Underinvestment and external dependence of the Argentine hydrocarbons sector (2003-2022)

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Abstract

Argentina's energy matrix is highly dependent on hydrocarbons, but domestic production has not been able to supply the domestic market, resulting in trade deficits and permanent foreign exchange outflows. In this context, the Kirchner administrations conducted several economic reforms, one of the axes of which was the recovery of the leading role of the State in order to achieve energy sovereignty. This series of reforms was modified before the arrival of the liberal Mauricio Macri to the presidency but was partially reinstated by the government of Alberto Fernandez in 2020. This paper aims to analyze whether successive governments have mitigated the underinvestment and external dependence of the Argentine energy sector and the limitations of such policies. It concludes that the different oil policies implemented had failed to reverse the underinvestment and foreign dependence of the Argentinean hydrocarbon sector.

Keywords: hydrocarbons; state-owned companies; energy dependence.

1. INTRODUCTION

In recent years, Latin America has been characterized by the proliferation of development strategies based on natural resources, especially hydrocarbons (natural gas and oil). Countries such as Bolivia, Ecuador, and Venezuela, among others, show variants of what has been described in recent years as *resource nationalism* - policies aimed at regaining national sovereignty over natural resources (Monaldi, 2010; Burchardt and Dietz, 2014; Arbatli, 2018). Undoubtedly, the primacy of the state and its development goals are present in recent experiences of hydrocarbon exploitation, including in the case of Argentina after the Kirchner couple came to power.

Unlike the major Latin American hydrocarbon powers (Mexico and Venezuela), Argentina is an atypical producer despite having significant oil and gas reserves following the Vaca Muerta discoveries in 2011.[1] In the case of Argentina, the oil and gas sector has contributed for more than a decade to the deficit of the energy sub-account of the current account balance and to the constant outflow of foreign currency, even during periods of boom in hydrocarbon prices. This is unusual among producers in Latin America, the Arabian Gulf or Norway, where the sector generates external surpluses and strong foreign currency inflows.

This exacerbates the structural problems of the country in question, specifically limiting the growth of its gas-dependent industry while draining foreign exchange reserves, which are at their lowest level since 2017. The country

is practically isolated from international financial markets and is seriously indebted to the International Monetary Fund (IMF). The value of the Argentine peso has been devalued against the US dollar (USD) and the euro, which has exacerbated the permanent inflationary tensions. Several authors point out how the hydrocarbon sector has limited the country's economic progress over the last 20 years. Recalde (2011), for example, points out that the energy problem is mainly explained by the lack of coordination between organizations, institutions and agents due to the abandonment of energy policy and the lack of planning. Serrani and Barrera (2023) argue that constant economic crises restrict the transition to renewable energies despite the country's solar, wind and biomass energy potential. Other papers focus on explaining how the mismatch between energy supply and demand perpetuates external restriction as an obstacle to development (Serrani and Barrera, 2018).

Thus, this paper aims to address complementary aspects, offering a shared vision of the sector and the external accounts through a detailed analysis of the reforms during the Kirchnerist period (2003-2014), the return of liberalizing policies under Macri's mandate (2015-2019), and the return of Peronism with Fernández (2020-2023). Its primary purpose is to examine how the energy policies of these governments, despite their good intentions, have aggravated the underinvestment in and dependence on the Argentine hydrocarbon sector, creating a vicious cycle between fiscal regime/regulations-investment-production-exports/imports from which it is difficult to escape. With the victory of the ultra-liberal Javier Milei, the oil sector may again undergo significant changes, as the new president intends to reprivatize public companies and remove export restrictions.

The text begins with a review of the literature on state-owned oil companies and their role in economic development. It then analyzes the changes the Argentine oil model has undergone throughout the political mandates, including the fiscal regime and, in particular, the role of the oil company Yacimientos Petrolíferos Fiscales (YPF). It assesses the trajectory of the main productive variables related to investment and the external insertion of the sector. Finally, it draws conclusions and policy implications from the Argentine experience.

2. STATE OIL COMPANIES AND THEIR ROLE IN DEVELOPMENT

The hydrocarbon industry is considered a strategic sector due to its potential to generate income, local content policies, and satisfy national energy demand. For this reason, the governments of many producing countries have established and strengthened National Oil Companies (NOCs) as a developmental strategy based on state participation (Waterworth and Bradshaw, 2018; Noreng, 2021).

Several authors have criticized the inefficient management of NOCs compared to private oil companies due to high personnel and reserve costs per dollar earned (Wolf, 2009; Eller *et al.*, 2011). They also claim that their existence limits competition in a sector that already has high barriers to entry, encourages rent-seeking and corruption (McPherson, Eszter Wirth and Juan M. Ramírez-Cendrero and MacSearraigh, 2007; Valarini and Pohlmann, 2019), and creates conflicts between the government and the NOC itself due to information asymmetries (Tordo *et al.*, 2011; Manley *et al.*, 2019).

Nevertheless, other researchers point to the benefits of having an NOC that promotes sustainable economic growth independent of foreign capital and free market logic in a strategic sector for national security (Chang, 2007; Singh and Chen, 2017). There is also a focus on the drive to hire local suppliers and employees (Ryggvik, 2015; Kasahara and Botelho, 2019) and to maximize hydrocarbon revenues during commodity price booms, especially in emerging economies with weak fiscal systems (Tordo, 2007; Ramírez-Cendrero and Paz, 2017).

Al-Fattah (2013) and Noreng (2021) emphasize that NOCs have access to capital with favorable terms and low costs, which allows them to invest in exploration and exploitation projects in hostile or unknown geological conditions that increase geological, technical, operational, and financial risks. This factor makes them less risk-averse operators in an industry with high fixed costs and strong economies of scale compared to private oil companies, whose investments tend to be more cyclical as they depend mainly on world prices. Investments in R&D and technology were essential for the launch of the *condeep* concrete platforms off the Norwegian coast (Engen, 2009), developed by the Norwegian NOC, Statoil, or the floating platforms on pre-salt deposits in Brazilian deep waters, which benefited from the accumulated experience of Petrobras (Paz, 2014). In general, private companies concentrate their investments in the most profitable areas of the sector to maximize short-term profits and satisfy the interests of their shareholders through profit sharing at the expense of reinvestment in production and, above all, in exploration, the riskiest phase of the upstream chain (Barrera, 2013).

By contrast, Monaldi (2020) points out that most of the large deposits were discovered by private companies throughout history in the initial phases of the value chain, particularly in underdeveloped countries, and were subsequently nationalized once the heavy initial investments had been made. Many NOCs were created in the 1930s and 1940s, especially in the 1960s and 1970s, due to the nationalization of private oil companies (Mahdavi, 2014) in the context of high prices and a strong resurgence of nationalist sentiment regarding local natural resources. Nationalizations are more likely to occur when commodity prices remain high (Vivoda, 2008; Guriev *et al.*, 2011), significant discoveries are made, and/or production volumes increase, as occurred in the 1970s and early 2000s. These circumstances create the perception among the public that foreign capital is appropriating the extraordinary profits that should belong to the nation (Victor, 2013) and, therefore, provide incentives for nationalization. In contrast, permanently low prices, the depletion of proven reserves and falls in production drive liberalization and privatization in the sector, as occurred in the 1990s and between 2014 and 2020, due to the financial vulnerability of NOCs and the need to create an investment drive that weakens state power (Joffé *et al.*, 2009).

However, hydrocarbon nationalism is much more than the mere nationalization of private companies in the sector. It includes changes in contracts between companies and the government, as well as measures that reduce the cash flow of companies: exchange rate controls, obstacles to exporting or repatriating profits, local content requirements, selling at subsidized prices, or environmental sanctions (Arbatli, 2018; Monaldi, 2020).

From an ideological point of view, right-wing governments favor privatization. In contrast, left-wing governments favor nationalization, as occurred between 1980 and 2000, with the rise of neoliberal policies, and in the 2000s, with the wave of progressive experiments. Prominent leaders of the Latin American left, such as Hugo Chávez, Rafael Correa, Evo Morales, and Cristina Fernández de Kirchner, have carried out nationalizations in Venezuela (2001), Ecuador (2006), Bolivia (2006), and Argentina (2012), respectively. However, in Berrios *et al.* (2011), an analysis of the numerous nationalizations in the Latin American oil sector –from 1922 to 2010— finds only a weak relationship between left-wing ideology and nationalizing tendencies, while right-wing governments rarely opted for privatization.

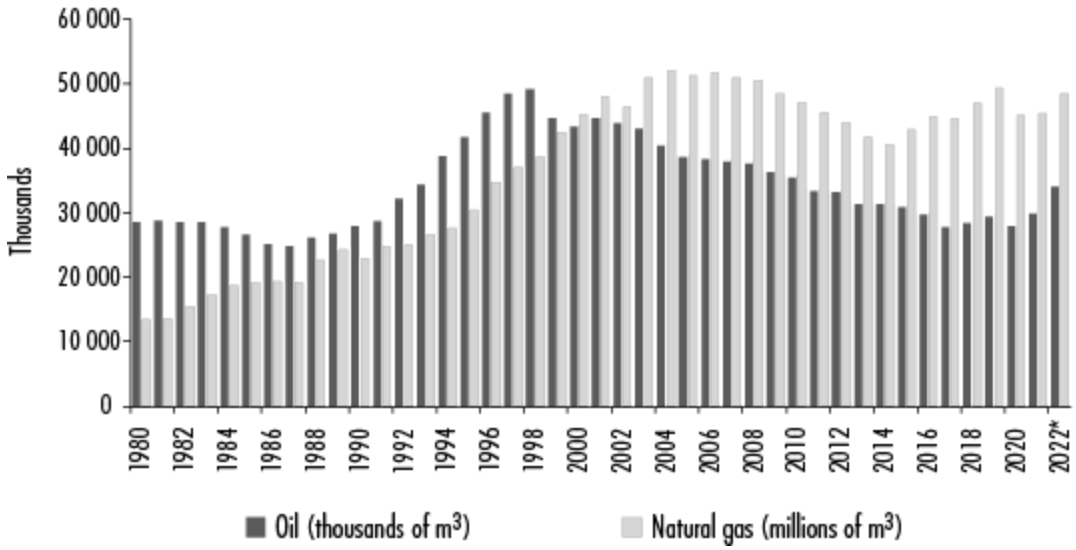
According to the IMF (2022), since 2015, investment in the sector has been declining globally in terms of GDP, a trend exacerbated by the Covid-19 pandemic in 2020. It was precisely the private oil companies that contributed to this trajectory due to low oil prices and Western environmental policies, while the investment activity of NOCs has remained more stable. Investments declined particularly in Africa and the Americas, with more adverse geological characteristics. In 2022, however, the trend of underinvestment in the sector seemed to be reversed thanks to the rebound in the value of hydrocarbons following the invasion of Ukraine (International Energy Agency [IEA], 2023).

3. EVOLUTION OF THE ARGENTINE OIL MODEL

YPF was established in 1922 as a vertically integrated public company to achieve national self-sufficiency by controlling all crude oil produced and selling it at prices preset by the State, generally below its international value. The debt crisis of the 1980s had a negative impact on the availability of public funds, as did the fall in the price of crude oil from 1986, which resulted in YPF operating at a significant loss by the end of the decade. All this reduced its investment capacity and led to a decline in crude oil reserves and production between 1981 and 1988 (Gadano, 1998). To revitalize both the sector and the company, as well as to improve Argentina's trade balance and receive foreign currency, Carlos Menem's administration undertook a series of disruptive neoliberal economic reforms that included the privatization of numerous state-owned companies (Clairmont, 2002), including YPF. In 1992, it was partially privatized (Law 24145/1992), and the process ended in 1999 when the Spanish company Repsol acquired the remaining State shares (Huizar, 2019). The package of reforms also included the deregulation of prices to bring them closer to international market prices, the removal of restrictions on the export of crude oil produced in Argentinian territory, and the limitations on the free disposal of foreign currency.

Following the completion of these reforms, the sector's performance was remarkable: crude oil production peaked in 1998, and gas production increased steadily until mid-2000 (see Figure 1). Reserves of both resources increased and, after domestic prices gradually converged with world prices, Argentina became a net exporter of hydrocarbons by the end of the 1990s (Gadano, 1998).

Figure 1. Production of oil (millions of m^3) and gas (billions of m^3) (1980-2022)



*Note: *the figure for 2022 is provisional.*
Source: Ministry of the Economy (2023) and INDEC (2023).

Paradoxically, the increase in reserves and production was not due to a higher level of exploration and discovery of new deposits but to the introduction of secondary recovery technologies in already discovered fields. According to YPF itself, which is controlled by Repsol, the directors prioritized the most profitable and low-risk segments in order to maximize short-term profits and satisfy their shareholders through the distribution of dividends (YPF, various years). This logic of private oil companies took resources away from reinvesting profits, especially in exploration

activities: according to Barrera (2013), proven oil and gas reserves began to decline between 1999 and 2000 due to underinvestment in exploration and the lack of state supervision of business plans, even before Néstor Kirchner came to power.

In addition, consumers suffered the most from the liberalization of prices, as they could no longer obtain these goods at subsidized prices (Kozulj, 2002). Finally, after an increase in the oil and gas account of the balance of trade between 2003 and 2008, the surplus began to decline until 2011, when Argentina became a net importer of hydrocarbons. After the financial "corralito" crisis and the fall of the convertibility regime, the Peronist president Eduardo Duhalde reinstated the tax on oil exports in 2002 and fixed the price of gas in order to once again decouple the dynamic of domestic price from trends in international markets and avoid energy shortages (Law 25561/2002, Government of Argentina, 2002).

The Kirchner period

With the arrival of Néstor Kirchner as president in 2003, the country embarked on a series of economic reforms, the main focus of which was to restore the role of the State (Wyle, 2016). This process was similarly intensified during the two presidential terms of his wife, Cristina Fernández, with the approval of the Hydrocarbon Sovereignty Law in 2012. Both leaders wanted to reverse the trend of underinvestment and overexploitation of wells and the deterioration of the energy trade balance caused by the deregulation of the previous decade.

Tax regime for the hydrocarbon industry

First, several taxes levied on oil companies were redefined, although without applying drastic changes from the pre-Kirchner era. The most notable aspect was the updating of the square kilometer (km^2) fee, an annual tax payable to the provinces in which the holders of exploration and exploitation concessions operate. Its value depends on the territorial area in which the possible reserves are located, and the concessionaire will only be able to recover it in the event of successful extraction activities. It therefore penalizes inactivity by encouraging the holder to explore, discover and produce hydrocarbons. The failure to update the fee in line with the peso exchange rate leads to the accumulation of areas to be taken away from potential competitors, but without the intention of making investments, given the low tax cost (Despouy, 2013). As a result, in 2007 and 2014, the exploration fee was significantly increased in order to increase the cost of maintaining inactive areas, especially in successive periods, and thus reverse the disinvestment in exploration (see Table 1).

Table 1. Update of 1991, 2007 and 2014 exploration and exploitation fee, Argentine Pesos (ARS)

			1991	*2007*	*2014*
Exploitation	Basic term	1st period	10.56	86.71	250
		2nd period	21.12	173.37	1 000
		3rd period	31.68	260.46	-
	Extension	1st period	2 112	17 342.65	17 500
		Others	2 112 + 50% annual accumulative	17 342.65	17 500 + 25% annual accumulative
Exploitation			419.5	3 444.87	4 500

Source: prepared based on Decree 1454/2007 and Law 27007/2014, Government of Argentina (2007 and 2014).

As mentioned above, the most important and controversial tax was created in 2002 (under Law 25561/2002, Government of Argentina, 2002), the hydrocarbon export tax (called export duties), which is levied on sales abroad. Initially, it taxed the export price of a barrel of crude oil at 20% and liquid fuels at 5%.[2] However, in 2004, it was extended to gas, and its rate was increased until it reached 100% by 2008 in order to guarantee domestic supply, given the high dependence of the Argentine energy matrix on gas (Ritchie and Roser, 2023). This instrument represents an indirect intervention by the State to determine domestic prices and to uncouple the dynamics of domestic hydrocarbon prices from their international price. It discourages the export of raw materials produced in Argentina and thus regulates the extraordinary profits of oil companies in favor of Argentine companies and final consumers.

This tax caused unease among operators as it limited their profits in the context of rising global oil prices. They accused the State of discouraging investment in the exploration of new wells and exacerbating the decline in reserves. Joffé *et al.* (2009) and Arbatli (2018) called this setting of domestic prices well below international prices an indirect expropriation, as it significantly reduced the companies' revenues.

However, the fall in international prices in 2014 limited the usefulness of this tax in terms of oil revenue distribution. Moreover, YPF had already been renationalized, so the government reduced the tax rate to 10-13% and authorized increases in the domestic prices of the products sold by the oil company in order to recapitalize it. In this way, the convergence between domestic and world prices was restored until 2015, precisely to encourage investment in the hydrocarbon complex, especially in the unconventional Vaca Muerta field, which is characterized by higher costs.

The other two taxes that Argentine oil companies must pay are corporate income tax, which is levied on all companies with net profits over ARS$50 million, and royalties, which are monthly payments based on the total value of hydrocarbons extracted at the wellhead. The former remained at 35% of net profits, while the royalty rate was slightly increased by Law 26197/2006 (Government of Argentina, 2006) in the case of concession renewals.

To counteract the discouraging effects of export taxes on production and reserves, various tax benefits have been granted that have partially modified the scope of these taxes. In 2008, the "Oil Plus" and "Refining Plus" programs

were created (Decree 2014/2008, Government of Argentina, 2008), which granted transferable tax credit certificates applicable for the payment of export taxes to those companies that increased their production and reserves and, on the other hand, the possibility of considering as "Critical Infrastructure Works" investments aimed at increasing production capacity and incorporating new technologies. Furthermore, in 2013, the Investment Promotion Regime for the Exploitation of Hydrocarbons was created (Decree 929/2013, Government of Argentina, 2013), which reduced the rate of export taxes from the fifth year of the project for companies that invested more than $1 billion in the first five years of the project. In 2014, this minimum investment was reduced to USD$250 million and the project duration to USD$3 million.

Hydrocarbon Sovereignty Law

The Hydrocarbon Sovereignty Law (Law 26.741/2012, Government of Argentina, 2012a) and its evolution (Decree 1277/2012, Government of Argentina, 2012b) established as a priority objective national self-sufficiency in hydrocarbons and the exploration, exploitation, industrialization, transportation and commercialization of hydrocarbons, in order to guarantee "economic development with social equity, job creation, increased competitiveness in various economic sectors and equitable and sustainable growth in the provinces and regions." Its most notable aspects were the repeal of the liberalizing provisions of the 1990s, which provided for the free availability of hydrocarbons and the foreign exchange generated by their external sales, as well as the freedom to set prices and to import and export hydrocarbon resources.

In addition, new institutions were created to increase the regulatory and supervisory capacity of the State over the strategies of private operators, such as the Commission for the Planning and Strategic Coordination of the National Hydrocarbon Investment Plan (CPCE), which is responsible for the annual elaboration of the Plan and the National Hydrocarbon Investment Registry. The latter established the criteria and desirable goals in terms of investments in the exploration, exploitation, refining, transportation and commercialization of hydrocarbons. The Registry, in turn, required the registration of all firms as a condition for operating. Thus, registered companies were obliged to present their Annual Investment Plan, with quantitative exploration and exploitation targets to be approved and supervised by the CPCE. Finally, the law defined the public utility of the oil company YPF, which justified its partial renationalization.

The role of the NOC: YPF

Law 26.741/2012 (Government of Argentina, 2012a) allowed for the expropriation of 51% of Repsol's capital in YPF, which meant that the State took control and there was a strategic shift in the company's objectives. Thus, the Argentine State sought to move closer to the major Latin American economies, such as Brazil and Mexico, and to other countries in the region with hydrocarbon reserves, such as Bolivia, Ecuador and Venezuela, which have significant NOCs. In the case of Argentina, after renationalization, YPF continued to act like just another competitor in the market without acquiring regulatory or supervisory powers, unlike Pemex (until the 2013 energy reform) or Bolivia's YPFB.

However, the most notable change was the redirection of the company's profits since Repsol had allocated most of them to the distribution of dividends to shareholders, which peaked in 2001 and 2008, with 203 and 255% of profits (ECLAC, 2015). The new state management limited the distribution of dividends to between 5 and 8% of profits in order to promote the recapitalization of YPF[3] and its exploratory and productive investments. Another controversial

measure that, along with export taxes, created uncertainty among private operators and a loss of confidence in the government, especially after the discoveries made by Repsol in Vaca Muerta a year before the expropriation.

The liberal reorientation of Mauricio Macri

Mauricio Macri became president in 2015, intending to adopt a liberal approach to economic policy, replacing Peronist regulatory policies with the interplay of supply and demand and reducing fiscal spending. In this way, he intended to attract foreign capital to the energy complex and reduce producer subsidies. He began by dissolving the CPCE (Decree 272/2015, Government of Argentina, 2015a), thereby abolishing the body responsible for the centralized guidance and supervision of private hydrocarbon activities and a large part of the powers it had exercised.

During his term, the tax burden and the fiscal expenditure related to the hydrocarbon policy were reduced. Although the royalty rate remained unchanged, the ceiling on the royalties applicable to extracted hydrocarbons was lowered. In addition, the tax on corporate profits was reduced from 35% to 25% (Decree 1112/2017, Government of Argentina, 2017). However, the most prominent measure was the temporary elimination of export duties in 2015 to encourage international sales of hydrocarbons. However, three years later, they were reintroduced (Decree 793/2018, Government of Argentina, 2018) with a tax rate of 12% on the export value and a maximum of ARS3-4 per exported USD$. This decision by a government with a liberal approach is striking, but it was necessary to mitigate the strong depreciation of the peso and inflation by controlling energy prices in the run-up to the 2019 presidential elections.

The Oil Plus (Government of Argentina, 2015b) and Refining Plus (Government of Argentina, 2016) programs were eliminated to control public spending, but the government-maintained subsidies for gas producers in Vaca Muerta. The aim was to stimulate investments in unconventional deposits and prevent the fall in international gas prices from affecting activity by guaranteeing oil companies a premium for the gas produced. However, the plan was cut short when Argentina was bailed out by the IMF in 2018 with a loan of nearly USD$57 billion, and the multilateral institution demanded cuts in subsidies.

As for the legal status of YPF, it did not change despite Macri's rejection of the company's expropriation in 2012. YPF was still a majority public company[4] with no regulatory or supervisory attributes, but it diversified its activities by entering into energy innovation projects by creating its own venture capital funds. YPF Ventures stands out, having invested in urban electric scooters and services based on the use of solar energy.

Another notable initiative of the Macri administration was the RenovAr program, launched in 2016, which aimed to diversify the sources of Argentina's electricity grid by promoting the use of renewable energy sources to the detriment of gas. The program sought to attract foreign private capital through long-term power purchase agreements. Despite its initial successes, the program had to be halted in 2019 due to a deteriorating macroeconomic context that deterred international investors (Barrera *et al.*, 2022). In addition, the program exacerbated dependence on foreign technology and failed to sufficiently involve domestic suppliers in renewable energies (Kazimierski, 2022).

Therefore, the Macri era did not bring drastic changes in the sector's configuration, except for the simplification and reduction of some taxes and the reorientation of YPF towards businesses far removed from hydrocarbon exploration and production.

The aims of the administration of Alberto Fernández

Alberto Fernández's government faced the deterioration of the country's monetary conditions, the debt contracted by Macri with the IMF, and the COVID-19 pandemic. He wanted to pass the Law for the Promotion of Hydrocarbon Investments in 2021, but it was rejected even within his own party due to its federalist perspective and lack of respect for the environment by promoting fracking, and therefore did not reach Congress.

In the four years of the administration, the changes introduced were modest and improvised based on decrees. These include the Regime of Access to Foreign Currency for the Incremental Production of Oil and Gas (Decree 277/2022, Government of Argentina, 2022a) and the Plan for the Reinsurance and Empowerment of Federal Hydrocarbon Production (Decree 730/2022, Republic of Argentina, 2022b), both promoted by the Minister of Finance, Sergio Massa. In May 2023, the Liquefied Natural Gas (LNG) and Green Hydrogen Law was also proposed, which sought to establish stable rules for a 30-year horizon aimed at promoting the construction of infrastructure for the production, storage, commercialization and transportation of LNG for those companies that invest at least USD$1 billion and have a minimum production capacity of one million tons of LNG per year, with local content contracts. In return, they would receive access to foreign currency, export permits, and tax breaks. However, the proximity of the presidential elections made it impossible for the bill to be debated and passed in Congress. The most notable development was the construction of the first section of the Néstor Kirchner gas pipeline (1,050 km) with public funds in less time than expected. This will make it possible to transport gas from Vaca Muerta to the main consumer provinces and northern Brazil and Chile, reducing the need for imports and promoting future exports.

Starting in 2021, the main goal was to take advantage of the recent oil boom following the invasion of Ukraine to increase exports, tax revenues, and foreign exchange to mitigate the peso's collapse and repay the IMF loan.

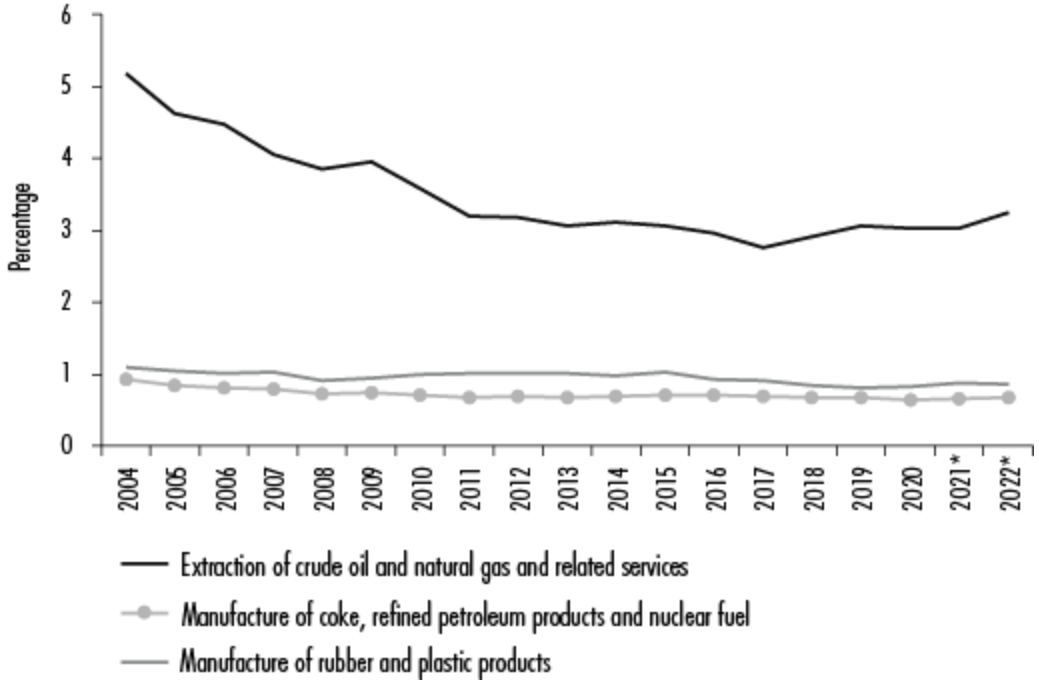
4. PERFORMANCE OF THE HYDROCARBON SECTOR (2003-2022)

After analyzing the changes in the Argentine oil model, its scope and limitations can be evaluated with statistical data. Policy implications and conclusions can be drawn from this assessment.

Trends in production, investment and reserves

The share of the Argentine hydrocarbon sector in GDP, including basic petrochemicals, has been dominated by extraction activities, which, nevertheless, have suffered a gradual fall since the beginning of the century to around 3.3% (see Figure 2). Therefore, we are dealing with a sector with declining participation in the economy that represents around 5% of GDP, when at the beginning of the period analyzed, it accounted for more than 7%.

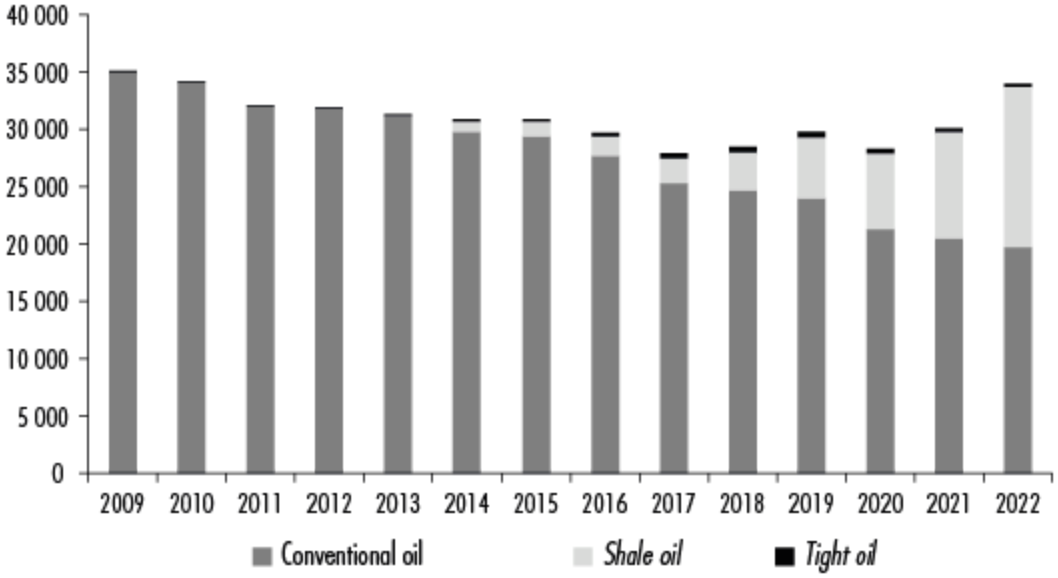
Figure 2. Share of Hydrocarbon Sector in GDP (%)



*Note: *Data for 2021 and 2022 is preliminary.*
Source: based on INDEC (2023).

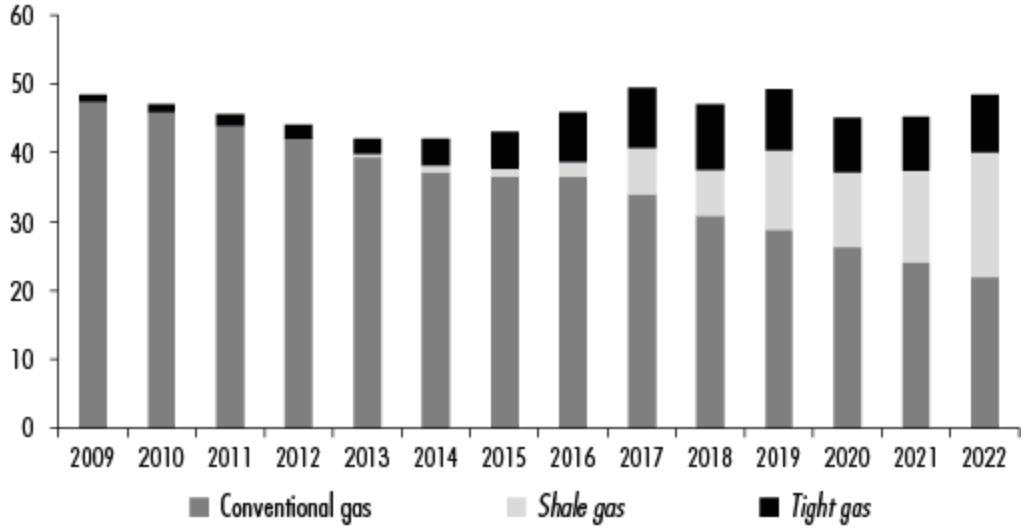
The decline in participation was due to the decline in production volumes, especially oil, which fell by 20% between 2003 and 2022 (see Figure 1). Reversing that decline was one of the main objectives of all the measures adopted during the period analyzed. On the other hand, natural gas production stagnated and then improved slightly from the end of the 2000s, but without reaching the peak of 2006. It should be noted that the factors responsible for improved production in recent years are unconventional resources, such as shale oil and gas (see Figures 3 and 4). They are extracted using the fracking technique, mainly in Vaca Muerta, a deposit that has been able to attract foreign capital despite the political risk following the renationalization of YPF because unconventional resources are subject to a lower risk of expropriation (Collins *et al.*, 2021). It should be recalled that, in order to mitigate the decline in reserves, hydrocarbon production and the constant flight of capital, the second Fernández de Kirchner government, the Macri government and the Fernández government have made a strong commitment to promoting fracking in this formation and other unconventional deposits through the association of YPF with the North American company Chevron.

Figure 3. Oil production by type, millions of m^3 (2009-2022)



Source: Ministry of the Economy (2023).

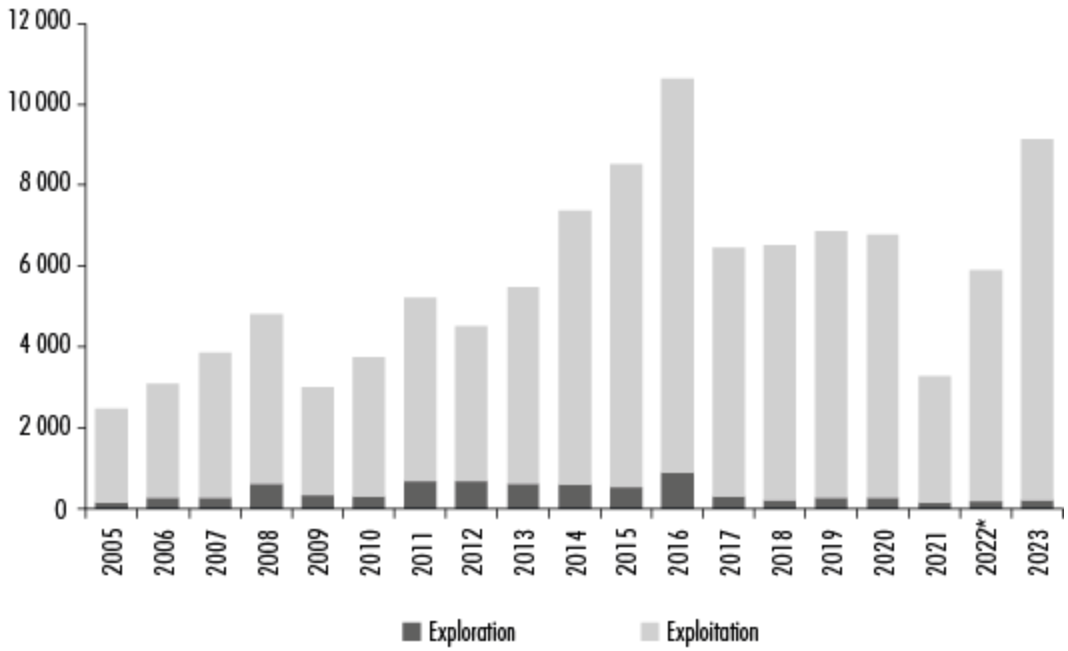
Figure 4. Gas Production by Type, Billions of m^3 (2009-2022)



Source: Ministry of the Economy (2023).

In addition to the evolution of production, the evolution of investment and reserves is revealed in order to identify the potential of the oil industry and its growth prospects. As can be seen, investment in exploitation dominates throughout the period analyzed, with notable increases in 2009-2016 and a sharp decline from the Macri era to 2021 (see Figure 5). At the same time, investment in exploration increased slightly in 2013-2016, immediately after the Hydrocarbon Sovereignty Law, but has remained at extremely low levels since 2017, which largely explains the behavior of production and reserves. This trend of underinvestment is revealing in that it shows the lack of success of successive reforms, including the updating of the royalty, the renationalization of YPF, subsidies to gas producers and tax incentives.

Figure 5. Exploration and exploitation investment, USD millions (2005-2022)



*Notes: The exploration values for 2005 are anomalous: they total USD$327,292 million, of which USD$324,974 million correspond to the company Petrominera Chubut S.E. -which does not appear in the following years. Therefore, the investment in exploitation corresponding to this company has been eliminated from 2005; * the data for 2022 is preliminary.*
Source: Ministry of the Economy (2023).

Table 2 clearly shows that, after a slight improvement between 2012 and 2015, the number of completed wells (exploration and exploitation) has decreased significantly since 2017. If we break down the number of wells drilled by company, we can see that YPF's exploration activity improved considerably between 2013 and 2016, accounting for between 40 and 50% of the total. An improvement can also be seen in YPF's production wells between 2012 and 2015, while the number of new wells drilled by the other operators remained the same or even decreased in the case of exploration wells. As a result, YPF regained its investment momentum after renationalization, but this effect was temporary and did not reverse the underexploration trend of the other companies.

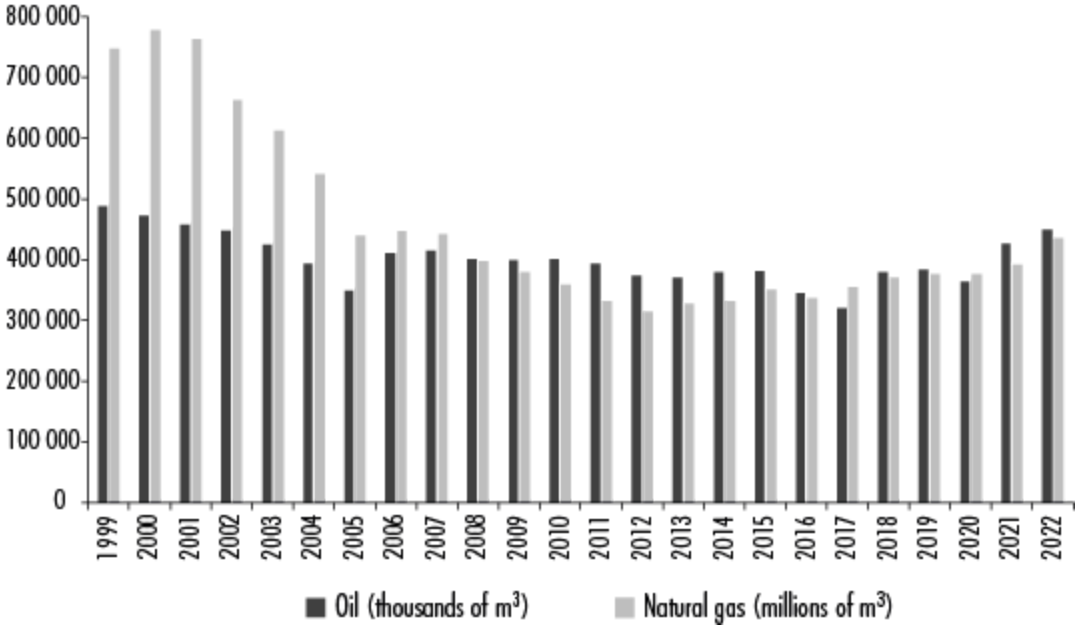
Table 2. Number of wells completed by companies (2009-2022)

Exploration	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
YPF	7	8	13	34	22	31	37
Other operators	80	39	64	64	61	46	33
Exploitation	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
YPF	254	505	447	384	600	712	719
Other operators	697	652	586	566	456	440	475
Exploration	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*
YPF	29	25	15	20	5	7	13
Other operators	42	43	28	14	4	15	19
Exploitation	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*
YPF	567	386	353	262	92	214	240
Other operators	310	432	517	488	499	572	394

Source: Ministry of the Economy (2023).

The consequence of concentrating investment on the exploitation of already discovered deposits, to the detriment of exploration, has been the decline and subsequent stagnation of oil reserves, and even more so of gas reserves, over the last two decades (see Figure 6). The decline in production and the increase in YPF's exploration activities since 2012 have not been able to reverse this process, although they have mitigated it.

Figure 6. Proven oil reserves (thousands of m^3) and gas reserves (millions of m^3) (1999-2022)

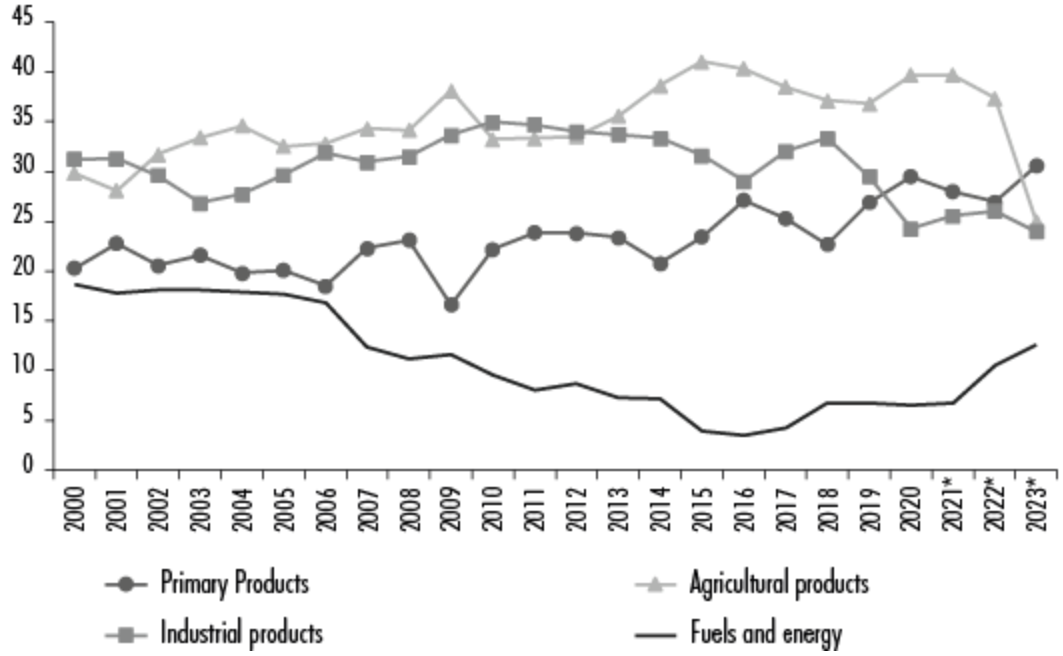


Source: Ministry of the Economy (2023).

Trend in the foreign sector

The external insertion of the Argentine hydrocarbon industry has been one of the factors that has most influenced the deepening of changes in the oil model since 2012. The growing reduction in the weight of oil exports and the continued increase in imports in the context of high international prices deteriorated the current account balance and forced a review of the country's energy supply patterns. We can see a deterioration in the share of fuels and energy in total exports: from 18.1% in 2003 to 4% in 2015, although it improved slightly to 9.6% in 2022 (see Figure 7). The largest share is crude oil and gas (around 85-90% of total exports), while the contribution of refined products is much less significant.

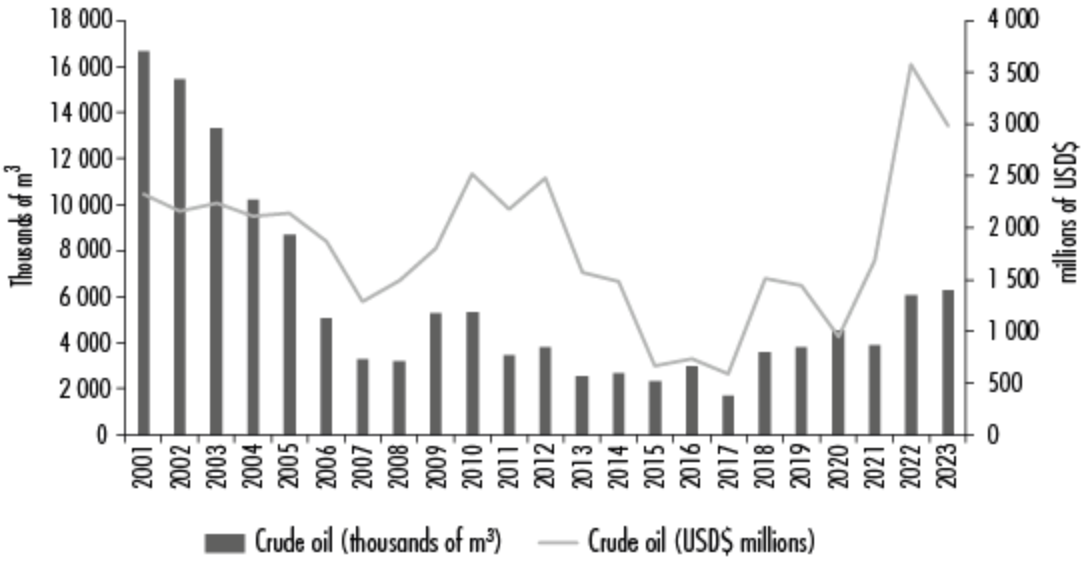
Figure 7. Share of total exports from Argentina, in % (2003-2022)



*Note: *Data for 2021-2022 is preliminary.*
Source: Based on INDEC data (2023).

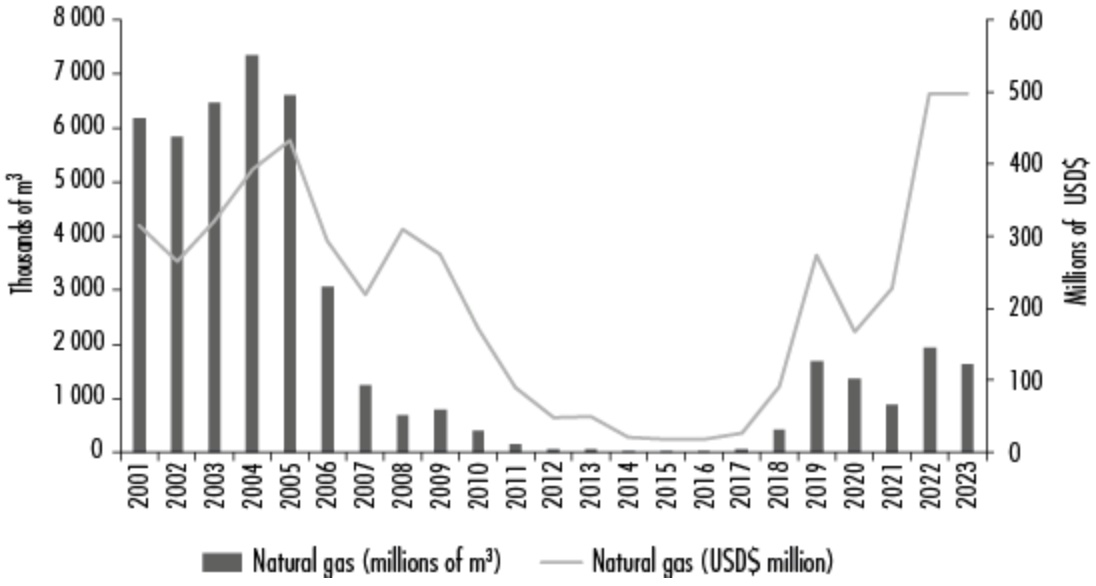
As can be seen, the evolution of these shares is explained by the sharp fall in export volumes and the high volatility of international prices (see Figures 8 and 9). Indeed, the price rise between 2004 and 2012 partially mitigated the impact of the fall in export volumes, which is in line with the fall in production already mentioned. Meanwhile, the impact of export duties on volumes can be seen, particularly for gas, when the rate rose to 100% in 2008, and volumes were practically zero. The marked improvement in the value of exports between 2021 and 2022 is due more to the increase in prices caused by the international situation than to the effect of volumes.

Figure 8. Crude oil exports in thousands of m^3 and billions of USD$ (2001-2022)



Source: Based on data from the Ministry of the Economy (2023).

Figure 9. Natural gas exports in millions of cubic meters and USD millions (2001-2022)

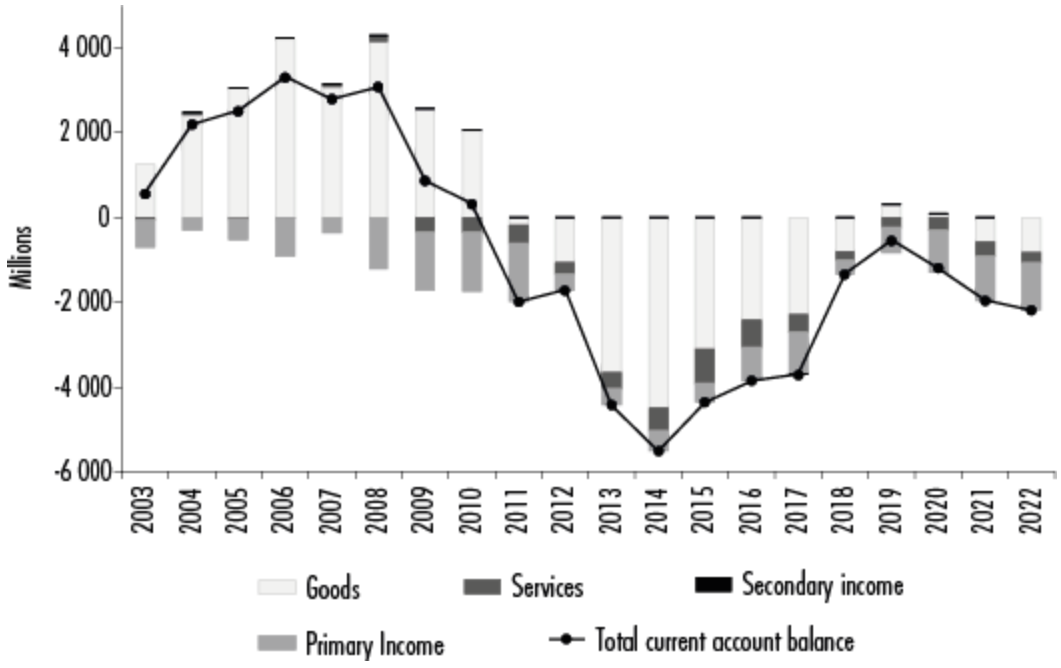


Source: Based on data from the Ministry of the Economy (2023).

This declining trend in production and exports coincided with an inverse behavior of imports in the context of growing domestic consumption, which worsened Argentina's external insertion. Until 2012, the response to this problem was to favor imports through subsidies in order to avoid transferring the high global prices to the domestic market. Thus, foreign natural gas purchases came mainly from Bolivia and liquefied natural gas from Trinidad and Tobago. Following the nationalization of YPF, significant imports of capital goods destined for the unconventional hydrocarbon sector were also registered (Barrera, 2021).

Figure 10 shows the contribution of oil and gas to the sub-accounts of the current account and shows that the sector recorded a surplus in the goods sub-account until 2010 and then an increasing deficit until 2014. Between 2015 and 2022, this deficit in hydrocarbon goods decreased due to the fall in international prices between 2014-2017 and 2020, which made purchases cheaper, and the increase in domestic gas production by YPF-Chevron. However, except for 2019-2020, the balance remains negative.

Figure 10. Current account balance related to oil and gas, USD millions (2003-2022)

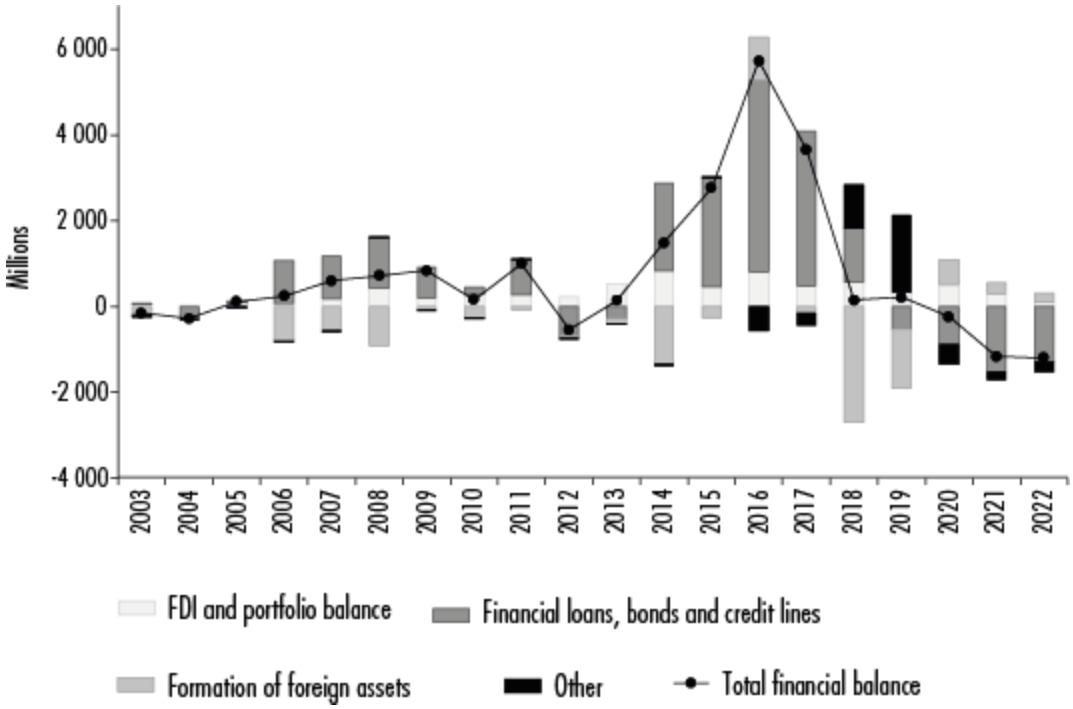


Source: Based on data from the Central Bank of the Republic of Argentina (BCRA, 2023).

The energy complex has also contributed negatively to the services subaccount since 2009 by importing foreign business services, technical services and patents. According to Barrera (2021), consulting services are frequently used to transfer foreign currency through artificially inflated prices. Finally, the sector was responsible for the outflow of foreign currency through interest, profits, and dividends repatriated abroad to the detriment of reinvestment in Argentina, as reflected in the primary income subaccount. However, a smaller deficit balance was observed after the renationalization of YPF and its corporate reorientation, which probably reduced the distribution of dividends but did not manage to eliminate the negative balances (Schorr *et al.*, 2015).

Meanwhile, Figure 11 reflects the dependence of the energy complex on foreign capital and its role in draining foreign exchange. Foreign Direct Investment (FDI) and portfolio investment recorded net inflows for practically the entire period analyzed –especially after the nationalization of YPF and its association with Chevron, which boosted investment— as did foreign loans and credits, except in the last three years. However, these items coexisted with net outflows of banknotes and foreign currency (external asset formation items) in most years, especially for the following periods: 2006-2010, 2014-2015, and 2017-2019. There was a notable net inflow of foreign currency between 2021 and 2022, but it had marginal values despite the favorable terms of trade. Consequently, the hydrocarbon sector exacerbated the draining of foreign currency, a structural feature of the Argentine economy that reflects its subordination to foreign markets and is responsible for several crises.

Figure 11. Oil and gas-related financial balance, USD millions (2003-2022)



Source: Based on data from the Central Bank of the Republic of Argentina (BCRA, 2023).

5. CONCLUSIONS

The analysis of recent policies in the Argentine hydrocarbon sector has produced different results, such as identifying the scope and main limitations of oil strategies in Argentina since 2023, while offering different conclusions regarding the objective of this research. As mentioned, this paper aimed to investigate how the oil policies of various governments failed to reverse the underinvestment and foreign dependence of the Argentine hydrocarbon sector.

As can be seen from the study, several well-defined stages can be identified in the period analyzed. The first (2003-2011), predominantly private, saw a deepening of the underinvestment and deterioration of production that had already begun in the late 1990s. State participation was limited to the fiscal sphere through the collection of increased taxes, particularly export duties, which discouraged long-term investment. Increased energy demand and supply difficulties boosted imports and the outflow of foreign currency to the point of turning the country into a net importer of hydrocarbons from 2011. In this context, the second stage (2011-2015) began, characterized by marked state participation in the productive sphere after the recovery of control of YPF and the regulatory changes of 2012, which empowered it to influence the strategies of private oil companies. The impact of these reforms was rapid and positive in terms of exploration and production, mitigating the trajectory of previous years but with little effect when it came to reversing the dynamics of the other participants. Meanwhile, the third stage (2015-2021) sought to simplify the regulatory framework, reduce fiscal spending and stimulate the involvement of private oil companies, abandoning the investment and exploitation drive of YPF, which expanded into other sectors. However, these less interventionist measures did not halt the deterioration of underinvestment and the level of reserves, although the energy trade balance improved in the face of weaker economic growth and falling imports. The volatility of international prices marks the fourth stage (since 2021) due to the pandemic and the war in Ukraine. The sharp rise in prices in 2021 improved export income, but they could not exceed the value of imports due to the insufficient increase in domestic production. To date, it has not managed to generate sufficient foreign currency inflows to partially mitigate the country's serious macroeconomic problems or to substantially stimulate investment.

Moreover, the changes introduced in 2012 have only partially managed to overcome the structural limitations of the hydrocarbon sector that are holding back the development of the Argentine economy. Indeed, on the one hand, the renationalization of YPF broke the private dominance in the sector and reversed the strategy of the most prominent upstream company. However, underinvestment in exploration, over-exploitation and stagnation of production by private operators remained. On the other hand, the short duration of the reforms (2012-2015), which allowed more significant state intervention in their investment plans, did not succeed in modifying the historically rent-seeking behavior of the private sector, which is not necessarily in line with the country's energy needs. Finally, the Argentine hydrocarbon complex remains dependent on external financing linked to the repatriation of profits and other forms of currency outflows, exacerbating Argentina's macroeconomic problems, which are on the verge of default and hyperinflation.

Milei recently announced that YPF would be one of the first companies to be privatized in the coming years. Analysts from Citi and Goldman Sachs highlight the attractiveness of the oil company due to its dominance in Vaca Muerta,[5] a deposit that has achieved significant development and offers a threshold price that is 50% lower than unconventional formations in the United States. After restructuring, the sale of the company could become a tool for the dollarization process that Milei proposes for Argentina by facilitating its access to dollars.[6] Reprivatization in an environment of high oil prices and eliminating export taxes could contribute to the resumption of exports of virtually all hydrocarbon extraction, reducing the energy trade deficit but exacerbating domestic energy shortages. In addition, it would be necessary to ensure that private oil companies reinvest part of their profits in local industry in order to maintain extraction activity in Argentina instead of prioritizing the distribution of dividends, something that has not been established during the period analyzed and that continues to pose a challenge to the reformist efforts of successive governments.

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[1] These deposits began to be exploited in 2013 and are expected to account for more than 50% of both gas and oil production.

[2] This percentage increased to 25% in 2004 and to 45-53.33% in 2007 when oil traded above $90 dollars per barrel.

[3] Repsol was compensated with USD$5 billion, an amount that was increased to USD$11 billion because the payment was made with Treasury bonds.

[4] 51% state-owned, of which 49% is in the hands of the hydrocarbon-producing provinces and the remaining 51% belongs to the National State.

[5] In 2023, YPF controlled approximately 12,000 km^2 of the 30,000 km^2 of the formation and had 582 operational wells out of a total of 1,331.

[6] However, the votes of two-thirds of Congress are needed to approve the sale of shares to private investors, support that the ultra-liberal politician does not currently have.