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Working Paper 03/21

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Abstract

Due to growing oil imports, political leaders had been forced to let private companies produce the much-needed oil without which modern life is impossible. The most strident political clashes with what is known as 'oil nationalism', both ending in a coup d'état, happened in the period 1954/55 and 1958/63. The former had President Perón's dealings with the California Argentina de Petróleos S.A., a subsidiary of the Standard Oil, at the center of a heated debate and, the latter, had President Frondizi's oil contracts with foreign oil companies. The historical, political and diplomatic background is developed so as to understand the complexities that led to the annulment of this unprecedented and effective policy with impressive effects on oil production and investment. For the first time, we show empirical evidence on the effectiveness of these contracts on domestic oil production.

JEL classification: E22, F21, F23, G31, H54, L16, L52, N46, O14

Keywords: Argentina, economic development, Foreign Direct Investment, import substitution policies, industrial policy, petroleum sector, structural change

> ... We must achieve energy self-sufficiency, based on the exploitation of the oil and coal fields and the use of hydroelectric power. This will allow us to gradually substitute fuel imports ...
>
> *Frondizi's inaugural message, Legislative Assembly, May 1st, 1958*

1. Introduction

This paper examines different aspects of domestic politics and international relations of oil production in Argentina that have been present since it started to be exploited and that have affected the development of the industry in fundamental ways, through a historical reconstruction since the end of the XIXth century until 1966. The main aim of this paper is to analyze the impact of risk service oil contracts, a very specific stage of the import substitution policies in the oil sector, on national oil production.

Our first contribution is a historical reconstruction of 'oil nationalism'. From its beginnings, there has been a bitter discussion on whom should develop the resource, the State or the private sector. This led to the creation of an ideology that can be described as 'oil nationalism' that has had big political presence in politics since the 1920s when H. Yrigoyen first made use of it in 1928's election. Yet, time and again, due to growing oil imports, political leaders have been forced to let private companies produce the much-needed oil, without which modern life is impossible. The most strident events involving oil nationalism, both ending in a coup d'état, were that of President Perón's dealings with the California Argentina de Petróleos S.A., a subsidiary of the Standard Oil, in 1954/5 and President Frondizi's oil contracts with foreign oil companies.

The historical, political and diplomatic background is developed so as to understand the complexities that led to the annulment of this unprecedented and effective policy with impressive effects on oil production and investment. Moreover, our contribution is also enriched by statistical evidence for the period 1907-2006. Emphasizing the role of import substitution policies, we incorporated certain dummy variables into our empirical demand-led analysis

that evaluates the hypothesis of whether the oil contracts with foreign companies were effective or not. Our main results from the performed tests are that, even controlling for external demand and government's expenditures, these contracts have been profoundly effective to increase national oil-production in Argentina.

The structure of the paper will be as follows: In Section 2, we will present our historical reconstruction of 'oil nationalism'. In section 3, we develop a demand-led model for the oil sector that will be a theoretical introduction for our empirical exercise performed in Section 5. Some conclusions will close.

1.1. The First World War (1914-1918)

While oil was produced in Mendoza between 1886 through 1891 by a private company, the 'Compañía Mendocina Exploradora de Petróleo', with some 30 wells in the Province of Mendoza (Yacimientos Petrolíferos Fiscales, 1958, p. 15) and large amounts of oil were discovered in the Patagonian area of Comodoro Rivadavia in 1907, oil development really started to take-off because of the shock created by the First World War (1914-1918). The war not only caused an economic depression, unseen up to that moment, but it also sunk the country in a severe energy crisis. The start of hostilities in July 1914 meant a virtual halt of exports from and imports to Argentina which impacted negatively on prices, overall activity and government's revenue (heavily reliant on import taxes) and on the financial side, to stop the gold flight, the government issued a decree finishing the gold standard (Solberg, 1986, p. 48). According to Havens (as cited in Solberg, 1986, p. 51), the price of coal increased over 500% from 1913 through 1918. Coal imports between 1913 and 1917 fell 82% and the lack of it made railways turn to the use of wood and corn as means of fuel, and set great limits to the navy's operations (Gadano, 2006, pp. 69–70).

Even with this situation, the Argentine government's stance on industrialization was summarized by the Minister of Agriculture, then in charge of oil exploitation, Honorio Pueyrredón in a conversation with the US consul White, where he stated that a bigger population or transforming into an industrial nation would be a disaster for the country as the future was in meat exports and that competing in manufacturing in the world markets was a delusion (Solberg, 1986, p. 65). Hence, then President Yrigoyen's (1916-1922) reaction was slow and inadequate, and the resulting social unrest prompted both military strategists and influential groups of intellectuals to realize that the country's dependency was unsustainable and to conclude that a more self-sufficient and industrialized economy was indeed vital (Solberg, 1986,

p. 47), following the examples of Japan and Germany, and using the theoretical framework proposed by Friedrich List in his 'National System of Political Economy' (Solberg, 1982, pp. 383–384, 1986, pp. 56–57).

With this outlook, the growth in Argentine oil production would have to wait for a change in political leadership. In 1922, President Yrigoyen could not run for the presidency, as the Constitution did not allow, therefore he chose Marcelo Torcuato de Alvear as his successor. In 1922, Alvear was elected president and as soon as he got in charge, he made it clear that he was to organize the oil sector quite differently, making the development of a state-owned oil company a top priority. For this purpose, he named nationalist colonel Mosconi as the head of the company. While in charge of the Argentine Army War Arsenals during the war, Mosconi understood the threat to national security posed by dependence on imported equipment, thus concluding that the country needed to industrialize. Later he served as the director of the Army Aeronautic Service, finding the same problem as the country relied on imported fuel for the military aviation (Solberg, 2001, pp. 62–63). Argentina became the first country outside the USSR to have a completely vertically integrated state-run oil company, Yacimientos Petrolíferos Fiscales also known by the acronym YPF (Solberg, 1982, p. 381).

By 1923, Mosconi launched a strategic plan of investments aiming to cover all areas of the oil industry: production, exploration, refinement and distribution at competitive prices, and making it fully autonomous from the central government, with the exception of its annual budget and major purchases that required the use of credit. Only once he resorted to the president's aid, after Congress refused to finance the construction of La Plata's refinery (among the world's top ten largest in 1925), commissioned to the Bethlehem Steel Corp. of the US (Solberg, 1982, pp. 385–386). Yet, oil exploration lagged behind, as the company wasn't deemed to have enough financial resources to put forward a large exploratory drilling plan that would result in the production per well falling sharply over the period. In 1926, the Director General decided that the company would center its efforts at getting control over all the country's oil production instead on exploration. As a result, YPF's supply as a share of oil consumption fell as imports rose and almost doubled (Solberg, 1982, p. 388). By a decree issued in January 1924, President Alvear turned all parts of oil-rich Patagonia into a reserve to be exploited only by the State and, therefore, limiting the reach of foreign direct investment in the area (Solberg, 1982, p. 390). Yet, the northern part of the country was exempted from this decree, and the Standard Oil started exploring the region of Salta province, which at the time was considered among the richest oil areas in the country

(Bocanera, 2005).

1.2. The emergence of 'oil nationalism'

The Great War had showed that the country had to become more self-sufficient and that at a time of crisis Argentina could not rely on foreign provisions, specially of coal. The military took a central role in pushing the State to lead the oil industry and other basic sectors (Solberg, 2001, p. 60) with a nationalist position, that was also growing among civilians. In 1913, engineer Luis A. Huergo, a prestigious figure in the nation that leaded the General Directorate for Oil Exploitation of Comodoro Rivadavia, published a manifest denouncing the threat that the Standard Oil posed over the country depicting it as a criminal organization that caused a lasting impression in the public (Gadano, 2006, pp. 40–43). Scandals on its pricing policy and tax evasion would follow over the next years (Solberg, 1986, p. 43, 2001, p. 61). The mistrust on foreign oil investment was growing. The leading figure that would settle the idea that oil should be a State monopoly was none other than Mosconi. He developed a theory in which industrialization and oil self-sufficiency were intertwined and in which foreign oil companies only aimed to import oil or establish reserves in Argentina for export, leaving no choice but to develop the industry by the State. To an extent, his assessment was a shared view around policy-makers at the time, as Bradley states

> While Argentina has made remarkable headway in manufacturing, the lack of natural power resources has been a great drawback to its industrial development
>
> Bradley, 1930, p. 119

The method that the head of YPF chose to spread support for the State monopoly was, first, to create a distribution network with gas stations not only in the wealthy capital but in the interior provinces where the private companies did not see enough profit and, secondly, in 1929 by lowering the prices of fuel below the international one by 17% while maintaining a uniform national price (Gadano, 2006, pp. 264–265; Solberg, 1982, p. 391, 2001, p. 73). This policy made YPF a standard in defending consumers and the incendiary speeches against oil multinationals would become a part of nationalists from then on. While the low fuel prices might have helped spawn industrialization, it also prevented YPF from having enough resources to invest in exploration (Solberg, 1982, p. 394). Yrigoyen sided with oil nationalism, interpreting that he would get broad political support from the urban middle classes that saw employment opportunities at YPF and benefited from the low fuel prices. Hence, in 1927 Yrigoyen's party ('Unión Cívica Radical') presented a piece of legislation proposing to give jurisdiction over all oil to the federal government taking it out from the

provinces, implicitly aiming at Salta province, that was negotiating with the Standard Oil. This would not be approved. In 1928, Yrigoyen was elected president again, and a nationalization proposal of the private oil assets was presented. In both cases, the law would pass the Lower House but not the Senate where every province had the same amount of seats (Gadano, 2006, pp. 256–257; Solberg, 1982, pp. 394–397). Although Salta was the province presumed to have the most oil, Jujuy and Mendoza also had stakes in the matter and, even though the other provinces might not have had stakes in oil, this situation would inflame the sectionalism that divided the country between Buenos Aires city and the inner provinces (de Soiza Reilly, 1935, pp. 7–9; Gadano, 2006, pp. 296–301). As the composition of the Senate was the limit for the bill, Yrigoyen intervened many provinces to change the authorities. This led to a legitimacy crisis, the mobilization of the opposition parties that, combined with the effects of the Great Depression of 1929, would lead to the weakening of his political support and him being ousted from the presidency in 1930 (Buchanan, 1973, pp. vii–ix; Gadano, 2006, p. 273; Solberg, 1982, p. 396). To oil nationalists, this coup became an indication of the power of oil multinationals (Gadano, 2006, pp. 274–276) yet, in words of Buchanan,

> The consistent efforts of the Yrigoyenist Radicals to develop a popular rather than a practical petroleum policy constituted a clear case of political opportunism.
>
> Buchanan, 1973, p. 371

In the long run, this ideology would permeate to all sides of the political spectrum depending on the economic condition, whether they were right or left (Berrios, Marak & Morgenstern, 2011, p. 693).

1.3. The infamous decade (1930 – 1943)

The coup, that would kick-start a tradition of military interference lasting over half a century, was led by José Félix Uriburu, a member of Salta's elite[1], so it was expected that he would let foreign oil companies make deals with the provinces and limit YPF's operations. The former happened, and the foreign oil companies duplicated their oil production in the next two years yet the latter wasn't the case (Solberg, 1986, pp. 235–236). Uriburu disappointed those who expected him to go against YPF as he signed three decrees: the first extended the national oil reserve dictated by Alvear in 1924 to all the National Territory of Tierra del Fuego; the second authorized the deal between YPF and Salta province to exploit

[1]Located to the northwest, during the colonial times Salta was located at a strategic position between the silver mines in Peru and Bolivia and the Buenos Aires port where metals were shipped to Spain. Uriburu was a member of one of the families that politically and economically dominated the Province from before the country's independence

the provincial reserve and; the last one, conceded YPF the right to explore and exploit oil in all the country and granted the General Director rights of judiciary and extra-judiciary representation (Gadano, 2006, p. 293). In the last days of his government, Uriburu decreed important investments at La Plata's YPF Refinery that increased the fuel obtained and set up an oil and grease plant (Gadano, 2006, p. 314). Yet, passed two decades of the oil discovery, the national production did not cover even half of the requirements by the end of the 1920s (Bradley, 1930, p. 119).

On November 6th, 1931, two days before the fraudulent election where General Agustin P. Justo[2] was elected president, the Standard Oil signed a deal with Salta for a 30-year concession against the payment of 10% royalties and the authorization to build a pipeline from Bolivia. Just a month later, the agreement was annulled, in part by the public opinion's pressure, but also due to the British lobby (Gadano, 2006, pp. 297–300). Justo's administration aimed primarily to sustain Argentina's ties to the British Empire which was materialized in the controversial Roca-Runciman Pact of 1933 that guaranteed Argentina's access to the British beef market while giving Britain advantages into the Argentine import market. As the British Royal Dutch Shell was a major oil importer to the country, this meant that oil importing interests could not be affected (Solberg, 2001, pp. 79–80). For the US-based Standard Oil the situation was completely different, even though it was an oil producer (Gadano, 2006, pp. 338–342).

In the midst of the Great Depression, in which sales decreased, the State's agencies owed the company a huge debt that had been accumulating since 1929, equivalent to 29% of its sales in 1932, year in which Justo decreed that YPF had to keep on provisioning public agencies at below the market prices. In order to obtain revenue, Justo increased the fuel taxes created by Uriburu in 1931 and, at the same time, curtailed the budget destined to YPF limiting its investment possibilities (Solberg, 2001, p. 79). If this were not enough, Congress imposed an obligation to YPF of contributing a percentage of its profits, ranging from 10% to 30%, depending on the year, a 12% production royalty on all oil output. In addition, the company was put under the government's supervision. All of this lowered the already meager profit of the company to around half after taxes (Solberg, 2001, pp. 82–85). This situation was reversed from 1935, after a presidential decree that centralized oil imports through YPF, which made the company propose a series of agreements to foreign oil companies in order to

[2]Agustin P. Justo was part of the Argentine northeast's elite. He would take side with the 'anti-personalist' branch of the Radical Party (against former President Yrigoyen) and was appointed as War Minister under President Alvear between 1922 and 1928

create a trust (Gadano, 2006, pp. 376–378).

1.4. Peronism, industrialization & mass consumption: 1943-1955

In June 1943, a group of young colonels lead a military coup with a strong nationalistic orientation. The coup designated Col. Juan Domingo Perón as head of the National Labor Department, then an unimportant position, which would soon change as Perón made alliances with unions pushing for the establishment of social reforms demanded by workers. Perón stressed the importance of income redistribution, social justice, a pro-unionization policy and a full employment system led by the State (Ferrer, 1977, pp. 83–84). According to Graña (2007, p. 56), the worker's share of the GDP, between 1943 and 1954, reached the highest point in all of the historical series (up to 47,92% in 1954). From this place he would create his political leverage to be elected president in 1946. Though the start of the import substitution industrialization is set to have started in Argentina in 1930, it is really in this period that it takes off, as the Peronist government elaborated a Five-Year Plan with the objective of industrializing the country.

When Second World War begun, Argentina had its machinery's supply heavily curtailed for as much as 39% of providers were European (of which, 57% being German), 30% were from the USA and only 31% was manufactured domestically. By 1940, the Argentine producer's share grew to 42%, yet 58% was still imported from US providers. This became a great constraint for the oil industry as, according to Escudé (2006, p. 7), the US started an economic boycott to Argentina in 1942, which included '(...) steel machinery, railway replacement parts and rolling stock, petroleum equipment and chemicals, iron and steel, coal, fuel oil, caustic soda and ash, tinplate, etc., to a far greater extent than was justified by wartime scarcities, and with the definitive intention of increasing Argentina's vulnerability (...)', pressuring neighboring countries and UK not to export to Argentina and, once the war ended, the US' Economic Cooperation Administration (ECA) in charge of the "Marshall Plan", prevented that countries receiving dollars from the program use these to import anything from Argentina (Escudé, 1980, pp. 34–37, 2006, p. 8). All this caused a rise in costs of production and, by 1945, these five-fold what they were in 1939 (Gadano, 2006, pp. 456–457).

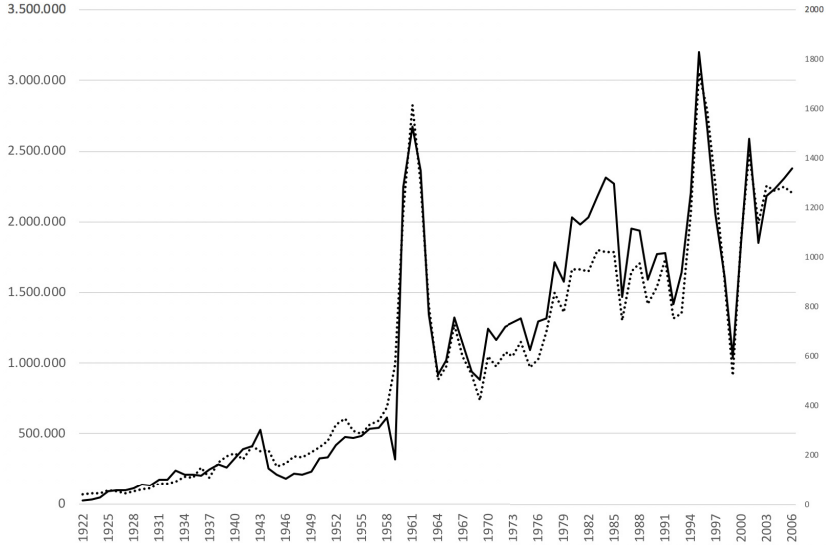
Like what happened during WWI, Argentina had to resort to corn and other substitutes of fuel due to the shortage in oil production (Kaplan, 1973, p. 91; Perón & Santos, 1955, p. 69). At the same time, the country had large amounts of foreign currency reserves and

Europeans were in debt. As Mr. Bruce, the US Ambassador in Argentina noted:

> England, France, and other countries owe large amounts to Argentina but their currencies cannot be converted into dollars and they are unable to supply the manufactured products desired by Argentina. It must be said to Argentina's credit that while we were preparing to put the Marshall Plan into motion, it shipped enormous quantities of foodstuffs to European and other countries without receiving payment.
>
> Bruce, 1979, p. 474

The repayment of these debts in international currency barely happened, as many European countries declared the inconvertibility of their national currencies and refused to pay in US dollars which Argentina needed in order to proceed with its industrialization plan (Escudé, 1980, pp. 1–2, 21–22). More evidence on the limitations established by the international political economy can be found on a series of guidelines on the bilateral trade with Argentina that the then Acting US Secretary of State, Edward L. Reed commanded to the Chargé in Argentina (1971, p. 527) on March 2, 1945, that set: 'Export Policy I. Export of capital goods should be kept at present minimums. It is essential not to permit the expansion of Argentine heavy industry'.

Fig. 1. Meters drilled and finished oil wells (1922 - 2006)



Note: Meters drilled (solid line) and finished oil wells (dashed line). Sources: Own elaboration based on: Dirección General de Minas, Geología e Hidrología (1927, 1929, 1931a), Velasco (2012), State's oil statistical reports published between 1960 and 1999.

Nonetheless, it is worth noting that US' exports of sensible material were curtailed to many countries after the enactment of the Export Control Act of July, 1940, that granted the US president the authority to ban or limit the export of basic war materials, including most machinery (US Department of State, 1943, p.97). Hence, the idea of an economic blockade specifically directed towards Argentina before 1945 could have been pushed as a way to exert diplomatic pressure. On the other hand, after the war, the international economic activity started to dwindle and by 1949 the US suffered a recession which worsened the dollar shortage in Europe and pushed the UK to start a program of "curtailing the dollar outlays of the entire sterling area by 25 per cent" (Menderhausen, 1950; p.2). Under Bretton Woods' agreements, the lack of dollars was noted with great preoccupation by Europeans that tried to eliminate dollar expenditures, specially on oil (Menderhausen, 1950; p.3). In this context, Argentina's objective of being paid for in dollars was doomed to fail.

It should also be taken into account that among the top priorities of the US was the industrial

reconstruction of Europe, and the industrialization of Argentina would have been in the way. The interests of the Great Powers in combination with gross mistakes in foreign policy, the prosecution of the five-year plan aiming for industrialization, which was forced to focus mainly in light industries, the increase in worker's incomes and a shortage of supplies for oil extraction caused the systematic growth in the share of imported oil over total consumption (Instituto Argentino del Petróleo y el Gas - IAPG, 2007) between 1945 and 1950, turning almost half of all the oil consumed. Moreover, the share of fuel and lubricant imports on the total share of imports and as a share of exports (Ferreres, 2010, pp. 723–725) started to grow from 1945 and would keep on growing until 1957. If we were to compare the investment in the oil sector where drilling is the main component, the tendency was dwindling (see Figure 1). And if we were to take all the period comprised between 1923 and 1957, 9 out of 34 years (26,47% of the period), there were less drillings than the year before. This is reflected on the yearly average growth in oil production of 7,78% over the period. This problem did not go unnoticed by the government and, as the US Ambassador Messersmith (1971, p. 280) pointed out in a secret message to the Secretary of State, May 9, 1947:

> In view of the importance of fuel, and particularly petroleum, in the Argentine economy, there were definite indications that the Argentine Government was viewing the problems of the foreign oil companies with greater understanding, and particularly in view of the fact that the Government was much dissatisfied with the operations of the Government company Yacimientos Petrolíferos Fiscales (YPF).
>
> Messersmith, 1971, p. 280

As Buchanan harshly remarked (1973, p. 307), 'Petroleum is a high risk, capital intensive industry which demands sophisticated technical skills, and Argentina simply lacked the capital and the technological resources to attain fuel autonomy without foreign investment.' Yet in 1949, the Chief of the Division of River Plate Affairs, Tewksbury (1979, p. 480) remarked that the harm done by the ECA was 'irreparable' and that the economic situation could 'lead to a catastrophe'. The US granted a loan for U$S 125 million in 1950 (Escudé, 1980, p. 38), yet the structural situation was unaltered and worsened by droughts in 1950 and 1952, and to a lesser extent floods in 1951 (Scarpati & Capriolo, 2013, p. 5), making the situation only more desperate, as this produced a fall in exports of around 50%. One of the consequences of this was that the government started reconsidering its policy towards foreign investment, creating a new law that increased the limit on foreign currency that companies could send abroad (Ferrer, 1977, pp. 93–94). By 1954, the country's foreign currency reserves were exhausted from paying for the oil imports which forced the government to review its nationalistic position for a realist perspective. On April 22, 1955, Perón issued decree 5.884 (Perón,

Borlenghi & Santos, 1955) where it states clearly that as the Second Five-Year Plan aimed for national fuel self-sufficiency which was regarded fundamental for the 'economic growth, the country's well-being and national security', the Ministry of Industry was granted authorization to start negotiations with the California Argentina de Petróleos S.A. (CAPSA), the Argentine subsidiary of the Standard Oil over a contract for exploration, search and drilling in a location to be determined. The most important parts of the negotiations can be broken down into the following points (Cámara de Diputados de la República Argentina, 1955):

1. The CAPSA was granted the right to explore and exploit in an area on the National Territory of Santa Cruz, covering 50.000 km^2, which would reduce 20% after 4 years, another 20% after 6 years, a 10% reduction at 8, 10 and 15 years, and an additional 20% reduction after 20 years from the start of the contract.
2. The contract would last for 40 years, with the possibility to extend it for 5 more years in accordance to the applicable law and if there was production at economic costs.
3. For exploration purposes, CAPSA compromised U$S 13,5 million in the first 4 years and drilling equipment in a relative relationship to the territory granted to the company for exploration for 20 years, whether oil was found or not.
4. For exploitation purposes, the company had the right to develop the oil sources it found.
5. The company had the right to build the oil pipelines it needed (and a refinery in the future).
6. The price settled was that of the East Texas, corrected by density and quality, subtracted a 5% and limited by the crude of Venezuela on 20 cents below or above the first one.
7. With regard to gas it fixed that, every 1.000 cubic meters, it would be payed as an oil barrel.
8. The price of gasoline was fixed at a relation of 1,25 to 1,5 of that of oil (taking into account the steam's tension).
9. The government participated in around 50% of the profit through taxes and additional benefits.
10. The payment to the company would be done monthly, in dollars, deducted the government's part. And no limit to send this payment abroad.
11. Crude oil exports were allowed if self-sufficiency was achieved. Until then, oil had to be sold to YPF.

An additional contract (Santos, 1955, pp. 54–62) obliged YPF to share the geological and

geophysical information it had elaborated until 25 April 1955 over the area under the contract with a payment by CAPSA with a base of U$S 500.000 and U$S 380 for every profile. This would be key in order to limit the geological risk, as only 1 out of 9 drillings were successfully productive in unknown areas (Santos, 1955, p. 11), and speed up production. Two weeks later, decree 6.688 (Perón & Santos, 1955) approved the terms of the negotiation recognizing that 'in order to dispense with imports as quickly as circumstances require, the cooperation of capital and private technical resources is essential' and, in article 3, it forwarded it to Congress for its approval. Yet, this was done even if as he once stated to the US Ambassador in 1947 in a private meeting, that 'conversations with congressional leaders had convinced him that it would be impossible for him to get the Argentine Congress to adopt a law which would permit foreign companies (i.e. American companies) to carry out explorations dealings and the development of Argentina's petroleum resources.' (Perón et al., 1971, p. 284).

Adolfo Silenzi de Stagni, a lawyer that took part in the government, became the most ardent opponent to the contract and, in a much-publicized conference titled 'The Argentine oil' (1955), he pointed out that it was a 'typical unconscionable contract', a 'capitulation' and accused the government of giving off the country's sovereignty. Perón's fears became reality and Congress, even part of the Peronist party, ended up rejecting the contract with the California Argentina S.A. This weakened his power as president and 4 months later he would suffer a military coup that would maintain the industry's status quo until a new government was elected in 1958.

1.5. Developmentalist government (1958-1962)

After the 1955 coup, the Peronist party was banned and could not participate in elections until 1973. Hence, the Radical party became the dominant actor in electoral politics yet, in 1957 it divided between the Unión Cívica Radical del Pueblo (People's Radicals) led by Ricardo Balbín (and later by Arturo Illia), with a conservative and anti-Peronist orientation and the Unión Cívica Radical Intransigente (Intrasingent Radicals) led by Arturo Frondizi who in 1956 associated with Rogelio Frigerio, a charismatic businessman who elaborated an economic theory of development - strongly influenced by Arghiri Emmanuel - that would be known as 'Developmentalism' and would become his chief economic adviser. In 1954, as a lawyer specialized in oil related issues, Frondizi published 'Oil and Politics' where he criticized the Peronist government's negotiations with foreign oil companies. Among other things, he wrote that

> The main obstacle to the country's progress is its close dependence on the import of fuel and steel. That dependency weakens our capacity for self-determination and jeopardizes our sovereignty, especially in the event of a global war crisis. Argentina currently imports around 65% of the liquid fuels it consumes. On about 14 million cubic meters, consumed in 1957, approximately 10 million came from abroad.
>
> Frondizi, 2011a, p. 106

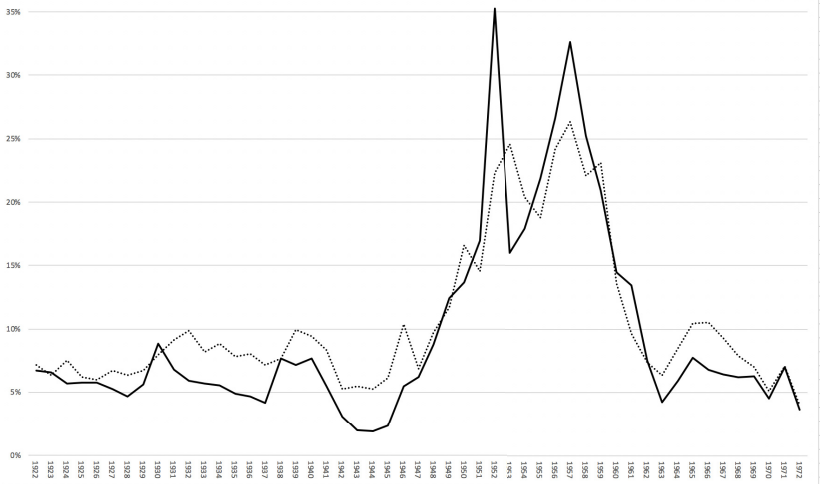
Yet Frondizi's oil nationalist stance and his view on the role of foreign investment was deemed to be changed, mainly by Frigerio's persuasive arguments in the years prior to his election as President of the Republic. The theory developed by Frigerio concluded that the modern world saw a process of concentration and centralization disregarding of the system of political economy, be it socialist or capitalist, which transcended the Nation State and as it caused the internationalization of capital, it triggered a fundamental contradiction with it (Frigerio, 1981, pp. 153, 156). As multinational corporations would try to dissolve the Nation State so as to create economies of scale that cover the whole of national territories, it would seem that there was a contradiction between a complete economic development of the nation - that would let it be independent of transnational strategies - and foreign investments (Frigerio, 1981, pp. 156–157). Nonetheless, Frigerio considered that foreign investment by multinational corporations was needed and unavoidable for the Nation to develop, as they were the holders of most investment capacity (Frigerio, 1981, p. 157). The alternative to use it in a national strategy would lie in other contradictions that would leave room for this to happen. First of all, competition still exists and it is not intended that the Nation State should work for the monopoly but build a relationship with it in line with the national interest (Frigerio, 1981, p. 157). And, secondly, thanks to the competition among Great Powers in a setting of 'pacific co-existence' that created favorable circumstances that, from the point of view of the Western world, imposed the promotion of economic development (Frigerio, 1981, pp. 161–163). As summed up by Arturo Sabato, an oil engineer who became the President's chargé at YPF in the years of his administration, the main turn made by the Developmentalist doctrine was the thesis that

> capital - national or foreign - is colonialist when it is dedicated to groups that strengthen dependency and, on the other hand, it is liberating when it is invested in the basic sectors of an economy. [And so] Importer capital, be it national or foreign, tends to subdue us, because its specific interest is that we do not free ourselves from that dependence from abroad that is the source of its profits and its power.
>
> Sabato, 1963, pp. 17–18

As a result, Frigerio divided nationalism in two: 'nationalism of objectives' and 'nationalism of means', the latter rejecting any foreign investment as colonialist but having no issues with letting any amount of oil to be imported rather than to be extracted with non-State resources. Hence, with regard to oil, Frigerio took the failed Peronist contract with California Argentina de Petróleos S.A. as a model to work around with foreign oil companies. The other issue that forced Frondizi to change his mind was the reality of the situation the country was in when he got into power. In a Memorandum by the US Department of State (1991a, p. 502), August 22, 1958, the situation is described as follows:

> (...) the problems are so pressing that [Frondizi] has limited time in which to show results before unrest could come to a head. Unless he can rapidly alleviate the economic distress, he may be unable to finish out his term.
>
> US Department of State, 1991a, p. 502

Fig. 2. Fuel and lubricant imports as a share of total imports and exports (1922 -1972)



Note: Fuel and lubricants as a share of total imports (solid line) and as a share of exports (dashed line). Sources: Own elaboration based on Ferreres (2009, p. 723-725).

As shown in Figure 2, the share of exports used to import fuel and lubricants grew year after year from 1945 on, reaching 26,36% of the value exported in 1957, this being 32,62% of all

what was imported to Argentina that year. In a private meeting with vice-President Nixon in Buenos Aires, April 30, 1958, Frondizi stated that

> (...) it would be fruitless to continue the same old discussions of the past several years regarding concessions, that it was simply not acceptable for Argentina to enter into such arrangements. Rather, he urged that those interested in developing Argentine oil negotiate on the basis of a contract acceptable to the Argentine people, and one at the same time fair to the investors, to permit useful cooperative ventures in the petroleum field.
>
> US Department of State, 1991a, p. 478

The US would cautiously provide aid to Argentina at the beginning and only increase it after the new government had made reforms that aligned the country to US diplomacy (Walcher, 2007, p. 73). In a speech to the Nation titled 'The Battle for Oil' (Frondizi, 2011a, pp. 107–117), 24 July 1958, he outlined the situation and the strategy the government would take. In the speech, Frondizi mentioned that 65% of the oil consumed in the country in 1957 was imported, being 21% of total imports. In his analysis, he provided, among others, the following points:

1. On May 1, 1958, the Central Bank had foreign currency and gold valued U$S 250 million and, between his inauguration May 1 and December 31, the country needed U$S 645 million to pay for its imports and obligations.
2. The country needed oil self-sufficiency which could be achieved thanks to its proved oil reserves and YPF with the know-how to do the technical analysis.
3. This was of the utmost importance so that the country could use foreign currency to import machinery and equipment for industrialization.
4. Foreign oil companies were essential to extract the most oil possible in the least time required and they would do business with YPF in the form of contracts, not concessions, meaning that the oil will be sold directly to it.

On the contrary to what happened in years past, the International Relations environment played in favor of the government's plans (US Department of State, 1991b, pp. 507–509) yet, the political situation was unstable throughout the whole period. As Frigerio later recalled, 'our government had to overcome multiple attempts at coups d'état, since there were 38 'situations' in 40 months' (Frigerio, 1981, p. 89). As part of the developmental strategy, the government limited imports and encouraged the settlement of industries in the country through two laws passed before the end of 1958 in which investors were insured that they

would be able to convert their profits into dollars and send them abroad, one relative to the establishment of foreign capital and the other for industrial promotion (Grenoville, 2002, pp. 586–587). It has to be noted that the oil self-sufficiency was only a part of the government's plans that included steel mills, dams and electricity production, chemicals, vehicles, machinery for agriculture and, also, the building of roads and connectivity throughout the entire land, among others (Frigerio, 1960, pp. 11–12; Frondizi, 2011b, pp. 407–412).

From the president's inauguration day on, the government started negotiations with foreign oil companies with which it had had communications since February 23, 1958, the day Frondizi was elected and, after 60 days it signed different types of contracts: five of which were exploration contracts with the aim of discovering new deposits and in which the companies ran the mining risk of the operation and five other in exploitation or development, in order to increase production immediately. The companies started supplying oil only 6 months after the contracts were signed (Frigerio, 1979, pp. 18–19, 48, 196). These contracts were so-called risk service, that granted a contractor status together with the risk of the operations and payed for the works only if oil was extracted, yet not giving ownership over it (Müller & Stern, 1989, p. 195). It is worth mentioning that Frondizi also had negotiations with the USSR that financed oil equipment for over U$S 100 million at 2% interest a year (Walcher, 2013, p. 32).

The Argentine government first tried to offer a proposal to the biggest oil companies to make exploitation contracts, but this offer was rejected. Hence, the first negotiation had to be made with smaller companies, for which the magnitude of operations in Argentina was considerable and, based on it, they could broaden their participation in the oil business. Once the contracts were formalized, large companies such as Shell and Esso had no choice but to participate so as to not be totally out of business (Frigerio, 1981, p. 162). Most contracts were negotiated by Arturo Sabato, the presidential delegate at YPF. In Appendix A a description of the two most successful contracts can be found.

The oil production and exploration rose to levels not seen since oil was discovered in the country, diminishing oil importation from 32,62% of total imports in 1957 to 4,2% in 1963 (IAPG, 2007). The companies had to provide with everything that was required in order to advance an oil operation, from staff and equipment to the planning of work while YPF maintained the ownership of the wells, its production and would bear the burden of most taxes and levies. The only contract that instituted a structure for cooperation between YPF and the contractor was the one with Carl Loeb Rhoades Co.; the APCO Contract created

a 'Work Committee' that audited and controlled; and the rest created a structure to settle differences in opinions between the contractors and YPF (Müller & Stern, 1989, p. 207). In all cases but one, contracts were subject to Argentine courts of law and listed force majeure situations that would suspend rights and obligation while the situation lasted (Müller & Stern, 1989, pp. 218, 224). All contracts had renegotiation clauses as the span of the contracts was long enough to foresee changes in standards that were set out in the contracts, that were linked to it or due to the possible mutual benefit of postponing some issues (Müller & Stern, 1989, pp. 220–221). Also, in every contract there was a default clause concerning YPF and the government on one side, and by the companies on the other, which might have been ill-defined, as minor violations could have been considered breaches (Müller & Stern, 1989, p. 223).

While in the period 1958-1963 the drilling count amounted to 5862, in the period 1922-1957 it reached 5930 (5709 for the period 1964-1973). This means that in five years almost as much as the previous 35 years of drilling took place, and it would take another 35 years to reach the rig-count of 1960. The oil production, that had been growing at an average rate of growth of 3,99% yearly, with ups and downs, dramatically changed in the period 1958-1962, as it grew at an average rate of growth of 23,82% yearly. Crude oil production that took 19 years to duplicate in the period 1938-1957 from 2.438.694 toe to 4.858.071 toe, just took 5 years to grow 247,75%, from 5.668.120 toe in 1958 to 14.042.963 toe in 1962 (Bénichou, L., Ringenbach, C., & Kahraman, Z., 2020 and IAPG, 2007).

1.6. Criticisms & Oil nationalism

As what happened when Perón tried making a contract with CAPSA, the oil nationalist rhetoric reached levels of mass hysteria led by the 'People's Radicals', the faction that had opposed Frondizi. Prominent Argentines condemned the contracts as outrageous handouts to foreign companies and, once again, professor Silenzi de Stagni undertook a nationalist campaign accusing the government of 'treason to the homeland'. Critics denounced that the large remittances of companies' profits nullified the import savings that were made by the increase in production and that payments in dollars that YPF had to do for the contractors' oil jeopardized the finances of the state company; that the mining code in effect at the moment would have prevented foreign companies, or the contract modality, to operate as they had (Solberg, 1986, p. 252). The contracts forced the Central Bank of Argentina and the Industrial Credit Bank to 'provide free access to their exchange reserves', which was forbidden by the charters of said banks (Luce, 1966, p. 2089). Another issue that was

raised which would have made them null was the lack of public bidding, though a clause in YPF's articles of association added before the contracts were signed clearly stated that the company could resort to public or private bidding or, even, direct contracting (Mairal, 2019, pp. 11–12). It was pointed out that the contracts were not such, but concessions, given the fact that the wells would be fully exploited by the time the contracts ended and so it would require Congress' approval (Mairal, 2019, p. 11). Also, as the President's chargé had negotiated the contracts secretly and without the consent of Congress, this was made one of the main criticisms and an argument that increased the nationalist's suspicion (Conesa, 1963, pp. 7–9; Illia, 1964; Solberg, 1986, p. 252). To this, it was counter-argued that, aside from it being legal in the Argentine administrative law, it was also the president's authority to intervene SoEs and change its articles of association (Mairal, 2019, pp. 10–11). Also, as YPF had the legal authority to do this sort of business, due to the situation the country was in 1958 there wasn't timely or convenient to go through a bidding process. Arturo Sábato would remark that:

> (...) Regarding the advantages of the bidding procedures, it is worth remembering the tender that on April 4, 1957, YPF carried out to drill 40 wells in Tierra del Fuego. The works began on March 25, 1959, that is, two years later. Tennessee, on the other hand, started the exploitation works in Tierra del Fuego a month after the contract was signed and three years after it started, it had accumulated a production of 1.300.000 m^3 of oil.
>
> Sábato, 1963, p. 45

A similar situation happened in 1960 when YPF used a public bidding process to build a lubricant's plant which ended up not being built after three years (Sábato, 1963, pp. 45–46). Another point raised was that some provinces where contractors operated had special provisions in their constitutions forbidding anyone but the public companies to extract oil yet, as Conesa (1963, pp. 47–48) explains, the enacted laws passed by National Congress abiding by the National Constitution are above provincial laws and constitutions.

Finally, critics also pleaded that the price set for the oil extracted and delivered to YPF by the contractors was up to five times over YPF's costs of production and that there was no limit to over-exploitation which would lead to YPF paying for oil that could not store nor transport leading to it being lost by evaporation (Luce, 1966, pp. 2082–2083). However, the oil extracted was considerably cheaper than what it costed an imported equivalent and also in relation with YPF's cost. According to Sábato (1963, pp.73, 76–77), the financial cost per m^3 for the public company was U\$31,50/m^3 in 1961, U\$22,25/m^3 in 1962, U\$18,70/m^3 in 1963 and was projected to be U\$13,30/m^3 in 1970. Taking Frigerio's statements (1979,

p. 49) before the Special Investigative Commission on Oil between July 30 and August 19, 1964, on production costs per m^3: '(...) considering similar areas, the values are: Pan-American, U$9; YPF, according to [YPF's president Facundo] Suárez, U$13, according to the Ministry of Energy, U$23. Loeb Bank, U$7; YPF, according to the Ministry of Energy, U$11'. While YPF itself calculated that wages totaled half of the cost of the oil extraction, in the private sector this figure never passed 36% (Sábato, 1963, p. 80). As an example of this Frigerio (1979, p. 47) remarked, that the Loeb Bank exploitation, employing 350 workers, was equivalent to that of YPF in Mendoza province that employed 2500 workers. Nonetheless, in 1963, Esso and the Standard Oil accepted that the prices set in the contracts might have been too advantageous and that a renegotiation was acceptable (Walcher, 2013, p. 39). Weakened and cornered, especially after allowing the Peronist party to run in an election they ended up winning, in march 1962 Frondizi finally lost the confidence of the military which, in turn, carried out a coup (Walcher, 2013, p. 34).

1.7. Annulment

Even though Arturo Illia thought that YPF did not have what was needed to achieve and sustain oil self-sufficiency (Walcher, 2013, p. 51), the presidential campaign centered around the invalidity of the oil contracts, making it almost impossible for him to depart from this electoral promise without having to confront mass opposition (Walcher, 2013, p. 35). All the arguments from the oil nationalists were written down in the considerations of the annulment decree 744/63 November 15, 1963. There it can be read that 'in the sphere of oil policy we shall fulfill what we have repeatedly promised. The contracts which were signed in disregard of the law and of the economic interests of the country will be annulled and YPF, in accordance with the soundest Argentine tradition, will be the body to direct our development' (Illia, 1964). After annulment, the bilateral relations with the US were heavily affected (Walcher, 2013, pp. 26, 44) and one of the main concerns in US diplomacy was that Peru and Venezuela might follow the Argentine example (Walcher, 2013, p. 38). As a direct result, the US Congress, worried about US investor's private property rights, hence passing the 'Hickenlooper Amendment' to US foreign aid laws that would force the US government to suspend any assistance or program to countries that repudiate or cancel contracts with US companies if, within 6 months, there was not a 'speedy compensation for such property in convertible foreign exchange, equivalent to the full value thereof' (Luce, 1966, pp. 2078–2079, 2081). This amendment was viewed as a direct attack to Argentine sovereignty (Walcher, 2013, p. 46). According to Luce (1966, p. 2085) the amendment was ignored and had no efficacy in forcing a 'speedy' agreement. In one place, one of the problems in

applying the amendment to the case was that the companies had no ownership over the oil fields and, on the other, the oil companies didn't think it was benefiting their bargaining position with the Argentine government (Walcher, 2013, p. 43).

The Argentine government reached an agreement with almost all of the contractors, except for Pan-American and Cities Service (this one, assignee of the rights of Carl Loeb Rhoades), in order to retake the facilities and personnel, granting that they had not done anything illegal, hence granting reparations to them for the investments they could not recover, and also resulting in failed exploration investments to be compensated. The two companies that did not reach an agreement appealed, kept on operations and got their rights recognized after the 1966 coup d'état (Mairal, 2019, p. 13). In a meeting between president Illia and US ambassador Robert McClintock, the former mentioned that companies would receive an estimate of U$S 200 million (McClintock, 1971, p. 416). Different estimates go from U$S 100 to U$S 200 million, amounting 10% to 20% of total exports at the time (de Pablo, 2018, p. 18; Mairal, 2019, p. 14), still less than the calculated U$S 209,8 million in investments calculated by Sábato (1963, p. 68) and the U$S 375 million that the companies claimed to have invested (U$S 154 million in oil, services, loans and a pipeline) (Luce, 1966, p. 2086).

1.8. Possible Reasons for the Annulment

To list some possible interest groups that would benefit from reverting the situation to the previous status-quo, aside from YPF, a company that saw its traditional place threatened by the foreign oil companies, it can be said that one of the parties most interested in the contract's annulment fell on part of the contractors themselves as this would let them resort to a court of law and demand the compensation which was set in the contracts due to the government's interference. Frigerio (1979, p. 47) described the contractors interests in the following manner:

> Except for a single company, the companies have not recovered their investments. Instead, several of them have invested around 60 million dollars without result, without being able to repay them. They will only be able to do so if the cancellation of the contracts is carried to the last consequences, because those companies have made these investments based on mining risk.
>
> Frigerio, 1979, p. 47

Another possibility is elaborated by Mairal (2019, pp. 17–21). His argument is that traditional trade relations with the UK would have been at risk due to the oil self-sufficiency as

the trade agreements signed between the two countries in 1949 were of barter between beef on one side, and fuel on the other. As the beef industry held an important political leverage in the People's Radical Party, and given the fact that almost half of exports during the 1955-1960 period was beef, of which 63%-88% went to the UK, it could make sense to think of it as one interest group lobbying against the contracts, yet it might be too far-fetched to put it as the key element.

Last but not least, the key player whose interest had been harmed by the country's oil self-sufficiency, that is, oil importers. The importance of this interest group is revealed at a dinner organized by banker Alex Shaw May 22, 1965, with US Ambassador Edwin M. Martin in order to dissuade General Jorge Shaw of the need of a coup against Illia's government. This dinner included José Martínez de Hoz, former Minister of Finance of coup to Frondizi, and the representative of one of the major oil importers in the country, President of Shell, Enrique Puricelli. It was discussed the possibility of reintroducing 'a law to permit contracts involving risk' to which Puricelli and Martínez de Hoz pointed out that Congress would disapprove. The cable's transcription sums up the view of this sector: 'the Shell representative made clear the scarcity and relative high cost of petroleum resources in Argentina and the long term necessity for substantial imports' (American Embassy of Buenos Aires, 1965, p. 1). In other words, a defense of oil imports, which can be understood easily in Frigerio's explanation:

> And of course, in addition to breaking ideological taboos, we ruined a business of 300 million dollars yearly (...) The same amount of capital must be put on one oil well in Argentina as on another in Saudi Arabia; instead the results are different, since in Argentina there's an average daily production of 10 cubic meters per well while in Saudi Arabia there are wells of 500, 1000, 2000, and even more cubic meters of daily production.
>
> Díaz & Frigerio, 1977, p. 50

So far we have developed the notion of 'oil nationalism' and its counterparts. Given the lack of studies analyzing empirical evidence on the subject, we have decided to shed light on this issue by analyzing the impact of oil contracts on national oil production. We will do this in the next section.

2. Production theory, data and estimation strategy

There is a vast literature on proposed determinants of oil production, most of them focused on the supply-side, like the studies researching the behavior of OPEC producers with regard to pricing strategies yet, none have been found researching the effects on autonomous demand changes on oil production.

For example, by setting production and costs functions, Reiss (1990) builds an empirical model to establish the determinants of oil and gas exploration and development investments, assuming a homogeneous good, constant costs of wells, and the same degree of drilling by every firm (which increases stock of reserves), concluding that the main determinants of oil production are the financial liquidity of the sector to invest, the maturity of long-term debt, the possibility of using oil as a collateral for loans and price changes which can be influenced by deregulation, substitution and weather conditions.

Kaufmann and Cleveland (2001) propose a vector correction model for oil production in the period 1938-1991 in the lower 48 states of the United States, relaxing restrictions on the basic Hotelling (1931) model for nonrenewable resources. Their model assumes some limitation on competitive markets by a prorationing policy of the Texas Railroad Commission (TRC), an average cost of production and they differentiate the effects over production of increases from decreases in prices. The cointegration analysis indicates that oil production shares stochastic trends with the decomposed price series, average costs, and prorationing decisions, yet it's unable to state a production path such as in the classic Hotelling model.

Henderson (2015) does not provide an econometric model but, instead, provide an analysis of the oil production determinants such as the maturity of oil fields, the incorporation of Western technology, real prices for oil, exchange rate devaluation, the impact of sanctions on machinery imports, the access to capital markets by Russian oil companies and tax regime adjustments.

Cologni and Manera (2014) propose an econometric model to measure changes in oil production for small and large producing (and exporting) countries due to changes in international oil markets, be it in real prices or in the world demand by using Autoregresive Distributive Lag (ARDL) and Error Correction (EC) Models. The proposed model assumes profit maximization by price-takers which don't coordinate the level of output with other producers that, nonetheless, are non-competitive due to local restrictions. As for specification results,

after applying an ADF test in relevant variables, they suggest that oil production tends to be I(1) with some important producers being stationary around a trend. The applied unit root tests suggest that world oil demand is I(1). For many countries, there seems to be a cointegration relationship between oil production, world oil demand and oil prices. For some countries, the effects of positive oil demand shocks are larger than the reverse. The ARDL and EC estimations suggest that output adjusts to changes in oil demand. The model does not reject the hypothesis of no effects on production by price changes.

Following the lack of analysis for the Argentinian case on this matter, in order to examine the impact of these contracts with foreign enterprises on national oil production, we first need a theory of production. From a demand-led approach, we asked ourselves which are the main determinants of oil-production. In this sense, we firmly believe that a long-run demand-led oil production might be driven by long-run autonomous components of aggregate demand. We refer here, in particular, to autonomous demand-led growth models, in which capacity adjusts to demand in the long run. Models of this type include the Sraffian supermultiplier (see, for example, Serrano (1995a); Serrano (1995b); Freitas and Serrano (2015)) and the amended versions of the Neo-Kaleckian model with autonomous components (Allain (2015); Lavoie (2016)). If there is a permanent increase in autonomous demand, then production must adjust in the long-run. Following this reasoning, the SSM reverts Say's Law in the long-run. We think that this framework is useful in applied economic problems.

Although here we are applying this model to a particular sector and we are not treating the aggregate economy (that can be found, for example, in Freitas and Serrano (2015)). The oil sector is a basic commodity in terms of Sraffa (1960), so any change in aggregate demand will impact on oil production. In our sectoral-oil version of the model, output is equal to the product of autonomous demand Z and the so-called supermultiplier:

$$Y = \frac{Z}{s + m - h} \tag{1}$$

s and m are, respectively, the marginal propensities to save and to import. Oil business investment is assumed to be fully induced and can be represented by equation (1), which is the simplest way to reflect that entrepreneurs invest in order to be able to produce the amount they are demanded,

$$I = hY \tag{2}$$

where h is the aggregate marginal propensity to invest. Beyond the short run, this variable adjusts over time. Indeed, as long as oil firms experience discrepancies between the effective

speed and the *normal* speed of production, they will adjust their investment spending to be able to operate with the normal *speed* of production; at the sectoral level, these changes in investment spending manifest themselves as an adjustment in the investment share:

$$\dot{h} = h\gamma(s - s_n) \tag{3}$$

where $\dot{h}$ is the behaviour through time of the investment share, γ a parameter, s the effective speed of production of plants in the oil sector and s_n the normal speed of production of plants and equipment in the oil sector. The dynamic system given by (3) and the following equation allows us to study the equilibrium[3] results of the model,

$$\dot{s} = s(g_Y - g_K) \tag{4}$$

Where $\dot{s}$ is the behavior through time of the speed of production, g_Y and g_K the rate of growth of output of oil and the accumulation rate in that sector, respectively. In the long-run,

$$g_Z = g_Y = g_K \tag{5}$$

$$s = s_n \tag{6}$$

In our oil model, in the short-run the oil firms adjust production with a change in the speed of operations, while in the long-run they adjust productive capacity. In the end, the rate of growth of oil production will follow the rate of growth of autonomous components of aggregate demand (g_Z). Furthermore, although m is treated as a parameter, it could change through industrial policies.

With this demand-led model in mind, we will try to asses empirically the impact of a change in autonomous components of aggregate demand (public expenditures and exports) on the production of oil and the impact of industrial policies in particular periods of the Argentinian history, with a special emphasis on the 'Developmentalist' state of Frondizi. Therefore, we decided to built a dataset for the period 1907-2006. Given the combination of I(0) and I(1) variables of our dataset, a generic Autoregressive Distributive Lag (ARDL) long-run model is applied with the following form:

[3]See Freitas and Serrano (2015) and Pariboni (2015) for an analysis of the dynamic stability conditions of the equilibrium.

$$LPAR_t = C + \alpha_1 LPAR_{t-1} + \cdots + \alpha_n LPAR_{t-n} + \beta_1 LGPAR_t + \cdots + \beta_n LGPAR_{t-n} + \gamma_1 LERW_t + \cdots + \gamma_n LERW_{t-n} + \delta_1 D2629 + \delta_2 D3538 + \delta_3 D5862 + \epsilon_t \quad (7)$$

where C is the constant and ϵ_t is a random disturbance term; the total Argentine oil production (PAR) and the total world's energy production (as a *proxy* of foreign demand - exports), subtracted that of Argentina (ERW) were compiled based on Bénichou, L., Ringenbach, C., & Kahraman, Z. (2020); and, the Argentine central government's spending (GPAR) was compiled based on Ferreres (2010). D26-29, D35-38 and D58-62 are dummies. Every value was updated at U$S 2015 and logs were applied to every variable. As we said, we have chosen the ARDL[4] methodology because of the presence of a combination of I(0) and I(1) variables. LPAR is I(0) while LGPAR and LERW are I(1) (see Appendix B on Unit Root Tests).

The model has a max of 4 lags on the dependent variable and 3 on the regressors in order to better the fit, selected with the Akaike selection method info criterion. Three dummies are set in order to test for any significant changes in oil production: 1926-1929, years in which Gen. Mosconi, in charge of YPF, took the political decision that oil production was to be monopolized by the national oil company; 1935-1938, in which Gen. Justo created a cartel of imported oil led by YPF, and; 1958-1962, years in which the first risk service contracts were signed between YPF and foreign oil companies. To determine the long run relationship, we use a Long Run Form and Bounds test. For robustness, as heteroscedasticity is present, we use a HAC (Newey West) coefficient covariance matrix. Furthermore, a Granger causality test is run for the three variables. Finally, to check for robustness, we run post-estimation tests such as a residuals normality test, specifically, the Jarque-Bera test. For auto-correlation, we run the Breusch Godfrey test and, lastly, to check for the correct specification, we run the Ramsey RESET test. As for dynamic stability, we run the CUSUM and CUSUM of Squares test. Granger causality test and post-estimation tests are shown directly in the Appendix C.

[4]ARDL cointegration technique is preferable when dealing with variables that are integrated of different order, I(0), I(1) or combination of the both and, robust when there is a single long run relationship between the underlying variables in a small sample size. The long run relationship of the underlying variables is detected through the F-statistic (Wald test). In this approach, long run relationship of the series is said to be established when the F-statistic exceeds the critical value band.

3. Results

In this section, we present the econometric results for the proposed theoretical model and present the estimated determinants of the Argentine oil production (LPAR). We specify the model with 96 included observations as an ARDL(4,0,2) in which the dependent variable (LPAR) presents 4 lags; the first regressor (LGPAR) has no lag, and; the last regressor (LERW) has 2 lags, with all the variables expressed in logarithms.

Table 1: Short-run results

Variable	Coefficient
C	-1.3395***
LPAR(-1)	-0.1466***
LGPAR	0.04511*
LERW(-1)	0.1278***
D(LPAR(-1))	0.1967***
D(LPAR(-2))	-0.0178
D(LPAR(-3))	-0.2113***
D(LERW)	0.9436***
D(LERW(-1))	-0.2244***
D26-29	-0.01797
D35-38	0.0251
D58-62	0.1241**

Note: *=pval<0.1, **=pval<0.05, ***=pval<0.01.
Source: Own computations based on data provided.

Table 1 presents the short-run results of the model. The constant and the first lag of every regressor and variable are statistically significative at the 1% significance level. LPAR(-1)'s negative coefficient is in line with the error correction model's results. The coefficient for LGPAR implies that a 1% increase (decrease) of the central government's spending tends to increase (decrease) LPAR in t by 0,0451%. The same happens with the foreign demand (LERW(-1)) in t-1, as it influences LPAR in t in 0,1278%. LPAR shows negative autocorrelation of first order. D(LPAR) and D(LERW), with different time lags, are included in order to solve potential auto-correlation problems. The decisions made by the Argentine government in 1926, 1935 and 1958 are reflected on 3 dummies with the following results: D26-29 and D35-38 are not statistically significant in explaining LPAR, but D58-62 rejects the null hypothesis of its coefficient being zero at the 5% significance level showing a differential intercept coefficient of 0,1237. In other words, this means a rise of the intercept of 8,13%. One might claim that this result supports the idea that the oil contracts were

effective during the period 1958-1962.

Table 2: Long-run results

Variable	Coefficient
LGPAR	0.3077***
LERW	0.8716***
EC = LPAR - (0.3033*LGPAR + 0.8630*LERW)	

Note: *=pval<0.1, **=pval<0.05, ***=pval<0.01.
Source: Own computations based on data provided.

In table 2, the long-run results are presented. The F-Bounds test provide an F-statistic of 49,09 with k=2, largely exceeding the upper limit marked by Pesaran et al. (2001, p. 301) and the t-Bounds Test show a value of -12,28, exceeding the lower limit marked by Pesaran et al. (2001, p. 304). This suggests that there is evidence of a long-run relationship between the time-series present in the model, hence preventing the possibility of a spurious relationship. As can be seen, the central government's spending and the world's demand are statistically significant in explaining changes in Argentine oil production. As the error correction equation shows, for every 1% of increase (decrease) in the world's output, the domestic oil production tends to increase (decrease) by 0,8716%; and, for every rise (fall) of 1% in the central government's spending, national oil production tends to increase (decrease) by 0,3077%. The long-run adjustment happens at 0,1466 each year, meaning that it takes on average 6,82 years to complete the adjustment in domestic production.

Finally, a Granger causality-test following Toda & Yamamoto (1995) was performed. We cannot reject that the central government's spending does not cause the Argentine oil production as the null hypothesis is rejected with a 1% confidence level. Also, we cannot reject the world's energy output does not cause the Argentine oil production as the null hypothesis is rejected with a 5% confidence level. These results and post-estimation tests are shown in Appendix C.

4. Conclusion

This paper treated many different aspects of oil production in Argentina since it started to be developed in 1907. On the political front, it soon became a heated and divisive topic whose responsibility was to develop the oil industry. From the beginning, foreign oil companies were seen with suspicion, specially the Standard Oil. This might have been a result of

the Argentine alignment with Britain's geopolitical interests to counterweight United States' intrusion between the two nation's commerce, on one part, and the expression of the interest of the leading economic and political sector in the country at the time, that is, the agro-exporting sectors that were not interested in developing a new sector that might have short-circuited the fluid commercial relations with the UK while also made no contribution to Buenos Aires city's hegemony in the domestic arena.

This all started to slowly change due to the shock caused by the First World War and the realization by the military and a group of influential intellectuals that industrialization was a matter of national security and sovereignty. The military was at the forefront in the development of YPF, the first vertically integrated State-owned oil company. The thesis developed by Gen. Mosconi, that would have a lasting impact in Argentina and the whole of Latin America, assigned a special place to oil production, concluding that it had to be under a State monopoly. Nevertheless, a growing number of private companies started to produce and supply a bigger share of the domestic consumption. In 1926, Gen. Mosconi decided that YPF would center its efforts in building a national monopoly, trying to oust major private producers instead of increasing oil exploration, which led to a halt in the private producer's growth that could not be supplanted by YPF. The 1930's coup would revert this policy, leading again to a growth of the private producers, which then again would be reverted in 1935 by Gen. Justo, when an importation trust led by YPF was constituted. This oil nationalist policy would be unchallenged until the end of 1954.

A 50-year experience of oil production, mainly dominated by the State, should have shown that self-sufficiency required of private participation. Yet, the growth in oil imports from 1945 is explained not only by the growth in consumption and investment due to the Peronist policies but also, due to the United States prosecution of a policy of economic blockade on Argentina between 1942 and 1949. Although it was known to be politically risky, Perón signed an oil contract with the Standard Oil's subsidiary in a last attempt to lower oil imports which was firmly opposed by Congress, weakening his authority until 1955's coup. By 1958, already before President Frondizi's inauguration, the oil importation's situation was unsustainable, forcing the newly elected government to start negotiations over a set of bold 'oil contracts' of production and exploration with multinational companies. In the next five years, the positive impacts on oil investment and production were made clear, as the number of drillings compounded to levels that added up to the 35 previous years of exploration, peaking at 1613 drillings in 1961 and oil production would grow in the period 1958-1962 by 247,75%. Such growth would be brought to a halt in 1963, when the oil contracts were an-

nulled, resulting not only in economic harm but, also, in a deterioration of the international relations of Argentina. Given the results of the policy, without comprehending the history that led to this decision, it would be very difficult to understand.

The demand-led model for the oil sector developed in the econometric section comprises almost a century. We included three dummies, two relating to oil nationalist policies (1926-1929 and 1935-1938) and one devised to incorporate oil multinationals (1958-1962); controlling for central government's spending and external demand as the main sources of oil production in the long-run, we found that oil contracts during the 'Developmentalist' state are statistically significant while the contrary is not true with the 'oil nationalist' policies. A more in-depth study is pending to understand whether the oil case can be extended to other industries, and if so, whether state-directed foreign direct investment can be an alternative for underdeveloped countries.

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Appendix A. Contracts under Frondizi's administration

A.1. The contract with Carl Loeb Rhoades Co. (later, Cities Service)

This contract is the most unusual, as the contracted party was a bank, not an oil company. The 20 July 1958, it was approved by Decree 5.934/58 and its main components of the agreement were (Yacimientos Petrolíferos Fiscales, 1963, pp. 29–39, 228):

1. The Bank would finance the necessary activities for the fulfillment of all the programmed activities to increase the production in the designated area in exchange of benefits to the Bank that have been agreed upon.
2. The Bank and YPF shall get to an agreement on which of the areas was to be exploited and within 90 days after this agreement they shall formulate a Development Program.
3. The parts will constitute an 'Operation's Committee' within the next 30 days after the enactment of the contract constituted by 4 members evenly distributed. The president of said committee, having the decisive vote, will be designated by the Bank if and when YPF is in debt with it for investment and expenses.
4. The Committee will select the service contractors for the required works, the procurement of the equipment, materials or any other inputs necessary for the oil extraction with the approval of YPF.
5. National providers will be preferred if their quality and availability in every case when the domestic product is up to 5% more expensive than the imported one and, this rate would be exceeded, YPF has the faculty to still choose it by paying this excess to the provider (YPF's personnel can be involved in operations).
6. The committee will have the faculty to decide about testing, termination, drilling, location, deepening, repair, management or abandonment of well in order to maintain maximum efficiency.
7. The Bank won't have any right on the lands, oil or other hydrocarbons extracted or in the area of the contract. The hydrocarbons will be under the Committee's control until delivered to YPF, that is obliged to receive it, and build all the necessary infrastructure to transport it. Said infrastructure can be financed by the Bank with bonds of 20 years at a minimum interest rate of 5% and the same applied by US' Eximbank.
8. YPF will cover all national, provincial and municipal taxes, fees and contributions intended to be covered by the Bank.
9. The investment risks are to the Bank to cover. YPF only pays if the Committee extracts oil and delivers it in, which case, it will pay the Committee:

a) 50% of delivered oil's price as reimbursement of investments and expenditures, covering also the interest, up to the point of repayment.

b) As a compensation for the risk covered by the Bank, 15-20% of the delivered oil's price.

c) It was estimated, given the form of payment, that the price of oil was going to be high during the first couple of years and low at the end as, once the investments were reimbursed, oil would cost around 4-5 dollar/m^3 during the remaining 15 years. From the average 6,36 dollar/m^3, it was estimated that 4,47 dollar/m^3 would be remitted abroad.

10. The oil delivered is valued at FOB price of imported oil of similar quality delivered at an Argentine port coming from Venezuela, the US Gulf Coast, the Persian Gulf or a simple average of them all at YPF's choosing (when choosing Persian Gulf, it will have a limit).
11. Disputes would be settled in national courts and, if the contract would be annulled by the Government, YPF shall pay the total amount of the investments and expenses not payed yet and the profit that the Bank would have received in the 20 years of the contract.
12. Every payment to the Bank, aside from reimbursement of expenses made in Argentine pesos, will be done in dollars with no restrictions to remit abroad. The 3.971.600 cubic meters of oil delivered to YPF up until 1962 were valued at 16,04 dollar/m^3 (Conesa, 1963, p. 14).

A.2. The contract with Pan-American International Oil Co.

The negotiation took place the 21 July 1958, was approved by Decree 5.934/58 and it, as the company involved was from the oil sector, it was much simpler that the one with Carl M. Loeb Rhoades & Co. its main components of the agreement were (Yacimientos Petrolíferos Fiscales, 1963, pp. 41–48, 228):

1. The Company would make all the works, installations and oil pipes necessary to extract the oil in the designated areas, and YPF will lend the land without of charge to develop these actions.
2. The Company will have a year (extendable for 3 more months) to drill 50 wells using 5 drillers. Would it find the area economically profitable, it will start the construction of

an oil pipe to Comodoro Rivadavia within 12 months of its start and, using 10 drillers it will go on drilling to add 100 drills, in equal parts in the areas assigned by the contract, to the 50 already mentioned. The Company has the faculty to do the works before the deadline.

3. If it would find that the area is not profitable, it could withdraw from the area with all its equipment without being obliged to build the oil pipe and YPF would cover all national, provincial and municipal taxes, fees and contributions intended to be covered by the Company for exporting its equipment.
4. YPF will not set a limit to any amount of production under the maximum efficiency level of the Company's oil production and it is obliged to buy all the oil produced. If it were not to receive, it still would have to pay it. The Company is allowed to subcontract any task it wants or needs.
5. YPF will cover all national, provincial and municipal taxes, fees and contributions intended to be covered by the Company, including those for importing the needed machinery, equipment and materials. For a period of the beginning 5 years, YPF will also pay U$S 10 per cubic meter of oil produced and delivered to it and every payment will cover a whole calendar month before a maximum term of 45 days after the said month ended. From the U$S10 payed, 60% will be done in dollars (in Argentina or the USA) and the remaining 40% in its equivalent in Argentine pesos (in Argentina only). In case of delay at the payment, YPF will pay the max interest rate payed by the Export-Import Bank at Washington DC. For the remaining (extendable) 15-year period of the contract, the price payed will change depending on the international oil price.
6. The exchange rate used will be that of the free exchange rate in Buenos Aires at the last day of end of the month. If there was no free exchange rate, the rate used will be that verified at one of the main banking institutions in the USA. The Argentina Central Bank guarantees the acquisition and transfer of the dollars demanded.
7. By the third year of the contract, YPF will grant the Company the right of preference, with the same conditions of payments provided, to supply its oil needs over any other person or company.
8. Disputes would be settled in national courts and, if the contract would be annulled by the Government, YPF shall pay the total amount of the proven oil reserves under the influence of drilled oil wells by the Company, limited by the amount of oil it could have extracted by the end of the contract (to the sum, it will be subtracted the probable costs of exploitation, equipment and materials). If the contract were to be found null, this clause would also be null.

By the end of December 1962, Pan-American extracted 5.512.800 cubic meters of oil at an average price of U$13,6/m^3 for U$51.962.977 and it invested U$98.821.000 in an oil pipe (Conesa, 1963, pp. 16–17). The conditions agreed upon with ESSO Inc. and Shell Production Co. had a fundamental difference with the previously described contracts as instead of receiving the geological and geophysical data, which in some cases estimated 90% chance of striking oil (according to Silenzi as cited by Luce, 1966, p. 2083), they incorporated clauses by which the companies would carry out search and location works for structures with possible accumulations of oil. And drilling intended to check the extension and potential of structures and traps, well drilling, operation, production, recovery and collection of oil in order to obtain the maximum and efficient production of said fuel in accordance with an economic and rational exploitation of the wells (Yacimientos Petrolíferos Fiscales, 1963, pp. 63, 75).

Appendix B. Unit Root Tests

Table 3: Unit Root Tests

Variable	ADF
LPAR	-5.325***
LGPAR	-0.655
LERW	0.344

Note: *=pval<0.1, **=pval<0.05, ***=pval<0.01.
Source: own computations based on data provided.

Appendix C. Granger-causality and post-estimation tests

Granger (1969) proposes a method to test for causality in a statistical manner between two variables and their feedback mechanism or, in other words, by measuring temporal precedence. It's not a substitute for causality in a theoretical sense.

As series are nonstationary, in order to apply a Granger causality test, we applied the Toda and Yamamoto (1995) procedure, hence adding 5 lags.

Table 4 shows causation in a Granger sense. In the model, we cannot reject that the central government's spending does not cause the Argentine oil production as the null hypothesis is rejected with a 1% confidence level. Also, we cannot reject the world's energy output

Table 4: Granger Causality Test

Granger Causality Test	ADF
LGPAR does not Granger Cause LPAR	3.8308***
LPAR does not Granger Cause LGPAR	1.45111
LERW does not Granger Cause LPAR	3.1795**
LPAR does not Granger Cause LERW	1.07297
LERW does not Granger Cause LGPAR	1.51267
LGPAR does not Granger Cause LERW	1.08021

Note: *=pval<0.1, **=pval<0.05, ***=pval<0.01.
Source: own computations based on data provided.

does not cause the Argentine oil production as the null hypothesis is rejected with a 5% confidence level.

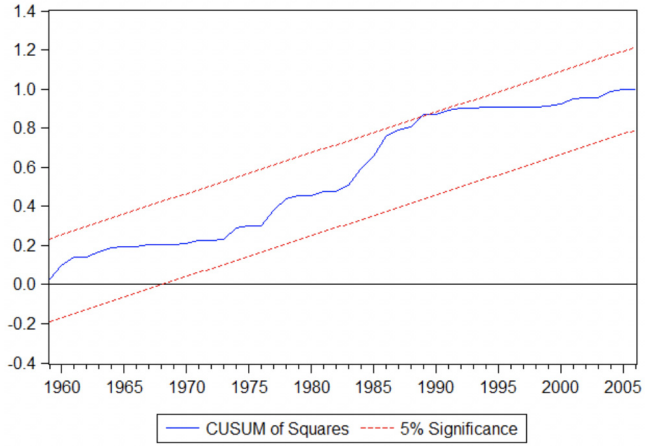
Table 5: Post-estimation tests

Post-estimation tests	
Durbin-Watson statistic	1.9950
Breusch-Godley LM	1.0430
Breusch-Pagan-Godfrey	18.1078***
Ramsey Specification test	0.7873
Jarque-Bera test	32.0227***

Note: *=pval<0.1, **=pval<0.05, ***=pval<0.01.
Source: own computations based on data provided.

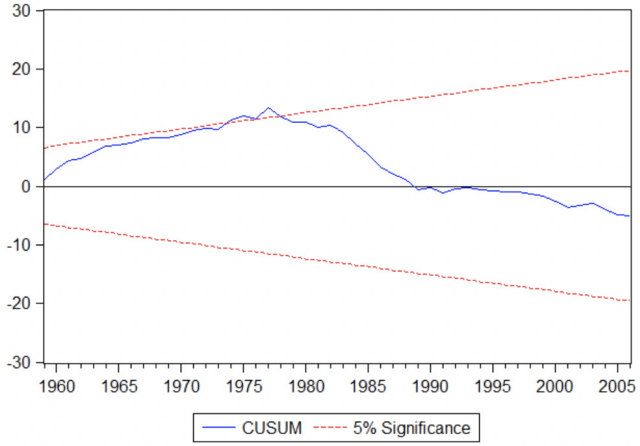
Following Savin & White (1977, p. 1992) at a 1% significance level, the Durbin-Watson statistic should be, at least, over 1,573 in order not to reject the null hypothesis of non-serial correlation. The calculated DW (95,2) is 1,995037. Breusch-Godley LM can't reject the null hypothesis of non-serial correlation. The Breusch-Pagan-Godfrey test shows a low p-value, hence rejecting the null hypothesis that there is a presence of heteroskedasticity. The Ramsey Specification test rejects the null hypothesis of omitted, non-linear, variables in both, the t-statistic and the F-statistic. This suggests that the model is correctly specified. As for normality, the Jarque-Bera test is statistically significant, meaning that the residuals are not distributed normally. This can pose a problem for forecasting as it might make estimations less efficient (Gabrisch, 2019, pp. 13, 22–23), yet it is not a problem for statistical inference.

Fig. 3. CUSUM of squares



Source: Own elaboration.

Fig. 4. CUSUM



Sources: Own elaboration.

To check for the stability of the short-run dynamics and the long-run coefficients altogether,

we apply the recursive estimation proposed by Brown, Durbin and Evans (1975), that is, the CUSUM of Squares and CUSUM tests. These show that, at a 5% significance level, the model is somewhat stable as it barely crosses the corridor. The exception in Figure 3 is the year 1989 that was marked by a hyperinflation of 3079,5% (Ferreres, 2010, p. 565) and previous to the 'mini-oil shock' of 1990 that followed the Iraqi invasion of Kuwait. In Figure 4, the CUSUM crosses the 5% significance boundary starting the year 1974 after the first oil shock in 1973 until 1978 (the year before the second oil shock), when it converges back to 0.

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