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Brazil: New Developmentalism and the Management of Offshore Oil Wealth

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Abstract:

Since the 1930s development strategies in Brazil have made reducing its dependence on imported energy one of their priorities. Efforts focused on hydro-electric power, ethanol and oil. Offshore oil exploration by the state oil company Petrobras began in the 1970s and resulted in energy independence by 2006. In the same year, however, unexpectedly large oil reserves were discovered in the so-called Pre-Salt levels, transforming the country into a potential major oil exporter. This new reality creates major challenges for Brazil. New legislation and new policies have been set up to use this opportunity to accelerate development. The discussion on how to make the best use of offshore oil resources is guided by a so-called neo-developmentalism approach, introduced during President Lula's second term. In practice this means a modest increase in state control with new regulations focused on local content. Special attention should be given to expanding research and development activities. Foreign capital and technology are welcome as long as they are willing to operate in the framework of a national development strategy. This paper will examine the main features and challenges of these new policies within the broader framework of the present discussion on neo-developmentalism in Brazil. *Keywords:* neo-developmentalism; local content; oil wealth; Brazil; Pre-Salt.

Resumen: Brasil: Nuevo desarrollismo y la gestión de la riqueza petrolífera offshore

Desde los años treinta del siglo pasado, las estrategias de desarrollo en Brasil se han propuesto como una de sus prioridades reducir su dependencia de la energía importada. Los esfuerzos se enfocaron en la energía hidroeléctrica, en el etanol y en el petróleo. Las prospecciones petrolíferas offshore llevadas a cabo por la petrolera estatal Petrobras empezaron en los años setenta y tuvieron como resultado la independencia energética en 2006. Sin embargo, ese mismo año, se descubrieron inesperadamente grandes reservas de petróleo en los niveles llamados pre-sal, que transformaron el país en un importante exportador potencial de petróleo. Esta nueva realidad supone retos importantes para Brasil. Se han puesto en marcha políticas nuevas y una legislación nueva para aprovechar esta oportunidad de acelerar el desarrollo. El debate sobre cómo hacer el mejor uso de los recursos petrolíferos offshore va guiado por un enfoque llamado neodesarrollismo, introducido durante la segunda legislatura del presidente Lula. En la práctica supone un aumento modesto del control estatal mediante nuevas regulaciones enfocadas en el contenido local. Se debe prestar especial atención a ampliar las investigaciones y las actividades de desarrollo. La tecnología y el capital extranje-

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ros son bien recibidos mientras estén dispuestos a operar en el marco de una estrategia de desarrollo nacional. Este artículo examinará las principales características y retos de estas políticas nuevas dentro del marco más amplio del presente debate sobre el neodesarrollismo en Brasil.
Palabras clave: neodesarrollismo, contenido local, riqueza petrolífera, Brasil, pre-sal.

Introduction

After almost two decades of semi-stagnation Brazil elected a government headed by Luiz Inácio Lula da Silva, the Workers Party (*Partido dos Trabalhadores*, or PT) candidate in 2002. The new government took over promising a shift in the focus of economic and social policy from the Washington Consensus. After concentrating on gaining the confidence of the market with an orthodox macroeconomic policy, early in 2006 the predominant focus became the construction of a new development model (Barbosa and Pereira de Souza 2010). There was no blueprint, nor was there a clear set of references for the new approach. Bresser-Pereira had introduced the concept of 'New Developmentalism' ('*novo*' or '*neo desenvolvimentismo*') in 2004. The policy debate that resulted was a combination of setting a theoretical framework to capture the essence and systematize the key economic and social policy decisions taken since 2003 and especially since 2006 on the one hand; and, on the other, using a more normative approach, an attempt to come up with a set of policy priorities that could be followed to ensure that Brazil would begin a new period of sustained growth with social inclusion.

This was the political and economic context when Brazil declared itself to be energy self-sufficient on 21 April 2006[1]. More significantly, a few months later, using its accumulated experience with exploring oil fields in ultra-deep waters, Petrobras discovered unexpectedly large oil reserves under the salt layer, known as Pre-Salt (*Pré-Sal*). In November 2007, President Luiz Inácio Lula da Silva officially announced the existence of the new oil reserves and referred to it as 'the second independence of Brazil'.

This paper links the discussion of the regulatory framework and the economic policy for the management of the Pre-Salt to the new developmentalism strategy debate. Key issues that are discussed are: the role of the State; the state-controlled public oil company Petrobras; the local content requirement as a key instrument for industrial policy; the challenge that excessive dollar flows into the Brazil economy presents; and environmental risk factors. Considering the impact of policy decisions around the Pre-Salt, there can be no doubt about the interaction between the Pre-Salt and any development strategy. It is clear that the discussion of new developmentalism received a new dimension with the Pre-Salt discoveries. In her fist Message to the National Congress in 2011,[2] President Dilma Rousseff re-

peated the words of her predecessor by declaring 'the Pre-Salt is our passport to the future'. However there are no guarantees of success, as she acknowledged in the same speech. The Pre-Salt may mean that 'for the first time Brazil has the opportunity to become a developed nation', but the outcome depends on 'policies focused on innovation and social progress, accompanied by measures to protect the environment'.

To put this debate in context, three additional factors should be stressed. First, in the history of oil production it is not easy to find examples of countries with conditions similar to Brazil when they began to become a major producer and exporter. Brazil is a medium-income country with a relatively well diversified industrial park and a national oil company with endogenous technological capacity. At the same time, Brazil is a consolidated democracy with increasingly transparent institutions, huge challenges notwithstanding, especially concerning the lack of efficiency at the different levels of the State administration. However, Brazil is above all still a developing country with enormous social challenges. This means that Brazil is in a position to make good use of its new wealth, but it also means that it needs a national development strategy to overcome its structural deficiencies. In other words: it is no Saudi Arabia or Norway.

Second, energy can no longer be considered separately from the environment. There is hardly any other example of a big oil producer and exporter with such a relatively clean energy matrix, almost 50 per cent of which comes from renewable sources, mainly hydro and ethanol; and from 2010 on, increasingly from wind farms. This means that Brazil faces a new challenge of preventing the crowding out of existing cleaner energy sources in a context of potentially abundant and cheap fossil energy. A sustainable strategy for economic growth also implies environmental sustainability. In the coming decades, the world will have to respond to the devastating impact of greenhouse gas emissions, which suggests a transition towards a low carbon economy. The tendency will be to diminish the use of petrol in a gradual, but consistent way. One could argue therefore, that Brazil is heading in the wrong direction by investing in a huge expansion of its oil and gas industry. And while it is true that one of the challenges that Brazil faces with the Pre-Salt is related to its energy matrix, as we will discuss in this paper, it is hard to deny that necessary changes in the global energy matrix will be implemented while carbon fuel sources are still around in the coming decades. This is particularly so if we consider the expected increase in Asian demand, specifically from China and India.

Third, independent of the recent oil discoveries, a discussion had already begun in Brazil and the other South American countries about the

impact of sharp increases in demand for primary export products pushed by China and the presence of high liquidity in the global financial markets, interrupted only briefly by the 2008 Recession (Albrieu, Lopés and Rozenwurcel 2012; Sinnott, Nash and Torre 2010). Other issues that will come up in this paper concern the so-called 'Dutch Disease' and, more generally, the risks of dealing with excessive dollar inflows on the production structure that are already part of Brazil's academic and policy agenda and are related to consistently high export volumes of products like soya, iron and meat, among others.

Brazil does not have a complete inventory of its Pre-Salt reserves. Estimates vary between 50 and 100 billion barrels. Production capacity is expect to increase to around 6 million barrels of oil equivalent per day (BOE, including oil and gas) over the next decade, a level that has been so far achieved only by the USA, Russia and Saudi Arabia. Just to give an idea, the Tupi area alone (now renamed 'Lula') located in the Santos Basin, has recoverable volumes estimated at 5 to 8 billion (BOE). Meanwhile, the Guará well, also in the Santos Basin, holds 1.1 to 2 billion barrels of light oil and natural gas. Cuts in production estimates by Petrobras in its 2012-2016 Business and Management Plan do not question the potential of the Pre-Salt itself, but are rather a re-evaluation of Petrobras' capacity to explore, develop and produce at a speed anticipated in the previous plans. Pre-Salt production reached 300,000 BOE/d by March 2013, only seven years after discovery. Exploration success rates were 82 per cent in the same period (Petrobras 2013b).

Neo-developmentalism, national developmentalism and neo-liberal policies

Neo-developmentalism represents not only a break away from the neo-liberal Washington Consensus, but also a differentiation from the 'old-style' national-developmentalism. The latter dominated economic policy discussions and practice from the 1930s to the late 1990s and got strong intellectual support from the United Nations Economic Commission for Latin America (ECLA). Neo-developmentalism implies, first, a recognition of the mistakes that were made during the national developmentalist approach, and, second, an understanding that the national and international situation has changed profoundly since then. Sicsú, de Paula and Michel (2007) identified the main failures as: 1) policies used to achieve protectionist goals, because of their generalized approach and the lack of time limits; 2) limited technological and innovation progress; and 3) a less than satisfactory development of a national financial infrastructure, leading to

excessive dependency of foreign capital. Erber (2010) believed that inadequate economic and social inclusion was the 'great deficiency' of the older developmentalist pattern recalling, however, that Celso Furtado had already insisted that the concentration of income and wealth was the main obstacle to sustained development. Bresser-Pereira (2011) also explicitly noted the concentration of income and the disproportionate focus on durable consumption goods for the upper middle class as an obstacle. He criticized the ambivalence in relation to the public deficit and 'relative compliance' with inflation (Bresser-Pereira 2012, 19). With regard to the new reality and the calls for new strategies, Sicsú, de Paula and Michel (2007) noted that there is no longer a need for direct state involvement in productive activities, citing steel as an example. The challenge, then, is not to build up an industry to emerge from a predominantly agrarian society, but to increase innovation and productivity and improve quality. And, last but not least, globalization has led to the integration of financial markets, which has created new challenges. International trade negotiations and the work of the World Trade Organization (WTO) have made trade policies more complex.

This means not only reinforcing and modernizing public administration at the different levels, but also promoting the formation of an endogenous social development alliance '*núcleo endógeno de desenvolvimento'* (Sicsú, de Paula and Michel 2007, 521), which includes strong private domestic companies able to invest in innovation. The references to 'internal' does not exclude multinational capital, but suggests that development strategy should encourage the formation of strong local companies with R&D capabilities. At the same time it emphasizes the need to form a consensus that includes different sectors of society and defines development not only in terms of production capacity and internal market growth, but also in terms of equity and human capital. This idea is linked to Erber's (2010) concept of a neo-developmental convention ('*convenção neodesenvolvimentista*'). In his paper, Erber introduced the notion of differences between paradigms of economic policies that involve ideas and interests of different social groups and classes. Analysing the Brazilian experience during the Lula Administration, he found the co-existence of a more liberal approach with a clear attempt to promote a neo-developmental agenda. The latter become more prominent with the launch of the 2007 Growth Acceleration Programme (*Programa de Aceleração do Crescimento – PAC*), and the Productive Development Policy (*Política de Desenvolvimento Produtivo*). Erbers emphasized the role of the BNDES and the other public banks (which were greatly strengthened); the expansion of consumer credit, housing credit and the successful focus on income distribution and job creation; in-

dustrial policy focused on innovation with fiscal stimulus and subsidies; and an active role in international policies, in particular linking up with other medium income developing countries to promote changes in the structure of international governance.[3] To contribute in a collective and organized way to this debate, a group of heterodox economists – organized around the Economic Institute of the University of Campinas (Unicamp) – created the Developmentalism Network (*Rede Desenvolvimentisa*) in 2011. They preferred to characterize the new logic introduced by the Lula administration as 'social-developmentalism' (*social-desenvolvimentismo*). In this view the major dynamic so far has come from the demand and distribution side, with little progress in making the structural changes necessary to upgrade Brazil's social and fiscal infrastructure and allow for a new cycle of investment and innovation (Carneiro 2011, 3). But they did identify a clear change in strategy regarding the reconstitution of the coordinating capacity of the State.

The debate in Brazil presented above also reflects the international debate on the failures and limits of the neo-liberal approach and the advocacy for 'reconstructing the developmental state' (Change 1999) or the 'search for the 21st century developmental state' (Evans 2008). Another contribution that stresses the need for industrial policies as a key element of a development strategy has come from Rodrik (2008). The author defines industrial policies as 'policies that stimulate specific economic activities and promote structural change' and argues that the discussion should focus on 'how industrial policy should be carried out than on whether it should be carried out'. Stiglitz (2011) has argued along the same line that industrial policies have been crucial to successful growth strategies, but recognizes that state failures do exist and economic policies must, therefore, be consistent with the capacity of the state to implement them.

What these authors have in common when it comes to a definition of the new developmentalism is an emphasis on the resumption of the central role of the State, which is seen as essential to promote a development strategy that should focus on:

- the promotion of the dynamics in the internal market through increased mass consumption and the reduction of social inequality;
- the creation of opportunities for investment in strategic sectors, considering industrial policies to be still strategic, particularly the use of local content requirements;
- the need to diminish external vulnerability by promoting internal savings, managing the capital account and preventing excessive currency appreciation and instability;

- the integration with international markets, rejecting protectionism, but defending domestic industry against unfair trade practices. This includes pragmatic negotiations as a way of opening markets based on the principles of reciprocity;
- the promotion of a medium and long term national development stra tegy, which implies rebuilding state's planning capacity.

Changes in the Brazilian regulatory framework for oil exploration and production reflect a new policy orientation that gained critical mass during the second term of the Lula administration and is influenced by the neo-developmentalist debate presented in this section.

A new regulatory framework for the Pre-Salt

Table 1 shows that the history of regulation of oil exploration and production in Brazil is closely related to its different development strategies and conventions (Barros, Schutte and Pinto 2012).

Table 1. Evolution of Brazil's petroleum history

1938	Creation of the National Oil Council; Recognition of the strategic importance of energy security for national development
1945-53	Popular campaign 'The Oil is Ours' (*O Petróleo é nosso*) defending state monopoly
1953	Law 2004: state monopoly and creation of Petrobras
1974/1977	Discovery of oil in the Campos Basin: start of offshore oil exploration and production
1988	Codification of the state monopoly in the new Federal Constitution (art. 177)
1997	Amendment 9: end of the state monopoly; The 'Oil Law': a new regulatory framework introducing the concession system and creation of the National Oil Agency (*Agência Nacional de Petróleo- ANP*)
2006	Declaration of self-sufficiency
2007	Public announcement of the Pre-Salt; cancellation of 9th round of bidding (see below)
2010	New regulatory framework for the Pre-Salt areas
2011	Start of exploration Pre-Salt in the Lula area (former Tupi)

Source: The author.

Until the discovery of oil in the Pre-Salt, all efforts were focused on reducing external dependency on oil and achieving self-sufficiency. The impact of the 1973 oil shock forced the government to choose between slowing the economy or accelerating investment by taking advantage of the liquidity created by the petrodollars. At the time Brazil depended on oil imports for 80 per cent of its needs. The II National Development Plan (*II Plano Nacional de Desenvolvimento)* clearly opted for the second solution (Castro and Pires de Souza 2004). One of the key decisions was to go for offshore oil exploration, which led in 1977 to the successful start of production by Petrobras in the Campos Basin, off the cost of Rio de Janeiro. This also meant moving forward in the development of endogenous technological capacity in what is considered to be the technologically most advanced activity in the petroleum industry: offshore drilling and exploration. It is this technological capability, built up since then, that allowed the company to explore the Pre-Salt area three decades later.[4]

The new realities of the Pre-Salt led to a discussion about the existing regulatory framework and the role of Petrobras. At stake are two central issues. First is providing the state with the ability to capture oil rents. As Bosquet (2002, ii) points out: 'Unrealized rent, inappropriate use and misuse of rent that has been withdrawn (due to irresponsible public expenditure programs) all represent a form of misuse of public resources'. Most of the literature on the Dutch Disease however, does not pay enough attention to the first of the three elements mentioned by Bosquet. Second, the ability of the state to exercise control over the exploration and management of oil reserves to make sure that revenues are channelled to development priorities as determined by the government to protect and improve Brazilian industry by fostering innovation and spin-offs in the production chain on the one hand, and financing social progress on the other.

The arguments raised to introduce a new regulatory framework for the Pre-Salt area also reflect a diagnosis of the changes made in 1997 when the state monopoly ended and the concession system was introduced through Law 9478, the so-called Oil Law. At that time, international oil prices were low and production costs in Brazil were considered to be relatively high – with considerable exploration risks. Getting private risk capital involved was considered essential to increase investment and efficiency. Article 26 of the Oil Law established that exploration would take place at the risk and expense of the company, but if successful, the company would own the oil and gas found. It would, of course, still have to pay royalties and other government taxes. There would be no interference by the government or attempts to control the exploration and production process. The National Pe-

troleum Agency (ANP) would be responsible for organizing bidding rounds to sell exploration rights for the different areas. At the same time shares of Petrobras were sold both domestically and internationally. This was justified by the need to raise capital and efficiency by submitting it to market discipline, although the state would keep the lion's share and management control. At the time, these changes were challenged by the opposition, mainly the Workers Party (PT) and the Federation of Petroleum Workers (*Federação Única dos Trabalhadores – FUP)* and were seen as part a neoliberal policy weakening state control and releasing domestic oil wealth to private and international interests.

By 2007, however, the situation had changed. The Pre-Salt was in a very different situation for a number of reasons. First, Pre-Salt exploration presented a relatively high probability of finding economically viable deposits of oil. Second, the areas are huge, quite different from what had been the case previously. Third, structural changes had occurred in the market and price levels were much different than the US$ 20 per barrel in effect at the time the Oil Law was introduced. Fourth, and related to the previous point, the existence of proven oil reserves provided by itself a strong guarantee to access financing for exploration and development costs. Fifth, the changes that were proposed in 2008 were made by an administration that had proved its respect for contracts existing since 2003, indicating that in this case there was a truly exceptional situation. Finally, revisions of regulatory frameworks in the energy and mineral sectors were part of a general trend in response to new market conditions (Kahale 2000) and coincided with changing post-neo-liberal views of the role of the state in developmental strategies as discussed in previous section.

In all of these points there is a heavy emphasis on the role of the State and the notion of a national development strategy. The first step was taken in December 2007 with the partial suspension of the ninth bidding round, carried out under the 1997 Oil Law. From then until August 2009, internal studies were carried out and discussion were held to come up with proposals to change the regulatory framework.

The government basically proposed four major changes, initially divided into proposed laws, later combined into two laws during the process. First, the government proposed a sharing system in those Pre-Salt areas that had not previously been part of the bidding process. Second there was the significant capitalization by Petrobras through the onerous transfer of five billion barrels of the Pre-Salt reserves (explained below). Third, there was the creation of a new 100 per cent state-owned company, Pre-Sal Petróleo S/A, responsible for protecting the interests of the Government by manag-

ing the 'shared' contracts, including the control of oil costs and the sale of the Government's share of oil and gas. And finally, there was the establishment of a Social Fund to manage the Government's oil revenues in a responsible and sustainable way.

The core of the new regime is, of course, the sharing system ('*partilha'*). Under this scheme the distribution of the oil will include: 1) reimbursement of contractor expenses (oil cost), only in the case of a commercial discovery; 2) payment of royalties; and 3) division of the surplus oil between the Government and the contractor(s). Note that this means that the Government will acquire oil and gas assets and not just tax revenues, which implies that it can take into consideration other longer-term interests in the sale of oil.

At the same time the role of Petrobras was strengthened. First, the company was designated as the operator of all the blocks under the new system (the sole-operator).[5] In other words, other domestic or international companies must join in a consortium with Petrobras to participate in the Pre-Salt operations, and the state controlled company would also be responsible for the operations. Second, Petrobras would retain at least a 30 per cent stake in all blocks. This means the oil companies, including Petrobras, would compete only for the remaining 70 per cent in each block. The winner would be the company or consortium that offered the largest share of surplus oil to the Government, and Petrobras would be required to forward to the government the same percentage as in the winning bid. In addition, the law also anticipated the possibility of Petrobras controlling 100 per cent of a specific block without going through the bidding process.

The argument for giving Petrobras control of Pre-Salt operations is that it is the company responsible for the discovery of the oil in the Pre-Salt layer and, as the largest deep-water drilling operator in the world, it has the largest fleet of floating production systems. But, most of all, the Federal Government wanted Petrobras as the sole operator because as a state-controlled company it could be used as an instrument for the implementation of national energy and industrial policies. However, given that Petrobras is a mixed company with minority shareholders, the new regulatory framework would give a new wholly-owned state company, *Pre-Sal Petróleo S/A*, control of all of the Company's Operating Committees, nominating half of the members as well as a president with veto power. In theory this would also work as a kind of check and balance preventing Petrobras from accumulating too much power in relation to the government itself (the 'state-in-the-state' syndrome). How this will work out in practice is still to be seen.

During the public ceremony after approval of the law by Congress, December 2010, President Lula said that the new regulation will give the State more control over three main elements: the timing and speed of extraction; the capacity for Brazilian industry to meet the demand for equipment and services and the destination of the oil rents.[6]

The new regulatory framework was discussed in Congress during the national elections of October 2010, but did not receive the attention it deserved, considering its importance. Oil industry critics, through the Brazilian Petroleum Institute *(IBP*), and the main political opposition parties argued that there was no need to change the concession system as it had proved to work very well. Francisco Dornelles (2009), a conservative member of congress and former finance minister and one of the spokespersons for this viewpoint, argued that the government's proposal replaces 'a transparent and efficient concession system with a bureaucratized sharing mechanism, creating one more state company, which means an enormous step backward for the country's oil policy'. On the other hand, the government received support from Bresser-Pereira (2009), who at the time was still a member of the main opposition party PSDB: 'The introduction of the sharing system, instead of concession, is [the right one] because the risks are small and because this system allows Brazil to capture the oil rents...' and above all, the author argued that greater control by the government is required to deal with the currency risk and its impact on Brazil's industrial structure.

The decision to apply the new regulations only to the Pre-Salt area means that the concession system will still be used for existing and future exploration and production outside the Pre-Salt area. But the government's decision to honour existing contracts was more controversial because the reality to which they refer turned out to be quite different than that anticipated by the parties involved. This means that 28 per cent of the Pre-Salt areas, those mapped out so far, will continue to be governed by the concession system because these areas had been acquired by companies before the implications of their geological realities had been fully understood. Around 40 per cent of these Pre-Salt blocks were acquired by companies like BG, ExxonMobil, Hess, Galp, Petrogal, Repsol and Shell. The remaining 60 per cent are held by Petrobras. This was one of the reasons that the National Petroleum Workers Union (*FUP*) and the Central Trade Union (*CUT*) began the national 'The Pre-Salt is ours' (*O Pré-Sal é nosso*) campaign in honour of the historic 'the oil is ours' campaign. The campaign had little impact however, although a group of congressional members, mainly those with links to the Workers Party (*PT*) presented a law proposal (PL 5891) to

re-establish the state monopoly, re-nationalize Petrobras and cancel the bidding rounds in the Pre-Salt areas.

Although the Lula administration did not embark on a full blown re-nationalization programme, it did increase the state share in Petrobras in a very sophisticated manner, using the capitalization process, organized in September 2010. The main focus was on raising new funds for Petrobras to meet its investment needs both directly (new money) and indirectly, by increasing its borrowing capacity. Part of this process was the onerous transfer through which Petrobras was granted the right to undertake exploration and production activities in given Pre-Salt areas, at a limit of up to 5 billion barrels of oil and natural gas. The value of this onerous transfer was assessed in accordance with market practices and paid to the Union by the company. The proposed law allowed Petrobras to pay the Brazilian government using public debt securities.

The Federal Government shared in the capitalization by using federal public debt instruments. Petrobras then used the debt instruments to pay the Government for the 5 billion barrels of oil. Total capitalization was US$ 72 billion, (± R$ 120 billion), and the onerous transfer was priced at R$ 74 billion, which means that 'only' R$ 46 billion in new money was raised. This operation was the largest capitalization of a public company in history. (As a comparison, Facebook's IPO raised US$ 16 billion.) It could be argued that while the government did not explicitly state the objective of increasing its share, it was implicit in the process.

Table 2. Increase in state participation in Petrobras' paid-in capital

	Before Capitalization	After Capitalization 24/09/2010	31/12/2011
State sector	39.8%[7]	48.3%[8]	47.6%
National private sector	22.8%	19.9%	18.5%
Foreign sector	37.4%	31.8%	33.9%

Sources: Petrobras (2012c).

The increase in paid-in capital did not reflect a present or near future increase in revenues, as it anticipated the future revenue stream once the Pre-Salt areas were in full production. This means that the operation automatically incurred a decline in the return on equity. Considering the Pre-Salt perspectives this would not necessary lead to a decline in the share value. However, the paradoxical sharp fall registered after the capitalization process reflected the frustration of expectations of a short term increase in

profitability. One relevant issue has been the reluctance of the Government to increase gasoline prices as part of the general policy to contain inflation. But, more generally, market analyses point to a presumed excess of government interference in Petrobras' policies.[9]

Industrial and technological policies: upstream and downstream

One of the features of the exploration of natural resources much discussed in the literature is the low potential for linkages and limited externalities with other sectors. This underlies the idea of low value-added and low innovation for the economy as a whole (Sinnott, Nash and Torre 2010). This might not be the case with the Pre-Salt, first, because of its magnitude and second, because of the fact that the offshore is the high-technology segment of the oil industry. The first step, however, is to create the economic and institutional conditions that reflect the strategic opportunities for the economy as a whole. Using data from the BNDES, Puga and Borça (2011) calculated that 61.5 per cent of all industrial investment in the period between 2011 and 2014 will be linked to the exploration, production and refining of oil and gas. A survey by the National Oil Industry Organization (ONIP 2010, 7) estimates that the total value of demand created by O&G exploration and production to be US$ 400 billion for the period 2010-2020. This figure includes machinery, equipment, the shipbuilding industry and services.

These figures explain why the government considers Petrobras a key player in Brazil's industrial and technological policies in the coming years. By 2012 the share of Petrobras in total investments of the National Acceleration Programme (*Programa de Aceleração do Crescimento* – PAC) was already 35 per cent.[10] The impact is both upstream and downstream. Upstream refers to the demand for products and services for exploration and production. Downstream covers the production chain to final consumption, in particular refining.

The main focus of Pre-Salt industrial policy strategy is the preferential system of contracting goods and services on the domestic market, the so-called local content requirements. These are designed to strengthen the domestic supplier chain with a ripple effect throughout the entire Brazilian industry. The argument refers to the numbers presented and the time span involved. This should allow the industry to gain enough critical mass and economies of scale to create an industrial capacity that will be able to compete in international markets, both in offshore O&G exploration and production as well as in other sectors where the technology can be applied. This perspective should also work as a policy to attract foreign direct in-

vestment (FDI) in those areas where it is not realistic to expect domestic investment to take the lead.

A trade-off between local content requirements and short-term exploration and production goals in terms of price and time is plausible, precisely because of the learning curve and the need to create economies of scale and critical mass, especially in terms of human resources. This is clearly the case in the shipbuilding industry, which had almost completely disappeared. In 2000 Brazil had 1900 registered workers nationwide in this sector. As a result of the local content requirements related to the Pre-Salt demand, by 2010 this figure increased to 80,000 workers, working in 42 shipyards and the trend is to continue to increase (Sinaval 2010, 7).

As pointed out above, neo-developmentalists agree to a certain extent with the liberal criticism that technological development was not a high priority in the national developmentalist policies of the past. At the same time, the current discussion of the challenges of building up endogenous technological capacity underestimates the main feature of Brazil's industrial structure highlighted by Salerno (2011): the fact that the principal advanced production chains are controlled by transnational companies, whose decisions to invest in building up R&D capacity first consider their global strategy. This means that building up R&D capacity in Brazil necessarily involves negotiation with these international players. The regulatory framework for O&G production in major fields requires a mandatory investment of 1 per cent of gross receipts in R&D. This is guaranteed by the so-called R&D clauses in the exploration and operation contracts. Half of these funds must be used for contracting local research institutions, mostly public universities. The other half can be used in-house or through outsourcing, which encourages investment by O&G service companies like Halliburton, Siemens and Schlumberger in technological R&D centres in Rio. Funds raised for R&D by research institutes jumped from R$ 509 million in 2005 to over R$ 1 billion in 2011 (Colela 2012; ANP 2012) and projections for the next decade point to a yearly average of R$ 2 billion in the period between 2012 and 2022 (Haraldo 2012).

The downstream policy discussion has been focused around the strategy of exporting crude oil or building up refining capacity to export derivatives. Following the old logic, Brazil should opt for the second solution. Petrobras in fact started to initiate plans for the construction of two major export refineries in the Northeast, Premium I in Maranhão and Premium II in Ceará. However, as Castro (2010) pointed out, the simple logic of vertical integration does not always make sense from a development perspective, let alone from a purely commercial approach. And in this case it does not make

sense for several reasons. First there is the enormous refinery capacity in the consuming countries that makes the global demand for derivatives much smaller than for crude oil. Second the margins are very small, especially when the huge costs involved in building up refinery capacity are taken into account. The third argument used by Castro is that refining is a consolidated technology with little room for technological upgrades in the Brazilian production structure. The alternative in this case is to export crude oil, but making sure the revenues are channelled towards the expansion of endogenous technological capacity in frontier sectors.

At the same time, however, Brazil has experienced an explosion of internal demand as a result of its successful economic policies. ANP data show, for example, an increase in demand for gasoline of more than 40 per cent between 2006 and 2011. In any event there is a need to expand refinery capacity from 2 million bpd in 2010 to the target set by Petrobras of 3.6 million bpd by building the four refineries planned so far. Until the new capacity comes on stream, Brazil is doing precisely what it should not be doing: exporting crude oil and importing derivatives.[11]

Surplus US dollars, the exchange rate and the threat of deindustrialization

Furtado (2008) had identified the relation between excess dollars and underdevelopment in his studies of the Venezuelan economy in the fifties. In 1977 *The Economist* introduced the concept of Dutch Disease to suggest a similar relation between an oversupply of dollars and deindustrialization. This concept was rapidly assimilated by the economic literature.[12] The discussion on the need for 'current account protectionism' was already part and parcel of the neo-developmentalist debate in Brazil, even prior to the Pre-Salt. In fact Brazil, which in the past had suffered from external constraints on development for of lack of foreign exchange, had to face a completely new situation, that of having to deal with the negative effects of too much foreign currency. The Pre-Salt tends to increase this threat and therefore the policy discussion around it. The paradox is that the opportunities for Brazilian industry described in the previous section will face a powerful counter-effect created by the appreciation of local currency as a direct result of: a) the dollar inflow from the increase in oil exports and, b) the dollar inflow as a result of a sharp increase in public and private borrowing linked to the very existence of the oil wealth and the convincing financial guarantees it represents.[13] Local content requirements, discussed in the previous section, serve as protection against the currency-related loss of competitiveness, but the neo-developmentalist approach rejects this as a solu-

tion. The idea is to use local content requirements to build up an industrial capacity that can compete internationally.

This reinforce the argument that the exploration and production of oil from the Pre-Salt must be adapted to the absorption capacity, in this case the capacity to manage and use the inflows of foreign exchange and the availability of extra budgetary resources in a productive way to favour medium- and long-term development.

Environmental pressures

The lack of attention to potential environmental impacts and the notion of sustainable development is certainly one of the missing links in national-development policies, although this was not unique to these strategies but rather a reflection of the general perception at the time. But the neo-developmentalist approach cannot ignore the environmental issues involved.

Since 2006, Brazil has been party to an internal debate between the developmentalists exemplified by Dilma Rousseff on the one hand, (first as Minister of Mines and Energy, later as Chief of Staff and since 2011, as President) and the environmentalists on the other. Energy has been one of the battlefields, mostly focused on the construction of new hydroelectric power plants in the Amazon. The same debate is reflected in Brazil's foreign policy where, together with the other BRICS countries, all environmental discussions, especially with regard to climate change, are systematically put in the context of the need and the right to development. Brazil has an advantage in that it has a significantly cleaner energy matrix than the average OECD or any of the other BRICS countries. On top of that, since 2005, there has been a successful policy to structurally reduce deforestation in the Amazon, which used to be Brazil's major contribution to the carbon emission. But what about the Pre-Salt? Here there are three dimensions that need to be explored. First, there are the emissions of gases during the exploration and production process, among which is the old practice of burning ('flaring') the associated gas that is released as part of the extraction of oil. In this case, stricter laws (like prohibition of burning natural gas) and monitoring to force companies to use and develop up-to-date technology. Second, there is the issue related to the risk of accidents ('oil spills'). This issue got a lot of attention after the BP disaster in the Gulf of Mexico in 2010, when millions of barrels of oil were leaked. The disaster reminded observers around the world of the high risks involved in off shore oil production and the need for regulation, monitoring, and controls as well as the need for advanced contingency planning. In Brazil, the events in the Gulf

of Mexico had a major impact on the discussion regarding updating and detailing the National Contingency Plan.[14]

However, so far no attention has been given to the tremendous potential of the Pre-Salt for crowding out non-conventional sources of energy, specifically ethanol. Sugarcane-based ethanol is much more environmentally friendly than gasoline (CBO, 2010) and Brazil is the only country in the world that offers the option of using ethanol (100 per cent) as fuel. Gasoline sold in Brazil has a mandatory percentage mix of 20-25 per cent ethanol to gasoline. The introduction of the flex-fuel engine in 2003 led to a significant increase of ethanol consumption, which coincided with an explosion of the car market as a result of economic growth and income distribution policies. But investments and expansion of the ethanol market are viable only if the gasoline is sold on average at opportunity prices, linked to the international oil prices. Once the Pre-Salt is in full operation, it cannot be automatically assumed that populist pressures would not call for delinking local from international prices. This is the case in most of the oil producing countries, with the notorious example of neighbouring Venezuela where gasoline is sold at a price below that of mineral water. In this case ethanol will no longer be viable and risks being crowded out of the market. The government so far is convinced that it can resist the pressure. The Brazilian car makers association, Anfavea, projects an increase of the car fleet from 29 million units in 2009 to 56 million units in 2020. However, the Energy Research company (*Empresa de Pesquisa Energética* – EPE), linked to the Ministry of Energy and Mining, published the following figures:

Table 4. Projections of the evolution of gasoline x ethanol production (in $1000m^3$)

	2011	2015	2020
Gasoline	24,688	18,174	21,677
Ethanol	23,715	42,268	64,643

Source: EPE, 2011

These figures shows that government's projections work with the hypotheses of using the Pre-Salt production to replace existing oil production in wells that are facing diminishing productivity and export the rest. This will not be as easy as its looks, the lack of discussion so far notwithstanding.

Environmental issues and climate change therefore need to be given special attention in public policy in order to overcome the negative impacts and explore the opportunities given by the Pre-Salt. In the case of the environmental risks in the exploration and production process itself, the solu-

tions will be technological and constitute one of the goals of the investment in local high tech capacity. With regard to the risk of being crowded out, the issue at stake is to continue prioritizing a cleaner energy matrix as part of a conscious contribution to the transition to a low carbon economy.

Table 5. Pre-Salt and the neo-developmentalist debate

Key elements of the neo-developmentalist debate	Pre-Salt	Strategy and Challenges
Industrialization is an essential part of Brazil's development strategy to push productivity increase and innovation	Enormous potential for strengthen the national supplier chain with ripple effect throughout the entire industry	Strong local content requirements that focus on diversification and international competitiveness and prevent promoting rent-seeking and privileges; Building local competence.
Income distribution among social classes and regions	Availability of significant funds by government and private sector	Clear policies to use the funds in an extra-budgetary way for social development through the Social Fund; Prevent rent-seeking and corruption.
Protection of the current account to prevent excessive local currency appreciation and managing the exchange rate to prevent deindustrialization and stimulate competitiveness.	Significant inflows of foreign currency through oil exports and increase in private capital flows to the country (including foreign private debt)	Prevent excessive currency protectionism and inflationary pressures through monitoring. Management of the currency and the use of sovereign wealth fund.
Environmental concerns as an integral part of energy and development policies	Offshore O&G production involves direct risk to the environment (gas emissions during production and leakages), but also risk of crowding out of renewable energy alternatives, especially ethanol.	Integration of environmental concerns in the whole exploration, production and distribution process with strong control mechanisms; Clear policy at medium-long term for the necessary transition towards a low carbon economy; Prevent delinking local from international prices.

Final considerations

On the one hand, the Pre-Salt can give an enormous push to Brazil's economic and social development while on the other hand creating an illusion of great wealth with no real transformation and even, in the extreme case, destruction of existing production capacity. The industrial and technologi-

cal challenges are closely linked to macroeconomic ones, specifically those related to the exchange rate. But Brazil does have the advantage of having endogenous technological and industrial capacity as a starting point.

In this paper we argued the idea that there is no predetermined path to follow or model to emulate and that the Pre-Salt discoveries will create risks as well as opportunities. Risks will be identified and dealt with over time, and new opportunities are yet to be explored. The outcome depends therefore on policy strategies. But there can be no doubt that Brazil's future economic, social and political development will depend to a great extent on these policy decisions.

The discussion of development strategies other than the ones proposed in the Washington Consensus, and the search for a neo-developmentalist paradigm, heavily influenced the structure of the new regulatory framework for the Pre-Salt areas as well as the Government's industrial and technological policy with its strong insistence on local content requirements. In table 5 we represent the key elements of a neo-developmentalist approach as contained in the national and international literature previously presented.

In all of these cases, the return of the Government as a major player is central. Petrobras, although still a mixed company, has been identified as a critical part of any industrial and technological strategy in the coming years. The discussion of the need to protect the current account from excessive appreciation will become very intense and concrete once oil exports start to expand. But part of the policy discussion refers also to the lessons learned from the national development period, with its excessive commercial protectionism, lack of priority for the building up of endogenous technological capacity, lack of attention to the income distribution aspects, lack of attention as well to the environmental impact and unsatisfactory attention to the risk of foreign borrowing as well as inflation.

It is still too early to evaluate the effectiveness of the new regulatory framework in dealing with these challenges. Production under the sharing system will not take place until around 2020[15] and only from 2016 on will exports reach significant levels. Therefore, the debate over the coming years will be focused on the local content requirements and the role of Petrobras.

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Notes

1. April 21 is a national holiday honouring Joaquim José da Silva Xavier, Tiradentes, a leading member of a Brazilian revolutionary movement known as the *Inconfidência Mineira,* whose aim was full independence from Portuguese colonial rule and to create a Brazilian republic.
2. http://www.secom.gov.br/sobre-a-secom/acoes-e-programas/publicacoes/mensagem-ao-congresso-nacional/ – Message to the National Congress, 2011.
3. For a more detailed analyses of the concrete economic policy measures in the second term of President Lula see also Barbosa and Pereira de Souza (2010). Although these authors did not use the term new developmentalism, they argued that Brazil has opted since 2006 for a new developmental economic policy. On Brazil's foreign policy during the Lula Administration see Schutte (2012).
4. Part of the same strategy was the renewed attention to biofuels through the national *Proalcool* programme and expansion of the hydro capacity.
5. The operator is the member of the consortium that carries out the oil and gas exploration and production activities based on the decisions made by the Operating Committee.
6. http://blog.planalto.gov.br/pre-sal-um-presente-natalino-que-o-brasil-proporciona-a-si-mesmo/ (accessed 2012/03/23).
7. This Share is made up of 32.1 per cent of the Federal Government and 7.7 per cent of a BNDES subsidiary (BNDESpar).
8. This figure is the sum of 31.1 per cent Federal Government, 11.6 per cent BNDESpar, 3.9 per cent Sovereign Wealth Funds, with 17 others linked to the BNDES.

9. See, for example, Moody's announcement changing Petrobras rating outlook to negative, 17 December 2012.
10. Information obtained during interview with the General Coordinator for O&G of the PAC Secretary at the Ministry of Planning, Felipe L. Marques, 12 July 2012.
11. According to Petrobras, figures made public in August 2012, up to 15 per cent of the consumption of derivatives is imported. In 2011 this deficit alone added a US$ 9.9 billion to the current account deficit.
12. The name Dutch Disease is in fact unfortunate, as the Netherlands actually handled the situation created by the exports of natural gas comparatively well. In one sense the term had a negative side effect since few scholars focused on the way the Dutch managed to prevent the threat of the 'disease' and used its gas revenues to re-qualify its economic structure (Schutte 2010)
13. The relation between private international borrowing and the fluctuation of the oil prices was detailed in a study on Russia by Schutte (2011).
14. One year later, a much smaller incident involving Chevron's operations in the Brazilian off shore exploration led to a major mobilization of the different public agencies at the federal, state and municipal level as well as from the site of the judiciary, all determined to show that they are ready to act.
15. The first bidding round under the sharing system will take place at the end of November 2013. So far pre-salt production is carried out in the areas already auctioned under the concession system.

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