

# Latin American Oil Sector in a Low Price Environment

A POLITICAL RISK ANALYSIS OF ARGENTINA'S VACA MUERTA OIL AND GAS RESERVES

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## *Abstract*

Low oil prices could strain plans for increased investment for new oil and gas exploration projects. Using data from 2006 to 2016, I found that Latin American producers' responses to low oil prices aren't homogeneous: while the great majority of the countries reduced investments when prices declined, Argentina kept high levels of CAPEX. The increasing capital inflows in Argentina is explained by the exploitation of *Vaca Muerta's* resources, the main shale development in the region. Despite previous episodes of expropriation and other risk factors, oil companies are still investing in Argentina. This paper suggests that unconventional resources have a cost structure that makes it harder to expropriate. Unconventional resources are more capital intensive than conventional resources. In case of expropriation, Argentina's National Oil Company doesn't have the technical, nor financial capabilities to exploit *Vaca Muerta's* potential. Since expropriation is too costly for the Argentine government in terms of production and revenues, the government has incentives to follow contracts' terms and ensure property rights to attract further investment.

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## 1. Introduction

Oil prices are volatile, and volatility itself varies over time. After commodity boom prices on the early 2000s –around \$150 per barrel–, oil prices have declined in the last decade and are expected to remain low in the near future: forecasts about oil prices remain around \$65-70 per barrel for the next five years, half price from the peak price<sup>1</sup>. However, any further increase in global production could reduce prices even more<sup>2</sup>.

Lower oil prices could strain plans for increased investment for new oil and gas exploration projects. It's just economics: lower prices mean lower profit margins or also that companies start losing money in existing projects. Lower profit margins mean less money to re-invest in new ventures or to adopt newer technologies<sup>3</sup>. Previous shocks in oil prices provide evidence of how investment responds to oil price changes. In the early 2000s, investment averaged \$30 billion (in 2014 dollars) per year after crude oil prices significantly decreased; but when prices rose again, from 2003 to 2014, investment increased up to \$158 billion<sup>4</sup>.

For many Latin American (LATAM) countries, oil rents are an important component of their national budget. A low-price environment can easily lead to fiscal instability since oil rents make dependent states prone to excessive public spending in boom periods<sup>5</sup>. When prices decline, the government's expenditure levels are unsustainable since tax collection is relatively low<sup>6</sup>. The

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<sup>1</sup> Reuters, "RPT-COLUMN-Oil prices expected to stay around \$65-70 through 2024: Kemp", <https://www.reuters.com/article/oil-prices-kemp/rpt-column-oil-prices-expected-to-stay-around-65-70-through-2024-kemp-idUSL8N29J3VH>.

<sup>2</sup> Reuters, "Oil plunges 25%, hit by erupting Saudi-Russia oil price war", <https://www.reuters.com/article/us-global-oil/oil-prices-plunge-by-a-third-after-saudi-arabia-launches-output-war-idUSKBN20V131>.

<sup>3</sup> The One Brief, "How Low Oil Prices Are Affecting The Global Economy", <https://theonebrief.com/how-low-oil-prices-are-affecting-the-global-economy/>.

<sup>4</sup> U.S. Energy Information Administration, "Sustained low oil prices could reduce exploration and production investment", <https://www.eia.gov/todayinenergy/detail.php?id=23072>.

<sup>5</sup> Devlin and Lewin 2005, 187-188; Ross 2013.

<sup>6</sup> Mahmah and Kandil 2019, 78.

government is forced to implement strict fiscal rules and contractive policies to reduce spending levels. Then, the fiscal instability might fuel political instability. Less revenues means that the State also has less resources to buy off opposition and reward their supporters<sup>7</sup>. Weak states do not provide institutional channels, nor compensatory policies for addressing social grievances, making it more likely that political unrest will be expressed into the streets.

Using data from 2006 to 2016<sup>8</sup>, I found that LATAM producers' responses to low oil prices aren't homogeneous: while the great majority of them reduced their investments when prices declined, Argentina kept high levels of CAPEX. The increasing capital inflows in Argentina is explained by the exploitation of *Vaca Muerta's* resources, the main shale development in the region.

In 2012, Argentina's government nationalized the country's oil company, YPF by expropriating Repsol's share<sup>9</sup>. The expropriation episode along with low prices should have discouraged investments in Argentina's oil exploration sector. However, investors are putting their money into Argentina, instead of taking out. I would argue that unconventional resources have a cost structure that makes it harder to expropriate. Unconventional resources are more capital intensive than conventional resources. In case of expropriation, Argentina's National Oil Company (NOC) doesn't have the technical, nor financial capabilities to exploit *Vaca Muerta's* potential. Expropriation is too costly for Argentina's government in terms of production and revenues. Therefore, it's a non-credible threat. Furthermore, low prices –but enough to keep projects economically feasible–make less attractive expropriation since future oil revenues are smaller. Given these factors, oil companies keep investing to sustain shale exploration. They know their

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<sup>7</sup> Bueno de Mesquita and Smith 2011.

<sup>8</sup> My period of analysis will be from 2006 to 2016 due to data availability. My findings might change in further years.

<sup>9</sup> Reuters, "Argentina nationalizes oil company YPF", <https://www.reuters.com/article/us-argentina-ypf/argentina-nationalizes-oil-company-ypf-idUSBRE8421GV20120504>.

returns are secure from political risk as the Argentine government doesn't have incentives to expropriate their assets.

The rest of the paper is structured as follows: Section 2 gives a brief description of Latin America's diversity in oil and gas sector and how oil prices reshape policy and investment. Section 3 discusses Argentina's unconventional resources potential and the factors that explains growing investment despite low prices and high-risk country conditions. Section 4 concludes the paper.

## **2. The diversity of Latin American hydrocarbon sectors**

Across many countries in Latin America, oscillation in policy and government's role in the energy sector is like a swinging pendulum. Latin America exemplifies that having resources is no guarantee that a country will benefit from them. Capitalizing on natural resources requires policies that welcome competition, regional integration, and private investment and technical expertise. It ain't the resource, it's the framework and its implementation.

LATAM has experienced shifting energy policies tied to international price swings. In the early 2000's when prices declined, some LATAM's Oil and Gas (O&G) sectors were reformed to allow International Oil Companies' (IOCs) capital, forcing NOCs to compete. However, when prices rose again, the region experienced a new wave of resource nationalism in which countries returned to statist policies to maximize rents of newly discovered projects (see Figures 1 and 2, Appendix).

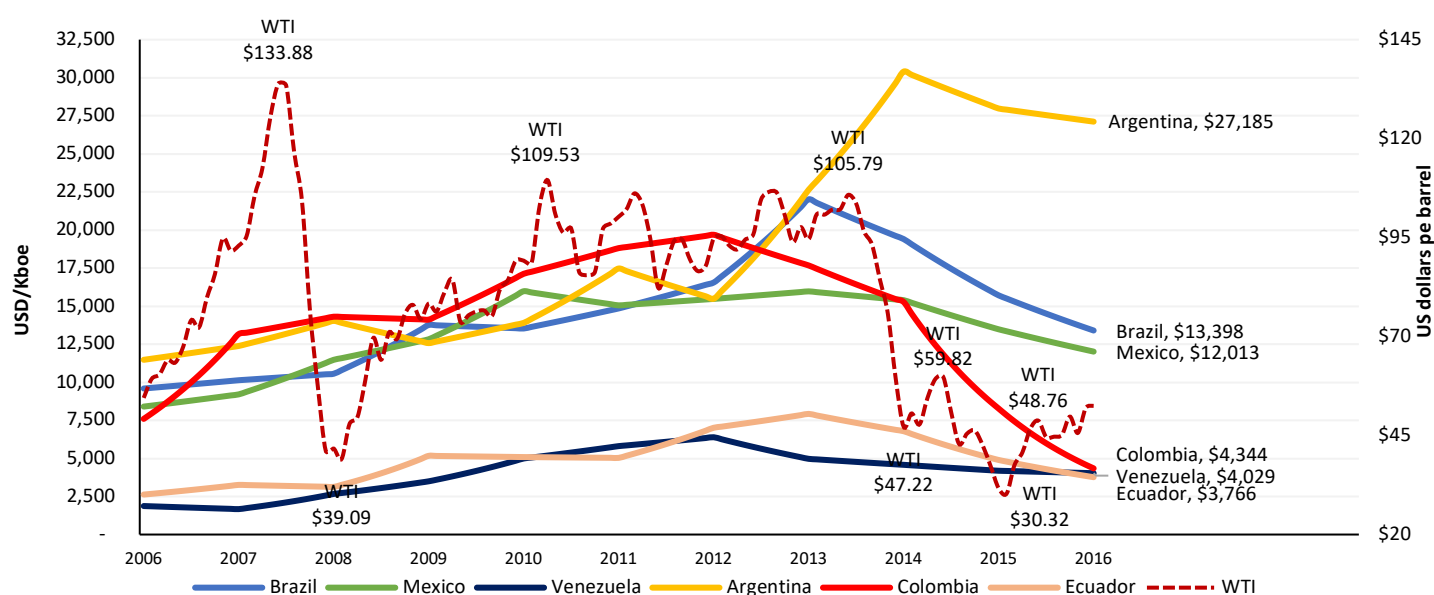
Besides differences in natural resources endowments<sup>10</sup>, LATAM countries face different levels of Capital expenditure (CAPEX) in upstream. From 2006 to 2016, Argentina, Mexico and Brazil

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<sup>10</sup> Oil is plentiful in LATAM, but production has fallen as consumption rises, squeezing the region's trade balance. LATAM's gas reserves are small, and with consumption rising sharply, the region is now a net importer. The region's oil producers are led by Brazil, Venezuela and Mexico; the rest, all are net importers (see Graph 1, Appendix).

were the countries with the highest levels of OPEX<sup>11</sup> and CAPEX in the region as Graph 1 shows. Generally, low prices are correlated with cuts in CAPEX. Low and volatile prices make it difficult for the industry to justify capital expenditures for drilling new wells or develop new infrastructure. LATAM countries follow that route, except for Argentina which showed an increased in CAPEX after the oil price shrank.

**Graph 1. Latin America's Oil and Gas Capital Expenditure (CAPEX) per Kboe by Region, 2006-2016**



Source: BP statistical review of the world energy 2018, WoodMackenzie and US Energy Information Administration.

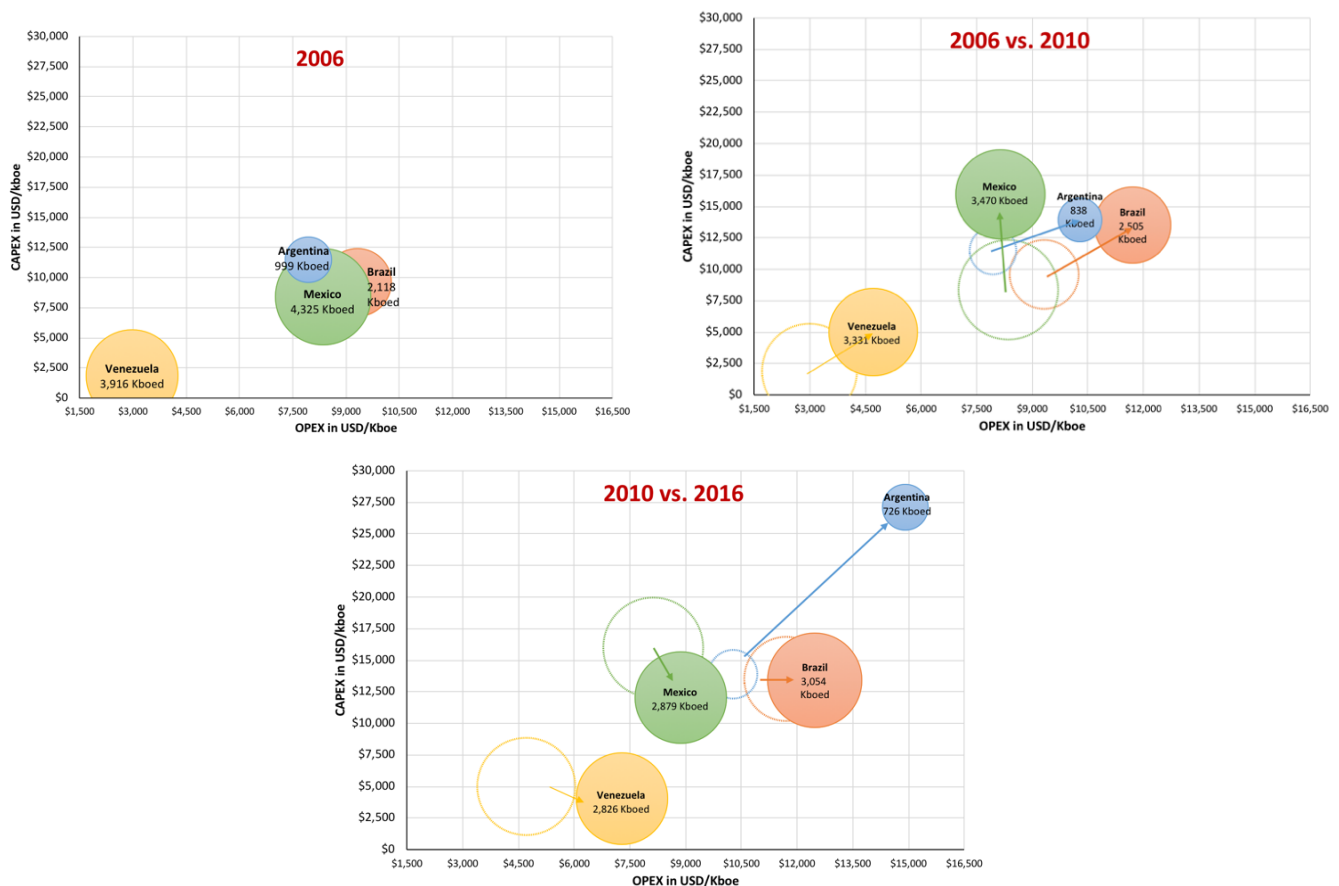
Graph 2 shows that before the price upswing (in 2006), LATAM O&G producers had similar CAPEX/OPEX ratios suggesting that companies were no longer pursuing aggressive growth, though with very different output levels. During the price upswing (2006 to 2010), all LATAM producers heeded price signals. Argentina, Brazil and Venezuela increased both CAPEX and OPEX. Mexico's NOC invested to contain production slide, but also became reliant on service companies, therefore incurred slightly lower OPEX.

<sup>11</sup> Levels of Operating expenses (OPEX) are show in the Appendix (Graph 2).

On the downswing (at 2016), responses are mediated by asset differences and policy choices. In terms of CAPEX, there was a dropped in Mexico and Venezuela, under the expectation of lower income. It remained stable in Brazil on account of deepwater projects<sup>12</sup>, while it increased dramatically in Argentina to sustain shale exploration.

Argentina is the only country who follows a different route in terms of investment. Argentina might not be considered the best place to invest considering its exchange rate instability, the echoes of default and the history of expropriations. So, why do investors still invest in a high-risk country like Argentina?

**Graph 2. Evolution of Latin America's CAPEX and OPEX in Oil and Gas, 2006-2016**



Source: Own elaboration with data from WoodMackenzie.

<sup>12</sup> U.S. Energy Information Administration, "Offshore oil production in deepwater and ultra-deepwater is increasing", <https://www.eia.gov/todayinenergy/detail.php?id=28552>.

### 3. Heterogeneous responses to a low-price environment: Are unconventional resources still profitable in Argentina?

This section provides an analysis of how Argentina, despite of being a high-risk country in the region, is still attractive for oil and gas exploration projects. First, I describe briefly *Vaca Muerta's* potential. Second, I identify Argentina's challenges to increase further investment, both domestic and international. Third, I address the main drivers that explain oil private companies' decision to invest in Argentina, which are associated with the probability of expropriation.

#### 3.1. *Vaca Muerta*, Argentina's Crown Jewel

Argentina has a huge potential for the development of unconventional resources: it ranks fourth of unconventional oil deposits and is second for shale gas worldwide<sup>13</sup>. It remains largely untapped. *Vaca Muerta*, located in the Neuquen basin, is the main non-conventional hydrocarbon formation in Argentina (see Figure 4, Appendix). It occupies an area of 36,000 km<sup>2</sup>, similar to the area of the state of Maryland. The resources are estimated at 16 billion barrels of oil and 308 trillion cubic feet of gas. The proven reserves would secure Argentina's hydrocarbons consumption for more than 80 years for oil and 150 years for natural gas<sup>14</sup>.

Capital injections is the key to the development of *Vaca Muerta's* resources. It is estimated that *Vaca Muerta* will require an investment of USD \$8,000 million per year up to 2030<sup>15</sup>. Since 2013, the development of *Vaca Muerta* increased the attention of several international companies, which revitalized the upstream activity in Argentina. Larger investments, declining drilling costs,

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<sup>13</sup> U.S. Energy Information Administration, "World Shale Resource Assessments," <https://www.eia.gov/analysis/studies/worldshalegas/>.

<sup>14</sup> PwC, "Vaca Muerta: Argentina's energy future", <https://www.pwc.com/ar/es/publicaciones/assets/vaca-muerta-energia-argentina-i.pdf>.

<sup>15</sup> Ibid.

access to the latest technology and an adequate regulatory framework could lead to rapid growth in *Vaca Muerta*'s development<sup>16</sup>.

### **3.2. Argentina's investment challenges... riskier, but acceptable?**

Argentina risk assessment is described as a country with uncertain political and economic outlook and a business environment with many troublesome weaknesses. Not to mention that the Argentine economy is known for its macroeconomic instability and its irresponsible defaults on its external debt<sup>17</sup>. However, considering the scope of this paper, the main risk that would discourage investment is the potential expropriation of private assets. In May 2012 the Argentine government expropriated 51% of the ownership of YPF from Repsol, just after the Repsol YPF made potentially massive shale discoveries in *Vaca Muerta* in November 2011.

The energy policy in Argentina doesn't provide incentives for further investment. Since 2002, prices for gas and power were frozen. The difference was financed by the government: in 2014, subsidies made up 3.8% of Argentina's GDP<sup>18</sup>. Furthermore, Argentina had subsidies that kept domestic oil prices low. In 2016, the oil international price was half of what Argentinians paid in their domestic market<sup>19</sup>. During Macri's administration, there were efforts to reduce energy subsidies, but private firms gas enterprises still received subsidies: in 2018, government transfers were equivalent to 0.12 per cent of the GDP (400 million)<sup>20</sup>.

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<sup>16</sup> Gross 2018, 3-5.

<sup>17</sup> OECD Economic Surveys, Argentina, <https://www.oecd.org/economy/surveys/Argentina-2019-OECD-economic-survey-overview.pdf>.

<sup>18</sup> BNamericas, "Will Argentine energy subsidies return?", <https://www.bnamericas.com/en/analysis/will-argentine-energy-subsidies-return>.

<sup>19</sup> Dialogo Chino, "Argentina cuts oil subsidies to ease the deficit", <https://dialogochino.net/8058-argentina-cuts-oil-subsidies-to-ease-the-deficit/>.

<sup>20</sup> International Institute for Sustainable Development, "Removing Subsidies for Oil Production in Argentina", <https://www.iisd.org/sites/default/files/publications/stories-g20-argentina-en.pdf>.



Oil companies are used to dealing with geopolitical risk, as they operate in regions with high volatility. They pursue opportunities in countries with higher returns, possibly knowing that eventually they may become troublesome: more return, more risk, especially political risk. So, is it Argentina much riskier than other countries from the region?

**Table 1. Comparison of several risk indexes for Argentina and other LATAM countries**

<i>Country</i>	<i>MARSH Country risk index 2017<sup>22</sup> 100=best</i>	<i>Rule of Law Index<sup>21</sup>-ranking</i>			<i>BMI Research RRI (2017) 100=best</i>	
		<i>Global (2016) - total 113</i>	<i>Regional (2016)</i>	<i># countries in region</i>	<i>Upstream</i>	<i>Downstream</i>
Canada	79.2	12	9	24	78.4	85.1
USA	77.3	18	13	24	86.2	85.0
<b>Argentina</b>	<b>50</b>	<b>51</b>	<b>14</b>	<b>30</b>	<b>54.4</b>	<b>52.5</b>
Brazil	56.7	52	15	30	62.4	57.0
Colombia	58.5	71	19	30	46.7	47.5
China	68.4	80	13	15	62.5	64.5
Mexico	58.4	88	24	30	52.8	48.1
Venezuela	33.6	113	30	30	30.2	20.9

Source: MARSH, World Justice Project and BMI Research RRI.

Table 1 shows different risk indexes for Argentina compared to other LATAM countries, United States and Canada. According to MARSH, Argentina is a middle range stable in terms of country risk index 2017 (<49 unstable, >69 stable). However, Argentina has better performance in other aspects. For example, the NGO “World Justice Project” with its Rule of Law index situates Argentina in a better position (51 out 113) than other LATAM oil producing countries. BMI Research (consultancy) computes a Risk-Reward index for the Upstream and Downstream Sectors.

<sup>21</sup> *World Justice Project in a NOG. Rule of Law Index* relies on more than 110,000 household and expert surveys to measure how the rule of law is experienced and perceived in practical, everyday situations by the general public around the world. Performance is assessed using 44 indicators across 8 categories, each of which is scored and ranked globally and against regional and income peers: Constraints on Government Powers, Absence of Corruption, Open Government, Fundamental Rights, Order and Security, Regulatory Enforcement, Civil Justice, and Criminal Justice.

<sup>22</sup> MARSH. Country Risk Index (CRI) is based on data from BMI Research. Quantifies the risk of a shock, such as an economic crisis or a sudden change in the political environment that would affect business conditions within a country. See Figure 3, Appendix.

It is worth notice that only Brazil set ahead of Argentina. Overall, Argentina maintains a high-country risk, but not so different from other countries of the region.

### **3.3. Unconventional resources... harder to expropriate!**

The exploration of oil is a riskier business. It's a capital-intensive industry and the investment do not assure production: there might be no oil available at your drilling location. By the nature of this business, property rights and enforcement of contracts are essential to ensure constant flows of capital inflows<sup>23</sup>.

There is a paradox. Oil industry requires a strong institutional framework to ensure a future stream of income. A good institutional environment may decrease the cost of doing business either by increasing certainty about commitments and compliance to the rule of law<sup>24</sup>. However, many of the world's oil reserves are located in unstable countries with weak institutions<sup>25</sup>. Weak institutions mean that any commitment made by the government is not credible as it's not self-enforcing: if it has significant benefits, it can deviate anytime.

Investments are a bargaining relationship. At entry, investor holds cards: host country wants capital and technology to exploit oil resources. Once investment is made, bargaining power shifts, particularly when investments are large and immobile. Oil developments are of low mobility: once a company start drilling a well, there's no turning back. Therefore, if governments can obtain high political or economic benefits from deviating on agreements and the transaction costs of doing so are low, the absence of strong domestic institutions or external players (ex. international organizations) provides uncertainty about compliance of governments' contracts.

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<sup>23</sup> North and Weingast 1989, 803.

<sup>24</sup> Ibid.

<sup>25</sup> Patrick 2007, 658.

Contracts are expected to hold. However, oil companies face three kind of risk: 1) the contract risk, in which the host country partner can seek to re-write or renege on contract; 2) the policy risk, in which the government changes policy in ways that affect the profitability of the investment, for example tax rates or regulations, and 3) the political risk, in which the government can nationalize or expropriate assets from private contracts<sup>26</sup>. This paper focus in the political risk and the likelihood of expropriation.

Governments expropriate oil assets to maximize state revenues. Oil rents are appropriated by two ways: royalties and taxes<sup>27</sup>. The primary benefit of expropriation is a short increase in the state's take of oil revenues. Instead of receiving royalties from private companies, the State can collect 100% of profits through the NOC<sup>28</sup>.

A higher perception of injustice in how profits are distributed between the State and the oil companies increases the probability of expropriation<sup>29</sup>. An open sentiment of resource nationalism –oil revenues should be used for the benefits of the host country rather than for private gain<sup>30</sup>– is most likely to appear in a scenario in which the government perceives is receiving less economic benefits than the IOCs, and then expropriations are justified as measure to eliminate this disadvantage situation<sup>31</sup>. The government also receive other benefits from expropriations, such as the direct oversight of production decisions, and the control of the NOC's management positions for patronage or clientelism purposes<sup>32</sup>.

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<sup>26</sup> Forbes, "International Politics Is Always A Risk For Oil Companies, But Business Conditions May Matter More", <https://www.forbes.com/sites/uhenergy/2017/03/28/international-politics-is-always-a-risk-for-oil-companies-but-business-conditions-may-matter-more/#664497e29912>.

<sup>27</sup> Mares 2010, 8.

<sup>28</sup> Mahdavi 2014, 230.

<sup>29</sup> Ibid.

<sup>30</sup> Mares 2010, 6.

<sup>31</sup> Mahdavi 2014, 230.

<sup>32</sup> Golden and Mahdavi 2015, 18; Victor et al. 2011, 10-12.

Investors should consider different drivers to support its decision to keep investing in Argentina's upstream sector. I argue that there is a mix of two variables that reduce the likelihood of expropriation in Argentina: 1) low oil international prices, and 2) type of resources (conventional versus unconventional).

**a. Oil international prices**

It seems natural to think expropriation is more likely to happen when oil prices are high as benefits are greater. If governments are revenue maximizers, then the timing of expropriation should be done in periods in which the short-term gains outweighs the potential financial costs of expropriation<sup>33</sup>. However, why is most likely that private companies face a political risk, instead of a policy risk under high prices? Operating firms and host governments could renegotiate fiscal contracts to narrow higher operator-retained revenues compared to the State's share.

The contract theory assumes that governments would prefer to guarantee property rights and get revenues from taxes<sup>34</sup>. By enforcing contracts, a government faces greater benefits: 1) create incentives to boost investment, as it builds credibility of its institutional framework, and 2) have gains in efficiency from technology adoption<sup>35</sup>. However, the weakness of this setting is that government plays two roles: enforcer and contracting party. This mechanism is not self-enforcing: it depends on short-term government's incentives<sup>36</sup>. Since this framework doesn't have checks and balances within the government or third parties, expropriation is the equilibrium when oil prices

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<sup>33</sup> Guriev, Kolotilin and Sonin 2011, 9.

<sup>34</sup> Aghion and Holden 2011, 183.

<sup>35</sup> Guriev, Kolotilin and Sonin 2011, 2.

<sup>36</sup> North and Weingast 1989, 808.

are high<sup>37</sup>. Otherwise, the government's incentives are aligned to enforce property rights: It will have foster investments to develop new exploration projects and increase future cash flows.

## **b. Type of resources**

Argentina's exploration investment has focused in the exploitation of unconventional resources. Unlike conventional resources, I argue that unconventional resources have properties that make them harder –or economically less attractive– to expropriate. They have two particular features: 1) Capital requirements, and 2) Investment recovery.

### ***Capital requirements***

Unconventional resources are more capital intensive than conventional<sup>38</sup>. Considering the cost of conventional versus unconventional hydrocarbon extraction projects, hydraulic fracturing is a more expensive process as it requires additional equipment and complex technology<sup>39</sup>. More than 65% of the production costs consist of CAPEX, which around 95% of CAPEX include drilling<sup>40</sup> and completion costs<sup>41</sup>. According to IHS Markit, unconventional drilling will be responsible for more than \$5.1 trillion in capital spending for the next 25 years, 250x times U.S. GDP in 2017<sup>42</sup>.

Unconventional oil plays can be drilled many times. Fracking is described like an oil and gas manufacturing operation<sup>43</sup>. Hence, unconventional plays are short-term production assets: after

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<sup>37</sup> Ibid.

<sup>38</sup> The American Oil & Gas Reporter, "Unconventional Plays Fueling Economic Growth", <https://www.aogr.com/web-exclusives/exclusive-story/unconventional-plays-fueling-economic-growth>; The American Quarterly, "Can a Peronist Capitalize on Argentina's New Energy Reality?", <https://www.americasquarterly.org/content/can-peronist-capitalize-argentinas-new-energy-reality>.

<sup>39</sup> Gryphon Oilfield Solutions, "Conventional vs. Unconventional Oil & Gas Wells in the U.S.", <https://www.gryphonoilfield.com/conventional-vs-unconventional-oil-gas-wells-in-u-s/>.

<sup>40</sup> Drilling costs range from \$2.1 million to \$2.6 million per well in average, around 40% of the CAPEX. Completion costs range from \$3.8 million to \$5.6 million per well, 55% of the CAPEX.

<sup>41</sup> Mistré *et al.* 2018, 3.

<sup>42</sup> Global Energy Institute, "Report sees economic boost from unconventional oil and gas", <https://www.globalenergyinstitute.org/report-sees-economic-boost-unconventional-oil-and-gas>

<sup>43</sup> HartEnergy, "Conventional, Unconventional Drilling Go Hand In Hand", <https://www.hartenergy.com/opinions/conventional-unconventional-drilling-go-hand-hand-122267>.

two years of the completion of a well, production from that well declines rapidly, unlike conventional wells that decline slowly (see Table 1, Appendix)<sup>44</sup>. To sustain production, there should be systematic amounts of capital inflows to keep drilling new wells and replace the old ones. Unconventional resources required specialized technologies and innovative methods, so their management is expensive. A conventional gas well could run with a maximum cost of \$1 million, while an unconventional well requires an operation costs ten times higher<sup>45</sup>.

Capital constraints and technical expertise reduce the incentives of the government to expropriate these resources. Unconventional wells not just require systematic capital inflows, but also face high operation costs. Since governments have budget constraints, it's likely they might not have the resources to invest, nor the human capital to operate these wells. Therefore, the cost of expropriation outweighs the benefits from expropriation. The government could expropriate private assets, but it won't be able to benefit from them. The Argentine government prefer to collect '100% sure' royalties from IOCs than other scenario as it will not be able to sustain investment with public resources. Any expropriation threat is non-credible.

### ***Investment recovery***

Unconventional investments recover their costs faster than conventional wells. This feature makes attractive unconventional resources in high risk countries. This can be explained from two perspectives: 1) Unconventional projects require moderate initial capital compared to conventional ventures and 2) they are faster to produce commercial output. According to the EIA, the total capital per well in the onshore regions in the U.S. ranges from \$4.9 million to \$8.3 million<sup>46</sup>. A

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<sup>44</sup> Kleinberg *et al.* 2018, 79.

<sup>45</sup> Ibid.

<sup>46</sup> EIA 2016, 7.

conventional project requires a much high influx of capital at the beginning of the development. It's faster to recover \$8 million than an unpredictable influx of capital to a conventional project. Or, in the worst-case scenario, if you're expropriated, your sunk cost is lower.

Unconventional projects provide quick payback on investments. Conventional developments take up to 4 years to show production for commercial purposes<sup>47</sup>; unconventional wells take less time. On this sense, the Argentine government knows that, on average, investors risk less in unconventional ventures compared to conventional projects. Expropriation of conventional wells make sense as they pay off longer, with more production over time; in unconventional projects, it's not the case. In fact, the damage is greater in terms of reputation and credibility. Deviations are costly for the government as they will discourage further investment.

In sum, capital requirements, operations management and short-term investment recovery makes unconventional resources less prone to expropriation in Argentina. Government's expropriation is a non-credible threat. The Argentine government could expropriate shale wells from private companies and give them to YPF. However, the NOC wouldn't be able to gain benefits from underground resources. The NOC doesn't have sufficient capital to keep production of these wells. Production would stop and the government would end with the worst scenario: 1) less production and 2) less cash flow to support its budget needs. Therefore, the dominant strategy of the government is to enforce property rights, comply with contracts' terms and provide an incentive system (e.g. tax incentives) to encourage new capital inflows.

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<sup>47</sup> EIA, "World Energy Investment 2019", <https://www.iea.org/reports/world-energy-investment-2019>.

## 4. Conclusions

In the 1990s, historically low oil prices pushed Latin America's energy sectors toward privatization. Argentina's state oil company, YPF was sold 100% to private investors. However, when prices rose, Latin American governments re-nationalized oil companies in order to get economic benefits of high prices.

Governments often care only about the short-term. In fact, an oil private company face many successive governments as oil projects are of long maturity. They want to maximize private benefits from holding power. The first government may accept to sign a contract that ensures high benefits in the short term but is detrimental to the country in the long run. Future administrations may don't like ex-post contracts' terms, as they feel they're not receiving a fair share when oil prices are high: this is soil ground for expropriations.

Argentina is a peculiar case. Despite low prices and high-risk country conditions, investment has not declined. Why? I argue that there is a mix of two variables that reduce the likelihood of expropriation in Argentina: 1) Oil international prices, and 2) type of resources.

Low prices reduce the probability of any expropriation episode since the economic and political benefits are small, so the government prefer to commit to contracts and build credibility about its framework to attract more private capital. Regarding the second variable, conventional and unconventional resources do not face the same risks. Capital requirements, operations management and short-term investment recovery makes unconventional resources less prone to expropriation. Moreover, unconventional projects involve less risk: the probability of dry hole is minimal, which is an attractive feature for investors in a high-risk country<sup>48</sup>.

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<sup>48</sup> Energy Funders, "Why Directional Drilling Projects Can Be Solid Oil and Gas Investment Opportunities", <https://www.energyfunders.com/blog/how-to-invest-in-oil-in-directional-drilling-projects/>.



There is room of improvement to make Argentina a less risky country to invest. The Argentine government should create mechanisms to resolve disputes in the future and attract more investment as it will be needed. Unconventional resources are capital intensive. One recommendation is to implement progressive income taxes in order to reduce temptation of expropriations. Additionally, disputes should be solved outside the State's judiciary system and consider an approach of an International Commercial Arbitration, of a credible third party to mediate conflict.

The current oil price war between Saudi Arabia and Russia has pushed pressure on shale gas new projects. For example, U.S. shale has long been accused of high levels of debts, and high breakevens –for U.S. drillers, they are around \$40s per barrel<sup>49</sup>. With a price around \$30, many projects are not going to be economically viable. Probably, a wait-and-see approach would be taken by oil companies in Argentina in the short term.

Historically, Argentina has been seen like a comic full of desperate stories, where economic crisis and political instability are the main characters. *Vaca Muerta* is seen as one of the few solutions the country has to solve endemic problems. The resources are there, underground; they are not going anywhere. The question is if the government is willing to find an efficient way to exploit this enormous potential as long as it's economically profitable. It looks easy to assume that we would find political support across the political spectrum to expand drilling, but politics and commodities prices are hard to predict.

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<sup>49</sup> Nasdaq, "Can U.S. Shale Survive The Oil Price War?", <https://www.nasdaq.com/articles/can-u.s.-shale-survive-the-oil-price-war-2020-03-10>.

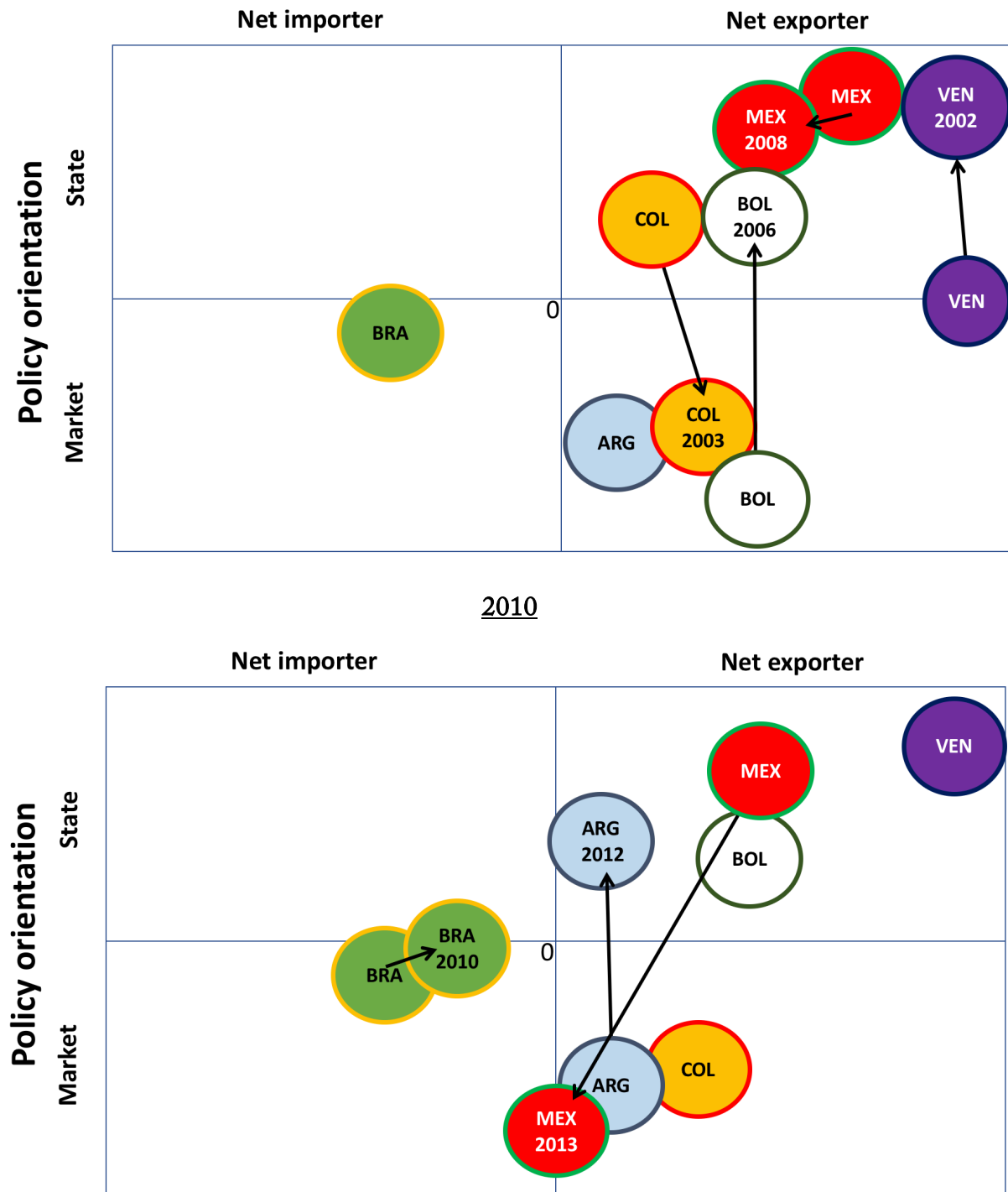
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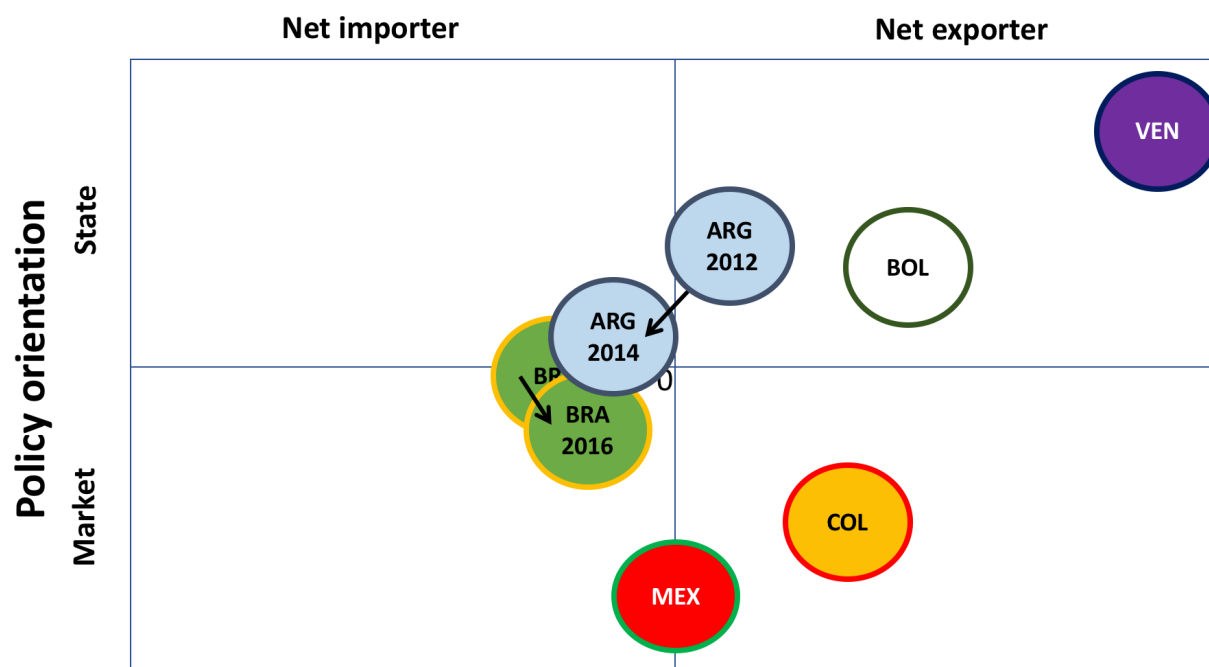
## Appendix

Figure 1. Latin America's changing oil and gas policy space: Early 2000s



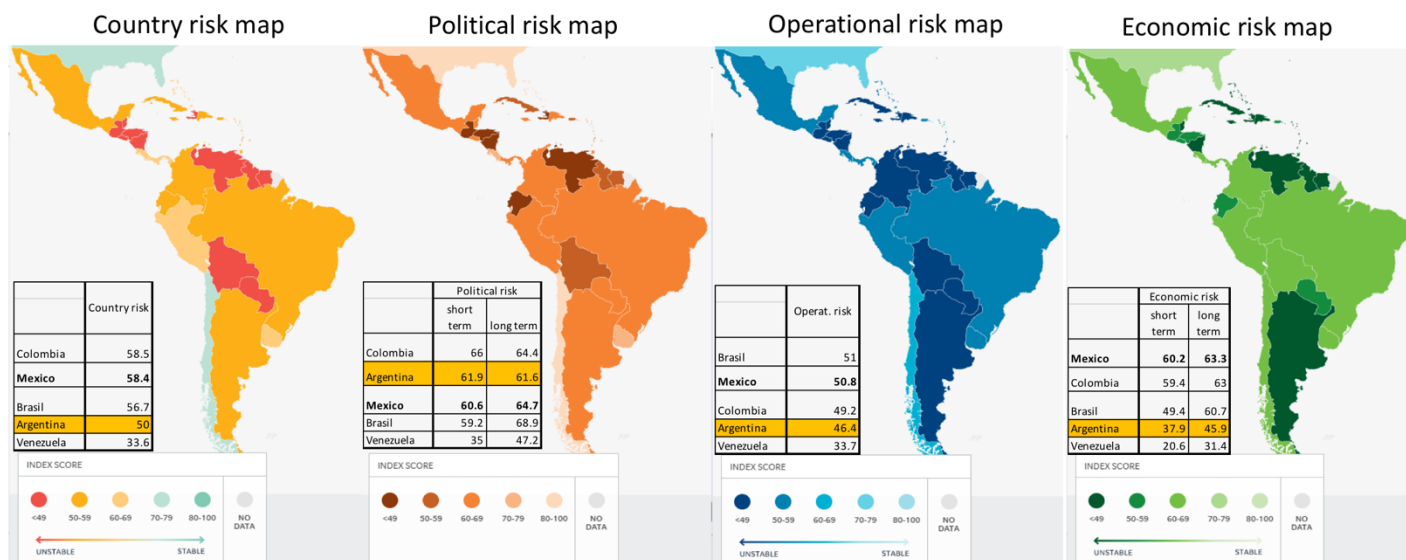
Source: Own elaboration.

Figure 2. Latin America's changing oil and gas policy space: Low oil prices (2016)



Source: Own elaboration.

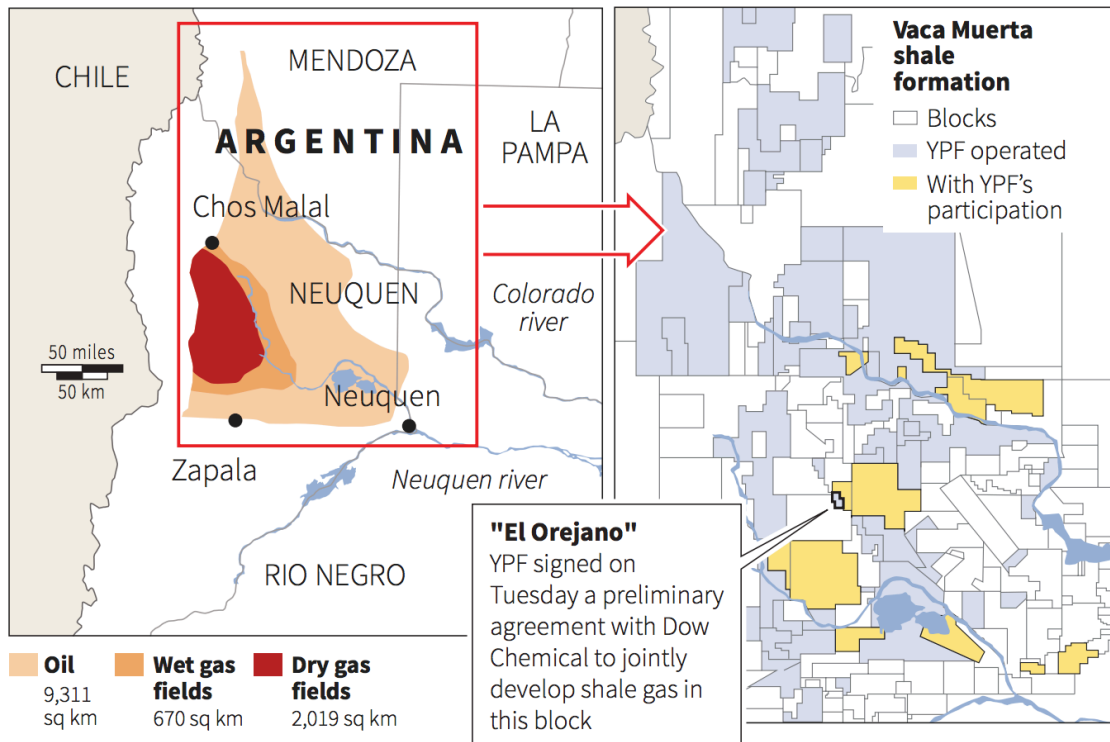
Figure 3. MARSH comparison of LATAM countries risk, 2017



Source: MARSH.

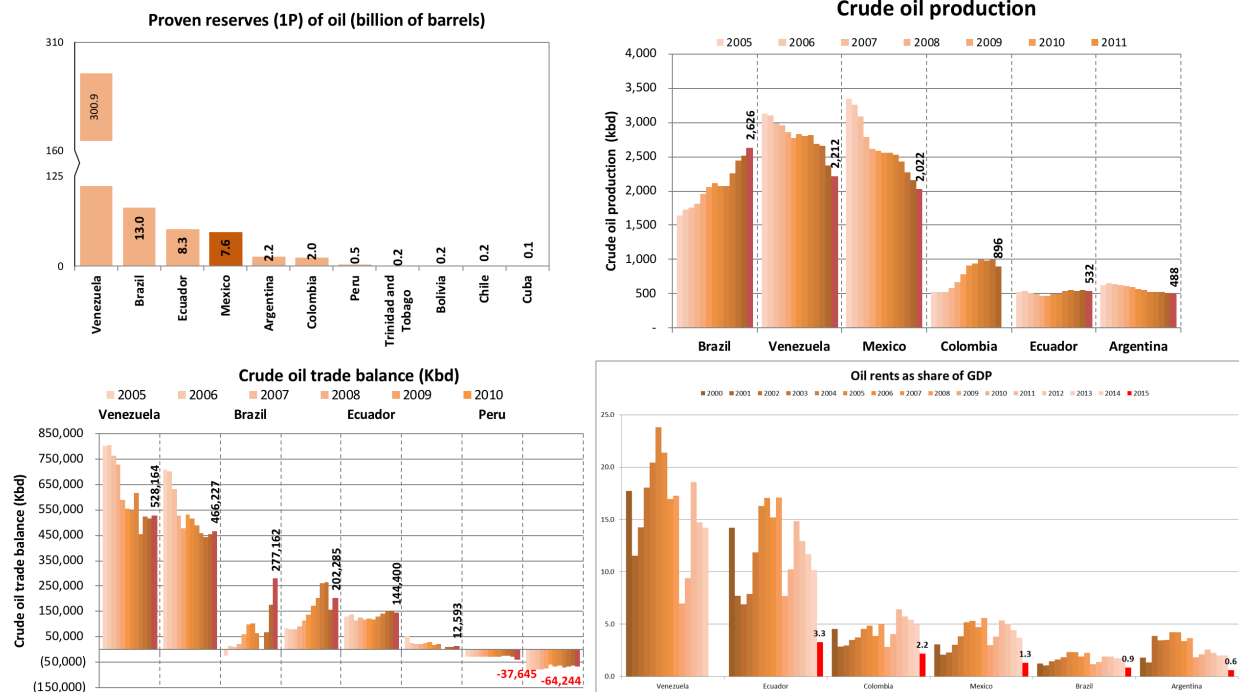
Note: Under Fitch Solutions' method, a country's score is ranked out of 100 - the higher the index, the less political risk.

Figure 4. Argentina's shale resources, *Vaca Muerta*



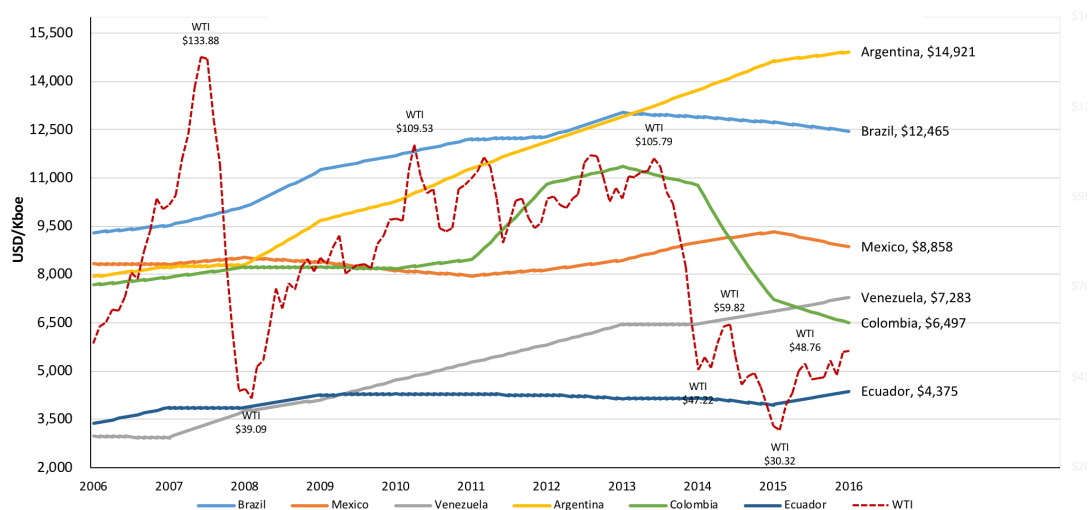
Source: Gross (2018).

Graph 1. Latin America oil and gas sector  
2006-2016



Source: BP Statistical Review 2018, World Bank and Jodi (IEF)

**Graph 2. Latin America's Oil and Gas Operational Expenditure (OPEX) per Kboe by Region, 2006-2016**



Source: BP statistical review of the world energy 2018, WoodMackenzie and US Energy Information Administration.

**Table 1. Percentage annual decline of conventional oil well versus tight oil**

Year	Conventional oil (secondary recovery)		Tight oil (primary recovery)	
	Well	Field	Well	Field
1	6%	6%	60%	28%
2	6	6	27	16
3	6	6	18	12
4	6	6	13	11
5	6	6	11	11

Source: Kleinberg *et al.* (2018).