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Edyta Chwiej
Institute of Political Science and International Relations,
Jagiellonian University, Kraków, Poland

Opportunities and Risks Associated with Exploitation of New Oilfields in Brazil

Brazil's domestic energy production has risen in recent years, particularly since the discovery in 2007 of large oil and gas deposits in its pre-salt oilfields. This was an important event in the history of the energy sector in Brazil. The discovery of the new oil fields may be an opportunity for Brazil to improve its energy security and strengthen its position in the international arena. But the future of energy security of Brazil may be threatened by a recent scandal with country's biggest energy company, Petrobras, mired in national debt, low oil prices, and the potential hazards of the oil industry for the environment. This article reviews the potential benefits and risks of exploitation of Brazil's new oil deposits.

Key words: Brazil, energy politics, Petrobras, energy sector, pre-salt oilfields

Introduction

The discovery of new oil deposits on the "Tupi" oil field (now the "Lula" oil field) in the Santos Basin, about 300 kilometers east of São Paulo, by Brazilian company Petrobras (Petróleo Brasileiro SA) was reported in November of 2007. The first oil well in the area was drilled in 2005. New oil deposits have also been found in other Basins; namely the – Campos and Espirito Santo (Luna, Khalip *Br.reuters.com*). This could be an opportunity for Brazil, Latin America's largest and most influential country, to improve its energy security and strengthen its position in the international arena. The aim of this article is to identify the potential benefits and risks of exploitation of Brazil's new oil fields.

Historical Overview

Brazil's history of exploration and exploitation of energy resources dates back to the 1860s. The granting of licenses for carrying out geological surveys was controlled by the state during the Imperial era (1822-1889). However, the new constitution of 1891

gave local authorities more control over such activities. Nonetheless, shareholders from Great Britain and the United States were the main beneficiaries of the concessions granted by the authorities of Brazil. At the turn of the 19th century, many specialized institutions of Brazilian researchers and geologists were established, and tasked with locating mineral resources. Research was conducted in the states of Bahía, Sergipe, Alagoas and Amazonas (De Mattos Dias, Quaglino 1-16).

The Brazilian government subsequently retook control of the country's natural resources after the revolution of 1930, upon the assumption of power by President Getúlio Dornelles Vargas. The National Petroleum Council (*Conselho Nacional de Petróleo. CNP*) was then created in 1938 as a government agency subordinate to the president. The responsibility of the CNP was to set the rules for speculation and mining, in order to control activities connected with the transport, distribution and trade of oil and its derivatives (*Decreto No 538 de 7 de Julho 1938*). After the creation of CNP, Brazil took the first step towards the installation of a state monopoly in the energy sector. Petroleum exploitation thus began, and in 1939, Oscar Cordeiro and Manoel Inacio Bastos, under the jurisdiction of CNP, discovered the first oil field in Lobato near the city of Salvador, Bahia (De Mattos Dias, Quaglino 21).

In 1953, during his second presidency, Getulio Vargas passed an act (Lei No. 2004) (*Lei No 2004 de 3 de Outubro de 1953*) which established a state monopoly on the exploration, mining, processing, and transportation of crude oil and its derivatives, as well as a state-owned company called Petróleo Brasileiro S.A. (Petrobras). Petrobras controlled the monopoly on oil exploration and production operations and all activities related thereto between 1954 and 1997.

Table 1. Production and consumption of oil in Brazil in 1965-2000 (thousand barrels daily)

Year	Production	Consumption
1965	96	307
1970	167	523
1980	188	1163
1990	650	1478
2000	1271	2056

Source: own elaboration based on: *Data workbook. BP Statistical review of 2015, BP.com*

Petrobras formally began its activity on the 10th of May, 1954, with a production rate of 2663 barrels of oil per day (*Há 61 anos, começava jornada da Petrobras. Brasil. gov.br*). But Brazil's growing economy required more energy resources, and domestic production was not meeting the demand (see Table 1). In the 1970s, Petrobras began exploitation of the offshore oil. The main reason for this was insufficient import of crude oil caused by the first (1973) and second (1979) "oil shock". Moreover, in 1975, the National Alcohol Program *(Programa Nacional do* Álcool*)* was launched. This government program was aimed at replacing automobile fuels, derived from fossil fuels such as gasoline, with ethanol produced from sugar cane (Marçal *Economia.uol.com.br*).

The importance of energy resources was even highlighted in Brazil's most important legal act – the Constitution from the 5th of October, 1988. According to the

Constitution, "the natural resources of the continental shelf and of the exclusive economic zone are property of the Union". Moreover, "in accordance with the law, the participation in the results of the exploitation of petroleum or natural gas in the respective territory, continental shelf, territorial sea, or exclusive economic zone, or financial compensation for the exploitation thereof, is assured to the states, the federal district, and the municipalities, as well as to agencies of the direct administration of the union" (Article 20) (*Constitution of the Federative Republic of Brazil*).

After 43 years of exploration, production, refining, and transportation of Brazil's oil, Petrobras started to compete with other foreign and domestic companies. In 1997, during the presidency of Fernando Henrique Cardoso, the government approved Law No. 9478 (*Lei No 9478*). This Law dismantled Petrobras's monopoly and allowed private competitors to develop Brazil's oilfields. The Brazilian government created two additional institutions as well: the National Petroleum, Natural Gas and Biofiuels Agency (*Agência Nacional do Petróleo Gás Natural e Biocombustíveis*), the regulatory body responsible for the activities of private companies within the oil, natural gas and biofuels industries in Brazil; and the National Council of Energy Policies (*Conselho Nacional de Política Energética*), responsible for regulation and supervision of activities in the energy sector (*Lei No 9478 de 6 de Agosto de 1997*). In 2006, Brazil achieved self-sufficiency in crude oil production for the first time in history. The use of oil by domestic consumers was reported at 1.8 million barrels per day, and domestic production reached 1.9 million barrels per day. However, Brazil still had to import processed oil products (*Lula anuncia auto-suficiência do Brasil em petróleo amanhã. Folha.uol.com.br*).

Pre-Salt Oilfields

The above-mentioned discovery of new oil fields in 2007 was another important event in the history of the energy sector in Brazil. They were located in a pre-salt zone (*pré-sal*), below the ocean surface, under a thick layer of salt, at a depth of 5,000 to 7,000 meters below sea level (*Brazil's oil boom. Economist.com).*

The Brazilian Enterprise for Management of Crude Oil and Natural Gas – Pré-Sal Petróleo SA (*Empresa Brasileira de Administração de Petróleo e Gás Natural SA – PPSA*) was established in 2010. The PPSA is responsible for preparing plans for exploration and exploitation of new energy resources, concluding agreements regarding the production and sale of raw materials from *pré-sal* deposits, and overseeing the operations of companies exploiting new deposits (*Lei No 12304 de 2 de Agosto de 2010*). In addition, new regulations for exploitation of energy resources from the pre-salt fields were adopted in December 2010 (*Lei No 12351*). This law allows the state to retain full ownership of the *pré-sal* reserves. The Brazilian government controls the oil production by Petrobras and receives some royalties for licensing. According to Law No. 12351, in order for exploitation to take place, Petrobras must be the operator and must have at least a 30-percent stake in every pre-salt operation (*Lei No 12351 de 22 de Dezembro de 2010*). International oil companies are authorized to invest in these domains, but may only hold a maximum share of 70% in consortia. It is important to note that Chinese companies (such as CNOOC – China National Offshore Oil Corporation, CNPC – China National Petroleum Corporation (Busquet *Presalt.com*), and SINOPEC Corp. – China Petroleum & Chemical Corporation) (*China investe US$ 15*

bi em óleo *no país. Defesanet.com.br*), the Anglo-Dutch Royal Dutch Shell (Nogueira, Eisenhammer *Br.reuters.com*), the French *Total S.A.*, the Spanish *Repsol YPF* (in cooperation with *SINOPEC,* through the *Repsol Sinopec Brasil*) (Dowsett, Aizhu *Br.reuters.com*), and the Norwegian *Statoil ASA* (*Statoil plans to triple production in Brazil. Valor.com.br*) are interested in participating in such consortia. Moreover, Law No 12351 defines the rules for distribution of the income from exploitation of the pre-salt oilfields among state and federal authorities.

Brazil's proven oil reserves have almost doubled since the turn of the millennium, with the 2015 edition of BP's Statistical Review of World Energy estimating the country's reserves at 16,2 billion barrels – about 1% of the world's oil proven reserves (*Data workbook. BP Statistical review of 2015. Bp.com*). Today, it boasts the second largest reserves in Latin America (after Venezuela), and the fifteenth largest in the world (see Table 2). Conservative estimates for the total recoverable *pré-sal* oil now come in at 50 billion barrels (*Brazil's oil boom. Economist.com*). If these estimates are confirmed, Brazil will have the ninth largest oil reserves in the world (see Table 2).

Table 2. Countries with the largest proven oil reserves in 2014

Proven oil reserves in 2014		**Proven oil reserves in 2014**	
Country	**Thousand million barrels**	**Country**	**Share of total**
Venezuela	298.3	Venezuela	17.5%
Saudi Arabia	267	Saudi Arabia	15.7%
Canada	172.9	Canada	10.2%
Iran	157.8	Iran	9.3%
Iraq	150	Iraq	8.8%
Russian Federation	103.2	Russian Federation	6.1%
Kuwait	101.5	Kuwait	6%
United Arab Emirates	97.8	United Arab Emirates	5.8%
United States	48.5	Brazil (including the estimated *pré-sal* deposits)	3.89%
Libya	48.4	United States	2.9%
Nigeria	37.1	Libya	2.8%
Kazakhstan	30	Nigeria	2.2%
Qatar	25.7	Kazakhstan	1.8%
China	18.5	Qatar	1.5%
Brazil	16.2	China	1.1%

Source: own elaboration based on: *Data workbook. BP, Statistical review of 2015…*

Brazil's production originates from three main basins. The Campos Basin (Baía de Campos), which is located to the north-east of Río de Janeiro and covers approximately

115,000 km,^{2} is the most prolific basin in Brazil, and accounts for 72% of its proven reserves. Oil exploration began there in 1971; and by 2013, 75% of Brazil's oil was being produced from 47 fields in this basin (Chauhan, van Mourik, Florencio 4). The Santos Basin (Baía de Santos), which covers approximately 348,900 km^2, is located between the south coast of the state of Río de Janeiro and the north coast of the state of Santa Catarina (Chauhan, van Mourik, Florencio 4). Many new *pré-sal* oil fields can be found there, the most important of which are "Lula," "Merluza," "Lagosta," "Mexilhão," and "Uruguá" (*Baía de Santos. Petrobras.com.br*). The third of the larger basins is the Espírito Santo Basin (Baía do Espírito Santo), which covers an area of 75,000 km^2, and is located along the northern and central coast of the state of Espírito Santo. At the end of 2013, 45 producing fields were there. There are also several smaller basins, but the most important of these is the Sergipe-Alagoas Basin, situated along the coasts of the two abovementioned Brazilian states (Chauhan, van Mourik, Florencio 5).

In 2013, oil production in Brazil amounted to 738.7 million barrels, averaging 2.02 million barrels of oil per day. Approximately 15% of this oil came from the *pré-sal* oil fields. It is worth noting that oil production from the new oil fields has increased by 77% since to 2012 (*Anuário estatístico brasileiro do petróleo, gás natural e biocombustíveis*: *2014. ANP*.gov.br). In 2014, Brazil was producing 2.2 million barrels per day of crude oil. However, that same year, Brazil's demand for petroleum and other liquid fuels was 3.2 million barrels per day (*Brazil. International energy data and analysis. EIA.gov*). Brazil was trying to balance this deficit by importing oil, mainly from Africa (Nigeria – 53.5% of imported crude oil) and the Middle East (mainly from Saudi Arabia; see Table 3). In 2013, Brazil imported nearly 148 million barrels of oil, and 30.6 million m^3 of petroleum products (*Anuário estatístico brasileiro do petróleo, gás natural e biocombustíveis: 2014. ANP*.gov.br). The National Petroleum, Natural Gas and Biofiuels Agency are also planning to increase oil production to 3.6 million barrels a day after 2020, thanks to the exploitation of the pre-salt oil fields (Pamplona *Folha.uol.com.br*).

Table 3. Crude oil imports and exports in 2013

Region	Import (%)	Export (%)
Africa	71.7	0
Middle East	23.9	0
Asia and Pacific	2.3	43.1
Latin America	2	12.3
North America	0	32
Europe	0	12.6
Total (**million barrels**)	147.834	138.978

Source: own elaboration based on *Anuário estatístico brasileiro do petróleo, gás natural e biocombustíveis: 2014 ANP.gov.br*

In 2013, Brazil exported nearly 139 million barrels of oil, mainly to China (30.1%), the United States (approximately 29%), India (13%) and Chile (8%; see Table 3). The value of these exports amounted to nearly 13 billion USD (Bonato, Lorenzi *Br.reuters.com*).

Energy Security

Based on statistical data, we can say that Brazil has a real chance at improving its energy security thanks the new oil fields. This is very important, as primary energy consumption in Brazil has increased 1.6-fold since the beginning of the 21st century – the third highest increase after China and India (see Table 4). Brazil moved up from eleventh to eighth place in the ranking of countries with the highest primary energy consumption between 2000 and 2014.

Table 4. Primary Energy Consumption in Selected Countries 2000-2014
(Mtoe – million tonnes of oil equivalent[1])

Country	2000	2014
China	1001.7	2972.1
United States	2313.7	2298.7
Russian Federation	620	681.9
India	295.8	637.8
Japan	516	456.1
Canada	309.2	332.7
Germany	333.4	311
Brazil	186	296

Source: own elaboration based on: *Data workbook. BP, Statistical review of 2015…*

Regarding Brazil's energy security policy, all the most significant documents mention the strategic importance of energy resources and the necessity to defend them against external and internal threats. On the 18th of December, 2008, one year after the discovery of the new *pré-sal* oil fields, President Luiz Inácio Lula da Silva signed the new National Defense Strategy (*Estratégia Nacional de Defesa*). According to the Strategy, the Brazilian Navy will protect not only territorial waters, but the country's increasing number of oil platforms *(Estratégia Nacional de Defesa)*.

Brazilian authorities are investing in the development of the country's military fleet in order to protect the new oil and gas deposits. Brazil signed a defense cooperation agreement with France on the 29th of January, 2008, and an agreement on the production of submarines on the 23rd of December, 2008 to further this effort. The second agreement calls for a strategic partnership in order to build four conventional Scorpène submarines, and a fifth submarine equipped with nuclear propulsion provided by Brazil *(Acordo Estratégico Brasil – França. Defesabr.com)*. Moreover, between 2008 and 2012, the Brazilian Navy, Army, and Air Force developed Joint Operation "Atlantic" (*Operation Atlântico*), coordinated by the Ministry of Defense. The objective of the operation was mainly to prepare Brazil for the defense of marine resources and strategic structures (*Brazilian Armed Forces Perform Operation Atlantic III. Dialogo-americas.com*).

[1] Unit of measurement of energy consumption: 1 TOE = 0.041868 TJ

Development in the Other Areas

The rise in expenditure on protection of the *pré-sal* oil fields may also stimulate development in other areas. The basis of the strategic partnership with France mentioned above is the transfer of technology in the areas of submarine and aircraft construction. Joint Venture DCNS/Odebrecht has been created to support ship construction. DCNS (*Direction des Constructions Navales Services*)[2] will provide contractor assistance to Odebrecht[3] for construction of the naval shipyard that will build the five submarines covered by the contract. Construction of the first submarine began in July 2011 in Itaguaí, a metropolitan region in the state of Río de Janeiro. Brazilian engineers and Navy specialists will be responsible for the construction of the nuclear reactor for the fifth boat (*Ruszyła budowa Scorpene w Brazylii. Altair.com.pl*). Moreover, according to Navy spokespersons, more than 36,000 items used in the construction of the submarines will be manufactured by 30 Brazilian firms (*Meios futuros para a Marinha do Brasil. Defesabr.com*).

In April 2014, Petrobras announced its intention to invest 100 billion dollars in the domestic shipbuilding industry between 2012 and 2020. This is clearly related to its exploitation of the pre-salt oil fields. The money is intended for the production of 49 ships for transporting crude oil and petroleum products, 146 auxiliary vessels, 38 oil platforms, and more (*IPGAP Oil & Gas & Energy News Oil-gas-energy. ronaassessoria.com.br*). Despite having signed agreements for cooperation and technology transfer with foreign companies, the priority of Petrobras is to increase domestic investment. To this end, it has also signed agreements with domestic service providers for the construction of ships and oil platforms in Brazil (Gandra *Agenciabrasil.ebc.com.br*).

As a result of these plans, the demand for engineers is expected to increase, and more jobs are being created. It is estimated that the increase in the production of energy resources has contributed to the rise in employment in the Brazilian shipbuilding sector from about 7,500 employees in 2003 to 75,000 in 2014. Moreover, 25,000 new jobs are going to be created by 2017 (*IPGAP Oil & Gas & Energy News. Oil-gas-energy.ronaassessoria.com.br*). The question that remains is if these plans will be finalized in the context of the current problems with corruption and economics.

The money from exploitation the pre-salt oil fields can also be transferred to other areas. President Lula da Silva called it "a gift from God", which can help to end chronic poverty and narrow the country's broad gap between the rich and the poor (*Discurso do Presidente da República, Luiz Inácio Lula da Silva*). Law 12351 also created a special Social Fund (*Fundo Social*), designed to be a source for regional and social development. According to the experts, it could also function as a typical stabilization fund for reducing the impact of abrupt macroeconomic fluctuations caused by changes in global oil prices (Chauhan, van Mourik, Florencio 15). The Social Fund will fund programs and projects in the fields of education, culture, public health, science and technology, environment and sports. It has two main sources of income: the money paid by the companies and consortia from the production sharing

[2] French industrial group specializing in naval defense and energy.

[3] A Brazilian conglomerate consisting of diversified businesses in the fields of engineering, construction, chemicals and petrochemicals.

agreement; and the royalties allocated to the federal government from the pre-salt oil deposits (*Lei No 12351 de 22 de Dezembro de 2010*).

Law 12858/2013 states that 75% of royalties (from contracts concluded after the 3rd of December, 2012) will go to education, while the other 25% will go to health care. Moreover, 50% of the total income of Social Fund shall be used exclusively for public education, until the main aim of the National Education Plan has been realized *(Plano Nacional de Educação)*, which is to increase public investment in education to 10% of the GDP by the end of the decade (*Lei No 12858 de 9 de Setembro de 2013).* It is estimated that 112.25 billion reais (about 30 billion USD) will be spent for these two purposes within the next ten years (*Royalties do Petróleo. Brasil.gov.br*). There is good reason for such spending decisions. Although public investment in education amounted to more than 6 percent of Brazil's GDP, about 10% (20 million people) of the adult Brazilian population 15 years or older still cannot read or write (*Human Development Report 2014. HDR.undp.org*); and only 54% of the population holds at least a secondary education. The percentage of people with a secondary education is similar to that in Argentina (56,3%) and Mexico (58%). The world average is 63.6%. Spreading basic education, investing in secondary and higher education, and increasing the salaries of teachers should be priority for the government of President Dilma Vana Rousseff (Oliveira *Camara.leg.br*).

There is still much work to be done in the field of health care. For instance, the infant mortality rate in Brazil is 3 times higher than in the most developed countries (18 deaths per 1,000 live births). The number of doctors and hospital beds available to the population are crucial to the smooth operation of any health care system. In Brazil, the number of doctors per 10,000 people is 19 (*CIA World Factbook. CIA.gov*), compared to a global average of about 13. But the number of doctors per 10,000 inhabitants in the most developed countries is 28 (*Human Development Report 2014 HDR.undp.org*). In 2013, president Rousseff noted the unequal distribution of doctors across the country. There was not a single doctor in 700 municipalities (*municipios*), and an average of only 1 doctor per 3,000 inhabitants in some 2,000 municipalities (*Discurso da Presidenta da República, Dilma Rousseff*). Brazil also has an inadequate number of hospital beds, namely 2.3 per 1,000 people. In the world ranking for health care, presented by the CIA, Brazil was in the 97th place (*CIA World Factbook. CIA.gov*).

The rise in expenditure on education and health care is meant to improve the conditions of the country's poorest inhabitants. Brazil has so far reduced the number of its citizens living in extreme poverty by 75%, in large part thanks to the *Bolsa Familia* Program, initiated by President Lula da Silva in 2003. In 2011, President Dilma Rousseff created *Brazil Without Extreme Powerty* (*Brasil Sem Miséria*), a program that expanded on *Bolsa Familia.* But 16 million people still live on less than 2 dollars a day (*Brasil reduz a pobreza extrema em 75%, diz FAO. Noticias.uol.com.br*).

The decision to increase spending on education and health care was made after public demonstrations took place in several Brazilian cities in 2013. The demonstrations were initially organized to protest against increases in bus, train, and metro ticket prices in some Brazilian cities, but grew to include other issues such as high corruption in the government, and the spending of billions of *reais* on large sports projects. Brazilian protesters held signs reading, "Health And Education, Not The Cup" and "We don't need the World Cup" (Rosas *Brasil.elpais.com*).

Threats

Exploitation of pre-salt oil fields also poses some threats, as Brazil's oil reserves are situated exceptionally deep under thick layers of rock and salt. In 2007, while drilling in the Tupi field, Petrobras discovered the estimated equivalent of 5-8 billion barrels of oil in a pre-salt zone, 18,000 feet (about 5488 meters) below the ocean surface. For comparison, the ultra-deep oilfields in the Gulf of Mexico are located 5,000 feet (about 1525 meters) below the ocean surface (*Brazil. International energy data and analysis. EIA.gov*). The large depth and pressure involved in pre-salt production present significant technical hurdles. There are also high costs associated with the construction of oil platforms and pipelines, because the resources are located far from the coast of Brazil (*Brazil's oil boom. Economist.com*).

In 2010, Petrobras announced its Business Plan 2010-2014, with investments totaling 224 billion dollars. More than half of this amount was allocated to developing the production of pre-salt deposits in the Santos Basin, and to intensify efforts in other areas of exploratory pre-salt (Albuquerqe *Portalnaval.com.br*). However, due to the economic recession in Brazil, the corruption scandal of Petrobras[4], and falling oil prices (see. Table 5), the plans had to be revised. In June 2015, the company announced the new *Business Plan 2015-2019*. Petrobras reduced its planned investments by therein 40%, i.e. from 221 to 130 billion dollars. The company reduced its 2020 domestic production target to 2.8 million barrels of oil a day, down from its previous goal of 4.2 million barrels (Ramalho *Valor.com.br*).

The oil industry poses serious environmental risks. For example, a large oil spill occurred during the drilling of an appraisal well in the Frade Offshore Field in November 2011. The Frade Field, which covers an area of 154 km^2, is located 370 km offshore the coast of Río de Janeiro. It was shut down in March 2012 after an initial leak of about 3,800 barrels of oil, and the appearance of small and unexplained amounts of oil in the surrounding area in the months that followed (Valle *Brasil.estadao.com.br*). Brazil's government accused companies Chevron and Transocean of contributing to the oil leak (Blound, Schneyer *Reuters.com*).

The pre-salt oil revenues also pose a moral problem. Indeed, one of the biggest cases of corruption in Brazil is the Petrobras scandal of 2014. Federal police state that starting from 2004, the most important construction and engineering firms paid at least 800 million dollars in bribes in exchange for lucrative Petrobras contracts (*Śledztwo wokół afery korupcyjnej zatacza coraz szersze kręgi. Tvn24bis.pl*). This has resulted not only in serious financial losses for Petrobras, but a decline in popularity for President Rousseff.

It is worth adding that corruption in Brazil is a pervasive problem. According to Transparency International's Corruption Perception Index, Brazil was ranked 69th among 175 countries. Although the Brazilian government has adopted legislative regulations to support the fight against corruption, the number of officials accused of taking bribes is not decreasing. Between 2003 and 2012 nearly 4,000 public servants were dismissed for this reason. The problem is further compounded by

[4] The prosecutors have uncovered that senior figures at Petrobras conspired with construction companies to inflate the value of contracts. Moreover, much of the extra revenue was funneled to political parties, including the ruling Workers' Party.

bureaucracy, weak and inefficient monitoring mechanisms, and the influence of lobbyists (individuals and companies) on the legislative decision-making process (*Corruption by country: Brazil. Transparency.org*).

The police investigation revealed an intricate scheme of bid rigging, bribery, and kickbacks at Petrobras involving party bosses, high-level government bureaucrats, money launderers, and the heads of Brazil's biggest construction companies. Businesses have shared the profits with politicians, who influenced on the Petrobras investment policy and protected these activities. Among the people accused of taking bribes are former Petrobras executive Paulo Roberto Costa, former Petrobras services director – Renato Duque, Senate president Renan Calheiros, president of the Chamber of Deputies Eduardo Cunha, and former energy minister Edison Lobao. Petrobras has estimated its losses on account of corruption at 2 billion dollars (*Petrobras: escândalo de corrupção causa perdas de US$ 2,059 bilhões Economia.uol.com.br*).

President Dilma Rousseff's approval rating has also suffered from the corruption scandal. As the former Energy Minister, she also held a seat on the board of directors of Petrobras between 2003 and 2010. In August 2015, President Rousseff's approval rating was at a record low of 8%. Moreover, on the 2nd of December of that year, Eduardo Cunha, president of the Chamber of Deputies, initiated impeachment proceedings against the president, accusing her of violating Brazil's fiscal laws and manipulating government finances to aid her re-election in 2014 (*Dilma's disasters. Economist.com*).

This political crisis has been aggravating economic problems as well. Brazil entered into a recession in the second quarter of 2015. Then its GDP shrank 1.7% in the 3rd quarter of 2015 – the third contraction in a row (*Brazil GDP Growth Rate 1996-2016. Tradingeconomics.com*). The unemployment rate, which was below 5% for most of 2014, increased to 7.9% in October 2015 (*Brazilian waxing and waning. Economist.com*), while inflation rate averaged above 9% in August 2015 (*Brazil's economy enters recession.BBC*.com). Moreover, the Brazilian *real* has lost nearly one-third of its value this year (Biller *Bloomberg.com*). The Petrobras scandal has foreign investors spooked. According to the CEPAL (United Nations Economic Commission for Latin America and the Caribbean), foreign direct investments in Latin America dropped 21% in first half of 2015. The biggest drop in the region could be seen in Brazil – a decrease of 36% from January to August (*Foreign Direct Investment in Latin America Drops 21% in First Semester of 2015 CEPAL*). Analysts believe growth might not return until 2017.

Brazil's economy has suffered from the decline in prices for resources like oil (see Table 5) and iron. Oil prices have been falling since June 2014, and are at their lowest levels since the great recession of 2008. The global oil benchmark fell to 34.62 USD per barrel in January 2016 (Macalister *Theguardian.com*). The price of oil is determined by actual supply and demand, and according to experts, the world has been producing far more oil than it needs. Since supply remains much higher than demand, prices have fallen (Kubik *Wyborcza.biz*).

We can expect the problems of Petrobras, caused by the decline in oil prices and the weakness of Brazilian currency, to get worse in the future. It is estimated that the net income of Petrobras between January and September 2015 was 58% lower compared the same period for 2014 (*Skandal korupcyjny w Brazylii*). To counteract these losses, the company is focusing on savings and plans to slash *investments*. At the beginning of 2015, the Petrobras authorities decided to cancel two refinery projects in the northeastern states of Ceará and Maranhão (*Cortes da Petrobras cancelam construção de refinarias no*

Nordeste). Maria das Graças Silva Foster, the Chief Executive Officer of Petrobras, said it was cheaper to import fuels than to build new refineries (*Wielka korupcja w Petrobrasie…*).

Table 5. Fluctuations in oil prices (Brent oil) 2007-2015 (USD per barrel)

Date	Price of oil per barrel
November 2007	92.41
December 2008	39.95
December 2009	74.46
December 2010	91.45
December 2011	107.87
December 2012	109.49
December 2013	110.76
December 2014	62.34
December 2015	37.97

Source: own elaboration based on: *Europe Brent Spot Price,* U.S. Energy Information Administration *EIA.gov*

Between 2003 and July 2008, oil prices rose steadily and afterwards reached a record peak of 147 USD per barrel (*Europe Brent Spot. Price eia.gov*). Then, after the great recession of 2008, they stabilized and generally remained between 70 and 120 USD until November 2014 (see Table 5). For this reason, Petrobras has intended to spend a lot of money on the exploitation of new oil fields and infrastructure for mining projects. But the oil price has been falling since June 2014, so this plan is now unrealistic. Let us not forget that the company is the compulsory operator of new oil fields with a minimum 30% stake in new concessions. Petrobras said it approved a series of measures aimed at maintaining its investments, but experts fear a potential setback in its efforts to continue developing huge oil and gas projects off the coast of Brazil (*Queda no preço do barril do petróleo…*).

Excessive exploitation of mineral deposits may also lead to what is referred to as a "Dutch disease". This term was used in 1977 by *The Economist* to explain the problems of the Netherlands' economy. When large gas reserves were discovered in 1959, Dutch exports soared, which led to an influx of foreign currency and strengthened the *guilder*. This had the effect of making other areas of the economy less competitive in international markets (*What Dutch disease is…)*. President Lula da Silva has quite rightly indicated that a similar eventuality is threatening Brazil. He said that the pre-salt oil deposits may be a strong temptation for easy and quick money, with potentially negative consequences. Fuel exports can lead to the uncontrolled inflow of foreign currencies, a loss of competitiveness in other sectors, and collapse of the economy. It is in this way, the pre-salt oil deposits – a "gift from God" – could turn into a curse for Brazil (*Discurso do Presidente da República, Luiz Inácio Lula da Silva*).

It only remains to hope that Brazil will overcome its current economic problems and benefit from its wealth of oil. The new oil deposits could be utilized for resolving its internal problems, like improvement of living conditions, increasing energy security, and strengthening its international position.

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