

# Beyond the low-skill equilibrium?

*A case study of the local content policy in the  
Brazilian oil and gas industry*

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Master thesis

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# Abstract

This master thesis wishes to explore the labor market in the Brazilian oil and gas industry during the peak years of the oil boom, seen from Norwegian multinational companies' (MNC) point of view. The theoretical perspective applied in the analysis is the hierarchical market economy (HME) typology, deriving from the varieties of capitalism (VOC) framework. In HMEs, the low-skill equilibrium is a prominent feature, in which none of the actors involved has incentives to invest in education and vocational training. This case study investigates to which extent such equilibrium exists in the Brazilian oil and gas industry. The industry is treated as a deviant case, due to factors like the national oil company Petrobras' efforts to raise the human capital, and the intentions of Brazilian authorities to increase Brazilian production rates through local content policies. The thesis finds that the low-skill equilibrium does not have a strong presence in the Brazilian oil and gas industry, mainly because of the firms' incentives to hire skilled workers. The industry's labor market was extremely heated during the oil boom, with a huge gap between the supply and demand for labor. This resulted in high turnover rates among workers. The thesis cannot however give firm conclusions regarding the role of local content policies in this transition.



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I am solely responsible for any mistakes or misinterpretations.

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# List of abbreviations

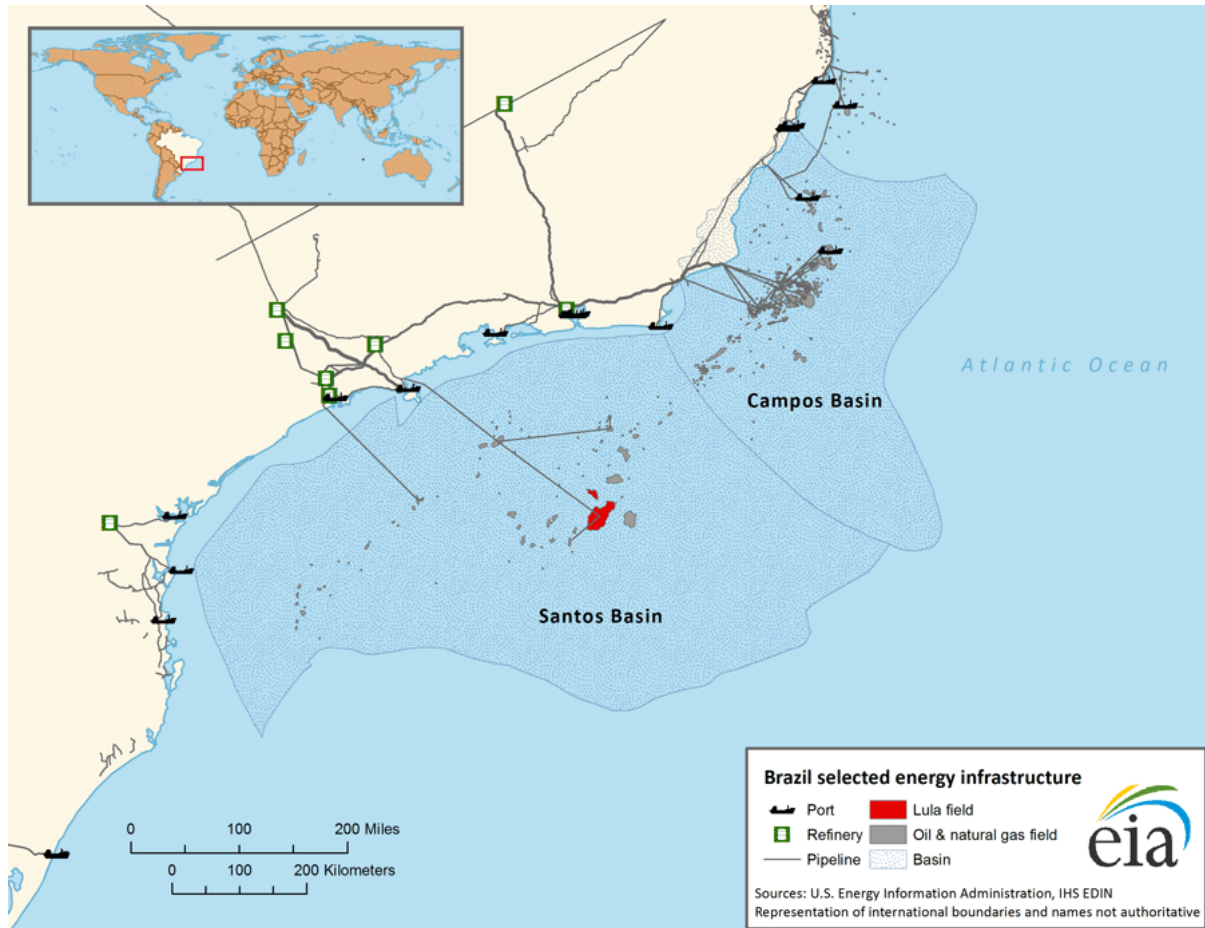
<b>ABRAN</b>	Associação Brasileira dos Armadores Noruegueses (The Brazilian Association of Norwegian Shipowners)
<b>ANP</b>	Agência Nacional do Petróleo (National Petroleum Agency)
<b>BNDES</b>	Banco Nacional de Desenvolvimento Econômico e Social (National Bank for Economic and Social Development)
<b>BRL</b>	Brazilian Real
<b>CEFET</b>	Centro Federal de Educação Tecnológica (Federal Center of Technological Education)
<b>CENPES</b>	Centro de Pesquisas e Desenvolvimento Leopoldo A. Miguez de Mello (Research and Development Center)
<b>CIABA</b>	Centro de Instrução Almirante Braz de Aguiar
<b>CIAGA</b>	Centro de Instrução Almirante Graça Aranha
<b>CME</b>	Co-ordinated market economy
<b>CNI</b>	Confederação Nacional da Indústria (National Industry Confederation)
<b>CNP</b>	Conselho Nacional do Petróleo (National Petroleum Council)
<b>ECLAC</b>	The United Nations Economic Commission for Latin America and the Caribbean
<b>FDI</b>	Foreign direct investment
<b>HME</b>	Hierarchical market economy
<b>IOC</b>	International oil companies
<b>LC</b>	Local content
<b>LCR</b>	Local content requirements
<b>LME</b>	Liberal market economy
<b>MNC</b>	Multinational corporations/companies
<b>NGO</b>	Non-governmental organization
<b>NOK</b>	Norwegian Krone
<b>NSD</b>	Norwegian Social Science Data Services
<b>PROMINP</b>	Programa de Mobilização da Indústria Nacional de Petróleo e Gás Natural (Program for the Mobilization of the National Oil and Natural Gas Industry)
<b>PT</b>	Partido dos Trabalhadores (Workers' Party)
<b>R&amp;D</b>	Research and development
<b>SENAI</b>	Serviço Nacional de Aprendizagem Industrial (National Service for Industrial Training)
<b>VOC</b>	Varieties of capitalism



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# Brazilian offshore oil fields



Source: EIA (2014)

# 1 Introduction

In 2007, the Brazilian oil industry made headlines. The national oil company, Petrobras, announced the discoveries huge oil reserves off the southeast coast. The findings were situated in the Pre-salt layer, about 5500 meters under the sea surface (EIA 2014), which meant that it would still take a while before the oil companies could overcome the technological difficulties involved with extracting oil and gas at such depths. However, this concern did not curb the enthusiasm and the Brazilian economy boomed. Many foreign firms wanted to participate in the economic euphoria, among them quite a few Norwegian firms. The Brazilian oil industry seemed like a good match for the Norwegians, with the next step of the oil adventure taking place offshore and demanding sophisticated technology for offshore exploration that the firms would be well equipped to deliver, taking into account their experience from the North Sea. However, the enthusiasm started to decrease when the expected outcomes did not appear. It turned out to be more difficult to extract the oil and gas from the Pre-salt layer than expected, and the project's time horizon expanded. Moreover, doing business in Brazil proved to not be an easy game. Norwegian firms have mentioned many reasons why doing business in Brazil has been so hard. Among them are the high level of bureaucracy, inefficiency, an intricate tax system, and the trouble of acquiring and keeping a qualified work force (Aftenposten 2014; NRK 2014). This thesis will revolve around the challenges in the Brazilian labor market related to the oil and gas industry.

The labor market will be analyzed in the light of the hierarchical market economy (HME) typology. The HME can be found within the varieties of capitalism (VoC) family, and has been developed in order to describe Latin American economies. It is based on previous typologies from the VoC branch, but argues that the hierarchical structures of society, together with a high level of social and economic inequality separate the HME from more developed economies (Schneider 2013: 4). In HMEs, one inclination is to sustain a fragmented labor market, in which one of the characteristics is the low-skill equilibrium. In low-skill equilibriums, "individuals do not invest in skills because firms offer few skilled jobs. Firms in turn do not invest in production requiring skilled workers because they do not think they can find them in the labor market" (Schneider 2013: 114). This situation can also be described as a vicious circle. Once you are settled there it can be quite difficult to break

out, but not impossible. In this thesis, I want to investigate whether it is possible to find such equilibrium in the Brazilian oil and gas industry.

## **1.1 Research question**

*To what extent is there a low-skill equilibrium in the Brazilian oil and gas sector, and how do Norwegian companies respond to this situation?*

The research question is divided in two parts, and will be explored through the eyes of Norwegian multinational companies<sup>1</sup> (MNCs) operating in the Brazilian oil and gas sector<sup>2</sup>. The first part of the research question is theoretically guided and related to the HME typology and the theory of low-skill equilibriums. This research question will be discussed by comparing the theoretical characteristics of low-skill equilibriums against the empirical findings in the Brazilian oil and gas industry. The second part of the research question is empirically guided and connected to the Norwegian MNCs' experiences in Brazil. The firm is portrayed as the most important actor within the varieties of capitalism framework (Hall and Soskice 2001: 6), and will therefore play a central role in this thesis as well. The analysis of the Brazilian oil and gas industry will be seen through a "firm's eye" (Schneider 2013: 21). The two research questions will be discussed interchangeably throughout chapter five.

## **1.2 Choice of case: the Brazilian oil and gas industry**

This thesis argues that the Brazilian oil industry deviates from HME characteristics because of its central position in the Brazilian industrial policy. Oil and natural gas have long been important natural resources for Brazil, and this industry has held a special position within the nation. For many decades, the national oil company Petrobras maintained a monopoly of the oil exploration and had the opportunity to develop without international competition. The

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<sup>1</sup> Multinational companies or corporations is defined as companies that have offices and/or factories in at least one country other than its home country (Investopedia 2015).

<sup>2</sup> The terms "oil and gas sector" and "oil and gas industry" will be used interchangeably throughout the thesis. I will also sometimes shorten the term to just "oil industry/sector", but the term will always refer to the upstream oil and gas industry and all its supply chains, including the maritime sector providing services to the offshore industry.

monopoly was dissolved in 1997, but Petrobras kept its powerful position within the industry. In order to secure the continued growth of the supply chain and surrounding industries, the Brazilian authorities implemented a local content (LC) policy. The policy has been expanded and fortified gradually since 1997, and demands that a certain percentage of the goods, services and work force applied in the oil sector should be of Brazilian origin. This percentage varies across the different sub-sectors and concession rounds (Guimarães 2013: 335). One of the intentions behind the LC policy, in addition to activating the surrounding industries, was arguably to boost the human capital. The aim was to induce the oil companies and the supply chain to employ a larger share of Brazilian qualified work force. Ideally, the increased use of skilled Brazilian labor force would gradually develop the nation's human capital, with the goal of eventually breaking free from the low-skill equilibrium. However, reality does not always reflect one's intentions, and at first sight it might seem like the journey towards escaping the low-skill equilibrium will still continue for many years.

This thesis wishes to explore the characteristics of the oil industry's labor market during the oil boom, or up until 2014, and compare them against the low-skill equilibrium. The hypothesis is that increased focus on Brazilian human capital through the implementation of LC policies will make the Brazilian oil industry deviate from an ideal HME by not showing a fully developed low-skill equilibrium.

### **1.3 Norwegian firms in the Brazilian oil and gas industry**

In order to narrow down the scope of the thesis, I chose to focus on the Norwegian MNCs operating in Brazil. It is more manageable to obtain an overview of the Norwegian actors than trying to map out all the foreign companies. Norwegian firms are also important actors in the Brazilian market, with a combined market share of around 11 %. In 2013, Norwegian firms in the Brazilian oil and gas sector made 31 billion Norwegian kroner (NOK) in revenues. This is a 14 % increase from the year before, and 20 % up from 2011 (Rystad Energy 2014). These numbers reveal that Norwegian MNCs in general have experienced a large growth, with many new investments in the last few years. The majority of the Norwegian firms operating in the Brazilian oil industry are oilfield service companies<sup>3</sup>. One

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<sup>3</sup> Statoil is the only Norwegian field operator with their activity in the Peregrino field. Statoil has become the largest foreign oil producer in Brazil, and only Petrobras is larger (Inventure Management 2014: 33).

definition of an oilfield service company is a company that provides oil and gas related goods and services to the industry involved in the exploration and production process (upstream industry) of oil and gas (Rystad Energy 2014). The oilfield service companies constitute a large part of the supply chain in the oil and gas industry. In Brazil, Norwegian MNCs are most prominent in the segments regarding drilling and rig equipment, subsea installations and offshore supply or transportation (Rystad Energy 2014: 27). Brazil has grown to be one of the most important markets for Norwegian oilfield services companies since the offshore discoveries in 2007, and is now one of the top-three international markets, along with South Korea and Great Britain (Rystad Energy 2014). The Norwegian firms in the Brazilian oil and gas sector had a total of 9000 employees by the end of 2013 (Inventure Management 2014: 5). The term “Norwegian companies” is not given a strict definition here, and is applied to all companies that are perceived as of Norwegian origin, even though foreign investors may have acquired them, and they no longer operate from Norway. This definition provides the thesis with a larger universe, since more companies are applicable<sup>4</sup>. All of the companies interviewed for this thesis are operating out of local subsidiaries in Brazil.

## **1.4 Outline of the master thesis**

Chapter two explains the use of method and research design, and discusses challenges regarding validity and reliability. In chapter three, I will give a more thorough review of the theories and literature regarding “varieties of capitalism”, and describe the characteristics of the low-skill equilibrium. Chapter four introduces the history and current state of the Brazilian oil industry, while chapter five analyzes the Brazilian oil industry’s labor market and compares it against the HME framework constructed in chapter three. Chapter six gives some conclusions regarding the empirical and theoretical results from the analysis.

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<sup>4</sup> A more specific definition of Norwegian investors requires that the company should have its operational headquarters in Norway and be registered in the Norwegian company registry (Brønnøysundregisteret) (Inventure Management 2014: 9). This definition leaves 37 Norwegian companies operating in the Brazilian oil and gas sector, with a total investment of 15 billion USD (Inventure Management 2014: 25).



## 2 Methodology

In this section I will discuss the research methodology I have applied while working on this thesis. The research design has a qualitative nature, and I will first describe the advantages and challenges of using a case study research design. Thereafter, I give a brief account of the data collection and the qualitative interview as a suitable method for gathering information in qualitative research designs.

### 2.1 The case study

The case study is often a favored strategy when the researcher wants to explore a phenomenon or an event more closely, and to answer the question of how or why the event has taken place. These types of questions usually require more complex answers and in-depth research which is hard to do when dealing with a large number of units, and thus the case study emerge as the best suited research design (Yin 2003: 1; Gerring 2007: 49). A popular definition of a case study is “the intensive study of a single case where the purpose of that study is – at least in part – to shed light on a larger class of cases (a population)” (Gerring 2007: 20). In this particular instance, the intent is to explore how aspects of the Brazilian oil and gas industry function, using a Latin American typology from the varieties of capitalism literature. The idea is to compare this industry with the general theory on how capitalism in Latin America appears. The study has few aspirations of making generalizations beyond this particular industry. External validity, or being able to generalize to a larger and unstudied population, is difficult to achieve when doing case studies, since they normally only include a small number of cases or subjects. Case studies will therefore not be very representative outside of their immediate surroundings (Gerring 2007: 43; Bryman 2004: 273). The case study is however not a preferable research design due to its external validity, but rather because of its ability to provide in-depth research.

There are several types and levels of case studies, depending on the degree of theoretical purpose or research objective. The case studies range from atheoretical, descriptive studies via hypothesis-generating studies and on to theory testing studies based on already existing theories (Levy 2008: 4-6). These categories are viewed as ideal types, and one can find case

studies with aspects from more than one category. This particular case study includes features from both theory-guided studies and theory testing studies. The theory-guided case studies aim to interpret the phenomenon in focus by using an established theoretical framework. They are often selected “because of an interest in the case rather than an interest in the formulation of general theory” (Lijphart 1971: 692). The element of theory-guided study in my thesis is that I chose to study the Brazilian oil industry based on an empirical interest in the subject. I was later introduced to the theoretical field of varieties of capitalism, and the hierarchical market economy (HME) as a typological theory for Latin American economies. A typological theory can be defined as

“a theory that specifies independent variables, delineates them into the categories for which the researcher will measure the cases and their outcomes, and provides not only hypotheses on how these variables operate individually, but also contingent generalizations on how and under what conditions they behave in specified conjunctions or configurations to produce effects on specified dependent variables” (George and Bennett 2005: 235).

The hierarchical market economy can be described as a typological theory since it assumes that actors behave a certain way around the Latin American institutions, and the outcomes are often represented as results of negative complementarities<sup>5</sup>. I decided to test this typological theory on the Brazilian oil and gas industry through a deviant case study. The reason for this choice is that at first sight, some trademarks of this industry seem to differ from the generalizations made by the HME. I wanted to explore if these assumptions were correct, and what kind of variables that would explain this difference. A deviant case study seemed appropriate for this kind of study, since it is a research design that focuses on “observed empirical anomalies in existing theoretical propositions, with the aim of explaining *why* the case deviates from theoretical expectations” (Levy 2008: 13). Studying deviant cases that do not fit the already established typological theories can also serve to refine the applied theory (George and Bennett 2005: 240). Refining the HME typology is however not the priority of this thesis, but it might be possible to draw some recommendations from the conclusion.

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<sup>5</sup> These mechanisms will be explained more carefully in the next chapter.

## 2.2 Data collection

Here I will give a brief account of how I collected the information and data for this thesis, in order to increase the transparency around the research process and thus increase the thesis' reliability. The reliability in qualitative studies is measured by "the degree to which a study can be replicated" (Bryman 2004: 273), and a replication would not be possible without knowing the steps of the research process. I started the process by mapping out the Norwegian companies in the Brazilian oil industry defined by the sub-sector they were operating in, and the type of employees they used in their operations. The point of departure for this work was a list of all the Norwegian companies active in Brazil, provided by the Innovation Norway office in Rio de Janeiro. There are about one hundred Norwegian companies with a presence in Brazil, and the majority is connected to the oil and gas industry (Inventure Management 2014: 11). Based on the web pages of the companies, I made a tentative list of all the companies with operative subsidiaries in Brazil, in order to make a stratified random sample (Tansey 2007: 768). About two weeks before starting my fieldwork in Rio de Janeiro, I sent an e-mail asking for an interview to all the companies where I could find online contact information. I received a few answers, and I was able to set up appointments to meet them while in Rio de Janeiro. However, the majority of my interviews were obtained via the snowball sampling, where my respondents provided me with suggestions and contact information of other possible respondents, who I could approach and ask for an interview. A danger with this type of sampling is that you might end up with a sample of respondents who share many similar characteristics, as respondents tend to recommend people with whom they share similar characteristics (Tansey 2007: 770). I have avoided this trap somewhat by using the snowball sample from different starting points, and thus achieved a relatively widespread sample with representatives from different types of companies. In the end, I feel that I have obtained a fairly good representation of the Norwegian companies. I interviewed thirteen companies, in addition to representatives from interest organizations and Norwegian authorities<sup>6</sup>. However, the level of representativeness in units used in case studies is always questionable (Gerring 2007: 20), and it is very hard for qualitative studies to make wide generalizations.

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<sup>6</sup> See appendix A for more details.

All the company representatives I have interviewed currently have, or have had, positions in the management of the Brazilian subsidiaries. I have chosen not to include any personal names in this thesis, only company names, since the companies are the units of interest in this research. This way I can provide my respondents with a certain degree of anonymity while at the same time not withholding any vital information<sup>7</sup>. Most of the interviews were conducted during my fieldwork in Brazil between February 24 and March 13 2015. Some interviews were also conducted in Norway, and via Skype<sup>8</sup>. I additionally sent e-mail with follow-up questions to some of the respondents. All the interviews in person were recorded and transcribed. The respondents were presented with a consent form before the recordings started, and informed about their rights to withdraw from the interview at any time<sup>9</sup>. The interviews lasted between 15 and 40 minutes, and the majority had a duration of approximately 25 minutes. The research project was approved by the Data Protection Official for Research at the Norwegian Social Science Data Services (NSD) prior to the fieldwork, and will follow its guidelines concerning the collected data after the project is finished.

The reliability of the research is also influenced by the context in which the research was done. It is “impossible to ‘freeze’ a social setting and the circumstances of an initial study to make it replicable in the sense of which the term is usually employed” (Bryman 2004: 273); it is therefore the researcher’s responsibility to be observant and attentive to the research surroundings. While I have been working on this thesis, the Brazilian oil sector has experienced a rather turbulent time<sup>10</sup>. The whole industry is affected by a major corruption scandal in the national oil company Petrobras, which has resulted in many of the Petrobras’ contracts being put on hold or cancelled while the investigations are ongoing. The key role of Petrobras, as the largest oil field operator by far, makes it impossible for many of the oil service companies to continue their business as usual, and many companies – including Norwegian companies – are forced to economize their operations. The current situation can possibly have affected the way the respondents view their own situation, and perhaps made them more unsympathetic towards the Brazilian market. This was something I had to keep in mind while interviewing Norwegian firm representatives. The current business environment might have influenced their answers in more than one way, for instance by downgrading their

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<sup>7</sup> The contact information of my respondents can be made available on request.

<sup>8</sup> See appendix A.

<sup>9</sup> Appendix C shows the letter given to the participants.

<sup>10</sup> Read more about the current situation in chapter four.

own situation within the market and their prospects for the future. Although this is not necessarily a problem for the analysis itself, it does undeniably call the reliability of the research into question. Doing the interviews as little as a few months earlier could perhaps have yielded other answers, and therefore other results, which would be difficult to replicate.

## 2.3 Qualitative interviews

Qualitative interviewing is usually the preferred method when a researcher wants rich and detailed answers from the respondents, while at the same time being interested in the respondents' point of view and how s/he understands issues and phenomenon. This type of interview also allows for the emphasis of the research to change during the course of the data collection, if important issues should emerge. This way, the interviews will not be limited by the interviewer's preconceived ideas about what is important (Bryman 2004: 320; Berry 2002: 681). We can separate between two main types of qualitative interviews: the unstructured and the semi-structured. In the first one, the interviewer is guided by topic list and lets the respondent speak freely, with the possibility of asking follow-up questions about topics of special interest mentioned by the respondent. In the semi-structured interviews, the researcher has prepared an interview guide with more specific questions that should be answered. The respondents can however answer freely, and the interviewer also has the possibility to ask more detailed questions if topics of interest should arise (Bryman 2004: 321). I have used both types during my field research. When interviewing company representatives I used an interview guide<sup>11</sup> to ensure that all the firms were asked the same basic questions. During the interviews, I also asked additional questions when probing for more in-depth answers. In interviews with respondents not directly linked to a company, or with special knowledge of the Brazilian oil industry, I chose to use the unstructured form. This way I let the interviewees speak freely about the topic, while steering them into certain topics of special interest during the interview.

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<sup>11</sup> See appendix B.



# 3 Theory

The theoretical framework for this case study of the Brazilian oil industry is the varieties of capitalism typologies, more specifically the hierarchical market economy (HME). This ideal type depicts economic and social structures that are often found in Latin American economies, and offer a theoretical context for analyzing labor markets. This context will be explored in this chapter, but first I will account for the theoretical debate in which the HME can be found.

## 3.1 Varieties of capitalism

The varieties of capitalism (VoC) framework was first introduced by Peter Hall and David Soskice in 2001, and has since become an acknowledged reference in the literature of comparative political economy. In their contribution to the debate they argue against the belief that globalization has led the various economies of the world to converge towards a liberal free-market economy. Their claim is that the global tendency has rather been to diverge into two different types of market economies, the liberal market economy (LME) and the coordinated market economy (CME), which will be discussed further on. These types are constructed as ideal types of developed economies and are opposites, or the two “poles of a spectrum” (Hall and Soskice 2001: 8).

Firms are central actors in the VoC approach to political economy. They are regarded as the crucial actors in a capitalist economy, as they are “key agents of adjustment in the face of technological change or international competition” (Hall and Soskice 2001: 6). But firms alone cannot constitute a capitalist economy; they need other actors with whom they can interact in order to develop. The relationships they form can be divided into internal relations – with their own employees – and external relations, which can be many different actors such as clients, stakeholders, trade unions, business associations and governments (ibid.). To make these interactions run smoothly, actors depend on several institutions within the market economy. An institution can be defined as “a set of regularized practices with a rule-like quality in the sense that the actors expect the practices to be observed and which, in some but not all, cases are supported by formal sanctions” (Hall and Thelen 2009: 253). The

institutions appear in different sizes, and it is also possible to group together many institutions in order to form macro-institutions such as ‘markets’ or ‘vocational training systems’.

It is through the interaction between firms and governments that firms can act as ‘key agents of adjustment’. On the national level, the government is naturally the most important and influential actor. The firms may not be able to create new institutions on their own, however they can adjust their own strategies in order to strengthen or weaken the already existing institutions. Hall and Thelen describe the institutional adjustments in developed economies as a “*pas de deux* between firms and governments in which each responds to different pressures but has to cope with the moves made by the other side” (2009: 260).

The difference between the two types of capitalism presented by Hall and Soskice is based on the traits of the institutions within the market economy, and how they interact with each other. In LMEs, competitive market arrangements are the main arena in which firms coordinate their activities. While in CMEs, the firms focus more on collaborative relationships and information exchange inside networks (Hall and Soskice 2001: 8). Another difference between the two market economies is the degree of institutional complementarities. According to Hall and Soskice, “two institutions can be said to be complementary if the presence (or efficiency) of one increases the returns from (or efficiency of) the other” (2001: 17). For instance, a good and stable vocational training system is likely to improve the number of qualified workers available in the labor market. The various institutions cooperate differently in the two types of market economy. This means that the two types of capitalism will each have their own comparative institutional advantage, which is the idea that “the institutional structure of a particular political economy provides firms with advantages for engaging in specific types of activities there” (Hall and Soskice 2001: 37). According to this theory, each economy will offer a situation, or an institutional advantage, in which the firms can choose to initiate operations or not, depending on whether they view the situation as profitable. These institutional advantages can appear in various shapes, from providing excellent infrastructure, to providing a skilled labor force.

This thesis will focus on institutions that provide vocational training and education, and the labor market. Firms need to relate to these institutions in order to secure a workforce with suitable skills, while workers need to decide what skills to invest in, in order to obtain a job



(Hall and Soskice 2001: 7). The actors relate to the institutions in a distinctive manner, depending on what kind of market economy they are operating in. For instance, in liberal market economies, a distinct feature is high fluidity in the labor markets. This volatility gives firms little incentive to invest in vocational training to obtain industry-specific skills, as they have no guarantees that other firms will not poach their workers afterwards. The vocational training is therefore normally provided by institutions that offer an education based on general skills. The firms are generally not interested in supporting the public educational system, and the individual worker normally provides for its own education. This makes the workers more focused on obtaining general skills, so they can be suitable for working in many different firms and thus more coveted in the labor market (Hall and Soskice 2001: 30). The LME system is normally found in English-speaking countries, with USA and UK as clear examples. On the other hand, the coordinated market economy is more directed towards educational systems that provide workers with industry-specific skills. In addition, whereas an LME is more focused towards individualism in the labor market, a CME puts more emphasis on collectivity. Trade unions are typically strong and able to supervise a publicly subsidized training system, which firms contribute to indirectly by paying taxes. The unions encourage firms to take on apprentices and negotiate this training to ensure that the needs of the firm are met and that there is also an external demand for this skill in case the graduates should not be employed after their training. This system gives workers more incentive to obtain specific skills (Hall and Soskice 2001: 25; Hall and Gingerich 2009). The CME is often used to describe northern European countries, with Germany as the clearest example.

### **3.2 Objections to the varieties of capitalism framework**

Hall and Soskice have been criticized for their neo-institutionalist approach, especially from the social constructivist branch of political science. Their claim is that trying to map capitalist economies based on two ideal types is not very fruitful. When the models are staged at a macro level, the analysis is bound to somewhat ignore the empirical wealth found at lower levels, among various actors and mechanisms. This makes the macro analysis a limiting exercise. There are many actors within an economy, and it is not possible to assume that everyone acts according to the ideal type they fit into. Rather, social constructivists believe that actors will behave pragmatically: experimenting to find the best solution for themselves within their institutional and normative context, while at the same time working on how to

change this institutional framework in order to maximize their returns (Hancké 2009: 7; Colvin and Darbishire 2012). Colin Crouch argues that the VoC literature needs to shift its focus from the general assumption that most aspects of an economy can fit into an ideal type, and instead analyze single cases with the intention of finding more variation. Crouch continues to say that “[e]mpirical cases must be studied, not to determine to which (singular) of a number of theoretical types they should each be allocated, but to determine which (plural) of these types are to be found within them, in roughly what proportions, and with what change over time” (Crouch 2009: 76). To back up this argument, he claims that among the economies that Hall and Soskice (2001) originally placed in the CME basket, the majority from western continental Europe, only Germany belongs there without too much of an empirical stretch. The other economies have been forced to fit into this model. Even Germany may not be an ideal match (Crouch 2009: 85). Crouch’s criticism of the VoC literature can be summarized as follows: “Despite the claim to be firm-centred, the approach has been too concerned with the macro-level picture of whole economies, and the account of types has been too closely linked to the polemic between neoliberalism and social democracy” (Crouch 2009: 94). Following this argument, the VoC debate may have lost some valuable empirical insight when choosing to focus their analysis on the macro level. In particular, the importance of the firm as an actor in a market economy has not been highlighted sufficiently. The VoC framework tends to assume that the actions of the firms will be in response to the institutions they are surrounded by, while disregarding the variety that occurs between different firms (Allen 2004: 95).

The VoC framework also tends to overemphasize stability according to its critics. Deeg and Jackson (2007: 158) argue that VoC promote positive complementarities between co-existing institutions, and the subsequent resistance from the actors to change the institutions because they fear loss of efficiency. This situation leads to a dichotomy of stability and change, and makes it harder to regard firms as actors that are able to change their surroundings. One solution, according to Deeg and Jackson, is to pursue a more dynamic analysis that explores the possibility in which institutions are able to change without consequently changing the entire institutional framework (2007: 160).

### **3.3 Varieties of capitalism in Latin America: the hierarchical market economy**

The LME and the CME are typologies well suited for describing advanced economies, but they may not possess the same explanatory power when describing developing economies. In an effort to develop the VoC literature, Ben Ross Schneider has constructed another typology called the hierarchical market economy (HME). The HME is an ideal type used to describe the Latin American countries, and especially the larger economies in the region, but can also be applied to other middle-income countries such as South Africa, Thailand or Turkey (Schneider 2013: 5; Schneider and Soskice 2009: 33). The name refers to the hierarchical relations that are frequently found in these economies. On a macro-level they can be seen as top-down regulations distributed by the national government, while on a micro-level they describe relations within firms, which are often controlled by a strong owner. The firms' employees often lack formal representation and the unions have little influence on these hierarchies because so few workers are unionized (Schneider 2013: 8). The HME also separates itself from the CME and LME in terms of comparative institutional advantages. While LMEs seem to be especially suited to promote radical innovation and CMEs make incremental innovation through constant improvements, HMEs lack these kinds of capabilities to innovate owing to generally lower skills and short-term hierarchical labor relations. HMEs therefore specialize in commodity production based on natural resources and low-complexity manufacturing (Schneider 2013: 29).

The HME consists of four core institutions: a) domestic business groups that are often diversified into subsidiaries with few market connections to one another and with hierarchical relations to the owner group; b) multinational corporations (MNC), which traditionally have held strong positions in Latin America; c) labor markets that are atomized due to short-term connections between workers and firms, and weak links between workers and unions; and d) low levels of education or vocational skills (Schneider 2013: 10-12). Complementarities can occur between these institutions, as they also arise in LMEs and CMEs, but contrary to the other typologies, the complementarities in HMEs are often negative. The low-skill equilibrium is one of these negative complementarities, and will be discussed further on in this chapter. But first, I will give a more thorough introduction to the core institutions. The emphasis of the thesis is the connection between the MNCs and the domestic labor market,

and my informants are all representatives of the point of view of MNCs. I will therefore focus on describing the complementarities that appear between the MNCs, the low levels of education and the labor market, and have chosen to exclude the domestic business groups.

### **Multinational corporations**

MNCs have increased their presence in the Latin American economy since the late 1980's, when they were attracted to the region by macro-economic policies such as privatization, deregulation, trade liberalization, and the possibility to invest in agriculture and the industry related to the extraction of natural resources (Chudnovsky and López 2007: 12). They are described as being central economic protagonists since the mid 1990's (Schneider 2013: 76; ECLAC 2014: 19). While MNCs have been present in Latin America for many years, the debate about whether they contribute to economic and social development in the host country is ongoing. Studies have found that the effects of foreign direct investments (FDI) on growth and investment in the manufacturing sector are generally positive, while the same effects are negative in the natural resource sector (Schneider 2013: 80). Chudnovsky and López (2007: 12-13) highlight three ways in which FDI hypothetically can bring positive spillover effects to the host country's market: (i) when subsidiaries of MNCs introduce new technology and bring skilled workers that may go on to work for domestic firms, thus increasing the human capital, (ii) the entry of a new MNC in the domestic market can increase competition and productivity of local firms, also known as horizontal spillovers, and (iii) MNC subsidiaries can urge local suppliers to improve the quality of their products, and at the same time show them how to be more effective, creating vertical spillovers. The expected results do not always occur, however, as MNCs often do not transfer much of their own technology. There is also very little research and development undertaken in Latin America, in fact less than 1 % of the FDI between 2003 and 2009 were related to research and development (R&D) projects (Schneider 2013: 84). MNCs can have positive effects on the level of education in the host country. A study shows that blue-collar workers in MNCs had an average of 9 years of schooling, while their counterparts in national firms had 7 years. The average tenure was also higher within MNCs, and the workers there earned 2,5 times more than workers in national firms (Schneider 2013: 85). But MNCs do not seem to increase the incentives for investing in human capital, as they do not hire a sufficient number of workers to make a difference. In addition, when workers are hired, they are often poached from local firms (ibid). Examples of negative spillovers are domestic firms being forced to reduce their

production because they cannot compete with the MNCs, and when more productive foreign suppliers replace the domestic suppliers and force them out of the market. Natural resource-intensive sectors, and especially the mining and hydrocarbon industries, are labeled as particularly bad at producing positive spillovers, as their ability to create jobs is extremely limited (ECLAC 2014: 105).

### **Atomized labor market**

Labor markets in HMEs share some features that distinguish them from other types of economies. One of Latin America's most distinctive feature is the large segment of informal employment, to which about 40 to 50 percent of the working population belongs (Schneider and Karcher 2010: 631; Berg 2010: 7). The formal employment segment can be divided in two: a large group of workers with low skills, no unions and high turnover, and a smaller group of workers with high skills, long job tenure and union representation. The former group constitutes about 30 to 40 percent of the working population, while the latter accounts for the remaining 10 to 20 percent (Schneider 2013: 92). Labor unions in Latin America are small, compared to their European counterparts. They have less autonomous organizational strength, and rely more on state and party leaders (Schneider 2013: 95). Another feature is the job tenure, which is decidedly shorter in HMEs than in CMEs or even LMEs. The turnover is high, and a situation where workers change jobs more frequently has negative effects on the skill level and labor market regulations (Schneider and Karcher 2010: 630). The insecure job situation influences workers' incentives to invest in specific skills, as they are not guaranteed - or accustomed to - keeping their jobs over a longer time period (Schneider 2013: 104). Studies have shown that Brazil is one of the countries with the highest job turnover rate, with 30 % of the formal workers staying in their job for less than a year. Workers with the highest education tend to have a higher tenure than workers with basic education (Gonzaga et.al. 2003: 179).

These features create a situation where the firms have a lot of power, and the workers change jobs often and therefore will have little incentive to specialize on a specific skill. The labor markets in HMEs can resemble those in the LMEs to a certain extent, but the workers in HMEs lack the legal protection and market leverage of workers in LMEs, and the share of informality is larger. HMEs also lack the technological capabilities and innovation ratio that one can find in LMEs (Schneider 2013: 99).

## **Education and vocational training**

The education levels have historically been low in Latin America, and the average years of education is distinctly lower compared to Europe and the Asian emerging economies (Schneider 2013: 116; Aedo and Walker 2012: 6). Besides low levels of education in general, the Latin American economies have also been struggling with declining returns to education. This problem even continued into the 2000's when there was overall economic growth. Some explaining factors are low-quality training and that the students' skills do not meet market demands. Another explanation can be that the business demand for skills is not aligned with the skills supply. But no matter how these declining returns on education are explained, they still make it less profitable for students to take more education (2013: 124). Brazil is among the countries where firms have reported problems with the skills and education of available workers being a serious constraint on growth (Schneider 2013: 131; Aedo and Walker 2012: 110). However, The firms have not been pushing for educational reform, and there are several explanations as to why that is. One is that efforts made improving educational policies do not yield positive results over a short-term period, and it can prove difficult for the firms to commit for longer periods of time. Another explanation is that the low levels of skills and education are not entirely a disadvantage to the firms. There are many sectors where higher education is not a necessity to the firms, but rather an inconvenience since they would have to pay higher wages (Schneider 2013: 131).

### **3.4 The low-skill equilibrium**

The core institutions described above are all connected to one another, and these connections yield various effects, or complementarities. The low-skill equilibrium is one of them, and will be the focal point for this thesis. In labor markets, one can find two kinds of equilibriums, one at a high skill level, and the other at a low skill level. As mentioned in the introduction, a simple explanation of the low-skill equilibrium is that “individuals do not invest in skills because firms offer few skilled jobs. Firms in turn do not invest in production requiring skilled workers because they do not think they can find them in the labor market” (Schneider 2013: 114). In this situation, which is also referred to as a low-skill, bad-job trap (Snower 1996: 111), both parties will have few incentives to move out of the equilibrium. Schneider

argues that in HMEs the low-skill equilibrium is maintained through complementarities between the core institutions (2013: 34). I will base my analysis on three of these complementarities:

1. *The educational system does not provide enough skilled workers, and this is encouraging the MNCs to invest in lower-technology production.*

Latin American economies are in general affected by a low level of education, and have a tendency to specialize in lower technology commodity sectors, with very small investments in R&D (de Ferranti et.al. 2003). This means the foreign MNCs who choose to establish themselves in these economies will normally not have many incentives to start production demanding higher technology. And when there is an absence of a highly skilled labor force, the MNCs will have even fewer incentives to change the production pattern of the HME.

2. *The atomized labor relations and high turnover among workers prevents investments in training.*

The atomized labor relations that can be found in HMEs can have various effects on the labor market. In my analysis, I will focus on how these relations affect the firms' incentives to invest in their workers education and training. The overall high turnover rate can make the firms reconsider their training programs, as they may not want to spend too much time and money on their work force, in case the workers leave the firm after a short time period.

3. *The MNCs have few incentives to hire highly skilled workers locally, or invest in training and education.*

The HME is a typology developed to describe developing countries. These countries normally do not have a large segment of R&D or technological capabilities. Because of the increasing level of economic globalization, the main trend is arguably that MNCs produce the R&D in countries with high technological capabilities while the actual production takes place in countries with a lower salary level. For HMEs this means that they are likely to be stuck in the vicious circle of the low-skill equilibrium when MNCs make investments that do not need a high-qualified work force. On the other hand, the MNCs will have few incentives to move

their R&D to countries that do not have the academic infrastructure to provide them with the necessary work force.

The HME is portrayed as a typological theory, or an ideal type, that reflects a traditional view of the Latin American economies as developing countries that specialize in low-technology production and where the low-skill equilibrium functions as a vicious circle that prevents the economies from developing their human capital. The low-skill equilibrium also brings a static quality to the typology, and predicts that these structures are hard to break away from. Yet, the reality of HME countries cannot be as simple as their theoretical framework, and the general theory may not be able to account for all the sectors of an economy in the same manner. Andrew Schrank (2009: 58) argues that the left-wing parties that have risen to power in Latin America over the last decade are promoting change, which consequently weakens the explanatory power of the VoC-framework and the HME. Brazil is one of the main examples of this wave. In Brazil, the Workers' Party (PT) has been in power since Luiz Inácio Lula da Silva won the election and took presidential office in 2003. Since then, they have actively used the oil and gas industry to build industrial infrastructure and promote human capital. This process is described in the next chapter, where the local content policy is highlighted as an important part of the new industrial policy. When the LC policy is complied with, more goods and services are produced in Brazil, by Brazilian workers. One expected effect of this policy is that the dynamics of the low-skill equilibrium will change, as the MNCs have to change their production structure in order to follow the LC requirements. My hypothesis is therefore that the local content policy implemented in the Brazilian oil industry will change the dynamics and mechanisms that traditionally are found in HMEs. In chapter five, I will investigate this further by comparing the three mechanisms of the low-skill equilibrium against findings from the Brazilian oil industry.



# 4 An introduction to the Brazilian oil industry

When talking about the Brazilian oil industry, it is impossible not to include the national oil company *Petróleo Brasileiro S.A. – Petrobras*. Petrobras is represented in more or less every aspect of the oil industry, and has grown to become Brazil's largest company. This is the result of a political idea that started in the 1930's: that the oil should belong to Brazil, and be used as an instrument to encourage growth in other industrial sectors as well, with the state as an active part in the development strategy. In this chapter, I will give a brief account of the Brazilian oil history, from the formation of Petrobras up until today.

## 4.1 Early industrialization – O Petróleo é Nosso!

“Energy is the motor of development and it is the heart of the national organism and therefore should be Brazilian. No one lives with a borrowed heart” (General Arthur Levy, cited in Randall 1993: 10).

Petrobras was created in 1953, along with the introduction of state monopoly in the oil sector (Schutte 2013: 55), as a result of many years' debate concerning how the growing oil industry should be structured. The Brazilian Constitution of 1934 had concluded that all of the subsoil wealth in Brazilian territory belonged to the republic, and the government had exclusive power to authorize the search and development of natural resources. The government recognized energy security as a strategically important issue for the national development, and in order to gain more control over these resources, the National Petroleum Council (CNP) was created in 1938. The CNP had, however, a small budget, and was not able to start large exploration projects or construct many refineries for the oil production. During the 1940's, the main debate was whether to improve the oil industry by giving room to private investments, or implement a state monopoly in order to secure the resources and maintain national security, also known as the *O Petróleo é nosso* (the oil is ours) campaign (Randall 1993: 9). Getúlio Vargas was elected president in 1950, with a political platform that incorporated a state oil monopoly, and he implemented the monopoly by law in October

1953, creating Petrobras at the same time. In the following years, the Brazilian oil industry developed slowly, but gradually. The oil production increased steadily from 1954 with the goal of finding domestic oil resources and eventually become self-sufficient. Another goal was to develop the downstream activity and thus be able to refine the crude oil found on Brazilian soil. The downstream segment was just as important as the exploration phase, given that replacing the importation of refined oil products is a lot more beneficial to the foreign exchange than replacing the imports of crude oil. An important part of the development strategy was therefore to establish refineries and a petrochemical industry (Randall 1993: 15). In order to continue growing while developing such industries, Petrobras received financial incentives such as tax reliefs on the equipment needed for their projects, and exemption of import duties and royalties (de Oliveira 2012: 523). While Petrobras strived to achieve energy independence, the government handed out subsidies to roads, electricity and diesel in order to encourage development. These subsidies led to a larger demand for crude oil, and Brazil continued to be dependent on foreign oil, though the domestic oil production made them less vulnerable against the increasing international oil prices (Randall 1993: 13-15).

Laura Randall claims that Brazil was not sufficiently prepared for a development project as big as Petrobras. Brazil lacked the political stability required for such a project, and Petrobras was turned into a pawn in political campaigns. Brazil had also fallen behind in the educational sector by not investing enough in primary education; only 50 % of the population was literate in 1950. The lack of people knowing how to operate and maintain production equipment led to inadequate productivity and competitiveness in the world market. Since the state was unable to provide enough skilled labor, Petrobras had to train its own work force (1993: 16). The workers entered the company by either passing an exam, or by knowing someone in the government or Petrobras administration. The top managers were usually of military background, and implemented a disciplined culture in the company (de Oliveira 2012: 522). Most of the workers attended training courses organized by Petrobras in the fields where Brazilian universities did not provide the proper education. Courses in oil geology did not exist in the universities at all, leaving Petrobras with the option of hiring foreign professors and providing the education themselves. The company also sent students to study abroad, who would later return to teach in Brazil. Petrobras saw the need to create courses to strengthen graduates from other university programs as well, and it almost reached the point where they “were afraid that Petrobras would become a university” (Randall 1993: 191). Petrobras was investing in research and technology through their research center

Cenpes, which opened in 1963. Cenpes started doing its own technological research based on basic engineering in 1976, and would also provide detail engineering to refineries and the petrochemical industry. The basic engineering group started to develop offshore equipment in 1983, and the research activities towards increasing the technological capacity in deep-water production systems would expand rapidly in the following years. In addition to developing technological capacities, Cenpes was also in charge of the technical training for Petrobras from 1984, and the number of professional level employees within the research center was increasing steadily through the 1980's (Randall 1993: 245-248). Even though qualifying geologists, geophysics and engineers was emphasized, Petrobras would also participate in the national service for industrial training (SENAI), which had been established in 1942 (Senai 2014), by providing internship opportunities for the students in these programs.

The tendency of training your own workers was not just related to Petrobras and the oil industry, many business firms often spent large sums of money to equip their workers with the educational level they should have graduated with as a consequence of the low educational standards. The quality of public education deteriorated during the 1980's as a result of the lack of a public policy regarding secondary education. The students who could afford it chose private education alternatives, while others entered the labor market before finishing high school (Skidmore 2010: 192; Arriagada and Ziderman 1992: 5).

## **4.2 Increasing the offshore activity**

The 1973 oil crisis hit Brazil hard. Prices escalated, and crude oil imports increased up to 80 % of the domestic consumption (de Oliveira 2012: 527). Around the same time, Petrobras intensified its search for oil fields and started looking for potential offshore fields. In 1974, two fields were discovered in the Campos basin. However, Petrobras did not have the technological capability to extract offshore oil at that time, so the military regime announced that Petrobras would be signing service contracts with international oil companies (IOC). These contracts allowed IOCs to explore and develop Brazil's offshore fields while bearing the risks. The IOCs would share the revenue if they should find oil and gas, but would not receive compensation if the search were unsuccessful. Petrobras would be the sole operator of any oil field found (de Oliveira 2012: 528; Schutte 2013: 55). Petrobras gradually started to build up enough technological and practical knowledge to be able to perform offshore

activities, and introduced several technological innovations needed to discover reservoirs in increasingly deeper waters. This way, the Campos basin “became a gigantic innovation laboratory for offshore oil production” (de Oliveira 2012: 531). The stepwise approach to oil exploration may also have been an aiding factor in avoiding the resource curse that has plagued many petroleum nations. Sarah Brooks and Marcus Kurtz claim that “natural resource abundance may not necessarily be a curse when states possess both the human capital and industrial capability to discover and produce the ‘hard to get’ oil, such as that which lies in the deep offshore waters of Brazil” (2014: 31). This way, the unavailability of the Brazilian deep-water oil would allow the country and the national oil company Petrobras to develop gradually while improving their technology and human resources along with the oil exploration at sea.

The increased offshore activities also demanded a work force equipped to handle the new work environments. The merchant marine education has existed in Brazil since 1892. However, during the military regime, the Brazilian Navy obtained control over this education, and constructed the CIAGA academy in Rio de Janeiro and the CIABA academy in Belém in response to the increasing number of ships along the Brazilian coast and the new demand of naval officers and seafarers. The centers were completed in 1973, and are the only two maritime academies in Brazil today. The Navy still has a monopoly on this education (Ciaga 2015; Ciaba 2015).

### **4.3 Liberalization and growth in the oil industry**

The next big transition for the Brazilian oil and gas industry took place in the last part of the 1990’s. Fernando Henrique Cardoso assumed presidential power in 1995, and started reforming the country’s economic situation, which had worsened during the 1980’s and 1990’s. As a measure to improve the economic efficiency, Petrobras was partially privatized and the oil market was liberalized, with the goals of attracting foreign investment, reducing the subsidies residing in the oil market, and intensifying the oil activities in order to obtain self-sufficiency (Amann 2002: 878; de Oliveira 2012: 535; Bjørnstad 2000: 69). The Petroleum Law was implemented in 1997 to regulate the oil market, closely followed by the creation of the National Petroleum Agency (Agência Nacional do Petróleo – ANP). The oil industry regulation was a measure to protect the economy in the transition from a Petrobras

monopoly to a free market (Barbosa da Silva and Ventura Lucena 2011). The concession round system was also introduced in 1997, under the surveillance of ANP, with annual licensing rounds and the first auction taking place in 1999. Here, the oil companies would bid for exploration rights in the oil fields displayed in each round. At that time oil prices were low, and the production costs in Brazil were considered to be relatively high. The Petroleum Law opened up for private investments, stating that the companies would take the risk and expenses during the exploration phase, but would also own the oil and gas found if they succeeded (Schutte 2013: 56). Petrobras has fared well through this transition, a study by Bridgman, Gomes and Teixeira shows that the total factor productivity doubled in the years between 1995 and 2000 (2011: 1375). They explain this increase as a cause of the oil market liberalization: being exposed to competition has had a major effect on the productivity rate. Petrobras has also had the opportunity to develop a world-class capability in offshore drilling over the years through extended government support, and by being a central piece in the Brazilian industrial policy (Amann 2002: 886).

In October 2002, Luiz Inácio Lula da Silva from the Workers' Party (PT) was elected president, and held the position for two four-year periods. The economic policy shifted during his presidency, with the aim of constructing a new development model. This model is often termed "state-led developmentalism", or "new-developmentalism". The model can be defined as a strategy that emphasizes the central role of the State, and a development strategy focusing on: promoting the dynamics of the internal market by increased mass consumption and reducing social inequality; creating investment opportunities while still upholding industrial policies such as the local content requirements; the promotion of internal savings and the prevention of excessive currency appreciation in order to diminish external vulnerability; integration with international markets while still defending the domestic industry against unfair trade practices; promoting a medium or long term national development strategy (Schutte 2013: 54-55; Bresser-Pereira 2011). Industrialization was an essential part of the development strategy to increase productivity and innovation. Most relevant for this thesis, is the part about creating investment opportunities while at the same time maintaining a domestic industry through local content policies, a balance that can be quite difficult to uphold.

In Lula's first year of presidency, the Program for the Mobilization of the National Oil and Natural Gas Industry (Prominp) was created with the intention of increasing local content in

the oil industry on a competitive and sustainable basis. Prominp is a coordination forum where the government works together with Petrobras and industry associations to develop projects and policy design in order to “match the demand of the growing oil industry in Brazil with the capacity of local firms to supply industrial goods, services and skilled workers” (Almeida et.al 2014: 18-19). Lula campaigned on using Petrobras and the oil sector as a central tool in the industrial development of Brazil through the implementation of local content policies. The idea was to revitalize other parts of the industry by using them as suppliers for the growing oil industry. The oil and gas sector is still a vital part of Brazil’s development strategy. Data from BNDES, Brazil’s development bank, show that 61,5 % of their planned industrial investments between 2011 and 2014 is connected to the exploration, production and refining of oil and gas (Schutte 2013: 61; Piquet and Terra 2011: 33). An example of the oil industry promoting the growth of other national industries is the Brazilian shipyard industry, which used to be the second largest in the world before it collapsed in the 1980’s. Petrobras launched the Promef program via its subsidiary Transpetro in 2004, with the objective of building new ships and oil platforms with at least 65 % local content in order to reactivate the shipyard industries (Almeida et.al 2014: 22). This has led to a huge increase in shipyard activity. In 2000, there were 1900 workers related to the industry. In 2010, the number of workers had increased to 80.000 (Sinaval 2010: 7). The large and swift growth of the shipyard industry has not taken place without problems. One of the main problems is the lack of qualified workers, even though both Prominp and the shipyards themselves offer training programs (Piquet and Terra 2011: 38).

Prominp has been involved with the vocational training system providing the industry with skilled workers since its establishment, and instigated a program called the National Plan of Workers’ Qualifications<sup>12</sup> in 2006, sponsored by Petrobras. Between 2006 and 2013, this program qualified more than 97.000 workers, from basic educational levels up to university level (Rappel 2011: 70; Prominp 2015). Prominp defines the vocational training as one of the key issues for the further development of the oil industry, and cooperates with companies in the industry to promote this type of education. The candidates for the Prominp educational program are selected through competitive examinations. The training is done in collaboration with a range of institutions, from public universities to Senai (Almeida et.al 2014: 19). Senai offers technical education courses on various levels, ranging from high school to post-

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<sup>12</sup> Plano Nacional de Qualificação Profissional.

graduates, and is today the largest unit for vocational training in Latin America. More than 2.3 million workers are qualified through this program each year (Senai 2014). ANP is also engaged in vocational training, and has its own human resources program where they educate skilled workers who can attend to the needs of the oil industry. The education level range from technicians to post-graduates from universities. ANP has signed partnerships with several teaching institutions in order to promote education and research applied to the oil industry. The selected students receive a scholarship from ANP, and in the period between 1999 and 2009, 5,121 such scholarships were awarded in 44 different courses and 31 different institutions in 16 different states (Xavier 2012: 27; Rappel 2011: 69). The creation of Prominp represented a shift in the educational strategy of Brazil and Petrobras. Up until that point, Petrobras had been focusing on educating workers on university level, such as engineers and geologists. The demand for technicians and other vocationally trained workers had to a certain degree been ignored, but Lula's ambitions of revitalizing the national industry induced their commitment to increasing the number of qualified workers. Prominp thus represented a step towards boosting the general level of human capital.

Lula's industrial project coincided with an overall growth in the Brazilian economy, ignited by high commodity prices and optimistic times in the oil sector. Brazil announced that they had reached energy self-sufficiency on April 21 2006, and in 2007 Petrobras revealed the discovery of the Pre-Salt reserves off the southeast coast. This discovery made Brazil one of the countries with the highest estimated petroleum reserves (Roett 2011: 120; Schutte 2013: 50). The huge oil fields with high probability of finding economically viable deposits of oil, combined with the high international oil prices made the government rethink their oil strategy. The concession rounds were suspended the same year, and the role of Petrobras was strengthened when the firm became the sole operator of the Pre-Salt field (Schutte 2013: 58). The oil boom created a state of euphoria where many companies wanted to participate and the industry grew a lot in just a few years, with many newly established companies. The oil boom combined with the revitalization of the surrounding industries has led to a huge demand for skilled workers in Brazil. The Brazilian government and other institutions related to the oil industry have tried to meet this demand by increasing the number of students, but have not succeeded. A study from 2001 predicted that the oil industry would demand at least 5.000 new skilled workers each year, about half of them being university graduates. The study also indicated that the Brazilian education system was not equipped to meet this demand, and that the state would need a coordinated plan of action. This has however not

been implemented to its full potential (Rappel 2011: 69). The Pre-Salt discoveries and the following euphoria put more pressure on the already increasing demand for labor, and the labor market was not able to provide the sufficient amount of qualified workers.

#### **4.4 Local content policies**

The local content requirements were implemented along with the concession rounds in 1997, where the intention was to maintain a strong national industry that would produce equipment for the oil industry even after Petrobras had lost its monopoly. In the first four rounds, there were no fixed demands on local content, and the definition of LC was any goods or services coming from a Brazilian supplier (Guimarães 2012: 8). From the fifth concession round in 2003, the local content requirements (LCR) became more formal, and the oil industry suppliers had to comply with a certain share of LC in their deliveries. The ANP sets a LCR goal for each concession round (normally around 60-70 %), and the oil company that wins the auction has to secure that these requirements are met in their project. The oil companies then allocates LCR to the companies in the supply chain. The LC percentage varies between different companies, based on which services they provide. Some goods can be produced entirely in Brazil with Brazilian raw materials, and can be labeled as 100 % Brazilian, while other products need to be imported. The companies need to balance these products and have an end result that matches the LCR imposed on them. The LCR became harder to comply with after the seventh concession round in 2005, when the ANP implemented a compulsory and externally audited certification process. This new requirement has introduced higher costs - both economically and in time consumption - and led to more bottlenecks in the system (Almeida et.al 2014: 21; Guimarães 2013: 335).

The purpose of the local content policy is to secure a continued use of the Brazilian supply-chain even if international oil companies should become the dominant oil field operators. A long-term aim was to develop new technology-intensive sectors that would benefit the country in the future (Guimarães 2013: 336). One of the measures to secure this development was the implementation of the 1 % clause, which states that 1 % of the gross revenues from large oil production fields should be invested in research and development (ANP 2013). Another objective of implementing a local content policy is to avoid the resource curse, which is a situation where the national economy is dependent on one type of industry or



natural resource. One way to avoid this is to activate the supply chain of the oil sector, and thus promoting other industrial sectors besides the oil industry. If this strategy is fruitful, the economy will not be completely reliant on the international commodity prices. Another strategy to avoid the resource curse is to make investments in research and development in order to develop more technological demanding industries that are able to compete internationally (Xavier 2012: 12). The development of the Norwegian oil industry is often highlighted as an inspiration for Brazil. However, Eduardo Guimarães claims that the Brazilian authorities have constructed a disadvantage for themselves in demanding a minimum percentage of local content in every contract and operation in the Brazilian oil industry. This provides a protected environment for the Brazilian oil service companies, as it shelters them from competition from foreign actors. This situation will often create a loss of efficiency. His solution is to look to Norway, where local content is not required but rather rewarded: the companies with the highest level of local content are favored when the government hand out concessions (2013: 337-339). Another objection towards the local content regime is that it lacks a coordinated method of diffusing information about the various practices and ways to comply with local content requirements, and there is little transparency in the information that is made public. Every institution spreads its own information material, which can sometimes lead to misinformation, or cross-information. The lack of coordinated information makes it harder for the companies to comply with the local content requirements (Xavier 2012: 22).

## **4.5 The end of the oil boom?**

The optimism of the early 2000's has diminished in the last couple of years. Several factors can explain this decline. One of them is the decrease of the Brazilian economic growth, where the whole economy has stagnated since 2010, compared to the relatively high growth in the previous years (ECLAC 2015). Another factor is the declining international oil prices, which diminishes the economic surplus of costly offshore oil extraction. But the most important factor is arguably the corruption scandal now occurring in Petrobras. News of the scandal reached the surface in March 2014, when a former director of Petrobras was arrested. The investigations are ongoing, and involve both Petrobras executives and high-ranking politicians. The corruption scandal has led to a halt in further oil sector investments,

Petrobras has announced that they will cut about 30 % of their planned investments for 2015 (Estadão 2015; Folha de São Paulo 2014). The situation in Petrobras is affecting the whole industry, and many suppliers have seen their contracts with Petrobras postponed or cancelled.

A concluding remark about the oil and gas industry is that the most discernable aspect about is perhaps the national oil company, Petrobras, which has dominated the sector since its establishment. Another factor worth noticing is the steady development of technology and human capital following the offshore exploration in increasingly deeper waters. The government's intention was to continue this balanced development after the implementation of the local content policy, by creating Prominp and thus attend to the increased demand of vocationally trained workers. But the oil boom starting three years later disrupted the already weak balance between supply and demand of work force, and led to chaotic tendencies and a race between the companies to obtain enough qualified workers. It is safe to assume that the dynamics in the industry have changed over the last ten years and moved away from low-skill equilibrium dynamics? Or is it still possible to recognize mechanisms from HMEs? In the next chapter, I will address this question, using an MNC firm's-eye view.

# 5 The labor market in the Brazilian oil industry

In the final part of the theory chapter, I described the most central characteristics of the low-skill equilibrium, as presented by Ben Ross Schneider. I will now explore whether the same characteristics can be found in the Brazilian oil sector. My hypothesis is that the special position of Petrobras and the Brazilian oil industry in Brazil's industrial policy both make the oil and gas sector deviate from the traditional conception of HMEs. One aspect of this particular industrial policy is the local content policy, in which one of the central arguments is that goods and services should be provided locally to improve the capabilities of the supply chain and surrounding industries. One of the intentions behind producing goods locally and using the Brazilian labor force is to gradually increase the level of human capital. LC policies can put restrictions on the MNCs as to how much equipment and how many workers they can import from their home country or a third country. The limited opportunity to obtain skilled workers elsewhere will eventually put more pressure on the Brazilian labor market to supply such workers, and will possibly produce different dynamics than are typically found in a low-skill equilibrium.

The skilled labor force needed in the Brazilian oil industry can be divided into three groups based on the type of education, as seen in table 1. This distinction is not absolute, and there are possibly many examples in which it is not valid. It has however been fruitful for this analysis.

**Table 1: types of work force in the Brazilian oil and gas industry**

<b>Technicians, blue-collar workers</b>	Graduates from technical schools, vocationally trained.
<b>White-collar workers</b>	Graduates from universities or similar types of higher education
<b>Cadets and naval officers</b>	Graduates from the two naval academies, Ciaga and Ciaba.

The first distinction is between technicians with secondary education and specialized training, and university-trained workers such as engineers and geologists (Schneider 2013: 114). These two groups are often referred to as blue-collar workers and white-collar workers. The third group includes graduates from the naval academies, who are mainly found in the maritime industry and the offshore supply segment of the oil industry. These three types of work force will be discussed separately where this is possible, as the supply-demand mechanisms in each of them can differ between the types.

## 5.1 Low-skill equilibrium in the oil and gas industry?

In this section I will analyze the Brazilian labor market based on the three low-skill equilibrium mechanisms I presented in chapter three. These mechanisms feed back on one another, and are also described as negative complementarities. First, I will examine to what extent each of them are present in the Brazilian oil industry, before I discuss whether the Brazilian oil industry reflects a typical HME in regard to the low-skill equilibrium.

1. *The educational system does not provide enough skilled workers, and this is encouraging the MNCs to invest in lower-technology production.*

The liberalization of the industry, followed by the oil boom made Brazil an attractive investment area for foreign companies, and a huge number of MNCs have started operations there during the 2000's. The increasing number of active firms has created a large demand for skilled workers on various levels. Even though the Brazilian population is relatively well educated, they have not been prepared to meet this demand. The previous chapter showed that there was a foundation of highly skilled workers in the Brazilian oil industry prior to the oil boom, due to Petrobras' efforts in educating engineers and geologists. Petrobras' training system was however primarily based on white-collar workers. Nonetheless, these workers have been highly demanded. Geologists were highlighted as particularly sought after (Inventure Management)<sup>13</sup>. The educational foundation in regard to technical schools has not

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<sup>13</sup> The information in this chapter is based on the interviews (see appendix A for a full list of respondents), and references to company names without indicating the year means that I refer to the interview. I have chosen to not refer to the actual companies when I account for general opinions framed by more than three companies in order to maintain a certain flow in the text. These references are written as "some companies" or "nearly all companies".

been strong enough to cater to the blue-collar demands from a growing oil industry, despite the efforts to increase student numbers from programs like Prominp. The lack of qualified workers can be seen as a reflection and an effect of the Brazilian education system, which has been described as “poor” and “lacking” in several interviews<sup>14</sup>. The work type with the highest shortage of skilled workers is arguably the cadets and naval officers. The need for both white-collar and blue-collar workers must be regarded for Brazil as a national economy, in which workers such as engineers, technicians and electricians can be imported to the oil industry from other national industries (Innovation Norway). This option is however not applicable to the maritime graduates, as they belong to a shielded education only provided by the Navy, and cannot be assigned from other industrial segments.

Lack of skilled workers has however not prevented MNCs from making investments in the Brazilian oil industry. Norwegian oil service companies have experience and competence from operating in the Norwegian offshore industry, and see the Brazilian offshore market as a natural expansion area. But the Brazilian expansion has not been smooth and effortless. All of the firms interviewed report problems regarding the previously mentioned lack of skilled workers. However, the problems with finding skilled workers has not encouraged MNCs to shift their investments on to lower-technology production, the nature of the oil and gas industry probably can account for. Offshore oil extraction demands equipment of high quality, provided by workers with university education or technicians who have undergone vocational training programs, and can thus be labeled a higher-technology industry even though much of the R&D should be developed outside of Brazil. The companies with a large blue-collar work force provide their own training programs for new workers to make up for the lack of skills and to prepare them for their production tasks. The duration of these programs last from a few weeks for the most basic tasks, and up to two or more years for the most technologically demanding responsibilities (Aker and Vard).

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<sup>14</sup> The public universities in Brazil are quite good, but almost impossible to access if the student in question has a public school background. It is paradoxical that the majority of students accepted to public universities are from private high schools, while the students who have been attending public high schools have few chances of continuing their public and less expensive education. The educational system contributes a great deal to the maintenance of the hierarchical and unequal societal structures.

2. *The atomized labor relations and high turnover among workers prevent investments in training.*

High turnover rates are a problem in the Brazilian oil industry, and the phenomenon exists within all of the three work types mentioned earlier. Nearly every company I interviewed reported having troubles with employees leaving them after only six to twelve months. Most of the respondents explained the high turnover rates with Brazilian workers being more “short-sighted” and opportunistic than what the companies are used to from other countries. The Brazilians want to be promoted faster, and often ask for a higher wage than what can be assumed to be normal<sup>15</sup>. They want to rise rapidly in the career ladder, and are willing to go to another company if they are offered 200-300 BRL<sup>16</sup> more per month, or a more important job title. The high turnover rate is often described as an effect of the tough labor market caused by the oil boom. There is an overall lack of qualified workers, which implies that the demand is much higher than the supply of work force. This inequality in the labor market provides the qualified workers with a lot of power, and they can dictate their own terms. Should a worker choose to leave his current position, he would have no problems finding another job. This way, one can say that the atomized labor relations have favored the workers during the oil boom, since they easily can move on to better or more important jobs.

The companies are very much aware of this situation. The high turnover rate is a difficult issue, because it creates a lot of insecurity both within and among the companies. Within the companies, the administration can be unsure about how many resources they should invest in courses and training for the workers since this will make the workers more attractive on the labor market, which increases the risk of them leaving the company. The high demand for skilled workers creates insecurity and more competition between the companies, as they are not only competing for projects and contracts, but also for the workers’ favor. The high competition level has also led to increased numbers of poaching. Multiple MNCs stated that they have staff retaining practices in order to keep their workers satisfied and to keep them from wanting to leave the firm. Some representatives highlighted good benefit programs for their workers, which can include health care, private schooling for their children and legal assistance among other things. Some respondents also talked about the importance of creating

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<sup>15</sup> One company even told me about a Brazilian engineer asking for a salary that was higher than the salary of their executive manager in Norway.

<sup>16</sup> 100 BRL equals approximately 260 NOK (29.04.15).

a company culture where the employees felt that they belonged and were included. The Brazilian employees seem to enjoy working in a “Norwegian work environment” with a flatter and less hierarchical structure, shorter distances up to the manager, and more freedom in the way they handle their work tasks. This has however not prevented the turnover completely.

Problems regarding high turnover are a trait that the oil industry share with the HME typology. Nevertheless, the high turnover is arguably caused by two different chains of events. The atomized labor relations in HMEs, together with the general low skill levels, make the workers easily replaceable and render them with little power against their employers. In addition, the labor market regulations do not offer the workers adequate protection (Schneider 2013: 106). This leads to a labor market where the firms are in control and can ‘shop around’ for new employees if they are not satisfied with their current workers. The situation in the Brazilian oil industry stands in contrast to HMEs considering who has more power. The oil industry’s labor market is decisively more a market for the workers. Here, the workers ‘shop around’ for new positions if they are not happy with their current workplace, causing high turnover rates. An interesting observation is that while both theory and reality show high turnover, this phenomenon comes from two quite different places. Hence it is hard to conclude that the Brazilian oil industry displays the same symptom as the low-skill equilibrium, even though the effect is similar.

*3. The MNCs have few incentives to hire highly skilled workers locally, or invest in training and education.*

This is perhaps where the Brazilian oil industry deviates the most from the HME characteristics. The general impression of the oil industry is that MNCs operating in Brazil are interested in hiring skilled workers locally. One of the main reasons for hiring locally is the extra advantage of obtaining local knowledge on how the mechanisms of the market work. It would take a lot of extra effort for foreigners to acquire the same knowledge. The Brazilian staff has another advantage with already speaking the local language, Portuguese. Another highlighted reason for hiring locally was the costs of bringing expats to Brazil. An estimation of the annual cost of an expat is normally between 2 and 4 million NOK per worker (Inventure Management 2013: 41). As a result, nearly all of the firms I interviewed have at least 80% Brazilian staff. Some of the firms I interviewed manage with one or two

Norwegian expats. It also appears that the process of obtaining a work visa in Brazil is long and complicated. Avoiding the extra workload of the visa applying process can also be an important factor as to why the MNCs prefer Brazilian workers. At the end of the visa applying process, it is not given that the visas will be approved, which leads to a lot of frustration among the MNCs. Some respondents said that their firm could only get visas for a certain percentage of workers, but this visa restriction does not seem to be a direct part of the LC policy. In theory, the LC policy can prevent the importation of a large number of workers, since the final product that the firm provides needs to have a certain percentage of LC, and the labor used to create this product is included as LC. But if the firms want to hire a small number of foreign workers that does not necessarily affect the LC share, the visa regulations seem to be the real obstacle. Many of the companies also mentioned that there is not that much structure and regularity in the visa process, which makes the outcome less predictable. Most firms use headhunter agencies when looking for new workers. Many of the firms employing white-collar workers said they preferred to hire their workers straight from university. This way they can form the work mentalities to be more “Norwegian”. Other reasons are that newly graduated workers are cheaper in terms of salary, and convenience: It has been nearly impossible to get hold of skilled *and* experienced workers in the heated labor market during the oil boom.

Some of the companies in need of white-collar workers have collaborations with universities in order to attract newly graduated employees. The firms seeking blue-collar workers are often collaborating with technical schools and can offer trainee programs and apprenticeships (Aker). *Jovem Aprendiz*<sup>17</sup> is an example of such a program. Here, the companies are obliged to take on apprentices (Farstad). The maritime companies in need of naval officers expressed the necessity of working together with Ciaga in Rio, as it is one of only two naval academies in Brazil. The labor market during the oil boom, up until 2014, was very tough for most of the companies to whom I spoke. The solution has been to employ nearly qualified workers, and newly educated workers, or bring in foreigners if it is worth the effort to undergo the visa process.

Another illustration of the differences between HME theory and the Brazilian reality is the cooperation between Norwegian firms and organizations with the aim of improving the

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<sup>17</sup> Translates to Young Apprentice.



operational conditions in Brazil. Team Norway<sup>18</sup> lobbies the Brazilian authorities to increase the number of students with vocational training, among other things (Innovation Norway; Norwegian General Consulate). This example is not expected according to HME theory, where one assumes that the MNCs would rather concentrate on trying to avoid the local content policies, and not be interested in promoting education and increased human capital (Schneider 2013: 34). Another example of such cooperation between companies is Associação Brasileira dos Armadores Noruegueses (Abran), an organization established by Norwegian ship-owner companies operating in Brazil that have ties to the Norwegian Shipowner Association. Since its establishment in 2013, the organization has been working on influencing the naval authorities to increase the number of students at the two naval academies in order to attend to the high demand for labor. The number of graduates has augmented from ninety graduating cadets in 2000 to almost one thousand cadets in 2012 (Abran).

Some of the Norwegian companies have started an NGO called Dream Learn Work, encouraged by Norwegian minister of international development, Erik Solheim, in 2006. The idea was to target the youth in the poorer neighborhoods of Rio, and help them get into vocational training programs offered by Senai. This way, the companies also help themselves by increasing access to skilled workers, while at the same time conducting corporate social responsibility (CSR) programs (Dream Learn Work). These three examples are all interesting cases that deviate from the general expectations of the HME typology. However, it is not certain that they are traits of the Brazilian oil and gas industry; they might just be results of a Norwegian ‘culture’ or mindset.

### **Low-skill equilibrium?**

Based on the three characteristics just discussed, it is possible to argue that the low-skill equilibrium does not exist to its full extent in the Brazilian oil industry. It is difficult to locate the equilibrium in the labor market, as the market tendency leans towards an unstable and more dynamic situation. The equilibrium between supply and demand of labor force has been non-existent during the peak years from 2003 up to the end of 2013, as the demand for

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<sup>18</sup> Team Norway is a term used by Norwegian embassies and other institutions in the Foreign Service around the world. In Brazil Team Norway includes the following institutions and organizations: The Norwegian embassy in Brasilia, the General Consulate in Rio, Innovation Norway, Norwegian-Brazilian Chamber of Commerce, Abran/The Norwegian Shipowner Association, Intsok, Norwegian Seafood Council and Sjømannskirken (Norwegian Church Abroad).

workers increased out of proportions and made it an impossible task to secure a sufficient labor supply in all three work types. The massive demand for qualified labor gave workers the necessary incentives to invest in education and vocational training since the right kind of education would have guaranteed them a well-paid job. The MNCs have incentives to escape the low-skill equilibrium as well, since a well-educated work force is in their best interest. A good educational foundation in the labor market helps MNCs to avoid spending a lot of time and economic resources on training their employees on general skills in addition to the firm-specific skills. Finding qualified Brazilian workers is also more cost effective than bringing foreign work force, given the extra costs of the immigration bureaucracy.

With these incentives to invest in human capital from both parties, it would appear that the low-skill equilibrium should be on its way to oblivion. But the incentives are not the only prerequisite of breaking free from the vicious circle. Even though the low-skill equilibrium is not fully present in the Brazilian oil industry, there is still an issue with low skills. The Brazilian educational system is halting and can be characterized as a contributing factor to maintaining social inequalities. The poor quality of education can also have an effect on students' incentives to undertake higher education or vocational training, as they are not fully informed about what kind of opportunities they are offered after finishing high school. One example of this lack of knowledge is shown when students fail to fill up vacancies in free courses of vocational training that are sometimes offered (Dream Learn Work). This last part shows that even though the Brazilian oil industry is in the process of escaping the low-skill equilibrium, there are still many issues that need to be solved before the industry could eventually settle on a higher-skilled equilibrium in the labor market.

To sum up, it appears that all the Norwegian MNCs I interviewed have strong incentives to hire locally and to invest in increased human capital among their work force. These incentives can be defined as voluntary or mandatory. The voluntary incentives are the benefits of hiring locally such as knowledge of the local market and avoiding expat costs. The mandatory incentives derive from the bureaucracy of obtaining workers permits and visas, as well as complying with the LCR, and can be seen as incentives forced upon the companies. These incentives constitute the factor that deviates the most from HME typology, and can play a very important part in further developing the industry's human capital and hence escape the low-skill equilibrium. Another distinguishing difference is the mechanisms behind the high turnover rates. Even though the result is similar to HMEs, the causing factors

are quite different. The only characteristic that is in line with expectation from HME theory is the continuingly poor educational foundation that would normally create hindrances for breaking free from the low-skill equilibrium.

## **5.2 The effects of local content policies**

In the previous section I argued that the MNC incentives of increasing the human capital make the Brazilian oil industry deviate from HME typology. This section will be dedicated to the question of whether this deviation can be seen as a consequence of the local content policy that the Brazilian authorities have championed. Part of the intention behind the LC policy was to boost the human capital in the country by making the oil companies and the supply chain employ a larger share of Brazilian work force. This use of the Brazilian work force was supposed to lead to the industry breaking free from the low-skill equilibrium. The LC policy would create a greater incentive to invest in education and training by requiring that a certain percentage of the final company product should be of Brazilian origin. The labor is included in the definition of “Brazilian origin”, and this inclusion created a need for Brazilian workers in many companies, especially among the ones who relied on importing goods and thus would use the work force to increase the Brazilian percentage.

However, the policy itself cannot manage to increase the level of human capital in the industry; it is also necessary to strengthen the educational system, both on university level and opportunities for vocational training. Here, Brazilian authorities have arguably failed to cater to the demand for skilled labor. Even though the number of workers pertaining to the oil industry and its supply chains has increased radically over the last years, the number of students in the industry has not followed this growth. The gap between supply and demand has been filled by nearly or non-qualified workers that have been trained by their respective companies before starting to work. This would normally be an adequate solution to the skills problem, but the high turnover in the Brazilian labor market has caused the firms to dread extensive training courses since they could potentially waste a lot of resources on workers who would leave them after a short period of time.

The LC policy does not appear to have been regarded as an incentive to increase human capital among the firms I interviewed. The majority of the respondents claimed that they

would not have changed a lot in their labor force strategies since they would have strived to acquire Brazilian workers anyway. The companies who expressed concerns about LCR affecting their work force were the offshore supply representatives, in other words the maritime companies that require graduates from the naval academies. This can be seen as a consequence of a rather unbalanced approach to increase student numbers. Technical education and vocational training programs have received a lot of attention and support through programs like Prominp and Senai. The commercial naval education has on the other hand remained under the control of the Navy, with only two academies in the whole country, although with an increase in the number of students since 2000 (Abran). The result is that the requirements of LC<sup>19</sup> in the maritime segment has led to an enormous demand for Brazilian seafarers and a huge wage increase, which has made the whole segment more costly. The high wages make the industry less cost efficient, which makes it difficult to compete outside the Brazilian sphere (Farstad). Labor shortage can also potentially be a threat to security onboard the vessels as well, if the graduated cadets are promoted to officer rank too soon. The captain and the first officer onboard should have at least ten years of experience, but it is difficult to find adequately experienced staff in the heated labor market. A last resort to this problem is to promote less experienced officers who might not be capable of managing the responsibility. Unlike maritime companies, other firms with white-collar or blue-collar workers in their staff do not portray the local content requirements as the cause of the heated labor market since they would have preferred to hire Brazilian workers anyway. Rather, they name other areas where the LC policy was causing problems, such as strict rules regarding the certification process of LCR and the fact that these rules are changed too often. Another problem concerning the LC policy is unclear communication from the authorities, which can lead to different interpretations among the companies as to which regulations to follow (DNVGL). This difference in opinion between maritime companies in need of marine staff and the other companies can, as previously mentioned, derive from the fact that the land-based companies can search for workers in other Brazilian industries, and attract these workers with higher salaries.

When measuring the LC policy's accomplishment in raising the level of human capital, one should also take into account the timing and the context. President Lula's increased focus on improving the national industry through programs like Prominp was put in motion in a very

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<sup>19</sup> The local content requirement for offshore labor force at the time of my fieldwork (February 2015) was that 2/3 of the naval crewmembers should be Brazilian after the first operational year (Abran).

optimistic time for the oil industry. The international oil price was steadily increasing, and by Lula's second presidential period, the discovery of the Pre-Salt field was made public. Naturally, this increased the foreign interest of investing in the Brazilian oil and gas, and the industry grew rapidly. One can almost say that it grew too fast for the infrastructure to follow. The commitment to increasing human capital fell behind the economic growth, and the training programs already put in motion were not sufficiently prepared to attend to the increased demand for skilled workers.

In an attempt to sum up the LC's effect on the labor market, one can argue that the LC has indeed helped increase the Brazilian human capital related to the oil industry. Many actors have benefitted from the commitment to producing goods and services locally, both within the industry and its supply chains, and in other industries. In this way, the LC can be labeled as a tool in the continued development of the nation. However, LC policies have also made the oil industry less efficient and competitive. The suppliers compete for contracts by delivering the best and most cost effective offers. Many companies have stated that these offers would have been more effective if they were allowed to import parts needed for the production, instead of producing it in Brazil. In this regard, every level of the supply chain will be more costly than it would have been without LC. The MNCs themselves do not lose revenue, as they add these extra costs into their offer. It is Petrobras, and eventually Brazil as a nation that pays for this reduced efficiency. This can however be a small price to pay for the long-term goal of developing the nation's human capital and escape the low-skill equilibrium.

### **5.3 Objections towards the hierarchical market economy**

The varieties of capitalism framework in general promotes a stable market environment, with positive or negative complementarities that feed back on each other and thus strengthen the existing institutions. The labor market in the Brazilian oil industry is however an environment that has evolved and changed a lot so far in the 2000's. In this sense, one can argue that the case of the oil sector is supporting Jackson and Deeg's suggestions that it is possible to change certain institutions without changing the overall framework. Every market or economy has its own traits and dynamics, which can be the subjects of change if the actors within the economy are not satisfied. The oil and gas industry is arguably at the same time

bringing new dynamics in to the Brazilian national economy, but this would be need to be the subject for a more extensive case study.

The case of the Brazilian oil industry can also be used to support Colin Crouch's objections towards the rigidness of the typologies. Crouch claims that instead of one typology being pushed to fit a whole economy, it is possible that one economy can fit more than one typology. This analysis of the oil sector can to some extent support this claim, with traces of LMEs, such as extended poaching of workers and the worker individuality. The Norwegian MNCs coordination and cooperation can resemble the networks of a CME. One conclusion from this case study is that the Brazilian oil and gas industry certainly is not an ideal case of HME typology, but without discarding the HME completely. Researchers wanting more theoretical details will often criticize parsimonious typologies. If the typologies however become too detail oriented, they will loose their ability to generalize and group subjects together. Following this debate, this master thesis can be seen as an attempt to enrich, and make exceptions to, the HME, but without questioning its existence.

## 6 Conclusion

The Brazilian oil industry arguably deviates from a typical HME by not having an extended low-skill equilibrium in its labor market. The low-skill equilibrium mechanism regarding MNCs' lack of incentives to invest in training is absent in this case study. An unexpected observation was also made: not only are the Norwegian MNCs interested in hiring Brazilian skilled work force, they are also cooperating and coordinating among themselves in order to induce the Brazilian authorities to promote education and vocational training. Based on HME predictions, this is a surprising dynamic. The cause of high turnover rates is another alteration from low-skill equilibrium mechanisms. In theory, the high turnover would be caused by a fragmented and lowly skilled work force with few legal rights and powerful firms who would frequently change their staff. In this case study, one could almost say that it is the other way around. The high demand for labor has transferred the market power to the workers, who can choose between many job offers and will change jobs if they are not satisfied. The Brazilian oil industry still struggles with one low-skill equilibrium characteristic, which is the poor educational foundation. This can however be seen as a national issue, and not just related to the oil industry.

One conclusion is therefore that the dynamics of the Brazilian oil industry is quite different from HME theory, including the partial absent of the low-skill equilibrium. It is however not possible to claim that these differences are caused by local content policies alone, based on this case study. Some of the maritime companies interviewed named LCR as a cause of the heated labor market, but the majority of firm did not place such opinions. This does not necessarily mean that the LCR have no effect on the labor market, but rather that the causal connection is more implicit. The level of LCR impact on the low-skill equilibrium thus remains inconclusive.

The situation today is however different from the situation described throughout this case study. As a consequence of the Petrobras scandal, several contracts have been cancelled or put on hold. Many workers have lost their jobs and are now available in the market. This means that the supply and demand of labor force is relatively equal, with some exceptions. Workers do not have the same power as during the oil boom years, and one outcome is that it will be harder for the workers to change jobs as often as they have done in the past, as they

can now risk to end up without a job. Many respondents predicted that the labor market would be more “stable and balanced” from now on. If the labor market finds an equilibrium in the future, it is very likely that it will be higher skilled than the one described in HME theory.



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# Appendixes

## Appendix A: List of companies and organizations

### interviewed:

<b>Company name:</b>	<b>Place of interview:</b>
ABRAN	Rio de Janeiro
Axess (2 respondents)	1 in Rio de Janeiro, 1 via Skype
Deep Ocean	Via Skype
DNVGL	Rio de Janeiro
Dream Learn Work	Rio de Janeiro
Farstad (2 respondents)	Rio de Janeiro
Harding	Rio de Janeiro
Innovation Norway	Rio de Janeiro
Intsok	Oslo
Inventure Management	Rio de Janeiro
KNOT (Knutsen Offshore)	Rio de Janeiro
Kongsberg Maritime <sup>20</sup>	Oslo
The Norwegian General Consulate in Rio de Janeiro	Rio de Janeiro
Southern Marine	Rio de Janeiro
Statoil	Rio de Janeiro
Vard	Via Skype

I have also had access to the recordings of an interview with Aker Solutions, conducted by my supervisor Yuri Kasahara.

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<sup>20</sup> The Kongsberg representative is no longer working in the company.

## Appendix B: Interview guide

1. How long have your firm been operating in the Brazilian oil industry?
2. How many people does your firm employ? And how many of them are Brazilian?
3. What kind of educational background do the workers have?
4. What is your main strategy/practice when hiring workers?
5. Do you collaborate with any Brazilian institutions when searching for skilled workers, and if so, in what way?
6. How will you describe the labor market?
  - Is it easy to find skilled workers?
  - Any particular obstacles?
7. Has this situation changed in the last few years?
  - Easier or more difficult to find qualified workers?
8. In your opinion, have the local content requirements changed the Brazilian labor market in any way? If so, how?
9. If the LC requirement did not exist, would your employment strategy be the same? If no, what would have changed?
10. Any other factors relevant to this topic?



## Appendix C: Letter to participants

### Participation in a research project about Norwegian firms operating in the Brazilian oil/gas and maritime industry and their strategies in acquiring skilled workers

#### Research purpose

This project is a master's thesis written at the institute of political science at the University of Oslo, in collaboration with the Norwegian Institute for Urban and Regional Research (NIBR). The thesis' aim is to study the strategies of Norwegian firms operating in the Brazilian oil industry as to how they acquire skilled workers to their companies. In order to do so, the study is dependent on the participation of representatives from these firms, and we would appreciate your participation.

#### Practical information

The information gathering will consist of personal interviews conducted in Rio de Janeiro in the period between the 25<sup>th</sup> of February and the 13<sup>th</sup> of March.

The interviews will be recorded, and all personal information will be treated confidentially. The only people with access to the data are the master student and the supervisor.

The master's thesis will be handed in by the end of May 2015, and the recordings will be made anonymous afterwards.

The participation in this project is voluntary, and it is possible to withdraw your consent at any time during the project without any specific reason.

The project is registered with the Data Protection Official for Research at the Norwegian Social Science Data Services (NSD).

If you have any questions, please contact  
Maria Melby, master student, at [mariamelby0@gmail.com](mailto:mariamelby0@gmail.com) or  
Yuri Kasahara, supervisor, at [yuri.kasahara@nibr.no](mailto:yuri.kasahara@nibr.no)

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I have read the project information, and I hereby consent to participate in a personal interview on behalf of my firm.

.....  
(Date)

(Signed by participant)

