at the center of the largest corruption scandal in the history of Latin America (Petrobras, Demonstrações financeiras 2018, 2019, p. 16). From then on, new difficulties came to shore constantly.

TABLE: Petrobras` debt evolution (2008-2018)



Source: Author`s calculation based on Petrobras annual reports. It was used the exchange rate of the last work day of each year.

Lawsuits in different countries were filed against the company, which started to incur in losses. After a peak of US$ 98 per barrel in 2013, oil prices were in downfall, reaching US$ 49, US$ 43 and US$ 51 in the 2015-2017 period respectively. Moreover, the company`s shares equally went down the hill, decreasing from an annual average of US$ 24.9 in 2009 until US$ 9.2 in 2015, when it started to recover. In 2018, the average was of US$ 20.7 (Investing.com, 2019).

Furthermore, the Brazilian currency Real has depreciated pregressively over the time, from an annual average of R$ 1.83 per dollar in 2008 to R$ 3.68 in 2018 (Investing, 2019). This depreciation has brought considerable pressure on the company`s ability to pay its external debts, since it needs bigger amounts of local currency to pay the same quantity in dollars. Further, it has increased the cost of importing gasoline and other derivates, since Brazil`s refining capacity is below the total consumption and the government`s control over the internal price of gasoline has inhibited the company to raise it. In mid 2015, the parcel of Petrobras` debt in dollar was roughly 74% (Petrobras, Annual Report 2014, 2014, p. 75).

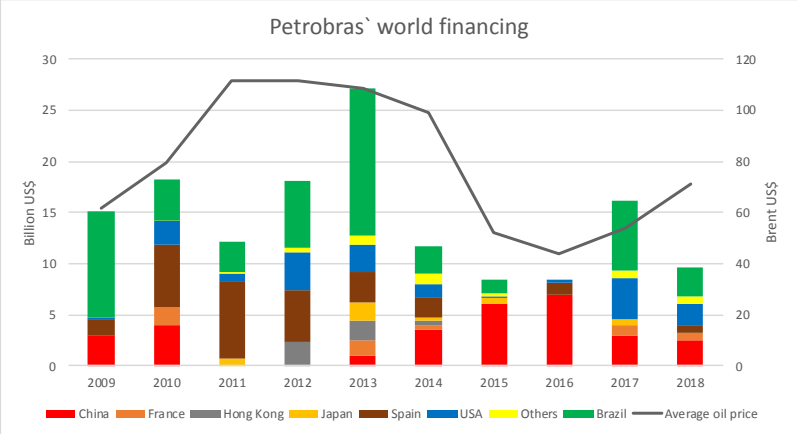
Besides, the corruption scandal involved several companies in Brazil and affected severily all the national oil industry. A no number of firms started to have liquidity

problems and some even bankrupt. Those involved in corruption charges were prohibited to make deals with the government and its SOEs. Delays and disruptions in the supply of materials and services has become recurrent and, therefore, have affected Petrobras` oil production expansion strategies as well (Petrobras, Annual Report 2014, 2014, p. 25). For instance, in its previous business plans, the company has forecasted a production of 2.7 mbd by 2013 (Petrobras, Plano de Negócios 2009-2013, 2009, p. 9) and 3.2 mbd by 2018 (Petrobras, Em 2018, produziremos 3,2 milhões de barris de petróleo por dia, sendo 52% no pré-sal., 2013). According to ANP, the actual figures were of 1.8 mbd and 1.9 mbd in those two years. The company`s oil production has remained stable between 2011 and 2018, ranging around 1.95 mbd.

In the wave of the troubles detailed above, Petrobras` debt went up progressively. In the 2008-2018 period, the net debt went from US$ 21 billion to US$ 154 billion, reaching a peak of US$ 225 billion in the end of 2015. Because the ebitda has augmented in a slower pace, the coefficient net debt/ebitda, which better reflects the capability of a corporation to pay its debts, raised from 0.85 in 2008 to 2.34 in 2018, the highest point in 2015, 5.31 (Petrobras, Annual Report 2018, 2018) (Petrobras, Annual Report 2008, 2008). The situation has become difficult to Petrobras` employees as well. There were delays in their wages in late 2014 and 2015 for instance, which sparked protests in different parts of the country (Almeida, Ilha, & Scrivano, 2015).

As a result of the company`s increasing financial deterioration, the rating agencies Moody's, Standard & Poors and Fitch all downgraded Petrobras` rating to non-investment grade in February and September 2015 and May 2016 respectively (Petrobras, Annual Report 2016, 2016, p. 27). These decisions have virtually closed the access to international financing, putting in peril the company`s operational and administrative capacity.

TABLE: Petrobras` world financing (2009-2018)



Source: Author`s calculation based on data from Petrobras. Values according to the date of disbursement.

Strangled in a financial crisis, Petrobras has found in China a helping hand. Chinese banking institutions, mainly CDB and CHEXIM, have offered credit when the company was unable to find elsewhere, operating in a countercyclical way and distinctively to other international and domestic financial institutions and even the COCs, which have decreased their investments in moments of risk and low oil prices. When the company`s net debt/ebitda coefficient has increased substantially from 2013 on and kept high levels in 2016 and 2017, Chinese banks offered billions of dollars in credit lines. In the worst year of Petrobras` crisis in 2015, the CDB`s loans might have saved Petrobras from defaulting in the short run (Hogenboom, 2017, p. 201). As a response to this increasing partnership, the company`s office in Beijing, which was inaugurated in 2004, started to dedicated itself only to financial issues (Rosito, 2017, p. 11).

Although Chinese financial institutions started to lend to Petrobras in 2009, in ten years they have become its main creditor, surpassing other traditional lenders, such as the USA and Spain. In the whole period of analysis, Petrobras received no less than US$ 145 billion, of which roughly US$ 93 billion from international banks and US$ 52 billion from domestic ones. The Chinese US$ 29.85 billion would represent almost 21% and 33% of the total and of the global loans of the company respectively.

Lastly, it is interesting to point out that the fact that Petrobras, the biggest national producer, is bounded by loans to sell crude to China has raised nationalist concerns about foreign meddling in disfavor of national interests. Some analysts highlight that the Venezuelan and Equatorian oil – two countries that received EBLs –, was possibly being bought by COCs with some discount and then resold to international traders – ending up in the USA – at market prices, a profit made at the cost of both states` taxpayers (Hogenboom, 2017, p. 205). In the Brazilian case, however, disclosen information show that all loan deals were made according to oil commercial rates.

Another concern is that COCs were selling their foreign production only and directly to China, possibly with lowers prices, which could reflect a political agenda behind this in disdain to local interests. Nonetheless, there is no evidence so far suggesting that the Chinese government somehow push COCs to export back home their overseas oil production. On the contrary, there are signs that they sell it in the global market, where they can sometimes get better prices, instead of shipping it straightly to China, which the distance makes transportation costs higher, and where internal prices are controlled by the Chinese state, lowering profit margins (Vasquez, China, Oil, and Latin America: Myth vs. Reality, 2018, p. 13). It is unknown how much of the oil secured through loans are effectively sent to China, because this information is not disclosed by companies or governments. What is known is that there is no direct relationship between the production of a COC in a country and what is imported by China from that nation, because profitability

and corporate strategies drive more and more COCs` activities abroad. The 2012 white paper on energy policy affirms that 90% of Chinese enterprise-invested energy resources abroad are sold locally, therefore increasing and diversifying supplies in the global energy market (StateCouncil, China`s Energy Policy 2012 , 2012). In reality, it seems that China indeed progressively relies on the international market to satisfy its craving oil demand, which undeniably augments the available resources in the world and contributes to a safer global energy balance (Liao, 2015, p. 91) (IEA, Update on Overseas Investments by China's National Oil Companies Achievements and Challenges since 2011, 2014, p. 16) (Hogenboom, 2017, p. 181). However, some voices highlight that the fact that COCs are state-owned gives the government a high hand in the final decision of where to export the oil in the eventuality of a disruption of world supply or a sharp upsurge of demand (Liao, 2015, p. 80).

CONCLUSION

The objective of this chapter was to identify the core characteristics, describe the projects and debate the overall bilateral relationship in the oil sector. Reflecting on the existing literature about the topic, it aimed at supplementing previous works and presenting a complementary analysis, in which not only examine the four main features of the partnership altogether, but also introduce original and more accurate data.

In doing so, it was argued that the bilateral relationship in the oil sector developed concomitantly in four pillars: commerce, investments, construction projects and loans. Trade figures had an explosive growth of 14,000% over the years, reaching US$ 16.2 billion in the end of 2018. From an unimportant position, Brazil became China`s sixth main crude provider, with almost 7% of total oil imports, in front of other traditional exporters with way bigger reserves, like Iran, Venezuela and Kuwait.

In parallel, capital in the form of FDI and loans started to flow in big quantities to Brazil. FDIs and construction projects of COCs reached the amount of US$ 22.4 billion, ranking the country as China`s second biggest destination of oil investments. All the big five COC now operate in Brazil – Sinopec, CNPC, Sinochem, CNOOC and PetroChina –, and they are helped by other machinery and service Chinese firms, such as Jiangsu Asian Star Anchor Chain, BGP, Shandong Kerui Petroleum Equipment, Guangdong Zhenrong Energy and others.

The investments in the upstream sector already progressively started to pay off. In 2018, COC were responsible for XX% of the national production and some of its companies were among the top five biggest producers. Investments scattered to other segments, with green and brownfiled projects in the middle and downstream sectors. As an

original contribution to the existing analysis, besides the bonuses paid in oil fields auctions and the values involved in mergers and acquisitions, it was considered the capital disbursed during the exploration process, either in the form of production itself or in R&D.

Chinese banks did not lag behind and injected billions of dollars in NOCs, mostly Petrobras. Until 2018, roughly US$ 33.95 billion in credit lines were offered mainly by China's policy banks CDB and CHEXIM, mostly in the form of oil-backed loans and with some sort of Chinese content clauses included. Brazil turned to be China`s main destination of oil-related funds. Commercial banks also disembarked in Brazil, being the case of Bank of China and ICBC. Sinosure gave assistance to some of transactions, CIC enjoyed opportunities brought by Petrobras` disinvestment plan, and the New Development Bank provided fund to a project sustainable development.

With all that said, in this process of analyzing all the data available and debating the nuances of the bilateral oil cooperation, a few conclusions naturally came to shore. Firstly, Brazil inevitably became an important partner in China`s strategy of diversification of sources, internationalization of COCs and global expansion of its financial outreach. Nonetheless, it could be said that, in China`s import partners` matrix, the country would still be playing a secondary role. China still relies in the Middle East and Africa as its main oil import sources and this situation is not expected to change in the near future, for the rich resource endowment of these regions. Even though it ranks as the sixth biggest supplier, the Brazilian crude still accounts for only 6.8% of China`s total imports. However, the fast growth pace of the bilateral trade in the last very few years, coupled with the immense potential of production and export expansion in Brazil – without forgetting the political will to foster relations – might turn this country a much more relevant actor in the Chinese oil diplomacy. It is a matter of fact that some investments in oil fields are still in their initial stage, being the case of the subsalt ones, which did not arrive yet in their full production capacity.

Secondly, in contrast, Brazil faces a more vulnerable condition, since its biggest partner buys more than half of its oil. Not to mention the Petrobras' case, in which China is the destination of almost three-quarters of its exports. In such a situation, both country and NOC are exposed to higher risks in terms of demand disruption and potentially more pressure in price-bargain negotiations, because the clients` mix of choices is more diversified. Consider the importance of avoiding overdependence could be a precautious measure (CEBRI, 2018, p. 8).

Thirdly, the kind of commitments made by COCs and policy banks, signing contracts and winning rights of exploration that will last for three decades in average, enhances the mutual desirability and inevitability of a long-term partnership. Facing complementary challenges, both Chinese and Brazilian players, no matter in the public or in the private sector, made a strategic and pragmatic approximation that meets their different necessities

at least in the short and middle term. In the long term, adjustments and changes are expected, in as much as Petrobras, other NOCs, engineering companies and dockyards recover from the crisis and regain a more active stance in investments in the upper, middle and downstream sectors.

Lastly, the analysis of the development of the bilateral relationship in the last few years opens space for making some predictions about the future of the partnership. In all the possible future scenarios, it is reasonable to see China as an important player in Brazil`s oil sector. Chinese oil consumption is expected to keep the upward ascension, although in a slower rythym. IEA forecasts that, independently of the diversification of the country`s energy mix towards renewables in course, more investments in energy use efficiency and efforts to curb pollution, China`s oil demand will grow, as part of the strengthening internal consumer market and increasing quality of life, which spurs carbon and oil-intensive consumer habits, such as private cars (IEA, Oil 2017: analysis and forecasts to 2022, 2017, p. 3). At least until 2022, the country`s demand will grow at an average rate of 2.4% annually and the domestic production might continue its downward tendency (IEA, Oil 2017: analysis and forecasts to 2022, 2017, p. 59). The gap between consumption and production might continue to widen and China may keep its position as the world`s top importer.

Brazil`s outlook, in contrast, is promising. Already the tenth biggest world oil producer and the fifteenth exporter, it might climb some steps in these rankings. The pre-salt area, which is still in the initial stage of production, accounts already for more than half of total production since 2018 and will certainly continue its expansion, in part thanks to COC`s investments in that region. Brazil is poised to become a relevant exporter of the commodity in the near time. In a shorter turn analysis, IEA believes the country`s production will be the one that increases the most until 2022 (IEA, Oil 2017: analysis and forecasts to 2022, 2017, p. 13). In a longer turn evaluation, OPEC estimates that the South American nation will be the most important source of non-OPEC liquids supply growth until 2040 (OPEC, World Oil Outlook 2040, 2019, p. 139).

For all the foregoing reasons, induced by their internal demands and limitations and influenced by a volatile and sometimes unfavourable external scenario, Brazil and China saw in a pragmatic bilateral approximation a mutually beneficial alternative to solve some of their short and middle-term problems. The Chinese unswerving hunger for oil and Brazil`s expanding production and lack of financial resources matched a perfect marriage for both sides. The longer future of this partnership seems also auspicious, with Brazil continuing to respond to an increasing part of Chinese immediate demands of oil and COCs and banks preserving and expanding its assets in the country. This situation tends to persist as long as it proves to be economically profitable and strategic to both nations` energy security concerns and national development plans.

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