The Complexity of an Oil Economy
– A theoretical analysis of the Angolan economy as a complex adaptive system

By: Jennifer Sandmark
Supervisor: Thomas Marmefelt
Abstract

In this thesis, the development and current state of the Angolan economy is analyzed on the basis of complexity theory in order to emphasize the interactions and relationships of the heterogeneous agents in it as well as the consequences of those interactions for the economy as a whole. A political economy approach is used to analyze the dualities and polarizations in the economy, and two stylized facts are identified as important for understanding the development of the Angolan economy; the deindustrialization of a country due to a booming oil sector causing an exchange rate appreciation in the core model of Max Corden (1984), and extractive institutions in a former colony hampering investments and development in the economy due to lack of protection of property rights (Acemoglu et al, 2001). The implications of these stylized facts for the case of Angola are investigated as well, and an ultimately an agent-based discussion is held.

Keywords: Angola, complexity, agent-based computational economics, Dutch disease

Acknowledgements
This thesis has benefited greatly from the comments and ideas of my supervisor Thomas Marmefelt and the process of completing it was made easier by the encouragement and inspiration from my friends and family.
Abbreviations:

MPLA  Movimento Popular de Libertação de Angola
UNITA União Nacional para a Independência Total de Angola
AEO  Africa Economic Outlook
AEU  Angola Economic Update
BNA  Banco Nacional de Angola

Definitions:

Complex Adaptive System
A CAS is a system where there are emergent properties and an adaptive behaviour as agents interact continuously and parallel to the influence of the history and environment of the system. As the interactions and relationships between the agents in the system changes due to outer influence and changed circumstances, so does the system as a whole change – a process called self-organization.

Agent-based computational economics
It is the computational approach of modelling economic worlds as complex systems where agents interact without necessarily having perfect information and rationality. Instead of focusing on studies of equilibria, ACE modelling focuses on economic processes and local interactions between agents.

Stylized facts
Stylized facts are defined as a general presentation of an empirical finding. In the context of this thesis it is considered to be a finding of previous research that concurs with what is identified in the case at hand.
# Table of Contents

1. Introduction 1
   1.1 An overview of the history and development of Angola 2
   1.2 Problem Formulation 4
   1.3 Research Question 5
   1.4 Method 5
   1.5 Purpose & Limitations of the Study 6

2. Literature 7
   2.1 Theoretical Framework 7
      2.1.1 Complex Adaptive Systems 7
   2.2 Stylized Facts 9
      2.2.1 Institutions Hypothesis 9
      2.2.2 Dutch Disease 10
      2.2.3 Previous Studies on the Resource Curse 13 & Dutch Disease

3. Case Description 16
   3.1 The Political Economy of Angola 16

4. Methodology 19
   4.1 Modelling Complex Adaptive Systems 20
   4.2 Agent-based Computational Economics 21

5. Results & Analysis 23
   5.1 The Implications of the Stylized Facts 23
   5.2 Agent-based Discussion 25

8. Conclusions 27

References 29
1. Introduction
The conventional approach to studying macroeconomics is based on the notion of microfoundations where the rational and optimizing behaviour of agents drives the economy into a static state of equilibrium (LeBaron & Tesfatsion, 2008). The development of this general equilibrium and rationality of agents as pillars of macroeconomics was a result of the oil shocks of the 1970’s and the stagflation they brought on, as it spurred the neoclassical revolution, which was subsequent to the depression of the 1930’s, initiating the work of Keynes. Delli Gatti et al. (2010) argue that we now, after the global financial crisis of 2007-2009 are in need of a new paradigm shift. Instead of relying on microfoundations and representative rational agents to attempt to understand macroeconomics, the understanding of an economy as a complex adaptive system is needed. In this thesis, that approach will be seen as a new instrument used to understand the events of an economy where lack of data reliability and availability would hamper an econometric analysis.

In this new paradigm the economy is thought of as a complex adaptive system where the interactions between the heterogeneous agents, the system as a whole, and the environment it is in are central. Moore (2006: 14) argues that the system as a whole cannot be understood solely by studying the micro components. Instead, the relationships of the parts need to be taken into account. The structure of the system is built upon the relationships of the agents in it, so for instance, as information from outside the system flows through it, the interactions in the system will change and the structure of the system will change with them (Cilliers, 1998:93).

In this thesis, the complexity approach is used to analyze the characteristics and history of the Angolan economy. Its contribution thereby will lie in taking into account agents, their characteristics, actions, and relationships, as well as considering the surrounding circumstances of the Angolan economy when studying its development from the independence in 1975 and onwards. Viewing the economy as a complex adaptive system allows the analysis to include the components, their interactions, and the history of the system. The case of Angola is well suited to study as a complex adaptive system as it is constituted of many different agents with individual goals and varying levels of power and wealth, while the history plays a large role, and the country’s endowments of natural resources are essential when understanding many of the occurrences. In order to facilitate the
complexity analysis of the case, a political economy approach is presented to highlight the major dualities in the economy, resulting in identification of some stylized facts of the case and the analysis of their implications.

1.1 An Overview of the History and Development of Angola

Throughout the last decades of Angola’s history the income generated by the oil sector have been a central part of the economy and of great importance for the government, making up about 95 % of export revenues and 80 % of government revenues, and 46 % of GDP (OECD, 2014).

The great mineral resources provided Angola with great potential for success after gaining independence from the Portuguese colonizers in 1975, but instead some effects have been prolonging civil war, and causing distortions and corruption in the economy and government (Kyle 2007). The reason for why this expected success never came to Angola is argued by some (Hodges, 2001:2) to be the wealth itself, as large receipts from natural resources can be connected to conflicts and mismanagement through corruption and rent-seeking behaviour among those in power, leading to widespread poverty among the rest of the population.

Hodges (2001:167) argues that the paradoxical fate of Angola is connected to the fact that the country had to transition on many levels simultaneously, on a security level (from war to peace), social level (humanitarian emergency to rehabilitation), shift in political regime (authoritarian regime to multi-party democracy), and economic system (from planned to market economy).

Angola has experienced decades of war and conflict, beginning with a fight to break free from the Portuguese colonization in 1961, which turned into independence in 1975. The nationalist fight against the colonizers then developed into a civil war where the governmental party, MPLA, stood against the opposition party UNITA (Aguilar, 2001). The process of decolonization left the Angolan economy weak and vulnerable in a state of war. During the armed conflicts, the two main sectors – the oil sector and the agricultural sector – were affected very differently as mostly of the oil resources are located offshore they were not affected by the war whereas the rural areas and the surrounding infrastructure was destroyed by battles fought in the countryside (Aguilar, 2001; Kyle, 2007). The insecure situation in the
hinterland led to extensive urbanization in the 1990’s, making cities like the capital Luanda severely overpopulated and further increasing oil dependence there in the shape of increased demand for imports financed by oil revenues (Le Billon, 2001).

The manner of which the independence came to Angola has brought on troubles along the path to development and growth as the Portuguese held up all institutions and system of rules. This led to a large gap in the human capital of the country as well as the structure of ruling, since the population did not obtain the skills and traditions of actually ruling the country when the Portuguese left abruptly. According to Le Billon (2001), the struggle to build up regulations and functioning institutions has been lingering on through lack of transparency and opportunistische behaviour amongst decision makers.

With support from the Soviet Union and Cuban forces to fight off UNITA, MPLA, who were in governmental position, attempted to implement a centrally planned economy, which due to lack of institutional competence and the ongoing war against UNITA, was unsuccessful and not long-lasting (Aguilar, 2001). The government attempted to relieve the critical situation of the agricultural sector by turning former colonial farms into state-owned ones. However, this failed due to lack of skilled management and insufficient inputs. The failed reform of the agricultural sector left the rural population even more exposed and distrusting of the government (Le Billon, 2001).

The determinants of the real exchange rate of Angola is the subject for Gelbard and Nagayasu (2004), where they find that Angola’s exchange rate had a strong relationship with the world price of oil and foreign interest rates. From this, Gelbard and Nagayasu draw the conclusion that a flexible exchange rate regime is suitable for Angola as a fixed one would prove a struggle to maintain.

The monetary environment was highly regulated under the attempt to centrally plan the economy, and as the government began to move away from that the exchange rate was devaluated in stages (Aguilar, 2001). Eventually, the restricted foreign reserves made the fixed exchange rate difficult to defend so it was allowed to float in May 1999. Thereafter the exchange rate depreciated at a stable rate until 2003 when it was kept on a constant rate against the dollar. It was not officially pegged to the dollar but the monetary policy of the government resulted in a situation where it acted as such. However, in 2009, a small
depreciation was allowed (Kyle, 2010). Due to a nominal exchange rate that was kept constant and high inflation, the real exchange rate appreciated during the same time. The national bank, BNA, now focuses the monetary policy on stabilizing the nominal exchange rate due to the downward trend of the inflation rate (AEU, 2013). In order to achieve this, the BNA has intervened more on the foreign exchange market, and has supported the accumulation of reserves in order to shield against external shocks.

One example of the deep dependence on oil the Angolan economy has suffered from since its independence (Kyle, 2007) is the fact that only increased production and price levels in the oil sector has caused an increase in growth. Earlier, crops played a much bigger role in the economy as Angola for instance was the fourth largest coffee exporter in the world, as well as a great producer of maize, cassava, and sisal among other crops. However, due to the extensive destruction of the infrastructure around the rural areas, mass migration to the urban areas during the civil war, and increased production in the oil sector in the 1980’s, the agricultural production has consistently decreased since the decolonization (Kyle, 2002).

1.2 Problem Formulation
Considering the large resource endowments held by Angola, the actual state of the country and its economy and the manner of which it has transitioned over the past decades is very underachieving. The mix of mineral resources alongside the arable land and favourable climate would have given Angola the income and tools to become a stable, growing and dynamic economy (Hodges, 2001:1) through diverse production. Instead the economy is characterized by extreme resource dependence and a weak domestic industry.

By a first glance at the case of Angola it would seem fairly easy to write it off as an oil economy where lacking institutional skill and corruption has caused inefficiencies and slow development. In that case the picture is quite clear on what has happened, how the economy ended up in its current state, and what needs to be done in order to turn it around. However, there are factors such as the history and the large resources along with high levels of growth that makes the case a bit more complex.

As the oil sector is so dominant in the Angolan economy, while distortions from the deep resource dependence has caused the domestic production to lag far behind although there are great resources to be used, is quite frustrating for a bystander to observe as the need of
development is clearly visible. It would seem as if the Angolan economy has the potential to be in a better state than it is now, and this thesis sets out to investigate why the economy is in its current state, and more specifically if the resource dependence is all to blame for the issues present in the Angolan economy.

The impact of these occurrences would be difficult to investigate in an econometric setting as the data availability and reliability of Angola is in need of great development, and the complexity of the relationships between agents and the economic developments as those relationships changes could potentially be lost in a statistical approach as for instance a regression. This is why the study of this case is based on complexity theory in order to highlight the different characteristics interactions of the agents in the economy.

1.3 Research Question
The underdevelopment of the Angolan economy, apart from the oil sector, would make it rather plausible to assume that the resource dependence is what has constructed its current state, but the theory of complex adaptive systems gives room for further study of how the economy has transitioned from its state as a colony, enduring civil war, to finally reach a state of peace as an independent state. Therefore, this thesis brings in the complexity theory in order to study the reasons for why the Angolan economy has developed in the way it has since the independence from the Portuguese.

The research question of this thesis is as following:

- What agents, adaptive behaviours, and circumstances can be identified to have shaped the Angolan economy into its current state?

1.4 Method
The basis of this study is a case study where literature about Angola is reviewed and then different agents and their levels of power and wealth are identified and discussed in the context of political economy and complexity theory. The aim for this approach is to offer an alternative in studying economies where the reliability and availability of data is low, and thereby making methods such as regressions less useful.
The political economy approach of this analysis is used to make the understanding of the Angolan economy more graspable due to the fact that viewing it as a whole, from the perspective of complexity theory, would simply be far too complex.

The analysis of the economy will consist of identifying the main agents, their relationships, and the consequences of their behaviour, the identification of the stylized facts and their implications for the Angolan economy. In addition, the thesis will conclude with an agent-based discussion.

1.5 Purpose & Limitations of the Study
The purpose of this thesis is both to offer an alternative approach for students studying economic issues that might not with ease conform to the conventional toolbox of statistical methods such as OLS regressions for instance, and also to gain understanding about the case of Angola as a developing country and an oil economy, on the basis of complexity theory.

The main limitation to this study is the lack of first-hand data on Angola, as the majority of the sources are previous studies on the subject, and the fact that complexity theory essentially would engage a much more complex and large study than is possible in this setting. It is possible to view this study as an introductory use of complexity theory, where there are many possibilities for future research, especially considering ACE modelling and computer simulations. While this study is mainly a theoretical analysis and to some extent consisting of a lot of literature reviews on the subject, the possibilities of computational modelling and simulations of the case are many.

The analysis of the Angolan economy has been limited to its largest polarization; that between the political elite and the rural population, as this draws attention to the heart of many issues found in the history and development of Angola. The former colonization, poverty, income inequality, trade, and security are some issues which are illustrated through this duality in the case of Angola.
2. Literature

2.1 Theoretical Framework

2.1.1 Complex Adaptive Systems

Moore (2006:10-11) argues that economies are complex systems, due to the fact that the economic world consists of individual agents with exceptionally heterogeneously behaviour determined by their free will, consciousness and memory. However, the different agents and interactions cannot themselves define the economy as a whole. This is the difference between a complicated system and a complex one.

Proposing a universal definition of the term complexity is easier said than done. Rosser (1999:170) points out that there have been gathered over 45 definitions of the term. He offers a so called “broad tent” definition which states that “a dynamical system is complex if it endogenously does not tend asymptotically to a fixed point, a limit cycle, or an explosion”. Cilliers (1998:3-5) move a bit closer to a more concrete definition as he lists ten characteristics for a complex system:

1. Complex systems include many elements.
2. Although many elements are needed, they are not sufficient.
3. The interactions are rich as the elements are influenced by each other.
4. The interactions have a number of important characteristics, mainly that they are nonlinear.
5. The interactions are locally rooted, the information produced stays in a limited area.
6. The interactions are recurrent, which means that there are loops.
7. Complex systems interact with their environment.
8. Complex systems operate out of equilibrium.
9. A time dimension is needed when analyzing a complex system, as history matters.
10. The elements of the system only act upon locally available information.

The complex adaptive system cannot be reduced to its parts, the interactions between the agents and between the system and the environment play a defining role as well (Moore, 2006:14). It is the relationships between the components that, in combination with the sum of
the parts, make up a complex system (Cilliers, 1998:2). In other words, complex systems have emergent properties which state that the definition of a system is independent from the definitions of its constituents. The adaptive feature of the complex system is defined by Waldrop (1992:11) as the fact that the complex system does not simply respond passively to events that occur, but it responds in a way that is most advantageous to it.

An emergent property of complex systems is the property of self-organization, which describes behaviour on a macro level by studying the micro level occurrences affected by local information. The process of self-organization entails that the system is able to adjust its structure when necessary. The relationships in a complex system are nonlinear, which means that the previous conception of causality does not hold, as the interrelationship between elements is continuously changing. Moore (2006:18) defines the structure of a complex system as being determined through the self-organizational process shaped by the complex interactions of the present state of the system, its history and its environment. As bunches of information from the outside world flow through the system, the interactions in the system are affected by them and the valuation of certain weights in the system will perhaps change due to the information (Cilliers, 1998:93). In the self-organizational process the system will recognize frequently present bunches of information and will alter its weights according to them.

Apart from these characteristics Cilliers (1998:6) also emphasizes that agents interact with many different elements in the economy, such as shops, banks, in addition to other agents. The economic interactions are nonlinear as investments can produce large revenue, and the fact that the activity of an agent produces a feedback of some sort, for instance as a return on an investment. Further, an economic system never stands still, which means that it can never be in equilibrium. It is also difficult to draw borders around an economic system as it is influenced by numerous factors such as the political system, agriculture, international relationships, technological progress, the stability of the society, and so on. The environment in which the complex system is and which it interacts with is in this context seen as the world in the shape of trading partners. Elements such as the global economic situation, the price of oil, and stability of neighbouring economies all have an impact on the expectations, decisions, and interactions of the agents in the complex system.
The question of control when viewing economies as complex adaptive systems provides an answer of a rather dispersed nature, according to Waldrop (1992:145). What occurs in the system as a whole is determined, as stated, by the interactions of the agents in it. This also applies to the control over the system. The movements of the entire system is decided by the innumerable actions and decision made by the agents constantly. In an economy, the governments may change fiscal or monetary policy but the behaviour of the economy at the end of the day comes down to the response of the individuals, and how they interact. The issue of control over the system is visible in the case of Angola, as the lack of functioning institutions and rule of law has led to unstable enforcement of policy and consequently a very shaky relationship between the government and the population (Hodges, 2001:93). The relationships and past interactions between agents in the system affect expectations and the agents’ plans for the future. For instance, the decisions of saving and investment are affected by the expectations of agents, which in turn will result in different levels of income and consumption in the economy.

2.2 Stylized Facts
The so called stylized facts presented below are empirical findings and models that are used in the analysis of the Angolan economy and its development. They are linked to different characteristics of the economy as a complex adaptive system; the institutions hypothesis is used to explain the impact of the colonial past of Angola, while the Dutch disease, through the core model of Corden (1984) and the findings of Benjamin et al (1989), looks into the resource dependence of the Angolan economy. The analysis is of the implications of these stylized facts are found in section 5.1.

2.2.1 Institutions Hypothesis
An important factor of the inefficiency and underdevelopment of the Angolan case is the weak rule of law and corruption and rent-seeking behaviour among those in power. This has caused widespread mistrust and lack of confidence in the government among the people and general instability and disorganization in the society. The lack of human capital and institutional weakness has paved way for these developments, and according to the institutions hypothesis (Acemoglu et al., 2001) it is not surprising that they exist.

Acemoglu, Johnson, and Robinson (2001) study the economic development of countries that were colonized by Europeans in the last 500 years and the reversal connected to it as it has
been documented that those which were relatively rich when colonized in 1500 are now relatively poor.

The institutions hypothesis argues that the economic development of countries depends on the societal organization and the ease of investment. This is presented in the shape of institutions which either ensures the protection of property rights or institutions which likely will expropriate the property of the population. In a societal organization where the institutions are not extractive and property rights are protected, investments are encouraged as the investors receive returns on their ventures. Another requirement of the institutions of private property that Acemoglu et al. (2001) present is that a more wide range of the society holds political power and wealth, in contrast to a society where the power and wealth is concentrated to a small elite group as in a society with extractive institutions.

Further, they consider the historical evidence of the behaviour of the European colonizers, which suggests that colonization led to extractive institutions in prosperous countries and development of institutions of private property in poor countries. This effect is called institutional reversal as the previously prosperous countries would end up with extractive institutions under European colonization.

The Portuguese rule over Angola fits the description of the extractive institutions as it was an authoritarian regime with strong concentration of small Portuguese elite ruling over the Angolan population. As the concentration of power and wealth continued after the independence the environment for investments and protection of property rights remains an area of development for Angola, according to the African Economic Outlook (2014). After the independence from the colonizers, the Angolan government did not organize in broadly divided power with institutions that maintained property rights, but instead continued on the concentration of a small elite running extractive institutions, leaving the population with a lot of mistrust towards the government and allowing for corruption and rent-seeking behaviour spreading.

### 2.2.2 Dutch Disease

The phenomenon referred to as Dutch Disease is the effects that hit a country’s economy as a resource boom occurs. It is a combination of two effects; an appreciation of the country’s real exchange rate due to a sharp rise in exports, and the movement of labour and capital from the
country’s manufacturing and agricultural sectors to the booming sector, which raises their production costs (Ross, 1999). The term comes from the description of the developments in the Dutch economy following a boom in the production of natural gas, which caused an appreciation of the Dutch real exchange rate.

As the oil sector grows so does the production possibility frontier of the economy and the increased revenue makes consumption go up in both traded and non-traded goods. The increased demand for non-tradables pushes the prices up and an increase in output follows. This draws resources from the tradables sector into the non-tradables sector. The increased demand for tradables is fed with imported goods which are paid for with revenues from the oil sector. The result of all this is that the tradables sector diminishes and the relative price of tradables to non-tradables falls, meaning a real exchange rate appreciation occurs.

Considering that the Angolan economy has revolved to a large extent around the oil sector since the middle of the 1970’s and developments such as the prolonged civil war and widespread corruption can be connected to its large revenues, the focus on the effects of a resource boom are naturally important for this case. Also considering the fact that one important duality of the political economy of Angola is that of the oil sector and the agricultural sector, as they represent different ends of the economic spectra in Angola.

The real appreciation of the Kwanza has caused the formerly large agricultural sector to decrease significantly over the years (in combination with the civil war) and continues to be a challenge for the government to contain (World Bank, 2013; Kyle, 2010). The AEU (2013) reports that the real exchange rate appreciation weakens the competitiveness of the manufacturers and farmers in the economy as imports become cheaper than domestic goods due to it. This effect is what Corden’s (1984) core model describes as a consequence of a booming oil sector.

According to the core model, presented by Max Corden (1984), the economy is divided into three sectors, the first (B) is booming, the second (L) is lagging, and the third (N) is the non-tradable sector. The booming and lagging sectors produce tradable goods. Corden (1984) stresses that the lagging sector can produce both manufactured output as well as agricultural output, being the case in Angola where the agricultural sector produced a lot of Angola’s export output (Aguilar, 2001).
The sectors use one input factor that is sector specific and labour which is mobile. If a boom occurs in sector (B), for instance due to a technical advancement, then it will raise the aggregate income of the factors used there. This produces two effects; the spending effect and the resource movement effect. The former implies that some of the extra income in sector (B) is spent, and the prices of goods in the non-tradable sector rise relative to prices of tradable, given that the income elasticity of demand for non-tradables is positive. Thereby, the result is real appreciation, which draws resources from the booming sector and the lagging sector into the non-tradables while shifting demand in the opposite direction.

The resource movement effect considers, as the name implies, the movement of resources – mainly labour. The boom makes the marginal product of labour rise in sector (B) which increases the demand for labour in (B), in turn inducing movement of labour from the two other sectors. The implications of these movements have two parts, first the shift in labour from the lagging sector into the booming one leads to a decreased output in the lagging sector. Corden refers to this as direct de-industrialization, due to the fact that it happens without involvement of the non-tradables sector and no real exchange rate appreciation.

The second part of the effect involves labour movement from (N) to (B), resulting in a supply shift that leaves an excess of demand in the non-tradables sector added to the excess demand already created by the spending effect. This means that the real appreciation will be even larger. As a result there is more movement of labour from (L) to (N), producing indirect de-industrialization.

Corden (1984) also points to the fact that an oil boom presents a special case where the factors employed are not mobile as in the standard description of the core model above. Instead, the oil sector is characterized as a so called enclave since it does not engage in a domestic factor market in the same way as other sectors.

The model presented above is the most common model used in the literature on Dutch disease; however it is not well applied to a developing country such as Angola. This issue is something that Benjamin et al. (1989) discuss, as they consider the effects of an oil boom on Cameroon’s economy. The two effects of an oil boom discussed by the core model – the spending effect and the resource movement effect – are found to different degrees in
developing countries. Benjamin et al. (1989) point out that the resource movement effect is rather limited as the capital and labour in the oil sector are mainly foreign, while the spending effect will have a larger impact.

An important aspect to consider when studying developing countries is the importance of agricultural production over for instance manufacturing, and the fact that agriculture is a sector that will be most hurt by an oil boom. As Benjamin et al. point out, and as can be seen in the history of Angola, the impact on agriculture from an oil boom will affect the relationship of the rural and urban regions in terms of trade and migration. Although the effect in Angola is shared between the oil boom and the civil war, it is clear that the economic centre is located in and around the oil sector and urban areas.

2.2.3 Previous Studies on the Resource Curse & Dutch Disease

Although the wealth brought into an economy might be seen as a blessing, as it for instance provides capital which allows for investments that might not be possible otherwise, the reality for many countries with resource abundance is another. The rents from oil production do not simply bring in capital but also inclinations to conflict, corruption, and decreased production in traded sectors (Sala-i-Martin; Subramanian, 2003).

Warner and Sachs (1995) showed that countries with resource abundance (in the shape of large share of natural resource exports of GDP) have a lower growth rate than those who do not. They control for variables such as trade policies, government efficiency, initial per capita income, and investment rates. Since then, these results have been contested, confirmed, and expanded.

Gylfason and Zoega (2006) find a link between natural resource abundance and economic growth through the effect on investment and savings behaviour. They argue that as the income from mineral resources is given to a larger extent to the owners, the demand for capital decreases, which in turn result in lower real interest rates, and ultimately less saving and growth in the economy. In conclusion, resource abundant countries would benefit from a better allocation of capital to help spark growth, which would be made possible by structural and economic reforms.
Auty (2001) is on the same track, as he argues that sustainable and rapid economic development need a “‘developmental’ political state”, in addition to equitable access to land and education, effective markets, public accountability, open trade policy, and competitive economic diversification. The developmental political state needs to be autonomous enough in order to pursue a consistent economic policy and aim to raise long-term social welfare. These developmental states are however connected to resource-poor countries as their governments do not show the predatory and rent-seeking behaviour as the governments of resource abundant countries do.

Sachs and Warner (2001) show a relationship between resource abundance and export sectors contribution to growth where they argue that one explanation for the resource curse is that resource abundance drives down the competitiveness of export sectors. This can be seen in Angola, where the agricultural sector that formerly produced various goods for export, now has barely any production, leaving Angola forced to import these goods (Kyle, 2010; Hodges, 2001).

The question of determining what causes the resource curse, apart from abundance of natural resources has proven to be quite difficult, and even determining how to define it is a matter on its own. Considering the case of Angola, signs of a resource curse are quite prominent as the natural resources (mainly oil) make up about half of its GDP (World Bank, 2014). Following the discussion of Sachs and Warner (1995) and those with similar results, there would be a lot speaking for a resource curse in Angola with slow growth as the result. However, since this is not the case as Angola has been keeping a growth rate for the last decade which was more than double that of the rate for Sub-Saharan Africa. This is due to a boom in international oil prices during the 2000’s and expanding production from new oil findings, according to the AEO (OECD, 2007).

These results leave the discussion of a possible resource curse a bit unfulfilled and a need to take more into consideration when looking at the complex case of Angola. Apart from the GDP growth and the wealth flowing in from the natural resources, Angola has experienced some movements within the economy that are identified as symptoms of the Dutch Disease (World Bank, 2014; Kyle, 2010; Aguilar, 2001). The term itself comes from the situation that

---

1 According to World Bank data.
occurred in the Netherlands in the 1970’s when new findings of natural gas expanded the sector, and as a result the sector of tradable goods reduced significantly. Consequently, the idea of the phenomenon Dutch Disease is, as Graham (1995:1768) states, “simply a description of the causes and structural effects of boom-induced growth”. He presents the idea that the Dutch Disease essentially lead to a deindustrialization of the economy, as the mineral resource sector booms and others such as agriculture or manufacturing decrease notably.

The BNA has been focusing monetary policies on stabilizing the nominal exchange rate by intervening increasingly on the foreign exchange market (World Bank, 2014). As the oil sector recovered from the implications of the global financial crisis, the foreign currency inflows increased in 2010 and 2011. This pressured the exchange rate, to which BNA responded by increasing open-market sales of the kwanza. However, the interference with the nominal exchange rate has caused an appreciation of the real effective exchange rate, which has had negative effects on the price-competitiveness of the non-oil sectors of the economy.

As seen above, the complexity of this case is emphasized in the question of Dutch Disease and policy response. Additionally, van Wijnberger (1984) concludes that there is no straight answer to the question whether accumulation of foreign assets can break the link between total expenditure and temporarily high oil revenues. He argues that due to the accumulated foreign assets, it may not be necessary to switch to production of non-oil traded goods after the oil periods since the foreign assets would allow for continued concentration of resources to the non-tradables sector. A path like this would perhaps not be beneficial to an oil economy like Angola as the natural resources are finite and to continue to focus only on the production in the oil sector while leaving the other sectors behind would not bode well for future generations, since a continued focus on the oil sector exclusively would not prepare the economy for the time when the endowments run dry, as well as making the economy stable and less vulnerable to external shocks.
3. Case Description

3.1 The Political Economy of Angola

The fact that revenue from non-renewable resources made up a major income for the government as Angola was transitioning from a colonial economy to an independent liberalized one, makes it rather plausible that the political economy of Angola revolves around the oil production. Kyle (2002:4)\(^2\) identifies three “axes of polarization” that follow this conclusion; “Urban/Industrial vs. Rural/Agricultural”, “Port vs. Interior”, and “MPLA vs. UNITA”. These three dimensions are connected as they all can be interpreted as shapes of the large duality of the agricultural sector and the oil sector. The dualities urban/industrial, port, and MPLA can all be connected to the oil sector as they are found in the large cities in the coastal area, where the governmental powers are located. Rural/agricultural, interior, and UNITA can on the other hand be connected to the agricultural sector as it is found in the Midlands of Angola, where the opposition is regionally based.

The polarizing division are used as a tool to conceptualize the Angolan economy as a complex adaptive system. As they are all expressions of different relationships in the economy, they contribute to understanding the system as a whole. A change in conditions in one of the polarizations may have an effect on one in another axis. This could happen for instance through predictions of increasing oil prices reaching Angola, and causing the government to invest more in infrastructure as they expect more income from oil extraction in the future, which would facilitate communication between the industrial and agricultural parts of the economy. This could be seen as an illustration of the argument of Cilliers (1996:93) – that the system self-organizes when information flows into the system and causes a change in the interactions in the system.

The first division, concerning urban and rural areas, emphasizes the duality of the Angolan economy of the industrial hearts located in the bigger cities, particularly Luanda, and the central plateau with the most productive agricultural areas. The relationship between the two is based on the industrial sector buying food and inputs from the agricultural producers, and in turn selling consumption goods to the rural population. The central plateau was the location for much of the agricultural production that had a comparative advantage, and in order to

\(^2\) Kyle also includes the division of ethnic groups; Mbunbu vs. Ovimbundu, which is excluded from this discussion as it is closely connected to the other divisions.
extract those advantages again, investment in the area is needed, Kyle (2002) argues. As the relationship between the two sectors is bidirectional, the investment needed in agriculture would benefit both.

The division of the ports versus hinterland brings up the power of controlling access to a country’s ports in comparison to the interior land which is isolated from the outside world. As control of the ports of a country historically has given the control over contact with foreign markets it is related to the advantage of charging taxes and adding mark-ups on goods flowing through the ports, generating revenue for the government. The ports of Luanda and Benguela are major gateways for the Angolan economy, and as the communications to the rural inland areas from there is underdeveloped, the coastal cities have an advantage in access to the outside world. In this sense, the division of ports and interior coincide with the urban vs. rural opposition to some extent (Kyle, 2002). It is also important to consider the proximity to the offshore oil production that the port areas keep. The weak infrastructure connecting the urban and rural areas has caused the areas to disconnect, leaving the rural population cut off from the urban areas and vice versa.

The political duality of MPLA versus UNITA is rather coloured by foreign influence. While MPLA was supported by the USSR and its allies, UNITA was connected to the US, South Africa and their allies (Kyle, 2002). The conflict in Angola became a stage for the cold war, leaving this axis in a way constructed rather than being indigenous to the Angolan political economy (Le Billon, 2001). The polarization of the two parties is more a product of opportunity than anything else, aiming at attaining rents from resources rather than basing it on ideology, considering that MPLA is no longer a Marxist party but rather conducts politics aiming at control of oil rents, while UNITA shifted allegiances from China to the US and South Africa in order to oppose MPLA in the 1970’s (Kyle, 2007). As a result of the parties focus on income from diamonds and oil, they have strong regional connections. MPLA keeps steady support in the coastal areas while UNITA is based in the midland (Le Billon 2001). The strong regional relations that the parties have is a big obstacle for a possible transition into becoming a stable democracy, as the victory of one side over the other at a national level could be seen as a take-over rather than electoral loss. This would be an argument for a federal system as a solution. However the important oil rents would not be easily divided regionally, speaking against it.
Considering a resource curse and Dutch Disease under complexity highlights the interactions and agents that caused it to occur and that are influenced by its presence. The relationship between the oil sector and the agricultural sector is central as well as the rural and urban populations, which are seen in the axes of polarization of the political economy of Angola. The political economy approach is applicable to a complexity perspective as it also puts emphasis on the implications from interactions in an economy. North (1997:224) views the use of political economy as crucial to progress in the understanding of economic growth. He argues that institutions provide the structure for interactions in an economy and proposes that the institutional structure of an economy provides the incentives that decide what skills and knowledge are perceived to produce the highest payoff for agents (North, 1997:226). For an economy with resource dependence, this could imply a need of changed institutions in order to break free from the resource curse.

Drawing from the analysis of Kyle (2002), the major agents in the political economy of Angola can be identified as the government, the oil sector, and the majority of the population. They all keep different levels of power, where the government is at the top with a small and very wealthy elite keeping most of the power over the country’s large resources, most of which are produced in the oil sector.

Considering that the government, through the state owned oil company Sonangol, is the general agent of the oil sector, the relationship between the two is not that straight forward and the line separating the two agents is not particularly clear. What is clear however is that the majority of the population, has the least power and wealth, and is employed within the agricultural sector. As oil findings were discovered in the middle of the 1970’s, during the same time as the Portuguese departed from governing the country, the investments and production declined notably in the agricultural sector and continued to do so until it was virtually demolished during the civil war. This meant that most of the Angolan population lost their income and livelihood and the economy has since become extremely concentrated on the oil sector. This has left the agricultural sector lagging behind the oil sector and the oil production has, through booms, been able to keep the economy at a steady growth rate for the last decades.
4. Methodology

The method of this study was chosen inductively based on the characteristics of Angola as a subject to study. The main determinant for the theoretical approach was the data availability of Angola and the nature of the history and economic developments motivated the choice of complexity theory as Angola has had many different agents interacting and causing the developments to take different turns over the last decades. In combination with the natural resources of the country and the history of colonization and use of these resources, it is quite fitting to view the Angolan economy as a complex adaptive system when analyzing the occurrences of the past and the structures in the economy.

As this study is of a qualitative nature, a literature review is utilized to gain understanding of the case and in order to facilitate the understanding of the economy as a CAS and to bring focus to the agents in the system with most power and wealth, a political economy approach to Angola is used.

Agent-based computational economics is included in the study in order to make the complexity theory more graspable and applicable to the economic issues at hand. However, the full use of ACE modelling is not fulfilled in this thesis on behalf of a more theoretical discussion as this was were the study set off from. A computational simulation would surely make a big contribution to this thesis, however it would require a lot of technical and computational knowledge of the modeller in order to bring useful results, which is something lacking the writer in question. Instead, the modelling of a CAS and ACE methodology, further explained below, are used in this case to identify two stylized facts and to analyze their significance to the developments of the case.

4.1 Modelling Complex Adaptive Systems

Moore (2006) argues in favour of a paradigm shift in macroeconomic modelling, where the analysis moves away form linearity, general equilibrium, and exogenous shocks. Instead the perspective of economies as complex adaptive systems ought to be implemented. As complex adaptive systems are made up of emergent properties and heterogeneous agents with complex relational structures, the conventional approaches of modelling – verbally or mathematically – are not best suited. Holland (2006) points to certain characteristics of complex adaptive systems, such as adaptation and evolution of agents, heterogeneity, and parallel interactions.
which makes modelling difficult. These features of CAS make for instance differential calculus and regressions only occasionally relevant, according to Holland (2006).

The time dimensional aspect of the change in the economy is the focal point of modelling as the explanation of specific variables over time is what economists, according to Moore (2006:123), are limited to. The complexity of a whole economy is too large to grasp, so the modelling of complex adaptive systems turn to analysis of complex subdivisions of the economy, with certain variables specified. This leads to the conclusion, Moore (2006:26) argues, that the implied choice for modelling complex systems is computer simulation. However, he also points out that successful simulations cannot be expected until economists are more familiar with the nature of complexity. The use of computer simulations is supported by Holland (2006) as well, as he argues that an exploratory model in a computer is much like a traditional thought experiment of physics which can be conducted without mental bias.

Nevertheless, the issue of simplification emerges since Moore argues that truly complex systems cannot be completely captured by a simple model, and any of the technological tools at hand today are not capable of accurately simulating the behaviour of complex systems (Moore, 2006:26). According to North (2014), this and other issues of modelling CAS can be overcome by using agent-based modelling with an individual-level focus. As complex adaptive systems contain a variety of heterogeneous agents with different behaviours and attributes the diversity of the dynamic behaviour of the whole system cannot be studied if not the different decision-makers in it are considered.

One example of how adaptive behaviour and a dynamic market could be modelled is brought in by Kirman and Vriend (2001) who study the fish market of Marseille with an ACE approach. They identify and analyse the impact of stylized fact of the market in order to investigate price dispersion and loyalty among buyers. Based on the stylized facts, they construct an ACE model to explain them and to gain understanding about the questions at hand. Returning to the question about simplification, Kirman and Vriend (2001) argue that they do not attempt to build an ACE model that will explain the entire fish market as it would not stand the test of data. Instead they focus on the specific question as ACE modelling is an abstraction of a phenomenon rather than a replication of reality. The approach of Kirman and Vriend (2001) will be used for this thesis, where stylized facts of the Angolan case will be
brought forward to gain understanding about the development and current state of the economy as a complex adaptive system.

4.2 Agent-based Computational Economics

Moore is not alone in his view of macroeconomics and the need to evolve the way it is studied. Delli Gatti et al. (2010) also argue in favour of a paradigm shift in macroeconomics, where the reductionist view of mainstream economics with representative agents and microfoundations are not adequate tools to study the structures and aggregate outcomes of macroeconomics. In applying complexity theory to economics, the use of agent-based computational economics shows itself rewarding. Tesfatsion (2006:835) describes ACE as a way of modelling the interactions of different agents in a dynamic economic system, where agents can either be active decision-makers such as individuals and social groupings, or passive institutions, or features of the world like biological and physical entities, such as weather, crops, and infrastructure.

Tesfatsion (2006:836-7) makes the distinction between a complex system and a complex adaptive system, where the former is proven harder to define than the latter which is defined as a system containing interacting agents and emergent properties. A complex adaptive system is defined in three ways; (1) as a system that contains agents who react to changed environmental conditions, or (2) as a system with goal-directed agents who apart from being reactive also steer their reactions towards a goal, and finally (3) as a system including agents that try to plan ahead in order to make it easier to achieve their goals. Modelling in ACE uses definitions 2 or 3 mostly and to some part definition 1.

It is important to remember that agent-based computational economics has not yet reached a major breakthrough in economics and therefore these issues of validation are quite natural. As Leijonhufvud (2006:1627-8) states, agent-based economics has not grown enough to attain technical validity in terms of mainstream techniques. He argues that although ACE models claim to handle heterogeneous agents in various forms, they are simpler than they would appear. The methods of the complex dynamic behaviour of these systems, Leijonhufvud fears, run the risk of spiralling into computer games as it is difficult to implement analytical disciplines and empirical constraints on them.
Vriend (2006:1050) has a different take on the matter as he argues that the actual running of an ACE model is simply a matter of analyzing the model at hand. The test is to construct a model, outside of computer simulations, experiments etc., that can be utilized to study macroeconomic phenomena and interaction of agents. Vriend (2006:1070) finds a prototype for modelling endogenous interactions by categorizing past studies using different approaches to modelling ACE interactions. He finds that the interactions need to be moving in some direction induced by a specific variable, which itself also changes as a result of the interaction, and that the agents’ view of the variable’s relevance changes as they gain new knowledge with each interaction.

5. Results & Analysis
When reviewing the history, developments, and political economy of Angola it is possible to identify many characteristics that can be used to explain the manner of which the system has developed. However, in this thesis, two stylized facts have been identified as important. They are presented in the shape of the core model of Max Corden (1984) and the so called institutional hypothesis brought in by Acemoglu et al (2001) in the following section. These stylized facts were chosen as they are helpful in understanding the present state and the developments of the Angolan economy and their implications will be analyzed in section 5.2.

5.1 The implications of the Stylized Facts
The stylized facts above were chosen as they are important in understanding the way in which the Angolan economy has developed during the last decades and to offer some insight into its composition. By reviewing the political economy of the case some major agents and relationships were identified, which could be useful to consider in combination with the stylized facts in order to gain understanding about Angola from the perspective of complexity as well.

Considering that 95 % of Angola’s export revenues and 80 % of the government revenues (OECD, 2014) come from oil, the dependence on the oil sector is extremely large in Angola. This has had implications on many aspects of the economy, being expected when viewing an economy as a complex adaptive system. The resource dependence has caused distortions connected to the Dutch Disease, which has caused the competitiveness of the once large agricultural sector to decrease significantly. The structure of the system has changed, from
being an agricultural economy with exported surplus to a resource dependent economy with persistent poverty levels, extreme urbanization, and widespread corruption. From the industrial point of view, under the assumptions of the core model, the main consequence of the strong reliance towards the oil sector is the decline and persisting lag of the agricultural sector. This has in turn led to an increasing demand of imported goods which further weakens the domestic industries and has caused large income inequality levels and widespread poverty among the majority of the population employed within agriculture (OECD, 2014).

Although the GDP growth rates of Angola has been excelling over the last decade, with levels far above the average levels of Africa (OECD, 2014), it is accredited to high price levels and booms within the oil sector. However, as the financial crisis struck and oil prices have decreased, the Angolan growth rate has dropped as well. This brings to light the vulnerability of the economy to the international oil market. In order to attain long-term stability, the Angolan government must implement reforms to increase the diversity of the economy and especially increase investment and development in agriculture.

One large challenge for the government is the inefficient financial system that is making investments in anything other than large companies in the oil sector impossible. The access to credit for medium and small companies is very limited due to the inability of borrowers to convey information about their creditworthiness to lenders, according to the Angola Economic Update (World Bank, 2014). The government has began to reform the property-registration and public record-keeping but they are still not up to demand, which has led to an imbalance in the credit market where foreign-owned, large enterprises in the oil sector attain most of the credit given in the economy. This causes small and medium firms to lag behind and ultimately hampering the development and long-term growth of the economy (World Bank, 2014). This is an illustration of one issue in the Angolan economy where the state of the institutions have caused inefficiencies and holding back development, as the institutions hypothesis concludes.

When viewing the Angolan economy as a complex adaptive system where a change in the environment, characteristics of an agent, or resources available to the system could alter it completely, two changes in circumstances stand out. The manner of which the Portuguese colonizers ruled and more particularly how abruptly they left Angola caused consequences in the system lingering on still. The second change which significantly changed the whole
system was the large oil finding in the 1970’s which sparked a range of changes in the composition of the economy as well through for instance the behaviour of the government and the civil war.

From the beginning of independence, Angola faced huge challenges, and as instability rose with the state of war, those challenges increased and the bright prospects was diminished. As the period of war left the rural areas basically destroyed, thereby demolishing the agricultural sector and causing the rural population to mass migrated to urban areas, the consequences of the civil war were far from just political. It had a great impact on the economy as well, where Angola still relies almost solely on incomes from the oil sector, which only employs about 1% of the population, while the agricultural sector employs about 70% of workers and only answers for about 10% of GDP (OECD, 2014).

It is possible to imaging that if these events would have occurred differently perhaps the present state of Angola would have been different. If the Portuguese colonizers would have co-operated more with the Angolan population, and perhaps would then have prepared them more for future independence, the instability and period of war could possibly have been averted, and instead paved way for development of diversity in the Angolan economy, preventing the present levels of poverty at about 36% (OECD, 2014). However, as the institutions hypothesis states, the extractive government in Angola is a result of the colonized past and therefore this more positive alternative past might not even be possible. To blame the developments on the oil findings and the extreme economic dependence on them is alluring but perhaps not helpful in understanding the case of Angola as the oil sector has carried the economy for the last decades, and has thereby not only caused trouble. However, the revenues of the oil sector could have been managed more efficiently had there been more stable institutions implemented, which could have been used to diversify the economy and provide the population with more tools to prosper.

Conclusively, the stylized facts and their implications are quite illustrative of the main agents and relationships in the Angolan economy. They provide a way of conceptually analyze the case at hand by focusing on the very important oil sector and more specifically the distortions the deep resource dependence has brought on, and the institutional weakness which has allowed those with access to take advantage of the system, causing corruption and rent-seeking behaviour to spread. As most of the economic activity in Angola now is located
around the urban and industrial areas, the rural population is isolated and virtually without means to catch up, especially considering the state of the infrastructure. Below follows an agent-based discussion which takes on to reflect on the behaviour, means, and relationships of the agents in the government, agricultural sector, and the oil sector.

5.2 Agent-based Discussion
After the stylized facts and their implications on the case have been identified, the next step would be to construct an ACE model in order to further analyze the theoretical conclusions drawn. This thesis will not construct an ACE model, but will proceed with a qualitative, agent-based discussion.

In this discussion, three agents are specified; the government, the oil sector, and the agricultural sector. They are chosen based on the conclusions of the stylized facts which focus on institutional development, and the duality of the booming and lagging sectors of the core model.

Each agent has certain characteristics and decisions to make; the government keeps the political power and can for instance implement policies that will affect the different sectors abilities to produce output, trade, and e.g. make a profit. In addition to this, the government attains income from the different sector in the shape of taxes and tariffs. The decisions made by the government are influenced by the different sectors as well as there perhaps could be a difference in expected returns on investing in each sector respectively, as well as a possible influence from corruption through bribes of government officials, and there are social benefits of investments to consider in addition.

The main characteristics of the two sectors are that they produce goods for domestic use and for export, where the oil sector mainly exports and the agricultural production only reaches a level of self-sufficiency. Apart from their different level of contribution to the economy in goods, they also employ workers. The oil sector mainly employs foreign workers and therefore do not contribute significantly to the domestic labour market, whereas the agricultural sector employs a majority of the population.
The decisions made in the economy would be affected both by the payoffs and choices of each agent respectively but also by the levels of wealth and power of the other agents as that would give them leverage and more influence. In the Angolan economy, the oil sector could be seen as the strongest agent as the incomes from oil production take up a dominant part of the economy, which would make it difficult for the government to implement non-beneficial policies for the oil sector and thereby jeopardize future income. However, as the state-owned oil company Sonangol still keeps a lot of partaking and ownership in the sector, the government holds a lot of influence there as well (OECD, 2014). Therefore it could be possible to say that the government would probably be highest in a power ranking of the agents in the economy.

There is little to argue with the ranking of the agricultural sector as last in terms of both power and wealth in the Angolan economy. Nevertheless, the possibilities for growth and developments are probably the highest there, considering the amount of arable land not used and the former levels of output from the agricultural sector. One significant factor to motivate investments in the agricultural sector is the poverty alleviation it would likely bring if the incomes increased in the sector as it employs about 70% of the populations (OECD, 2014). The increased domestic production would also benefit the economy as a whole as it would decrease the large demand for imported goods, and possibly increase exports with time. In order for these developments to take place, the protection of property rights need to be strengthened and developed in Angola, in accordance with the institutions hypothesis, as well as the gathering of information in order to increase the access to credit for small and medium firms outside of the oil sector (World Bank, 2014), where the need for investment is large.
6. Conclusions

The aim of this thesis has been to analyze the current state and development of the Angolan economy based on the framework of complexity theory and with a political economy approach. This has led to the identification of two stylized facts in the case of Angola, which have both had some impact on Angola as a complex adaptive system, and an agent-based discussion concerning the main agent groupings in the system.

The question set out to be answered in this thesis was: What circumstances, adaptive behaviours, and agents can be identified to have shaped the Angolan economy into its current state?

The two stylized facts this thesis identifies were the core model (Corden, 1984) and the institutions hypothesis (Acemoglu et al, 2001) which draw attention to two major issues hampering the development of Angola; the fact that the oil sector has constructed the complete foundation of the Angolan economy for decades while the returns from it hardly reaches any of the population, and the extensive weakness of the institutions and rule of law.

The core model, presented by Max Corden (1984), presents an economy with three sectors; one booming, one lagging, and one with non-tradable goods, where the first two are of most importance to this case as they are translated to the booming oil sector and the lagging agricultural sector. The model concludes that in the case of an oil economy the main consequence is an exchange rate appreciation, which diminishes the opportunities for domestic industries and thereby causes the lagging sector to further fall behind. In the case of Angola this has led to the former large exporting agricultural sector to diminish to about 11% of GDP and leaving the majority of the population unemployed or living in poverty. Meanwhile the large revenues from the oil sector, answering for almost half of Angola’s GDP are attained by a small elite class, causing income inequality to persist at a high level.

Part of the explanation for this power and wealth inequality in Angola is brought in by the institutions hypothesis, where the manner of which the Portuguese colonization was conducted and ended has led to the extractive institutions as place. Acemoglu et al (2001) argue that the existence of extractive institutions hampers development and investments in the economy as the lack of protection for property rights makes investments non-profitable for
investors as they will not receive returns on their projects. Therefore some of the issues in the Angolan economy can be accredited to the corruption within government, lack of protection of property rights, and virtually non-existing financial system.

As the methodology of this thesis is qualitative and theoretical, a future development could be to expand on the computational parts of this question and for an ACE model to further study the impact of these circumstances and investigate possible ways towards development for the future as this did not fit into the frame of this thesis.

In conclusion, the need for a reliable infrastructure to tie the urban and rural populations together and unify the economy is a common need, but besides that there is also the need for increased income and agricultural production in the hinterland versus the need for increased human capital in the governmental institutions and increased ease of doing business for the companies in the coastal areas. These needs for investment represent an overall need of availability in Angola, within the economy as well as between the economy and the outside world.
References


