Resources and Conflict in Angola

An economic conflict analysis

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Summary

Three attempts to cooperate between the fighting groups in Angola have proven unsuccessful, resulting in continuing conflict. This indicates that the parties to the conflict find it difficult to agree on a peaceful solution that satisfies both, and it seems that the prisoner’s dilemma is a recurrent problem. The three broken peace agreements and the long-lasting conflict in Angola lead me to the first statement: Natural resources such as oil and diamonds have been of major importance in sustaining the conflict in Angola since the end of the Cold War. Income from oil has been highly significant for the government army in financing warfare. International oil companies show a growing interest in Angola’s oil, and their technology makes extraction of oil possible. According to the model I will present, low transparency and lack of reporting of the oil revenues could have an influence on the extent of the fighting when it was ongoing, as well as on risk for further conflict. The size of the oil and diamond reserves is decisive for the scope of the fighting. The two groups, FAA and UNITA, decide their fighting effort from their expectations of the size of the rent. If the oil companies started to publish their earnings from oil, it could be revealed that the rent is higher or lower than the fighting groups expect. A higher rent than expected will increase the fighting, whereas a lower will reduce its extent. The second hypothesis is motivated by recommendations by the IMF and others to increase the level of transparency to solve Angola’s major problems of poverty and four decades of conflict.

In my thesis, I investigate the following two hypotheses:

\( H_1 \): The presence of oil and diamonds makes it difficult for the two fighting groups, FAA and UNITA, to cooperate.

\( H_2 \): Increased transparency in oil revenue from reporting by oil companies of payments to the Angolan government will reduce the potential for further conflict.

An approach by Mehlum & Moene (2002) is adapted to test if the two hypotheses hold. The conflict is modelled as a contest between the government and the rebel group over the resource rent. This game-theoretic model has been chosen because it appears to be
applicable for conflict analysis. The approach has not been used for specific country
analysis, and particularly not for the war in Angola. In both duopoly and civil war, there is
competition between two parties to get the highest expected payoffs. In Angola, the conflict
has been ongoing for four decades since both FAA and UNITA want to control the whole
resource rent by governing the country.

According to the model, the parties will end up in Nash-equilibrium in war if they follow
their dominant strategies. Two broken peace agreements between the Angolan government
and UNITA indicate that the parties find it difficult to cooperate, and this supports \( H_1 \). The
war ended without reaching a new peace agreement. It was a ceasefire agreement followed
by dismantling of former UNITA forces that ended the war. This could be a sign of
dissatisfaction within UNITA; maybe they were too weak to continue fighting. If the war
ended without a peace agreement that satisfies both, it is likely not a lasting peaceful
solution. A sharing of the rent that satisfies both is required to establish a long-lasting peace.
That has not happened so far, so \( H_1 \) is not rejected.

A third party, namely the oil companies, could possibly assist the country achieve lasting
peace. They can influence the conflict through reporting their income from oil and the size
of their investments in the oil sector. The oil companies’ activities may resolve the
prisoner’s dilemma. Increased transparency in oil revenue can either increase or decrease the
risk for further fighting, depending on whether the numbers reveal higher or lower oil
reserves than the belligerents expected. On the one hand, reducing the risk for further
conflict seems unlikely if the reporting of oil revenue reveals that the rent is higher than
FAA and UNITA expect. A high rent without a peace agreement that satisfies both can
increase the risk for further conflict. On this basis, the test of my second hypothesis \( H_2 \) is
uncertain.

In the case that increased transparency reveals that rent is higher than expected, the
hypothesis is rejected, since a higher rent will increase the extent of the fighting, according
to the model. One may argue that since the payments from the oil companies to the
government are kept secret, the rent is likely to be higher than the parties expect. This result
is opposed to the recommendation of increased transparency in public finances by the IMF.
Reasoning outside the model and from the viewpoint of the civilian population instead of the warlords, the results of increased transparency can differ. Angolans’ expectations of the oil reserves could be wrong. It is reasonable to assume that they have underestimated the oil reserves. Increased reporting of oil payments can change their expectations about the rent. If the reporting reveals a higher rent, the population could demand a higher share of the oil income. Then FAA and UNITA would have less to fight over. The risk for further conflict will be reduced, and poverty in the country could decrease if the people get their part of the oil income. Increased transparency could help sustain peace and establish the foundation for an equal distribution of income.

It is, however, possible to argue that the oil companies and warlords could have benefited from war, since the extraction rate is likely to be higher than optimal and since transparency is low. For some groups, low-intensity war may be preferred to peace, since it is possible in wartime to capture more of the rent from oil and diamonds. The minority that can benefit from war is powerful, and of course the consequence is that the majority suffers a huge loss from war. If the warlords get higher expected profit from war than in peace, they can have a preference for conflict. One may say that in such a case the prisoner’s dilemma exists for the majority only, but not for the groups that gain from war.
Preface

Writing my thesis is something I have been looking forward to since I started my studies. After a number of conversations about my topic with different people, the idea for this topic developed during a discussion with Kristine Blokhus at ECON. Since my topic seemed a little unusual for an economist, I had to ask Kalle Moene if my project was feasible. He soon showed interest in my topic and granted me a scholarship. This thesis is written for Halvor Mehlum and Kalle Moene on a scholarship from the Frisch Centre. I have also been fortunate to write my thesis in a motivating and helpful environment at PRIO (International Peace Research Institute, Oslo) on a scholarship. I want to thank my supervisors, Kalle Moene at the University of Oslo and Nils Petter Gleditsch at PRIO. Thanks to Ingeborg Flagstad and Mai Oldgard for reading through my paper. I am especially grateful for all the support and advice I have received from Petter Vegard Hansen. Finally, thanks to my friends and family for having supported me through this period. This has been a great learning experience and an inspiring process.
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1. Introduction

After nearly four decades of war in Angola, a ceasefire agreement was reached last year. The two parties to the conflict – the Angolan government and the UNITA rebels – signed the agreement on 4 April 2002, and peace was formally declared on 2 August 2002. Two months before the ceasefire agreement, the leader of UNITA, Jonas Savimbi, was killed. Shortly afterwards, in August, the military wing of UNITA was dismantled and its 85,000 soldiers came under the command of the government army. These events provide major potential for a peace agreement and eventually a long-lasting peace.

Angola has endured war for 40 years, including a civil war since the early 1990s between the government army, FAA, and the rebel group, UNITA. FAA and UNITA finance their warfare against each other with income from oil and diamonds, respectively. Angola’s problems include corruption and poor management of government revenue. No one knows for certain the size of the revenue from oil, and the Angolan people do not receive their share of the income. Angola is a resource-rich country and could potentially have been a welfare society, but with 70% living in poverty, it is not. Oil income is used for warfare and not for development. The oil industry is the largest sector in Angola and accounts for 80% of the government’s income. According to the IMF, transparency and openness in revenues from oil production are the keys to development. Increased transparency regarding the government’s income from oil could reduce poverty in Angola. If all oil companies operating in Angola reported their income from oil and payments to the Angolan government, would that reduce the risk for conflict and poverty in the country?

Three attempts to cooperate between the fighting groups have proven unsuccessful, resulting in continuing conflict in Angola. This indicates that the parties to the conflict find it difficult to agree on a peaceful solution that satisfies both, and it seems that the prisoner’s dilemma is a recurrent problem. The three broken peace agreements and the long-lasting conflict in Angola lead me to the first statement: Natural resources such as oil and diamonds have been of major importance in sustaining the conflict in Angola since the end of the Cold War. Income from oil has been highly significant for the government army in financing warfare. International oil companies show a growing interest in Angola’s oil, and their technology
makes extraction of oil possible. According to the model I will present, low transparency and lack of reporting of oil revenues could have an influence on the extent of the fighting when it was ongoing, as well as the risk for further conflict. The size of the oil and diamond reserves is decisive for the scope of the fighting. The two groups, FAA and UNITA, decide their fighting effort from their expectations of the size of the rent. If the oil companies started to publish their earnings from oil, it could be revealed that the rent is higher or lower than the fighting groups expect. A higher rent than expected will increase the fighting, whereas a lower will reduce its extent. The second hypothesis is motivated by recommendations by the IMF and others to increase the level of transparency to solve Angola’s major problems of poverty and four decades of conflict.

In my thesis, I investigate the following two hypotheses:

$H_1$: The presence of oil and diamonds makes it difficult for the two fighting groups FAA and UNITA to cooperate.

$H_2$: Increased transparency in oil revenue from reporting by oil companies of payments to the Angolan government will reduce the potential for further conflict.

I will discuss to what extent increased transparency in the government’s income from oil, through increased reporting from the oil companies, could reduce the risk for further conflict. I relate the statement to the possibility for the parties themselves to reach a peace agreement. During the conflict in Angola, three peace agreements have been broken, indicating that the parties find it hard to cooperate and get out of the prisoner’s dilemma situation through war. I also discuss whether the size of the oil companies’ investments in Angola has greater influence on the conflict than lack of transparency.

An approach by Mehlum & Moene (2002) is adapted to test whether the two hypotheses hold. The conflict is modelled as a contest between the government and the rebel group over the resource rent. This game-theoretic model has been chosen, because it appears to be applicable for conflict analysis. The approach has not been used for specific-country analysis, and particularly not for the war in Angola. In both duopoly and civil war, there is competition between two parties to get the highest expected payoffs. In Angola, the conflict
has been ongoing for four decades since both FAA and UNITA want to control the whole resource rent by governing the country.

In Chapter 2, I briefly review the four decades of war with a special focus on the oil and diamond income and their importance for sustaining the war. In Chapter 3, a game-theoretic model developed by Mehlum & Moene is discussed. The conflict is modelled as a contest between FAA and UNITA competing for oil and diamond rent. I model the conflict as if the fighting groups are motivated by economic opportunities. In this chapter, I focus on the role of resource abundance and economic opportunity in conflict, and discuss the possibility for the two groups to end the conflict themselves. The first hypothesis will be considered in Chapter 3. The model includes only the groups that are fighting against each other. The oil companies do not directly take part in the conflict, but they can influence its scope. Their role will be investigated in Chapter 4. I will discuss the effectiveness of one possible policy instrument: increased transparency of resource payments to the Angolan government. In particular, I will look at how the size of their investment and reporting of oil income can have affected the conflict when it was ongoing. I also discuss to what extent the oil companies reporting of oil payments and size of investment can sustain peace. The second hypothesis is discussed, and finally the model is criticized in Chapter 4. Chapter 5 presents my conclusions.
2. Background

Angola is rich in resources, both renewable and non-renewable resources. The focus of this thesis will be on two non-renewable resources, oil and diamonds. Angola could potentially have been a rich country, but a large part of the population lives in poverty. This chapter discusses resource abundance and poverty, as well as the possible relationship between them. The four decades of conflict and the three broken peace agreements are reviewed. I discuss whether it is a civil war or an internationalized civil war. The history of the conflict is examined to see if there is potential for a future peace agreement to last.

2.1 Four decades of conflict

The conflict in Angola can be divided into three phases. It started in 1961 as an independence war against the colonial power, Portugal. The first independence war lasted until 1975, when a peace agreement was reached between Portugal and Angola. In 1975, the three liberation movements, FNLA, MPLA and UNITA, representing different ethnic-linguistic groups, failed to agree on a coalition government, and war broke out.

The second phase of the war, 1976-90, has been called ‘The Second War of Liberation’ (Tvedten, 1997). In this phase, external actors played a central role in the conflict. The United States and South Africa gave support to UNITA, while the Soviet Union and Cuba supported MPLA. In so doing, they fuelled a larger conflict. One reason why the Cold War rivals involved themselves in Angola could be the country’s resource wealth.

The third phase of the conflict started in 1990 as a civil war between the Angolan government and UNITA. External partners started to withdraw in 1988 with the New York Accords. When the Cold War ended in 1989 and the external partners had disengaged, the conflict changed character to a civil war.

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¹ Perman et al. (1999: 184) define a non-renewable resource as ‘existing in the form of fixed stocks of reserves which, once extracted, cannot be renewed’.
The government and the rebels signed a second peace agreement, the Bicesse Accords, in 1991. UNITA broke the peace agreement after losing the democratic elections in 1992 (Hodges, 2001). The next war periods were 1992-94 and 1998-2002. From 1992 to 1994, there was a potential for ethnic fractionalization. This potential was accentuated by two cases regarding localization of oil and diamonds and unequal distribution of them: 1. ‘The war in oil-rich Cabinda and popular disaffection in the diamond-producing provinces of Lunda Norte and Lunda Sul’. 2. ‘the case of Cabinda an overt movement for separation from the Angolan state and nation’ (Hodges, 2001: 28). In November 1992, the inhabitants of Luanda united against their common enemy, the Ovimbundu. In 1994, the government and UNITA signed a new peace agreement, the Lusaka Protocol. It broke down in 1998, due to internal political factors. The peace agreements were difficult to keep because the government and UNITA did not trust each other. Both were afraid that the opposite party would break the agreement. This credibility problem will be discussed in Section 3.2.2.

I treat the governing nationalist movement (MPLA), the Angolan Armed Forces (FAA) and the Angolan government as one actor. The People’s Movement for the Liberation of Angola (MPLA) was established in 1956 and is supported mainly by the Mbundu, the second largest ethnic group. The second actor is the National Union for Total Independence of Angola (UNITA), also called the rebel group. This group was founded in 1966 and was supported by the largest ethnic group in Angola, the Ovimbundu. In the second phase of the conflict, foreign countries supported the two nationalist movements, MPLA and UNITA. In 1992, MPLA established a new fighting force, the FAA, but the third phase remains a conflict between the same two actors.

The third phase of the conflict has been called a civil war, a conflict between internal partners, for example the government and a rebel movement. I investigate whether the conflict really can be classified as a civil war in the 1990s with such heavy external engagement by, for example, international oil companies. In the next section, I investigate whether it is a civil war or an internationalized civil war in Angola.

2.1.1 Civil war or internationalized internal conflict?
What type of war is the conflict in Angola? Elbadawi & Sambanis (2000: 5) define a civil war as follows:
‘A civil war is an armed conflict that has 1) caused more than thousand deaths; 2) challenged the sovereignty of an internationally recognized state; 3) occurred within the recognized boundaries of that state; 4) involved the state as one of the principal combatants; 5) included rebels with the ability to mount an organized opposition; and 6) involved parties concerned with the prospect of living in the same political unit after the end of the war.’

One thousand battle-deaths per year is a rather high threshold, and periods with a lower number of deaths will not be classified as a civil war. The intensity in a conflict can vary if it is long-lasting, such as the one in Angola. According to this definition, the armed conflict in Angola did not start until 1975.

The PRIO-Uppsala dataset on armed conflict for the period 1946-2001 is based on a definition of armed conflict with a lower threshold. In this dataset, an armed conflict is: ‘a contested incompatibility that concerns government or territory or both where the use of armed force between the two parties results in at least 25 battle-deaths per year’ (Gleditsch et al., 2002: 619). Following this definition, there was an extra-systemic (or colonial) armed conflict in Angola in the period 1960-65. In the periods 1975-89, 1990-94 and 1998-2001, there were more than 1,000 deaths per year, leading to a classification of civil war.

The type of the conflict has changed during its four decades. In 1960-74, it was an extra-state armed conflict between the colonial power, Portugal, and the three nationalist movements, MPLA, FNLA and UNITA, supported by Cuba, Zaire and South Africa. The conflict changed character to an internationalized internal armed conflict in the period 1975-89 and 2000-01, implying that it ‘occurs between the government of a state and internal opposition groups with intervention from other states’ (Gleditsch et al., 2002: 619). It has been classified as an internal armed conflict from 1990-94 and 1998-99, because the international support was weaker.

From 1990 until 2002, the Angolan conflict has been a civil war, according to Gleditsch et al. (2002). It is uncertain if the last period of the war has been internal and only between the two nationalist movements, FAA and UNITA. With the Cold War ending in 1989, the external states withdraw from Angola, and the conflict changed character from an
internationalized internal armed conflict to an internal armed conflict. Even though the Cold
War actors withdraw in the early 1990s, there could still be foreign countries with economic
interests in Angola. During the 1990s, there was a growing interest in Angola’s oil reserves
among international oil companies. These companies see prospects for major earnings,
because the country has many promising offshore oil fields. The oil companies are not
directly a part in the conflict fought by FAA and UNITA. Indirectly, however, the oil
companies are taking part in the war, since FAA finances its weapons purchases from oil
income. Without the oil companies’ presence in the country, the governmental army would
not be able to extract oil and earn revenue from it, because the state-owned oil company,
Sonangol, does not have sufficient technology to extract oil itself.

Actors in the diamond industry are also dependent upon external partners, for example the
Democratic Republic of the Congo (DRC), Zambia and Namibia (Power, 2001). A map of
UNITA’s partners is found in Appendix 3. UNITA’s collaborators make transport and sale
of diamonds possible. The civil war between FAA and UNITA is financed by income from
oil and diamonds, respectively. The two movements each have control of one resource, but
depend on international networks to convert oil and diamond reserves into income. External
actors can still play a role in the conflict in Angola. Frynas & Wood (2001) support the
uncertainty of whether it is civil war or an intrastate war in Angola. One may argue that the
last conflict period in Angola could be seen as an extension of the Cold War, since there are
still large international interests in the country’s resources. Instead of classifying the conflict
as a civil war, it could be defined as internationalized internal conflict. According to the
definition of internationalized internal conflict, it is a conflict between the Angolan
government and UNITA, with multinational oil companies and international companies
making the conflict possible. The role and influence that the oil companies have had on the
conflict will be discussed in Chapter 4.

In the next chapter, I discuss the oil and diamond industry in greater detail, since these two
non-renewable resources have such a large influence on the conflict. Oil and diamonds are
use by the Angolan government and UNITA, respectively, to finance their warfare, and
many foreign oil companies have large interests in Angola.
2.2 Resource abundance

Since Angola’s independence from Portugal in 1975, different external actors have been involved in the extraction of two non-renewable resources, oil and diamonds. Especially since the beginning of the 1990s, international oil companies have shown a growing interest in Angola’s oil. Oil companies such as BP, Exxon, Hydro, Statoil and Chevron are present in Angola today. Their activities have an influence on the conflict, since the government uses income from oil to finance its warfare against UNITA. The role of the oil companies in the conflict is discussed in Chapter 4. Diamonds, on the other hand, provide a funding source for UNITA. External actors with interests in diamonds will not be discussed here. In Sections 2.2.1 and 2.2.2, I will try to find estimates of Angola’s oil and diamond reserves.

2.2.1 The oil sector

Oil was first discovered onshore in the Kwanza Basin in 1955. Production started the same year, and in 1968 offshore production started just off the coast of Cabinda. In 1973, oil replaced coffee as Angola’s largest export income for the country. Today, Angola is the second-largest oil exporter in sub-Saharan Africa (IMF, 2000a). The state owns all the petroleum deposits, and Sonangol administrates the oil activities (Hodges, 2001: 125). In the early 1980s, exploration in shallow water started. During the 1980s, Chevron discovered oil outside Cabinda, and Texaco and Elf made discoveries in the mouth of the Congo River. These findings increased the interest of other international oil companies in Angola’s oil, and production increased. In the 1990s, new technology enabled exploration of the seabed down to 150-160 metres. This is part of the reason why oil production in Angola in 2000 was more than five times greater than in 1980, as we can see from Table 1.

Table 1: Oil production, 1980-2000 (in barrels per day)

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According to Hodges (2002), in 2001 oil accounted for 54% of GDP, 79% of government revenue and 89% of export income. In early 2002, the oil production was 900,000 barrels per day. It is expected to grow to 1.9 million barrels per day by 2007.

The ten oil companies most active in Angola today are Sonangol, TotalFinaElf, ExxonMobil, ChevronTexaco, Agip, BP-Amoco, Petrogal, Norsk Hydro, Statoil and Shell (Global Witness, 2002). The Angolan state-owned oil company, Sonangol, does not have sufficient technology to extract oil and is thus dependent on the international companies. The role of Sonangol is to make contracts with the international oil companies, usually production-sharing agreements (PSAs). In a PSA, the foreign oil company covers all the costs and Sonangol receives a share of the profit. The profit sharing is divided on the basis of cumulative production or the internal rate of return (Hodges, 2001: 128). The cumulative production results initially in a low share for Sonangol. As the production increases, its part of the profit grows. Today, 97% of the oil comes from offshore fields.

The foreign oil companies bid competitively for a share in the exploration. Such bids are called signature bonuses, and they provide an important source of income for the government. BP-Amoco, Elf and Exxon paid over $900 million² in signature bonuses for blocks 31-33 (Hodges, 2001: 127). The size of the revenue from oil, for the oil companies as well as for the government, is uncertain due to lack of transparency and reporting. There is a lack of data about oil transactions, oil-backed loans, fiscal revenue from oil and off-budget government expenditure. Such lack of transparency and accountability can result in misuse of Angola’s oil and diamond resources. Greater transparency regarding public finances is a way to improve the country’s socio-economic conditions and achieve development, according to Hodges (2001: 146). At the initiative of the IMF in 1999, a system was developed for reporting data on oil revenue, reserves and taxes, called the Staff Monitoring Program (SMP). More about SMP is found in Section 2.3.2.

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² All dollar figures are US.
Sonangol has distributed 34 blocks to the international oil companies. Appendix 4 provides information on the different blocks. Currently, only the Girrasol field is in production. Angola’s proven oil reserves totalled 12 billion barrels in 2000, compared to only 3.2 billion barrels in 1996. Still, there are several oil fields that have not yet been explored. The oil reserves are estimated to be 15-20 billion barrels by 2010 (Clarke, 2001). For comparison, Norway had proven oil reserves of nearly 11 billion barrels in 2000 (SSB, 2001).

The estimated oil reserves in Angola vary from 5.4 to 12 billion barrels in the same year, according to different sources. This discrepancy can be caused by lack of transparency and reporting, as well as by the use of different definitions of reserves. Whether the true oil reserves were 5.4 or 12 billion barrels in 2000 makes a huge potential difference in the influence of oil on the conflict. The groups will scale their fighting effort to their expectations of the likely gain from the oil and diamond industries. The higher the oil reserves, the greater the expectations of future earnings and consequently the fighting.

2.2.2 The diamond industry

Angola is the fourth largest diamond producer in the world. Diamonds are found in north-eastern Angola, in the areas Lunda Sul, Lunda Norte and Huambo. A map of the location of diamonds is found in Appendix 5. The diamonds are located in the alluvial deposits in riverbeds, former river courses and valley hillsides (Hodges, 2001: 148). Most the production is from alluvial deposits, but the kimberlites pipes have a large economic potential (Levinson, 1998). Five promising pipes are found in Lunda Norte. ‘Thus, Angola has the potential to join a select group of the world’s major suppliers of diamonds, those that produce more than 10 million carats annually’ (Levinson, 1998: 93). Until the mid-1980s, diamonds were marketed through the Central Selling Organization (CSO) on behalf of De Beers. Official and unofficial export of diamonds was estimated at $600-700 million in

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3 ‘Alluvial diamonds are found in mineral gravel. Erosion carries diamonds down the slope because they are heavy. High quality gems sometimes collect in high densities in gravel and alluvium: the movement of water sorts the gravel by size and weight. The first diamonds collected in India were all form this source, not from deep mines’ (Kibble & Vines, 2001: 548).

4 ‘The rock in which diamonds are found is called kimberlite. (.). Kimberlite is usually found in carrot-shaped ‘pipes’ – remains of long dead volcanoes in large, stable and ancient chunks of the earth’s crust (known as cratons), and are at least 1.5 billion years old’ (Kibble & Vines, 2001:548).
The illegal sale of diamonds was estimated at $600 million annually between 1992 and 1997. The government’s revenue from diamonds has been insignificant (Hodges, 2001: 149). Its revenue from diamonds in 1999 was 10% of the value of oil exports, or between $544 and $700 million (Goreux, 2001). In 1998, income from the illegal sale of diamonds declined to $200 million. At this point, FAA took control over many of the areas previously controlled by UNITA.

How could the rebels control many of the most important diamond areas until 1998? Diamonds found in alluvial deposits are easy to extract, and this process requires little technical equipment. This is probably a major reason why much of the mining has been done illegally and by the rebel group (Goreux, 2001). According to Wright (2001), UNITA has earned $3 billion from diamond smuggling since 1992. Hodges (2001) estimates UNITA’s total diamond revenue between 1992 and 1998 at $3.7 billion. The net revenue in the same period is estimated at $2 million. This is more than UNITA received from external actors the USA and South Africa during the Cold War (Hodges, 2001: 153). Official export production of diamonds in 1999 was $600 million, including 2.1 million from the formal sector and 1.35 million from the informal sector. UNITA’s production of diamonds that year is tentatively valued at $150 million. Informal market production was $298 million; $50 million of this was accounted for by UNITA and $250 million by independent illegal diggers (garimpeiros) (Dietrich, 2001a: 151). According to Global Witness (2000: 3), the value of the total world production of diamonds for 1999 was $6.8 billion. South Africa, Namibia, Botswana, Canada and Australia produced $3.8 billion of the total; Russia, $1.6 billion, but this figure is uncertain. Angola produced the remaining $2.4 billion. Given the official total of $600 million (Dietrich, 2001a), a production value of $1.8 billion remains unreported. Russia’s production might be higher than $1.6 billion, which would lower the value of Angola’s unrecorded production.

The estimates of revenues from diamonds are uncertain because most of the mining is done illegally and the reporting and transparency leaves a great deal to be derived. Angola also has diamonds found in kimberlites that still have not been extracted. The estimates are uncertain, and probably greater. It is in UNITA’s interest to underestimate the true revenue from diamonds, to be able to withdraw more for private purposes, and some reserves have not yet been mined. Like the oil reserves, the diamond reserves may influence the extent of
the conflict, because the parties are motivated by profit. I have not been able to find estimates for Angola’s diamond reserves. In this thesis, the focus is on the oil companies’ role and their potential impact on the conflict. In Chapter 4, only the size of the oil reserves is of importance for the discussion.

2.2.3 The location of the oil and diamond reserves

Offshore oil is found along the coast between Benguela and Cabinda, and the diamond resources are located mainly in the Lunda region. The Chokwe ethno-linguistic group, largely inhabits Lunda Norte and Sul. The main part of the oil fields is located on the territory of the Mbundu and the Bakongo. The Angolan government controls the oil, and its members are mainly from the second largest ethno-linguistic group, the Mbundu. UNITA’s members are chiefly from the largest ethno-linguistic group, the Ovimbundu. Thus, the two largest ethno-linguistic groups dominate MPLA and UNITA. Is it because oil is found in the regions inhabited by Mbundus and Bakongos that MPLA controls oil? Or is it because this group governs the country? Why does UNITA control diamonds that are in Chokwe territory? Bakongos are the third largest group, and who receives their support?

A map of oil and diamond reserves is found in Appendix 6. This map shows the location of the main reserves and what areas were under government control in 1995. According to the map, the government controlled large parts of the oil and diamond reserves. This was at the beginning of the peace period that lasted from 1994 to 1998.

The period from 1992 to 1994 was a cruel war with heavier weapons than in previous wars, resulting in the killing of 300,000 people. Cities such as Huambo, Kuito and Malange were affected by the war, whereas earlier wars had been fought mainly in the countryside (Birmingham, 2002). UNITA controlled some of the major cities, important provincial capitals and strategic airfields. By September 1993, UNITA controlled 70% of the country (Hare, 1998). The government controlled the major oil fields. UNITA realized that its wealth from diamonds was much smaller than the government’s oil wealth (Birmingham, 2002). The rebels attacked an onshore oil field at the mouth of the Congo River in an attempt to get control over some of the oil. The offshore oil fields were not within reach of attack from the rebels (Birmingham, 2002). UNITA controlled the major diamond fields in this period. In
1994, the government was able to rearm because the oil production increased, and UNITA was expelled from the cities it had occupied in 1992-93.

In the period after the war broke out again, from 1998 to 2002, the government was strengthened and UNITA weakened. The UN imposed sanctions on UNITA that are said to have had little impact on the diamond sales. The rebel group lost control over its main airfields, making transport of diamonds difficult. In late 1997, it lost control over its main diamond area (Hodges, 2001).

In the next section, I will look at social indicators and public sector development from 1990 to 2000. Poverty and uneven distribution of income could be a reason for further conflict; therefore, it is also important to look at how the majority of Angolans are living. Angola experiences a high level of poverty, but at the same time it is rich in renewable as well as non-renewable resources.

### 2.3 Poverty

While the country is rich in resources, 70% of the Angolan population lives in poverty. In 1995, 61% of the urban population subsisted on $39 per month, and 12% suffered from extreme poverty with only $14 per month (Hodges, 2001: 33). People living on less than $1 per day are defined as being poor. In the Human Development Report (UNDP, 2002), Angola is ranked 161\textsuperscript{th} of 173 countries on the Human Development Index (HDI), implying that Angola is the 13\textsuperscript{th} poorest country in the world. Countries like Angola with scores in the range 0-0.499 are defined as having low levels of human development. HDI consists of average life expectancy, educational levels and real per capita GDP in terms of purchasing power parity. Table 2 presents some social indicators on Angola.

<table>
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<th>Table 2: Social indicators for Angola</th>
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<tr>
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<tr>
<td>Primary school enrolment ratio (%)</td>
</tr>
<tr>
<td>Secondary school enrolment ratio (%)</td>
</tr>
<tr>
<td>Infant mortality rate (per 1000)</td>
</tr>
<tr>
<td>Crude death rate (per 1000)</td>
</tr>
</tbody>
</table>
Crude birth rate (per 1000)     51.2 51 51.2
Total fertility rate (per woman)     7.2 7.2 7.2
Life expectancy at birth     44.6 44.8 45.3
Access to health service (% of pop.)    - - -
Access to safe water (% of pop.)    40 32 38
Daily calorie supply per capita    1,746 1,810 -

Source: African Development Bank (2003), Country Tables.

Primary school enrolment declined from 92% in 1990 to 72% in 1995 and 64% in 1997. Secondary school enrolment was relatively stable in the same period, around 12-13%. The infant mortality rate declined from 131 to 121 per 1,000 inhabitants. The crude death rate and birth rate have been stable, around 20 and 51, respectively, so population growth is 30 per year. Life expectancy in the period is approximately 45 years. Table 3 provides some comparative social indicators from Botswana, the Democratic Republic of the Congo (DRC) and Mozambique.

Table 3: Basic social indicators from African countries

<table>
<thead>
<tr>
<th></th>
<th>Angola</th>
<th>Botsw.*</th>
<th>DRC</th>
<th>Mozambique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pop. in millions, 1997</td>
<td>11.6</td>
<td>1.5</td>
<td>48</td>
<td>18.3</td>
</tr>
<tr>
<td>GNP per capita ($), 1997</td>
<td>340</td>
<td>3,260</td>
<td>110</td>
<td>90</td>
</tr>
<tr>
<td>Primary School Enrolment, 1996</td>
<td>74</td>
<td>112</td>
<td>70</td>
<td>62</td>
</tr>
<tr>
<td>Adult illiteracy rate (%), 1995</td>
<td>47</td>
<td>30</td>
<td>23</td>
<td>60</td>
</tr>
<tr>
<td>Life expectancy (years), 1997</td>
<td>48</td>
<td>51</td>
<td>54</td>
<td>48</td>
</tr>
<tr>
<td>CPI inflation (%), 1997</td>
<td>111.1</td>
<td>8.7</td>
<td>175.5</td>
<td>5.5</td>
</tr>
<tr>
<td>GDP growth (%), 1997</td>
<td>7.6</td>
<td>6.9</td>
<td>-5.7</td>
<td>12.4</td>
</tr>
</tbody>
</table>

* Botsw. = Botswana
Botswana’s GNP per capita is $3,260, nearly 10 times higher than that of Angola, $340. On the other hand, Angola is more than three times as wealthy as the DRC and Mozambique, with $110 and $90, respectively. GDP does not account for the distribution of income. Even though Angola’s GDP is three times higher than that of the DRC and Mozambique, this wealth could be in the hands of few people. Angola is second after Botswana with regard to enrolment in primary school, but it has the highest illiteracy rate for adults. Mozambique and Angola have the lowest life expectancy, 48 years, and the DRC has the highest, 54 years. Inflation has been very high in Angola and the DRC. The growth rate is highest in Mozambique, 12.4%; Angola has the second highest, 7.6%, and the DRC has the lowest, – 5.7.

To get a clearer picture of poverty in Angola, we need to go beyond social indicators and look at public services. One reason for the decline in primary school enrolment could be that schools were destroyed by warfare. Education and health services have been declining since the early 1980s (Hodges, 2001). In 1995, approximately 5% of total public spending was used for education, compared to 31% used for defence. In 1995, 41% of the urban population was doing informal sector work. The government has given priority to the oil sector, and together with a low level of education for many civilians, this can indicate low employment in the formal sector. Most of the people working in the formal sector have a high level of education and close relations to the government. The agriculture and manufacturing sectors have declined since independence. The oil sector is capital-intensive and employs only 10,000 Angolans. The oil sector is the only sector that is growing, meaning that few jobs are created. This industry is also an enclave with few linkages to the other sectors of the economy.

Table 4: GDP by sector of activity, 1993-97
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<th></th>
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<tbody>
<tr>
<td>Agriculture, forestry and fishing</td>
<td>11.6</td>
<td>6.6</td>
<td>7.7</td>
<td>7.3</td>
<td>9.6</td>
</tr>
<tr>
<td>Mining</td>
<td>41</td>
<td>58.6</td>
<td>58.5</td>
<td>61.3</td>
<td>52.3</td>
</tr>
<tr>
<td>Oil and LPG</td>
<td>40.2</td>
<td>56.6</td>
<td>55.8</td>
<td>58</td>
<td>48.5</td>
</tr>
<tr>
<td>Diamonds</td>
<td>0.8</td>
<td>2</td>
<td>2.7</td>
<td>3.3</td>
<td>3.8</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>5.7</td>
<td>4.9</td>
<td>4</td>
<td>3.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Electricity and water</td>
<td>0.1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Construction</td>
<td>4.5</td>
<td>3.4</td>
<td>3.4</td>
<td>3.1</td>
<td>4.1</td>
</tr>
<tr>
<td>Trade and commerce</td>
<td>20.3</td>
<td>18.1</td>
<td>17.6</td>
<td>14.8</td>
<td>16.3</td>
</tr>
<tr>
<td>Non-tradable services</td>
<td>14.4</td>
<td>6.5</td>
<td>7.3</td>
<td>8.1</td>
<td>11.4</td>
</tr>
<tr>
<td>Import duties</td>
<td>2.5</td>
<td>1.8</td>
<td>1.4</td>
<td>1.9</td>
<td>1.9</td>
</tr>
<tr>
<td>GDP at market prices</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: IMF (1999), Table 2.

Table 4 shows that the sectors of agriculture, forestry and fishing, manufacturing, construction and trade and commerce mainly declined during the 1990s. The exception is in 1997, but these numbers are estimated. The most important renewable resources derive from fishing and agriculture. The sector activity could have been reduced as a result of the war going on for four decades. Increased poverty could be the result of lack of employment opportunities, as many of the public sector shares of GDP are reduced.

In Angola, there are few employment opportunities in the formal sector, and the education and health systems are poor, because all sectors except from the oil sector have declined the last years. Earlier, many Angolans were subsistence farmers, but today large agricultural areas have been affected by land mines, so this opportunity has declined. A large part of the population is dependent upon receiving food from international aid organizations. This indicates that the government does little to support the population. Instead, people have to create their own jobs in the informal sector and rely on international organizations and their own churches for food and other support. Finding a source of income is critical for many Angolans; there are few employment opportunities, a low level of education and high poverty. Working as a soldier for either FAA or UNITA could be the only income opportunity for many, and this can in turn lower the costs for the two fighting groups. The
costs of fighting for FAA and UNITA are called opportunity costs and are discussed in Appendix 8.

2.3.1 Reasons for poverty
In this section, I discuss two different reasons for the high poverty level in Angola: the long-lasting conflict and government corruption and the oil companies’ short-term profit motive.

Angola has experienced over 40 years of violent conflict that has destroyed much of the country and the infrastructure. Land mines cover large agricultural areas, people are displaced and reporting of public finances is lacking. This creates possibilities for the public employees around President Dos Santos to use public money for private benefits. Transparency International (2002a) ranks Angola as the 5th most corrupt country in the world, out of 102 countries. On a scale from 0 (most corrupt) to 10, Angola gets 1.7. Among other resource-abundant countries, Norway is ranked among the least corrupt, in 12th place with a score of 8.5, and Botswana 24th with 6.4.

Why does Angola have such a low score? A war makes it easier to be corrupt. The president and his closest employees control the oil reserves. They have the possibility to withdraw money for private purposes. Parts of the government’s income are unreported, particularly oil income. Lack of accountability, reporting and transparency may indicate that something illegal is going on. At the same time, lack of reporting of public finances could give the impression that income is used for private enrichment of corrupt bureaucrats, when in fact it has simply not been entered. According to the BBC (18.10 02), nearly $1 billion of the government’s revenue disappeared in 2001, and over the last five years $4 billion has disappeared.

The practice of international oil companies when operating in western countries is to report all their earnings from oil. In Angola, they do not, except for BP and Statoil. The secrecy regarding the oil companies’ revenues from oil and their payments to the Angolan government indicates the presence of corruption. While a large part of the population in Angola does not get any income from oil, most of the oil profit is divided between the oil companies and Sonangol. The profit-sharing between Sonangol and the oil companies could be in favour of the latter. The government corruption, lack of statistics on oil income and
war create possibilities for the international oil companies to take a larger part of the profit from oil. The oil companies are motivated by the desire to maximize their profits in the shortest possible time. This leads to a higher rate of extraction than what is optimal. The best outcome for the society as a whole would be to maximize the present value of revenue from the resources, which is the definition of an optimal rate of extraction. There is a conflict between the profit motive of the oil companies and the welfare maximization of the Angolan people. This issue is discussed further in Chapter 4.

The oil companies have an ethical responsibility when doing business in a country that uses oil income to wage war. For example, signature bonus payments by oil companies to Sonangol have been used to purchase weapons: ‘A significant proportion of the estimated $870 million in signature bonus payments to the Government for these blocks (note: blocks 32 and 33), together with BP operated block 31, were diverted by the Government for arms procurement’ (Global Witness, 2002: 31). After the end of the Cold War, the financial support from the Soviet Union ended. In 1993-94, the government was short of money to finance arms (Global Witness, 2002) and was therefore heavily dependent upon oil revenue. Without income from oil, it would not be possible for the government to fight the war efficiently.

Goreux (2001: 17) states that ‘the immediate and most critical problem for Angola is not to earn more dollars, but to use them better’. Next I will discuss a possible way for the Angolans to gain their share of the oil revenue.

2.3.2 Increased transparency: a possible way to reduce poverty?

According to the IMF (2000a), the low transparency in public sector operations has been a major problem in Angola. The IMF and the Angolan government reached an agreement to establish transparency and accountability within the government, on 3 April 2000. The agreement is called the Staff Monitoring Program (SMP). The monitoring of oil revenues, known as the ‘Oil Diagnostic’, is an important part of the program. In early 2002, the reporting had not started yet (Global Witness, 2002).

In 2000, oil accounted for $3.26 billion of government revenue, or approximately 90% of the current year’s budget (Human Rights Watch, 2001). A large part of government revenue has
been used for warfare instead of for economic and social development. Increased transparency in the oil revenue is important because the money has enabled the government to finance its warfare. In addition, both sides in the conflict have misused weaponry and committed human rights abuses: ‘Government violations include torture, “disappearance”, summary executions, indiscriminate killings of civilians, pillaging, arbitrary recruitment into the military, forced displacement, use of indiscriminate weapons such as antipersonnel land mines, harassment of the political opposition, and restrictions on the press. For its part, UNITA has been responsible for summary executions, torture, mutilations, abductions of women and children, hostage-taking, and restricting the movements of civilians’ (Human Rights Watch, 2001: 6).

Examples of why lack of transparency could be a problem in Angola include:
1. ‘Moreover, the Presidency is the only organ with the power to authorize major governmental expenditures through a system of dedicated accounts fall outside public scrutiny. In addition, President José Eduardo dos Santos is said to have a personal oil account. This account is supplied by US$0.70 to 2.00 per barrel of oil produced in Angola. Thus, at current level of production, the President “earns” up to US$ 1.6 million per day of $584 per year!’ (Malaquias, 2001: 528).

2. ‘Alas, since the $900 million was not recorded in the country’s published budget, the Angolan political and military elites could continue to pay little or no attention to issues of accountability and transparency’ (Malaquias, 2001: 528).

3. ‘in 2001, up to US$1.4 billion in revenues and loans – almost one third of Angola’s state income of between US$3-5 billion cannot currently be located’ (Global Witness, 2002: 33).

4. There has been found ‘a difference of US$770 million between revenue data reported by the Ministry of Petroleum and that reaching the Ministry of Finance. This suggests that the current discrepancies uncovered by the IMF are part of a pattern of sustained economic abuses that is deliberately benefiting form civil conflict and unaccountable government’ (Global Witness, 2002: 33).
5. The government stated that its defence spending was 11.1% of government expenditure in 1997-98, whereas the IMF estimated it to be 40% (Human Rights Watch, 2001).

6. The government used the signature bonus payments of $870 million for blocks 31-33 to purchase weapons. Some of the oil companies that made these payments were BP, Exxon-Mobil and Elf, because they have made large investments in these blocks. ‘These funds were earmarked for the “war effort” according to the Angolan Foreign Minister’ (Human Rights Watch, 2001: 8).

It is uncertain whether the problem of low transparency is as great as these examples may suggest. More research is needed in this area. The examples may indicate, however, that low transparency is a problem, as is claimed by others such as the IMF and Tony Hodges. With a low level of transparency, it could be possible for the government to withdraw money for its own purposes and to use oil revenue to finance warfare. When financing warfare, both UNITA and FAA commit abuses against civilians, including violence, killing, looting, mutilation and displacement (Human Rights Watch, 2003). Approximately 87% of the government’s revenue is from the oil industry. The oil companies could contribute to a higher level of transparency if they reported their payments to the government.

The published reporting of payments from oil companies to the Angolan government could give the population an opportunity to hold their government accountable for its misuse of the oil revenue: ‘The lack of full transparency by companies also undermines the spirit of Law No 13/78, which states that Angolan oil belongs to the Angolan people’ (Global Witness, 2002: 36). Increased transparency regarding the oil revenue could give Angolans an opportunity to obtain equal distribution of the income from oil. Full transparency implies that the oil companies ‘publish data about their payments to the Angolan Government’ (Global Witness, 2002: 36). The oil companies should make information on taxes and payments to the government publicly available. The data on taxes and payments should be published in Portuguese as well as the company’s own language, and names and locations of all oil companies operating in Angola should be publicly available.

According to the Production Sharing Agreement (PSA), the oil company shall cover the costs. The oil company divides the profit with Sonangol according to the level of cumulative
production or the internal rate of return (Hodges, 2001). A large part of the revenue from oil is used for personal enrichment and to purchase weapons, and 70% of the population lives in poverty. It is likely that a large part of the oil revenue is shared only between the oil company and the government. If the government’s spending becomes more transparent, the people can demand their part. This can reduce the oil company’s share of the profit. Traditionally, the civil society has been weak and unable to organize, so it remains to be seen if the people are able to demand their part of the income when reporting starts.

Several attempts have been made to explain the link between natural resource endowment and poverty. I will present four of the contributions that explain this relationship.

2.4 Resource abundance and poverty
Resource-rich countries can experience high economic growth, such as Botswana, which is rich in diamonds. Angola is rich in both oil and diamonds, but still it is the 13th worst-off country in the world in terms of HDI (UNDP, 2002). The real GDP growth in non-oil sectors has declined from 10.3% in 1995 to 2.7% in 1999 (IMF, 2000a). Why is it that resource abundance leads to low growth in the non-oil sectors in Angola?

Hodges (2001) states that this is a paradox. Although Angola has one of the best resource endowments in Africa, it has experienced over 40 years of violent conflict and economic decline in all sectors except the oil sector. It is potentially one of the richest countries in Africa, but it has not been able to take advantage of this. Instead, Angola has used much of the income from its natural resources to fuel war. In the 1970s, Angola was a net food exporter, exporting more than 100,000 tons of maize annually, and today the country receives 200,000 tons maize annually from international aid organizations (Hodges, 2001: 94). The government could have used the oil income to diversify the economy so that the other sectors, such as agriculture, could start growing again. Sachs & Warner (1995) state that countries that are rich in resources often experience lower growth than resource-poor countries. Instead of explaining it as a paradox, they explain it as a phenomenon of ‘Dutch disease’. Exporting a large amount of oil can cause an exchange-rate appreciation, that is, an increase in the value of a currency against foreign currencies under a floating exchange regime. When Angola’s exchange rate appreciates, prices of its export goods increase, and
this can affect other sectors. The appreciation works against the development of the non-oil sectors. Dutch disease strikes when the discovery of a natural resource raises the value of the nation’s currency, such that manufactured goods become less competitive compared with those of other nations. This can result in a deindustrialization of a nation’s economy, since imports can increase and exports decrease. The term originated in Holland after the discovery of North Sea gas. Resource abundance in itself can therefore lead to low growth, according to Sachs & Warner (1995). Angola is extremely dependent upon income from oil: 80% of the government’s income and 90% of the income from exports comes from the oil sector. How was the development in the exchange rate of Angola during the 1990s?

Table 5: Angola’s exchange rate (readjusted kwanzas per US dollar)

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<tr>
<td></td>
<td>7</td>
<td>494</td>
<td>5,692</td>
<td>201,994</td>
<td>262,376</td>
</tr>
</tbody>
</table>

Source: IMF (1999), Table 9.

The kwanza is tied to the dollar in a fixed relation. The more frequently used parallel-market rate depreciated during the period 1993-97 with respect to the official rate: ‘the differential exceeded 1000 percent during 1992 and 1993 before shrinking to approximately 100 percent as a reflection of devaluation of the course of 1994’ (IMF, 1997: 9). In May 1999, the National Bank of Angola (BNA) decided to float the exchange rate. In the period January 1999 to March 2000, the kwanza depreciated 88% in foreign currency terms, and in real effective terms, 38% (IMF, 2000a). Depreciation is a reduction in the value of a currency against foreign currencies under a floating exchange regime.

During the 1990s, the exchange rate devaluated, implying that the value of the kwanza against other currencies was reduced. In this situation, imports become more expensive and exports become cheaper. This indicates that the phenomenon of ‘Dutch disease’ did not occur in Angola in this period, since the currency did not become revaluated or appreciated.
Resource abundance has not led to low growth in Norway, Botswana, Australia or Canada. These countries experience high growth despite resource abundance. Mehlum et al. (2002) try to explain the difference between countries where resources appear to be a blessing and countries where they are perceived as a curse. According to these authors, the decisive factor is the quality of the country’s institutions. Resource-abundant countries with solid institutions experience growth, whereas countries with ‘grabber-friendly’ institutions are likely to have low growth. Grabber-friendly institutions are described as having ‘a weak rule of law and a high risk of expropriation, malfunctioning bureaucracy and corruption in the government’ (Mehlum et al., 2002: 2). The quality of institutions is weakened by resource abundance, which in turn leads to low growth. Sachs & Warner (1995) fail to find empirical support for this hypothesis. Dutch disease is their explanation, meaning that resource abundance in itself lowers the growth, irrespective of the quality of the institutions. How are the institutions in Angola? Are they grabber-friendly?

According to Sections 2.3.1 and 2.3.2, it looks like Angola has corruption problems, since for example one-third of the state income in 2001 is not unaccounted for. In addition, the country has a low score on the index by Transparency International (2002a). The president’s private oil account indicates that few people in Angola are rich, while the majority are poor. Lack of transparency could be an indication of ‘grabber-friendly’ institutions. The following arguments indicate that the institutions in Angola are grabber-friendly: a growing income from oil while at the same time 70% live in poverty; lack of reporting of oil income; and the apparent lack of interest by the government and oil companies to start reporting of revenue from oil. In addition, war in itself is a signal of ‘grabber-friendly’ institutions.

Countries that are rich in natural resources and have more than a quarter of GDP from export of primary goods are more prone to conflict, as shown in an empirical study of 47 civil wars from 1965 to 1995 by Collier & Hoeffler (1999). Rebel movements are more likely to finance warfare when they have the ability to loot some of the country’s natural resources. Risk of rebellion normally increases with natural resource endowment and is decreasing in opportunity cost. Collier & Hoeffler state that rebellions are motivated either by loot or by justice, and they find strong evidence for looting motivation by the rebel groups. A country that receives a large share of GDP from primary commodity export is ‘over four times more likely to experience war than a country without primary commodities’ (Collier & Hoeffler,
The rebel movement is assumed to loot during the conflict. This implies that profit is generated during the conflict and is not dependent upon victory. This can encourage the formation and growth of groups with interest in violent conflict as a way of enriching themselves, which in turn can affect the duration of the conflict.

Angola is rich in oil and diamonds. Income from oil is 59% of GDP, a large share that should increase the risk of civil war. Angola has experienced over 40 years of war, including 27 years of civil war, and at the same time the share of oil in the GDP has increased. In Angola, the two parties in the war have each controlled one of these resources. FAA has been in control of the oil, and UNITA the diamonds. Since UNITA has been able to take control over several diamond fields, it has been able to finance warfare against the government. According to the loot model, the risk of rebellion increases with natural resource endowment. Diamonds found in alluvial deposits are easily extractable and possible for rebels to loot.

Next, I will introduce the model and try to understand the link between conflict and the natural resource endowment in Angola.
3. Resource abundance and conflict

Within economics, there are at least three relevant models explaining the link between resource abundance and conflict. Homer-Dixon explains conflict as a function of resource scarcity (Gleditsch, 2001). Collier & Hoeffler (2001) explain the risk of conflict in their model of greed and grievance. Rent-seeking activities based on resource abundance are a prime factor in greed (or opportunity) models of war. A third important model developed by Addison et al. (2001), called ‘The Cost of Peaceful Behavior’, models internal conflicts as a duopoly game, where effort for peace is the strategic variable. The model of Addison et al. (2001) is similar to the one I will apply to the conflict in Angola. The two models differ in that the former uses peace effort as the strategic variable and the latter uses fighting effort. In this chapter, I investigate what conclusions about the conflict in Angola can be drawn using principles from a duopoly model. I will use the approach by Mehlum & Moene (2002) to model the conflict between FAA and UNITA as a duopoly contest over resource rent from oil and diamonds.

Duopoly models are normally used to model the competition in markets where two firms operate. It is defined as a market situation where the two suppliers are assumed to maximize profit. In a Cournot model of duopoly, the strategic variable is quantity. In a duopoly without cooperation, each producer perceives the best action of the other producer. Given this prediction, the producer maximizes its own profit. When both behave in this manner, they together produce more than the quantity that would maximize the total profits of both producers. The interaction results in a more competitive behaviour than many would believe.

If the two firms cooperate, they can agree to limit total quantity, which will give them a higher market price than in a competitive market, and higher profit than in a duopoly with non-cooperation. In a duopoly, it is possible to cooperate by making a joint agreement.

Their motivation to fight is to maximize expected payoff. If the parties behave as rational actors, they can end up in a prisoner’s dilemma situation, where payoff is not the highest and the outcome of the game is war. The prisoner’s dilemma is described as a situation where non-cooperation leads to lower payoffs to the groups than with cooperation. This is likely to
be the result in a duopoly without cooperation. If the two groups cooperate, it is possible to solve the situation of the prisoner’s dilemma and end up in peace. In Angola, there have been three broken peace agreements, so it is a low possibility that the parties themselves will be able to get out of the prisoner’s dilemma. Chapter 4 discusses the oil companies’ influence on the war and the possibility for them to assist in resolving the prisoner’s dilemma.

In the model, there are two actors. In Section 2.1.1, I discussed whether the conflict in the 1990s in Angola should be classified as an internationalized civil war instead of a civil war. The government and the rebel group are both dependent upon an international network, but these networks are not taking part directly in the conflict. It is only FAA and UNITA that have had armed forces on Angolan territory in the last phase of the conflict, except for Namibia in 2000-01 (Gleditsch et al., 2002). The government and its international partners can be considered the first grouping, whereas the rebel group and its network act as the second grouping. Whether the conflict is modelled as a contest between two nationalist movements or between two groupings does not alter the results in the model. Once there are more than two participants, the conclusions in the model change.

First, I will present the model of Mehlum & Moene (2002) and duopoly without cooperation. Section 3.1.1 investigates the prisoner’s dilemma outcome. In Section 3.2, I discuss duopoly with cooperation as a solution to the prisoner’s dilemma. In each section, I use examples from Angola.

3.1 The model
It is important to understand the conflict before looking at possible solutions to it. A peaceful solution to the conflict is needed in order to reduce poverty in the country. In this chapter, I will try to understand the conflict in a duopoly model framework.

In Angola, the two players are the government army and UNITA. Their strategic variable is fighting effort. The government’s fighting effort is denoted $y_1$ and the rebel group’s $y_2$. The size of one group’s fighting effort is affected by the group’s opportunity cost and how much it can afford to spend on the conflict. In Angola, the conflict is an armed conflict; therefore
the fighting effort consists of armaments and soldiers. They meet each other on the battleground. FAA and UNITA are maximizing expected payoff. Expected payoff to the two sides are given by $v_1$ and $v_2$ respectively. The payoff depends on group k’s probability to win the war; $\rho_k$ therefore it is expected payoff.

The contest is one over natural resource wealth; therefore, the resource rent (R) is introduced in the expected payoff functions. Both actors want to control both the diamond and the oil reserves through governing the country alone. The winner of the conflict gets control over both oil and diamond reserves and receives the rent, R. The more rent that is available, the higher is the fighting effort, because expected payoff is subject to increase. The two groups are maximizing expected payoff, $v_k$ given by:

$$1) \quad v_k = \rho_k R - \alpha_k y_k$$

where $\rho_k = \frac{y_k}{y_1 + y_2}$ and $k = 1, 2$

The probability of winning the rent times the rent and the group’s opportunity costs times the fighting effort decides expected payoff. The probability of winning the rent, $\rho_k$, depends on your own fighting effort relative to the total fighting effort of groups 1 and 2. The total fighting effort is a measure of the extent of the fighting in terms of soldiers and military weapons and equipment. The cost of one unit of fighting effort is $\alpha_k$ units of forgone production. The opportunity cost for group k, $\alpha_k$, measures the efficiency in production relative to fighting. If $\alpha_k$ is low, group k is an efficient fighter. It is assumed that $\alpha_k$ is constant. This implies that the relative relationship between the productivity of the members of group k as producers to the productivity of the members as soldiers is constant. If the relationship is changed, both productivities are changed by the same number (see Appendix 8). If R goes up, the expected payoff increases and the fighting effort rises. An increase in R can be caused by increased transparency in the oil revenue or by a raised investment from the international oil companies. I assume that the government and the rebels have expectations on the size of the rent, and that more transparency regarding the oil revenue can change their expectations. This is discussed further in Chapter 4.
The first-order conditions indicate the groups’ optimal fighting effort, given by:

\[ 2) \frac{\partial v_1}{\partial y_1} = \frac{y_2}{(y_1 + y_2)^2} R - \alpha_1 = 0 \]

\[ 3) \frac{\partial v_2}{\partial y_2} = \frac{y_1}{(y_1 + y_2)^2} R - \alpha_2 = 0 \]

They engage in a strategic game where greater effort by one lowers the return to the other. Solving equations 2) and 3) gives the Nash-equilibrium in the game. In a two-player game, a set of strategies is a Nash-equilibrium for each player if a chosen strategy is the best response to the other player’s strategy (Gibbons, 1992).

We can find that:

\[ 4) \frac{y_2}{y_1} = \frac{\alpha_1}{\alpha_2} \]

Inserting equation 4) gives the following expressions in equilibrium (equations 5-10):

\[ 5) \frac{\alpha_1 R}{(\alpha_1 + \alpha_2)^2} = y_2 \]

\[ 6) \frac{\alpha_2 R}{(\alpha_1 + \alpha_2)^2} = y_1 \]

Equations 5) and 6) give the fighting effort for groups 2 and 1 and show the extent of the fight \((y_1 + y_2)\) in equilibrium.

\[ 7) \rho_1 = \frac{\alpha_2}{\alpha_2 + \alpha_1} \]

\[ 8) \rho_2 = \frac{\alpha_1}{\alpha_2 + \alpha_1} \]
The winning probabilities of groups 1 and 2 are given by 7) and 8). If the rival’s opportunity costs increase relative to the sum of the opportunity costs, then group k’s probability of winning will increase. \( v_k \) is found from inserting \( \rho_k \) and \( y_k \) into equation 1), and gives the following expressions:

9) \( v_1 = \rho_1^2 R \)

10) \( v_2 = \rho_2^2 R \)

Equations 9) and 10) give the expected payoff to groups 1 and 2. Expected payoff is determined by own winning probability squared times the rent.

The winning probability in equilibrium given by 7) and 8) shows that the higher the rival group’s opportunity cost is in relation to total opportunity cost, the higher the probability of winning for group k. \( \rho_k^2 \) in equations 9) and 10) is a measure of the concentration of group k’s relative fighting effort, as will be discussed in detail later. The winning probability increases with a group’s power dominance. The equilibrium expressions 5), 6), 9) and 10) show that the extent of the fight, group k’s fighting effort and expected payoff increases in the rent. An increase in the rent will increase the extent of the fight. The oil companies’ activities can affect the size of the rent. In Chapter 4, I discuss to what extent they have an influence on R, and \( y_1 \) through R.

From equations 2) and 3), we can find the groups reactions functions, given by:

11) \( R_1(y_2) = \sqrt{\frac{R}{y_2 \alpha_1}} \)

12) \( R_2(y_1) = \sqrt{\frac{R}{y_1 \alpha_2}} \)
$R_1(y_2)$ is group 1’s best response to group 2’s action, $y_2$. Equivalently, $R_2(y_1)$ is group 2’s best response function. A Nash-equilibrium is a pair of actions $(y_1^*, y_2^*)$ such that:

$$y_1^* = R(y_2^*)$$
$$y_2^* = R(y_1^*)$$

The reaction functions are upward sloping, and therefore the actions of the two groups are strategic complements. Each group’s expected payoff depends on the other group’s expected payoff; hence, each group has a reaction function. Reactions functions are found from equations 11) and 12), and shown in Figure 1.

**Figure 1:** Nash-equilibrium

N: Non-cooperate solution
C: Cooperation
Each group will operate on its reaction function, and where the two best-response functions intersect is the Nash-equilibrium. Point N shows the non-cooperative solution. In equilibrium, optimal fighting effort is \( y_1^* \) for group 1 and \( y_2^* \) for group 2. The slope of the reaction functions is given by:

\[
\frac{\partial v_1}{\partial y_1} > 0 \quad \text{for} \quad y_1 < y_1^* \quad \text{and} \quad \frac{\partial v_2}{\partial y_2} > 0 \quad \text{for} \quad y_2 < y_2^*
\]

The reaction functions have a positive slope, implying that if group 1 increase its fighting effort, group 2 should do the same as group 1. When group 1 increases its effort, group 2 will do the same in order to not reduce its winning probability. Their fighting efforts are complementary. This is a Nash-equilibrium, in which players are acting rationally, optimally and in their own self-interest. The characteristics of a Nash-equilibrium are that the players behave rationally and choose their dominant strategy. A dominant strategy is: a strategy that will be preferred whatever the rival does. To behave rational implies to maximize profit. They maximize expected payoff because it is dependent upon the probability of winning. Assuming that the two fighting groups in Angola maximize expected payoff, they will choose the strategy (fight or not fight) that gives the highest expected payoff.

Is the war in Angola a Nash-equilibrium? Over the last 40 years, there have been only short periods of peace in Angola, some months in 1975, and the periods 1991-92 and 1994-98. Every time a peace agreement has been signed, war has followed shortly after. Finding equilibrium in peace has not been successful. The constant return to war in Angola could be an indication of a Nash-equilibrium in war that the parties cannot get away from. In the last ten years of the conflict, there has been a rivalry over access to the non-renewable resources diamonds and oil between the government army and the rebels (Hodges, 2001: 19).

The Nash-equilibrium in war is a prisoner’s dilemma situation. In Section 3.1.1, I present a payoff matrix with the two players’ strategies, to discuss more carefully the outcome of the prisoner’s dilemma.
### 3.1.1 Prisoner’s dilemma

In the literature, prisoner’s dilemma is described as a situation where acting according to rational self-interest could make you worse off than if you act contrary to rational self-interest. Players that are rational and follow their dominant strategy can end up with payoffs that are lower than if the two groups cooperated. In this game, the players simultaneously choose their actions. In a simultaneous-move game or static game, each player chooses his or her strategy at the same time. This implies that one player chooses his action without knowledge of what they other player will do (Gibbons, 1992). The Nash-equilibrium \((y_1^*, y_2^*)\) found in Section 3.1 is an outcome that is related to a situation of prisoner’s dilemma. For this to hold, it is necessary to assume that in a situation of war \(y_1 = y_1^*\) and \(y_2 = y_2^*\) and in a peace situation \(y_1 = 0\) and \(y_2 = 0\). If group 1 fights and group 2 does not fight, then \(y_1 > 0\) and \(y_2 = 0\), and vice versa. In war, the fighting efforts are positive, whereas in peace they are equal to zero. Table 6 illustrates the situation of prisoner’s dilemma. A situation of war is denoted ‘fight’, while ‘not fight’ denotes peace.

#### Table 6: Payoff matrix for prisoner’s dilemma

<table>
<thead>
<tr>
<th>FAA</th>
<th>Not fight</th>
<th>Fight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not fight</td>
<td>((v_1, v_2))</td>
<td>((0, R))</td>
</tr>
<tr>
<td>Fight</td>
<td>((R, 0))</td>
<td>((v_1^<em>, v_2^</em>))*</td>
</tr>
</tbody>
</table>

\(R > v_k > v_k^*\)

Each group has two available strategies: to fight or not to fight. The outcome is war if both groups fight, and peace if neither of them fight. If one group starts to fight, then the other will start fighting as well, since their fighting efforts are complementary. The payoff to each group is given in the four cells. Payoff to group 1 is the first given payoff in the cell. If group 1 chooses not to fight, then group 1 will receive payoff \(v_1\) and group 2 receives \(v_2\). Since the payoff, \(R\), from fighting is higher than \(v_2\), group 2’s best strategy is fighting if
group 1 chooses to not fight. Following the same argument, if group 1 chooses fighting, group 2’s best strategy is to fight. Fighting is a dominant strategy for group 2. The best strategy for group 1 is also to fight whether or not group 2 chooses to fight. If one group chooses not to fight, it will fear that the other player chooses war. Then it receives zero payoff, and the other party gains control over the entire rent. Neither of the players is interested in zero profit, so they will both choose war. The Nash-equilibrium is marked with a star. Payoffs to the two groups are lower in equilibrium than they could be if the two groups choose to not fight; this is called the prisoner’s dilemma.

In Addison et al. (2000: 3), peace and conflict are relative conceptions. Low-intensity warfare or a temporary ceasefire agreement can be denoted as peace. The fighting effort in war could be maximal, and in peace the fighting effort is lower, but not equal to zero. I interpret Addison et al.’s relative conception as an outcome of peace being something less violent than war. In Angola, they have not experienced a long-lasting peace period in 40 years, except from the four years of peace from 1994 to 1998. Since the war has been going on for so many years, it is likely that long periods have been low-intensity war. Addison et al.’s (2000) relative concept of peace and war seems less applicable to Angola in the periods of low-intensity war. To me, peace is a situation where both groups’ fighting efforts are equal to zero, and this can be interpreted as a situation with a ceasefire agreement or peace agreement. The category of war denotes a low-intensity war. In the war period 1992-94, the civil war was cruel and could denote a high-intensity war, where the two sides’ fighting efforts were high. In this period, Addison et al.’s (2000) concept of war relative to peace could be more applicable to Angola. War could be associated with high-intensity war, and peace with low-intensity war. A greater part of the conflict in Angola has been a low-intensity war, so it is meaningful that the category of war denotes low-intensity war, and peace denotes peace agreement or ceasefire agreement.

Do we find the phenomenon of prisoner’s dilemma in the Angolan conflict? The length of the conflict in Angola, 40 years, may imply that it is a situation of prisoner’s dilemma that the two fighting groups cannot get out of. UNITA and FAA are using diamonds and oil respectively to finance their warfare. As the fighting goes along, the prize of winning the rent declines. Since there have been four different periods of war in Angola, the players should know from previous experience what the opposite party will choose. This implies that
it could be a repeated game and not a static game in Angola. In a repeated game, cooperation could result in Nash-equilibrium in peace if they both follow a trigger strategy. The peace agreements they have signed are attempts to cooperate. There is likely to be a duopoly game with cooperation in Angola, but still they end up in equilibrium with war.

In a duopoly without cooperation, the outcome is the prisoner’s dilemma and war. This is not the optimal outcome for the fighting groups, as we see from the payoff matrix. The problem in duopoly without cooperation is that the groups will not receive the highest possible payoff. They could be better off if they cooperated, so that the outcome could become peace. Cooperation could be a solution to the prisoner’s dilemma. In Section 3.2, I will discuss if it is possible to get out of the prisoner’s dilemma to equilibrium in peace.

3.2 Cooperation: A solution to prisoner’s dilemma?

As maximizing profit motivates both groups, they will be interested in receiving higher payoff. Higher payoff can be the outcome of cooperation and therefore a solution to the prisoner’s dilemma. With cooperation, both groups can receive a higher share of the rent, and therefore cooperation could be Pareto preferred to non-cooperation. If cooperation makes one party better off than before and does not harm the second, then cooperation is Pareto preferred to non-cooperation. Cooperation implies that the parties make promises about future behaviour that can affect behaviour today (Gibbons, 1992: 82). The fighting groups could avoid the waste of $\omega R$, if they could agree not to fight and instead share the rent (Mehlum & Moene, 2002: 9). This is called a repeated game. Participation constraint for a peaceful sharing of R is given by:

$$13) \left( \sigma_k - \rho_k^2 \right) R > 0 \text{, where } k = 1.2$$

$\sigma_k R$ shows group k’s share of the rent in a case with cooperation. $\rho_k^2 R$ is the expected share of R for group k if it wins the fight. If the share of the rent to group k, $\sigma_k R$, is higher
than the probability of winning two subsequent battles times the rent, the group will follow
the agreement. The participation constraint is like a trigger strategy. They continue to
cooperate until one of them cheats. If the groups make an agreement on no fighting for
future periods and this is broken in one period, then there will be fighting in all the
remaining periods (Sørgard, 1997). One mistake will negate the prospect of collusion
forever. Cooperation will result in a movement from point N to point C in Figure 1. At point
C, the fighting efforts of the groups are equal to zero.

The content of the agreement is important for the outcome of it. There are several ways to
share the rent between the groups. The following are three of the ways of sharing the rent, R
(Mehlum & Moene, 2002):

1. The rent is shared equally based on relative strength of the groups, e.g. \( \sigma_k = \rho_k \).
2. Sharing of the rent is based on economic strength, measured by \( \alpha_k \).
3. The rent is shared equally based on relative group size.

In number 1, the rent is shared such that group \( k \) receives its expected part of the rent. The
gain from peace equals the expected payoff from war, so the group will be indifferent
between fighting and not fighting. It is reasonable to assume that the groups will ‘have a
strictly positive gain compared to fighting’ (Mehlum & Moene, 2002: 10). A successful
cooperation is likely to occur if the rent is distributed in accordance with number 1. The
opportunity costs of the group can determine the group’s share of the rent. Sharing the rent
according to number 2 implies that the group with highest private earnings will get the
highest share of R. If a group has a low \( \alpha_k \), it may break the peace agreement, because it
can gain a higher payoff from fighting. In number 3, the agreement is likely to be broken
according to Mehlum & Moene (2002). If the rent is shared equally, the participation
constraint can be broken if, for example, one of the groups has few members but they are
efficient fighters. It is subject to be broken if a large part of the population is not part of a
fighting group.

Next, I make a brief review of the content in the peace agreements in Angola.
3.2.1 Peace agreements in Angola

There have been several attempts to solve the long, violent conflict in Angola. The two main parties as well as several outside powers have signed three peace agreements. The Alvor Accords were signed in January 1975 between Portugal and MPLA, FNLA and UNITA. The first peace agreement between MPLA and UNITA, called the Bicesse Accords, was signed in May 1991. The next agreement, building on the one from 1991, was the Lusaka Protocol, signed on 20 November 1994 between the government and UNITA. The New York Accords, signed by Angola, Cuba and South Africa in December 1988 and concerning external disengagement, should also be mentioned in this context. These agreements can be seen as cooperation between the parties to the conflict.

In the previous section, I discussed how cooperation could be a solution to the prisoner’s dilemma, depending upon how the rent is shared. I will now briefly review the two last peace agreements, which were between FAA and UNITA. These are the two groups I model the conflict between, and there are today still tensions between them.

According to Hodges (2001: 13), the content of the Bicesse Accords was as follows: ‘The Accords provided for a ceasefire, the quartering of UNITA troops, the formation of a new unified armed forces, the demobilization of surplus troops, the restoration of government administration in UNITA-controlled areas and multi-party parliamentary and presidential elections’.

The democratic election in 1992 was the reason that this agreement was broken, because Jonas Savimbi judged the election as unfair. MPLA won the elections with 54% against UNITA’s 34% of the votes. Jose Eduardo Dos Santos won the presidential elections against Savimbi. Although UN declared the elections fair, UNITA accused the government of ‘stealing the election’ (Hodges, 2001: 14). Analysts of the 1991-92 peace process give four more reasons for the renewed outbreak of war: the UN’s resources and mandate were insufficient; the time-frame for reaching the goals in the agreement was too short; the elections were held in a dangerous context with large rival groups; and power-sharing was not mentioned in the accords (Hodges, 2001).
In the Bicesse Accords, the sharing of R was not mentioned, and this is a requirement for the peace process to succeed. If the parties could have agreed on a peaceful sharing of the rent, it could have reduced the probability for outbreak of war, according to the model. The analysts feared that the lack of power-sharing in the agreement could increase both sides’ stakes (Hodges, 2001: 14). If the two groups still controlled all the oil and diamond reserves, both would have an interest in continuing the fighting in order to extend resource control. An important assumption behind the model is that they maximize profit. That implies that as long as there is not a single party controlling both the oil and diamond reserves, FAA and UNITA will have incentives to fight until one of them controls the whole rent.

The Lusaka Protocol was signed on 20 November 1994, and the contents were the following: “The protocol technically marked the end of Angola’s brutal and costly “Third War.” The Lusaka Protocol provided for a ceasefire, the integration of UNITA generals into the government’s armed forces (which were to become non-partisan and civilian controlled), demobilization (later amended to demilitarization) under U.N. supervision, the repatriation of mercenaries, the incorporation of UNITA troops into the Angolan National Police under the Interior Ministry, and the prohibition of any other police or surveillance organization” (Human Rights Watch, 1999: The Lusaka Protocol).

In 1998, President dos Santos stated: ‘Angola had to wage war to achieve peace’ (Human Rights Watch, 1999: Chapter 4). This was stated after the UN had withdrawn large parts of its peacekeeping troops in 1997, and after sanctions against UNITA and violations of the ceasefire in 1995, 1996 and 1997. The main reason for his statement was that UNITA continued to evade. A distinction between these two agreements was that the later one included guidelines for power-sharing. According to the model, this agreement could have had higher probability of resulting in long-lasting peace. The outcome of the peace agreement depends on how the power-sharing was regarded, and if it included recommendations concerning sharing of the rent. Sharing of power and control over the rent in a manner that satisfies both groups is important to establishing lasting peace. If power-sharing included sharing of the rent, they could succeed. I do not know the details of the power-sharing, but an imagined course of events could be the following: FAA has few members but efficient fighters, and is not satisfied with their share of the rent because it is too small.
Three peace agreements have been broken during the four decades of conflict. The two peace agreements in 1991 and 1994 between FAA and UNITA could have been broken because of mistrust. The one group does not trust that the other will keep to the agreement, since they have experienced broken agreements earlier and a long period of conflict. In the next section, the problem of credibility will be discussed.

3.2.2 Credibility problem

In a repeated game like the one of cooperation, credibility is of important concern. The promises the groups make about future behaviour can affect behaviour today (Gibbons, 1992). The two parties follow a trigger strategy, and if this is broken in one period, there will be fighting in all the remaining periods. ‘The theory therefore illuminates a recurring problem – that of credibility – which is frequently encountered in processes to end civil wars’ (Addison et al., 2000: 7).

In Angola, there could be a mutual credibility problem. Neither of the two fighting groups believes that the opposite party will keep the agreement, since they have a long history of conflict and broken agreements. After the elections in 1992, UNITA returned to war because it condemned the elections as unfair. This can lead the government mistrust to UNITA. Addison et al. (2000: 8) state: ‘The Angola conflict is also a tragic example of the credibility problem; the credibility of UNITA in any future peace agreement is now very low – at least under its present leadership’. Savimbi was killed in 2002, so the leadership of UNITA has changed, and this may raise the hope for a future peace agreement to succeed. On the other hand, UNITA has reason to distrust the government since the president declared that war was the only solution for peace and broke the peace agreement from 1994. The reason for his statement was UNITA’s evasion.

It seems that the prisoner’s dilemma is a recurrent problem in Angola. If the outcome turns out to be a situation related to the prisoner’s dilemma, the society will also experience a loss, because resources are used for fighting instead of in production. A situation of war results in huge losses for the society. Equally strong groups will result in the biggest loss for society,
whereas with one strong group, the loss will be smaller. In Section 3.2.3, I discuss social waste.

### 3.2.3 Social waste

Using qualified labour as soldiers instead of as producers will result in an efficiency loss for the society, because the resources are not allocated efficiently. In the model, the loss for society is measured in terms of efficiency. Social waste is given by:

$$ W = \alpha_1 y_1 + \alpha_2 y_2 $$

$\alpha_1$ and $\alpha_2$ are the groups’ opportunity costs, showing lost production in each group as a result of fighting and not producing. Society’s loss ($W$) is the sum of opportunity costs. Mehlum & Moene (2002) emphasize that their measure of social waste is conservative and underestimates total social waste. $W$ is a material measure taking into account only lost production and not damage of the surroundings such as destruction of oil and diamond reserves, loss of life and human suffering. It is likely that $W$ is higher than the model predicts. $W$ shows society’s loss when people are used as soldiers and not as producers; this indicates how hard the fighting is. The loss to the society increases when $R$ increases. The two groups maximize profits, and when $R$ increases they will increase their fighting effort. This is a loss for the society because people are used as soldiers and not as producers. If the groups are not motivated by profits, an increased $R$ will not change their effort, and then $W$ is also unaffected.

The measure of total waste of the society, $W$, emphasizes efficiency in production without considering distribution. In Angola, the president is powerful, and if he receives a large part of the rent without fighting, there is a small loss for the society. If the president gets hold of the rent through fighting, the loss to the society will increase. In a situation with centralized power around the president, who is also corrupt and grabs a large part of the rent, there will not be a big loss for the society. According to the model, $W$ is low in such circumstances. In Angola, if the president gets hold of the rent without fighting, the society will not suffer a loss.
The size of the loss for society depends on the relative power of the groups, as I will show in Section 3.2.4.

### 3.2.4 Waste ratio and power dominance

The measure $\mu$ is used for the concentration of firms’ market shares. It could also be interpreted as a measure of the power dominance of the groups. Power dominance, $\omega$, is the probability that the same group will win two subsequent battles. Power dominance and fraction of social waste are inversely related (Mehlum & Moene, 2002: 6):

$$19) \quad \omega = 1 - \mu$$

With a high $\mu$, one of the two groups has power dominance and the stability of the winners is high. There is a close relationship between the fractions of rent wasted. Waste of rent is the share of $R$ that is lost in a violent conflict. The relationship between power dominance and social waste is shown in Figure 2.

**Figure 2: Power dominance and social waste**

![Diagram](source: Mehlum & Moene (2002).

In Figure 2, the horizontal axis shows the relative power between the two groups, whereas the vertical axis shows the power dominance and the social waste. In the figure, we see that $\mu$ and $\omega$ are inversely related. When $\alpha_1 / \alpha_2 = 1$, the two groups are equal. In such a situation, the social waste is $\frac{1}{2}$ and stability is $\frac{1}{2}$ (Mehlum & Moene, 2002).
How are the power dominance and social waste in Angola? In Angola, the parties have probably been equally strong for a long period. The government has controlled the major oilfields, and the rebel group has been in control of some of the most important diamond areas. Oil and diamonds have been of major importance for sustaining the long-lasting conflict in Angola. Four decades of war indicates that neither of the two fighting groups is stronger than the other. If this were not the case, the conflict could have ended with one clear victor. As we saw in Section 2.3, many public sectors declined during the 1990s; in fact, they have been reduced since the mid-1970s. A great part of the population subsists from informal sector work. The government has given priority to defence and public order, growing from 24.6% of government expenditure in 1993 (IMF, 1999) to 41% in 1999 (Hodges, 2001). This indicates that the efficiency loss for society has been large during the conflict, since a large fraction of the workforce has been used as soldiers instead of as producers. According to the model, the loss for society is largest when the two groups are equal. In the last years of the conflict from 1998, the relative strength between the fighting groups has changed. The government army became gradually stronger, as it received rising revenue from oil. UNITA was weakened because it lost control over diamond areas and sanctions were implemented against diamond sales. The relative strength between the parties may have changed because the government’s opportunity costs could have declined and the stability increased and waste decreased. If, for example, FAA has zero cost, then $\alpha_1/\alpha_2 = 0$ and there is no social waste because it has absolute power. Reducing waste or the efficiency loss for society will take time, because there is a need to diversify the economy and build up the sectors to create new employment opportunities.

To summarize Chapter 3: According to the model, the parties will end up in Nash-equilibrium in war if they follow their dominant strategies. Two broken peace agreements between the Angolan government and UNITA indicate that the parties find it difficult to cooperate, and this supports $H_1$. The war ended without reaching a new peace agreement. It was a ceasefire agreement followed by the dismantling of former UNITA forces that ended the war. This can be a sign of dissatisfaction within UNITA, since it may be too weak to continue fighting. If the war ended without a peace agreement that satisfies both, it is likely not a lasting peaceful solution. A sharing of the rent that satisfies both is required to establish a long-lasting peace, and that has not happened so far, so $H_1$ is not rejected.
In the model, it is assumed that the parties are motivated by profit. If $R$ increases, the groups will increase their fighting effort, because there is potential to increase their income. We can see this from equations 1), 5) and 6). If the estimates of the diamond and oil reserves reveal that Angola is a rich country, then FAA and UNITA will find it worthwhile to fight for $R$, resulting in an increased extent of the fighting. If something reveals that the rent is lower than the groups had expected, the conflict will be reduced, because both parties will lower their fighting effort. The government in Angola keeps income from oil secret, and income from diamonds is highly uncertain since much of the activity is in the informal sector. The government army could therefore have a better estimate of the oil income than UNITA, and it is possible that UNITA has better information than FAA on the size of the diamond income. FAA and UNITA fight in the light of total $R$, meaning the rent from both diamonds and oil.

In Chapter 4, I try to find out if the oil companies can solve the Nash-equilibrium in war. The oil companies could reveal the size of the rent. If, for example, their reports of payments from oil in Angola show that the oil reserves are lower than expected, the extent of the violent conflict would decrease. In Chapter 4, I will discuss how the oil companies’ activity in Angola might change $R$ and how the conflict could be affected.
4. The role of the oil companies

The international oil companies are not included as an actor in the model. They are part of the government’s network and can influence the conflict through their activities. According to the model presented in Chapter 3, the oil companies can affect $y$, and $R$. The oil companies influence FAA’s fighting effort through the extraction rate of oil and their payments to the government. First, in Section 4.1, I will focus on how transparency through reporting of the oil companies’ income has an effect on the risk for conflict. I assume that the size of the oil companies’ investments is reflected in the rate of extraction of oil. In Section 4.2, I will examine the rate of oil extraction in Angola and see if it is optimal. The oil companies can also influence the oil rent. In this chapter, I will concentrate only on the reserves, revenue and rent for oil and not the role of diamonds. The focus is only on parts of $R$, because oil companies can have an effect on the conflict through their activity in Angola. I will discuss whether it is possible for the oil companies to end the prisoner’s dilemma. Finally, in Section 4.3, I criticize the model and discuss whether the warlords prefer low-intensity conflict to peace.

4.1 Increased transparency

Resource-dependent countries are more prone to conflict than countries with scarce natural resources. In Chapter 2, I discussed why Angola as a resource-rich country could experience natural resources as a curse. In Chapter 3, I modelled the long-lasting conflict with the two parties motivated by maximizing expected payoff. Angola has gone through over 40 years of violent conflict. Policy strategies have been tried during these years, but increased transparency, on the initiative of the IMF, regarding the government’s revenues has not yet been successfully implemented. In this section, I will consider increased transparency of resource payments to the government by the international oil companies as a possible policy instrument.
4.1.1 The oil companies’ responsibility

The oil companies face a dilemma when operating in Angola. On the one hand, they are involved in a country where UNITA and FAA commit widespread abuses against the civilian population, the poverty is extensive and war has been experienced for four decades. On the other hand, the Angolan oil industry is very promising for the oil companies. Also, there is a connection between the oil industry and the government’s repressive policies (Tvedten, 2000).

‘Paradoxically, despite the critical role played by international actors in sustaining undemocratic regimes, and their compromising effect on domestic affairs, the international norm of sovereignty is deployed to rationalize non-intervention in domestic political affairs of the country’ (White & Taylor, 2001). Some of the oil companies operating in Angola have stated that, in addition to business activities, they are they are taking a responsibility beyond profit maximizing:

‘Norsk Hydro’s challenges and opportunities in a country like Angola demonstrate corporate social responsibility in practice, says Hydro president and CEO Eivind Reiten’ (Hydro Oil and Energy, 2002). ‘We are, for example, supporting efforts initiated by the Angolan government with the International Monetary Fund to help Angola take measures to restore financial stability and improve the transparency and efficiency of its financial processes’ (BP, 2002).

‘The accounts covering our [Statoil] revenues and expenses in Angola are already in public domain, lodged with the Norwegian Register of Company Accounts at Brønnøysund and available on enquiry’ (Westgaard, 2001: 2).

So far, only BP has fully published its payments. It did so after Global Witness asked the oil companies operating in Angola to report their payments to the government from oil. In February 2001, BP reported the following to Global Witness:

- Total net production by block
- Aggregate payments by BP to Sonangol
- Total taxes and levies paid to the Angolan government
- Signature bonus payments

(Global Witness, 2001)

The other oil companies did not follow BP’s example, except that Statoil has published its payments in ‘Brønnøysundsregisteret’, but only in Norwegian. Statoil refuses to translate the accounts into Portuguese. Norsk Hydro has not published its earnings from the Angolan oil industry. A possible problem with increased transparency is that the most responsible oil companies, such as BP, will withdraw from a country like Angola, which is corrupt and risky to invest in (Ross, 2002). After BP reported its oil payments, its agreement with Sonangol was threatened (Transparency International, 2002b). This can give disincentives to the other oil companies operating in Angola. Although Angola has a high score on CPI, is it that risky to invest in its oil sector? Most of the oil is located off-shore, which lowers the possibility of attacks from UNITA, but at the same time it is a country that has gone through several years of violent conflict, making investment riskier. The IMF has signed a peace agreement with the government regarding increased transparency in public sector operations, the SMP. Next, I discuss the influence of transparency on the conflict.

4.1.2 How will increased transparency affect the conflict according to the model?

Reporting of oil payments to the Angolan government can increase or decrease the resource rent (R). Corruption and the lack of transparency today make it difficult to get information about actual oil revenues and the extent of the oil reserves. The two parties decide their fighting effort from the expected payoff from winning the war. I assume that FAA and UNITA have expectations regarding the size of the oil and diamond reserves, but they may not have enough information to get an accurate perception of R – it may be over- or underestimated. From their expectations, they will decide on their fighting effort. There is a probability that the groups have access to different information, so their expectations of R could differ. Since the government collaborates closely with the international oil companies, it may have access to more information about the oil reserves than the rebel group. The government could have expectations that are closer than UNITA’s estimates to the actual size of the reserves. If this were the case, the government army would increase \( y_1 \) and fight harder than the rebel group, because it would have information of higher rent than the rebels.
expect. The fighting effort of UNITA would also increase, since the fighting efforts are complementary. But \( y_2 \) would not increase as much as \( y_1 \).

In the literature, different estimates are given on the oil reserves. As I showed in Section 2.2.1, estimates on proven oil reserves vary from 5.4 to 12 billion barrels. Whether the groups expect the reserves to be 5.4 or 12 billion will affect the extent of the fighting, since the groups decide on the fighting effort based upon the size of the rent. As \( R \) increases, the extent of the fighting will increase. Let us assume that the reserves are 12 billion barrels. The group with expectations closer to 12 billion will fight hardest. If \( y_1 \) is higher than \( y_2 \), FAA will have the higher probability to win the war.

The oil companies can reveal the true size of the oil reserves, for example 12 billion barrels. The reporting of their revenue from oil could reveal that the rent is lower or higher than the fighting groups expected. The reporting of oil payments can reveal that \( R \) is higher than the two groups expected. If the resource rent increases, the extent of the war will increase, because the parties are maximizing profit and see the opportunity to increase their expected payoffs. The extent of the war consists of fighting effort for groups 1 and 2. If UNITA thought the reserves were 5.4 billion but gets more information from the reporting of the oil revenue, its expectations can change. If increased transparency reveals that the reserves are 12 billion, it will increase its fighting effort. Increased transparency may reveal that the resource reserves are lower than the parties expected. Then, there will be less to fight for, and the extent of the fighting will consequently decrease.

It is uncertain whether increased transparency will reduce or increase the extent of the conflict. That depends on whether the reporting reveals a higher or lower \( R \) than the parties to the conflict expected. The outcome of \( H_2 \) is uncertain. One may argue that since the payments from the oil companies to the government are kept secret, it is likely that the rent is higher than the parties expected. If increased transparency reveals that \( R \) is higher than expected, the hypothesis is rejected, since a higher rent will increase the extent of the fighting, according to the model. This result is contrary to the increased transparency recommended by the IMF.
Today, there is peace in Angola, so the oil companies’ reporting could create dissatisfaction in UNITA if the number reveals that the rent is higher than expected. UNITA could find it unfair that the government controls the oil and uses a large part of it for its own purposes. If UNITA is motivated by grievance, this could be a reason for the conflict to start again. If the rebel movement is motivated by profit, it could find it worthwhile to organize a new army to fight for the rent.

It is fair to assume that FAA and UNITA are well informed about the value and size of the oil and diamond reserves, since it is in their interest to get control over the resources. Information on the reserves is of major importance for these groups, and therefore they will make efforts to collect this information. Since the value of the reserves is of highly relevance for them, it is reasonable that the groups have similar expectations of R, and that both know the true size of the reserves. Increased transparency in the oil revenue will have no influence on the extent of the fighting or risk for further fighting, because the parties already have accurate expectations of the reserves.

Using the model to investigate the outcome of the oil companies’ activities on the extent of the fight is a partial analysis. The expectations of the civilian population of the size and value of the reserves can also affect the conflict. In the model, the expectations of Angolans are not included. Increased transparency can affect their expectations, which in turn can have an influence on the extent of the conflict. Increased reporting of oil payments from the oil companies may reveal that the reserves are higher than the population expected. If this is the case, they can require a larger share of the income from oil. If the population receives a higher share of the rent, there would be less for FAA and UNITA to fight for. When there is less to fight for, the government and the rebels will reduce their fighting efforts, and the extent of the fight will decrease. In a situation with peace, as today, the risk of further conflict will be reduced since there is a smaller rent. I find support for my second hypothesis when accounting for the effect increased transparency may have on the expectations of the population.
4.2 Rate of oil extraction

An optimal rate of extraction will maximize the value of the resource. The administrator of the natural resources will make a decision on whether it is more profitable to extract all of the non-renewable resource today or wait until the next period. Assume that there are two periods, 0 and 1. In Section 2.1, I used a definition of non-renewable resource whereby it existed in a fixed stock. But this is not always true, because new discoveries can be made such that the existing stock increases and new technology can make previously unprofitable operations profitable (Perman et al., 1999). The oil companies can change the rent in two ways: either the reporting of their oil revenue reveals a higher rent than the fighting groups expected, or new discoveries are made such that the proven oil reserves increase.

I assume that the oil companies decide the extraction rate of oil, since only they have the sufficient technology. A conflict can arise between what is optimal for the oil companies and what is a socially optimal extraction policy. The oil companies can apply a short-term profit mentality that can lead to an extraction rate that is higher than optimal. The use of oil by the government in warfare between UNITA and FAA is also an argument for a higher extraction rate than optimal, because the discount rate is likely to be high in Angola. The revenue from oil and diamonds is of high value for the groups today, since they need money to finance the war.

4.2.1 The optimal extraction rate

The optimal extraction rate for a non-renewable resource can be decided as follows. This section is based on Perman et al. (1999). The quantity extracted in period $t$ is $R_t$. Demand is given by $P_t = a - bR_t$, where $a$ and $b$ are positive constants. Gross social benefit can be expressed by:

$$B(R_t) = \int_{0}^{R_t} (a - bR_t) dR = aR_t - \frac{b}{2} R_t^2$$

Gross benefit, $B$, depends on the quantity of the resource.
There is an extraction cost, \( C_t = cR_t \), so the total net social benefit from extraction is given by:

\[
NSB_t = B_t - C_t
\]

(1) \( NSB(R_t) = \int_0^R (a - bR) dR - cR_t = aR_t - \frac{b}{2} R_t^2 - cR_t \)

We want to find the socially optimal extraction rate for two periods. The two-period welfare function is \( V = V(U_0, U_1) \), which can be written \( V = NSB_0 + \frac{NSB_1}{1 + \rho} \).

The problem is to choose how much to extract in two periods such that the welfare of the society is maximized. We assume that the resource stock lasts for two periods:

(2) \( R_0 + R_1 = S \)

where \( R_t \) is the quantity extracted in period \( t \), and \( t = 1, 2 \). \( S \) is the total stock of the non-renewable resource.

We maximize social welfare subject to the constraint that total extraction of the resource equals \( S \):

\[
\max_{R_0, R_1} V = NSB_0 + \frac{NSB_1}{1 + \rho} \quad \text{subject to} \quad R_0 + R_1 = S
\]

NSB is the total net social benefit.

Using Lagrange, we get the following:

(3) \( L = V - \lambda (S - R_0 - R_1) \)

\[
= (NSB_0 + \left( \frac{NSB_1}{1 + \rho} \right) - \lambda (S - R_0 - R_1)
\]

Inserting \( NSB_t = aR_t - \frac{b}{2} R_t^2 - cR_t \), \( t = 0, 1 \)
\[
(aR_0 - \frac{b}{2} R_0^2 - cR_0) + \left( aR_1 - \frac{b}{2} R_1^2 - cR_1 \right) + \frac{\lambda}{1 + \rho} (\bar{S} - R_0 - R_1)
\]  
(4)

First-order conditions:

\[
\frac{\partial L}{\partial R_0} = a - bR_0 - c + \lambda = 0
\]

(5)

\[
\frac{\partial L}{\partial R_1} = a - bR_1 - c + \frac{\lambda}{1 + \rho} = 0
\]

(6)

Rearranging the first-order conditions, we get the following:

\[
a - bR_0 - c = \frac{a - bR_1 - c}{1 + \rho}
\]

Inserting \( P_1 = a - bR_1 \)

\[
P_0 - c = \frac{P_1 - c}{1 + \rho}
\]

(7)

where \( P_0, P_1 \) is gross prices and \( P_0 - c, P_1 - c \) net prices.

Rearranging the expression, we get:

\[
\rho = \frac{(P_1 - c) - (P_0 - c)}{(P_0 - c)}
\]

(8)

From (8), we see that the Hotelling rule is a necessary condition for the optimal extraction rate. Hotelling’s rule states that ‘the social utility discount rate … embodies some view about how future utility should be valued in terms of present utility. The right-hand side is the proportionate rate of growth of the resource’s net price’ (Perman et al., 1999: 189). The net price of the resource is also denoted resource rent or resource royalty, and is presented by \( R \) in the model. The discount rate is decisive when deciding the efficient extraction. The
social utility discount rate reflects the time preference of the society (Perman et al., 1999: 188), showing how future utility is valued in terms of present utility. The socially optimal extraction is decided by Hotelling’s rule, implying that the social utility discount rate equals the proportionate growth rate of the net price of the resource. The growth in net price or the resource rent should equal the discount rate that society chooses. If the discount rate is 0,1, the net price should grow 10% over time. The discount rate is the interest rate.

It is reasonable to assume that for a non-renewable resource, for example oil, the price is subject to increase over time. The manager of the resource will compare the interest rate from the revenue he receives from selling the oil today against the expected oil price in the future if he is waiting till the next period to sell the oil. The decision depends on the discount rate. With a high discount rate, meaning a high interest rate, the resource manager will choose to extract a large part of the resource today, because selling the non-renewable resource will give him large revenue. A low discount rate makes it less attractive to extract the oil in this period, since a higher oil price is expected in the next period. The non-renewable resource is given and cannot increase over time.

Next, I investigate the extraction rate of oil in Angola. There could be a discrepancy between the socially optimal extraction rate and the rate that is optimal for the warlords and the oil companies.

4.2.2 The extraction rate of oil in Angola

According to the model, the extent of the fight will increase if there are large resources to fight over. Angola is assumed to have two of the most productive oil fields in Africa (Malaquias, 2001: 524). Expected oil reserves are estimated to be 15-20 billion barrels by 2010 (Clarke, 2001). Let us assume that Angola has a large R that will increase the extent of the war, which in turn will increase the extraction rate of oil and diamonds. When the two fighting groups increased their fighting effort, they had to finance it by extracting more oil and diamonds, to raise income to buy weapons and pay their soldiers. Oil and diamonds were of high value for FAA and UNITA during the conflict, because they wanted to win the war. They were motivated by profit and wanted to win the war to get control over both oil and diamond reserves.
The sizes of the oil companies’ investments decide the rate of oil extraction. During the 1990s, their investments grew, and this can increase the extraction rate and the extent of the fight. The foreign oil companies in Angola have invested around $8 billion in the oil sector (Dietrich, 2001b). Large investments in oil can increase the extraction rate. An increased extraction rate will also increase the rent, R, which may extend the conflict since the two groups are maximizing profits. If the investments were large in the last phase of the conflict, FAA could have been strengthened, since the extraction rate of oil can increase, and in turn give the group more oil revenue to buy more military equipment. Making the government sufficiently strong in the last conflict period could have resulted in deterring of UNITA.

When the fighting was going on between UNITA and FAA, the discount rate was likely to be high in Angola. The revenue from oil and diamonds was of high value for the groups, since they needed money to increase their winning probability. If, for example, FAA did not extract any oil during this period, it would not have been able to finance the warfare against their rival. It could risk losing the war and receiving no resource rent in the next period. Another imagined example is that UNITA extracted all the diamond reserves in this period and became very strong. The reason for the high rate of extraction was to become much stronger than the rival FAA. Then UNITA could win the war and get control over both oil and diamonds and receive the whole rent. The prize of winning the war was likely to be much higher for UNITA when the conflict was ongoing than if less diamonds are extracted today and the group loses the war.

The violent conflict could have influenced the extraction rate of oil and diamonds in the last phase of the conflict. It may have been higher than optimal, because FAA and UNITA used oil and diamonds, respectively, to finance their warfare. Each of the groups could have found it profitable to extract more of the resource in this period to increase its winning probability. Let us say that, for example, FAA used more income from oil, given that UNITA did not use more of its diamond income. If both reasoned in the same way, this could result in a Nash-equilibrium with a continuing war. It is possible to get a victor, with only one fighting group making itself stronger. But it is likely that both will do the same, that is, they will be equally strong and the conflict will continue. The loss for the society would have been high, and the prize of winning the war would decrease over time with the continuing war. It can be seen as a paradox that the government and the rebel group can
extract so much of the resources during the conflict that the prize of winning the war will gradually disappear. Sonangol does not have sufficient technology to extract oil themselves. The UN has placed several sanctions on UNITA, making transport and sale of diamonds more difficult. These two factors could have delayed the rate of extraction when the civil war was ongoing.

Large investments by the oil companies may be preferred to a higher level of transparency, since this can end the war. This could make the government so strong that it could win the war, or the rebels would be deterred. If one of the two happened, it might not be a good solution, because it is reasonable to assume that UNITA not would be satisfied with the outcome.

Present and future generations in Angola will get a higher value from oil with a lower rate of extraction than today. The revenue from oil could last longer than if all is extracted and all revenue is used today. A lower rate of extraction gives a higher gain on the remaining production, because a higher oil price will be expected in the future (Brekke, 1998). This is an argument for a lower extraction rate than today. The maximization of the value of the resource, with an optimal extraction rate, has to be evaluated against a higher rate than optimal. A higher rate of extraction than optimal during the conflict may increase the possibility for peace, whereas with an optimal rate, the two groups may be equally strong, resulting in a continuing war.

In Angola, the oil is state owned. Much of the revenue from oil has been used to finance FAA’s military expenditure. Their military expenditure is estimated to be $400 million in 1997 and $840 million in 1998 (De Beer & Gamba, 2001). The majority of Angolans have not received their part of the oil revenue, because little of the money has gone to invest in infrastructure and sector development. The rent from oil has, apart from being used to military equipment, gone to enrichment of leading families of the regime. A country’s non-renewable resources are often thought of to not belong to anyone, but that everyone should benefit from the oil revenue. In Norway some of the revenue from oil is saved in a fund. This will guarantee that also future generations will get their part of the oil revenue. The extraction rate of oil in Norway is such that the value of the oil reserves is maximized.
It has been peace in Angola for one year now with the ceasefire agreement signed on 4 of April last year. In addition 85,000 former UNITA soldiers demobilized and came under the control of the Angolan Armed Forces. Why did this happen without a signing of a new peace agreement? I still assume that both parties are maximizing expected payoff. If the parties decided to cooperate and reached a ceasefire agreement then expected payoff from cooperation should be higher than expected payoff without cooperation. This we can see from the participation constraint in equation 13). The question is why UNITA agreed on an agreement without profiting from it. One possible answer could be that FAA paid the rebel group a sum of money that is unknown. Another answer is that FAA could have been so strengthen in the last war period, because the interest from international oil companies to invest in the Angolan oil sector is growing so their income from oil has increased. An increased rate of extraction of oil as a result of large investments could have ended the war, because the rebel group was deterred.

Large investments, or a higher extraction rate than optimal, can be of interest for the warlords and the oil companies. In both peace and war the oil companies could have a potential interest in a higher extraction rate since profits are received more rapidly. With a high extraction rate the government receives a higher share of the oil revenue. This can strengthen the government army, such that they can increase their probability of winning the war or deter UNITA. For the society a higher extraction rate than optimal results in a lower value from the oil reserves. If a high extraction rate can end the war, this may be preferred by the society rather than maximization of the value of the resource.

The model states as long as the groups follow their dominant strategy, they will end up in war with a lower payoff than in peace. Cooperation is the only way to solve the prisoner’s dilemma. In Section 4.3 I investigate if some members in the two groups prefer low-intensity conflict, and that the conflict is not a situation of prisoner’s dilemma.

4.3 Criticism of the model
In the model the prisoner’s dilemma is a recurring problem. Although cooperation between the government and the rebels results in higher payoffs for the groups and lower loss for the society, they end up in a non-cooperative equilibrium. This indicates that the two peace
agreements the parties have agreed upon have been broken, because one of the parties have cheated. In Angola the government and UNITA experience a credibility problem. This can indicate that it is desirable for some to maintain war like for example the warlords?

4.3.1 Groups gaining from war
Let me speculate on why it has been a long-lasting conflict in Angola. The two broken peace agreements indicate that the two parties to the conflict find it hard to cooperate, and find a peace agreement that satisfies both. Do the two fighting groups prefer peace to war? Is it really a situation of prisoner’s dilemma we find in Angola, as indicated by the model?

A conflict creates disorder, chaos and makes illegal activity possible. This creates possibilities for the powerful people in Angola to be corrupt, and grasp a larger part of the rent than would be possible in peacetime. Some of the people that can benefit from war are the following: ‘opportunistic businessmen, criminals, traders and the rebel organizations themselves’ (Collier, 1999: 9). Opportunistic businessmen could be the oil companies whereas rebel organization could refer to both FAA and UNITA. The people that prefers low-intensity war to peace is likely to be the ones that are powerful. Influential members in FAA and UNITA, such as the warlords could benefit on a low-intensity war, because war makes corruption easier. The warlords could get a higher share of the rent than they would get in peace. The soldiers in the government army and in UNITA and the civilians could lose in conflict. One could say that prisoner’s dilemma exists for the majority only, and not for the gaining groups in war. It could be that $v_k^*>v_k$ and that prisoner’s dilemma does not exist for the warlords. Groups that gain from conflict could take the initiative to sustain war (Paul Collier 1999). In table 6 we saw that when both groups played their dominant strategies the outcome was war, and lower payoff than if the two cooperated. It may be misleading to interpret the conception of rationality in this way when applying the model to a conflict situation. To be rational in a conflict context could be called warfare rational. It is not a dilemma when they end up in war, but it is a calculated move from the warlords in FAA and UNITA.

How can the oil companies reduce the profitability for the warlord of sustaining war? Let us assume that the government controls all the oil and the rebel group controls all the diamonds.
If the profit from being in war could be reduced, the warfare would be less profitable for the warlord. International sanctions against purchase of oil and diamonds from Angola could reduce the prize. Sanctions against UNITA have been done twice of UN, but sanctions against oil and the government has never been done. Or it could have been worked out an agreement between the oil companies and the government saying that the international companies would not establish in the country before the parties reach a peace agreement resulting in a sustaining peace. Then the profit from peace could be larger than from war.

The government is not able to extract oil and is dependent upon international oil companies to get revenue from oil. Taxes and other payments by the oil companies is an important source for the government to buy weapons for, since it is only one oil field that is in production. Payments from the oil companies are an important financing source for the government in the conflict. Without the oil companies presence in Angola it may not have been possible for the government to finance its warfare against UNITA, and there would not have been a war.

According to the model the war would have ended if one of the parties were so strong that it could deter the rival. For example could the growing payments from the oil companies strengthen FAA so much that the rebels would not it worth to continue fighting because the know the would lose. It is likely that UNITA would not have been satisfied with the outcome so this may not be a good solution to a conflict. Another way to end the war is if one of the groups wins the war and controls both resources. This may create dissatisfaction and repression of the other part, and is probably not the best solution.

Civil wars create economic opportunities for a minority whereas it destroys the opportunities for the majority. It is reasonable to assume that the loss for the majority is higher than the gain for the winners. This is an argument for a higher $W$ than the model predicts. According to Collier (1999) the economy of a country with civil war declines 2.2% per annum relative to its underlying growth path.

### 4.3.2 Society’s waste

The measure of society’s loss neither takes into account the destruction of resources, the ruin of the infrastructure, the internal displaced people or the people that have died in the war. In
Angola large agricultural areas are affected by land mines and cannot be used for cultivation. The country also has had many displaced persons, which only now are returning to their families. Equation 14) could be expanded to include losses for society other than the efficiency loss. A rewriting of 14) gives:

\[ W = \alpha_1 y_1 + \alpha_2 y_2 + c(y_1 + y_2) \]

Where \( c \) measure for example resources that are destroyed in the war and the destroyed infrastructure. Four decades of war implies that a large amount of natural resources are destroyed, and that the country have experienced losses that are irreplaceable. Measuring society’s loss in terms of the two groups’ opportunity costs only, may give a too small number on the losses for the Angolan population of four decades of war. If \( c \) is extremely high then \( W \) will also be extremely high. The measure on the loss for society will measure both efficiency and destroyed resources, and if it goes to infinite it will take several years without conflict to rebuild the country. The model indicates that soon it is peace in Angola the country will experience an efficiency gain, but extending the measure on society’s loss this it not certain.

4.3.3 Motives for the conflict

In the model an important assumption for the results is that the parties are motivated by profit. The conflict is ongoing because the groups want a larger share of the rent. It is maybe to simple to explain the conflict on behalf of only one motive. The motives for war could have varied during the history of the conflict, and it may be to simple to explain the motivation of the warlords as they are only motivated by profit. In this section I will use some articles by Collier & Hoeffler to discuss to what extent the parties are motivated by profit. Collier & Hoeffler distinguish between conflicts that are motivated by greed and by grievance. Conflicts motivated by grievances are wars that start as a politically motivated protest, whereas greed motivated fighting groups wants to maximize profits (Collier & Hoeffler, 2001). Different motives for war can affect the outcome of the war, whether the war continues or if peace is obtained. In Table 7, I speculate on the possible relationship between distribution of wealth and resources and the probability of war:
Table 7: Income distribution, motivation and the probability of war

<table>
<thead>
<tr>
<th>Motives/distribution</th>
<th>Equal</th>
<th>Unequal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grievance</td>
<td>No war</td>
<td>War</td>
</tr>
<tr>
<td>Greed/opportunity</td>
<td>War potential</td>
<td>War potential</td>
</tr>
</tbody>
</table>

1. When groups are motivated by grievance, and the income distribution is equal the probability of war is low, because when the different ethnic-linguistic groups in a country have equal income they will have no reason to protest.

2. When groups are motivated by greed, together with equally distributed income, there is a potential for violent conflict. War can create economic opportunities for some people, for example the warlords (Collier, 1999). Minority groups can benefit economically from war, whereas the majority mostly experience disadvantages.

3. When groups are motivated by grievance and the distribution of income is unequal there is a high probability for war. For instance, people with low income may establish rebel groups as a protest against unfair income distribution.

4. When groups are motivated by greed and income distribution is unequal, this is creating a potential for violent conflict, since low level of income gives few economic opportunities. A group can provoke armed conflict, because it gets the opportunity to increase profits in a situation of conflict.

4.3.4 Motives for conflict in Angola

In Section 2.1 I divided the 40 years of conflict in Angola into three phases. The first phase is the origin of the conflict; the second phase is characterized by external intervention and finally the civil war between UNITA and FAA from early 1990s. Under I will discuss the motives for conflict in the different phases.
The first war period from 1961-75 is called the ‘First War of Liberation’. According to Hodges (2001), oil and diamond resources were of little meaning for the origins of the conflict. First, the rival movements FNLA, MPLA and UNITA that wanted absolute power could be the reason for war. The motive could have been grievance, since the three liberation movements FNLA, MPLA and UNITA, representing different ethnic-linguistic groups, could not agree on a coalition government, a war started. Grievance could also be the motive for conflict if for example the three population groups had different access to the country’s natural resources. Angolans put the responsibility for the outbreak of the war on the political leaders of FNLA, MPLA and UNITA. According to Tvedten (1997: 36) personal ambitions of the leaders were more important for the outbreak of war than ideological differences. The motives could have been greed as well, as the political leaders could have started the war to get economic opportunities. A second reason for the outbreak of war in 1975 could have been that Portugal had not prepared the country for independence (Hodges, 2001). The Angolan population could have experienced repression from the colonial power. Repression and tensions between the different population groups are both grievance motives.

During the second phase from 1976-90, ‘The Second War of Liberation’, (Tvedten, 1997) external partners played an important role in the conflict. Natural resources did not provide the motive for the domestic actors according to Hodges (2001). The reasons for the Cold War rivals to get involved in Angola could have been related to its resource abundance, even direct economic greed. But there could still be tensions between the two national movements, and grievance could be their motivation for continuing the fighting.

The third phase, from 1990 to 2002, was a civil war between FAA and UNITA. From 1992 to 1994, there was a potential for ethnic fracturing in the conflict according to Hodges (2001: 28). Political factors and potential ethnic fracturing in the conflict could indicate that the continuing conflict was grievance motivated. The most important driving force for further conflict was Savimbi’s personal ambitions, and economic interests in controlling the state to get access to oil and diamonds (Hodges, 2001: 19). This could be a sign of a greed motivated conflict.

Greed or opportunity as a motivation for violent conflict has been of growing importance the last decade. In Angola it is conceivable that also grievance play a role in the conflict, but
greed may be seen as the most important factor. Collier & Hoeffler have in several papers found empirical support that greed motivates conflicts rather than grievance. In a paper by Collier (1999) he finds that economic agendas are motives for civil war rather than grievances.

To summarize: The first phase of the war was probably motivated by grievance, the next of economic greed of external partners and may be grievance of the two fighting groups and the last phase greed has had been an important reason. Economic greed as motivation for conflict has been an increasingly important motive the last ten years of the conflict. Actors that are taking directly part in the war and oil companies are likely to be motivated by economic greed.
5. Concluding remarks

Angola suffers from a long-lasting conflict and poverty. With a less unequal distribution of income the country’s poverty could have been reduced, since the country is assumed to have large resources. Increased transparency regarding the government’s revenue from oil could reduce the potential for conflict, since the population could require their part of the income and the warlords and oil companies’ profit from oil will be reduced. In my thesis, I have discussed the possibility of the parties to reach a peace agreement themselves. This appears to be difficult, so I have also discussed the oil companies’ activities in Angola and how they can reduce the conflict or help sustain the present peace situation. The activities I have looked at are increased reporting by oil companies of oil payments to the Angolan government, and the size of oil companies investments.

Angola is rich in oil and diamonds. For a long period, each of the two groups controlled one of the resources. The possibility to finance is war is a precondition for sustaining a prolonged fight. It seems like Angola has suffered from a long-lasting war since the two groups have had access to oil and diamonds. The war was ongoing for four decades and that indicates that no one of the groups is stronger than the other. With equally strong groups the efficiency loss for society is the largest, because manpower is used as soldiers instead of as producers.

Oil and diamonds has been a major cause for sustaining the conflict in Angola. The government army and the rebel group have used oil and diamonds respectively to finance the war. Cooperation has not succeeded, so it is likely that the prisoner’s dilemma is a recurrent problem. FAA and UNITA have signed two peace agreements; the first in 1991 and the second in 1994, but these attempts to cooperate have proven unsuccessful. The first agreement was broken the year after, whereas the second brought four years of peace. Mistrust between the parties is likely to be the reason why the agreements were broken. When the groups adapt a trigger strategy they will end the cooperation for all the remaining periods if one group cheats in one period.
Two broken peace agreements between the Angolan government and UNITA indicate that the parties find it difficult to cooperate and this supports my first hypothesis. The war ended without the reach of a new peace agreement. It was a ceasefire agreement followed by dismantling of former UNITA soldiers that ended the war. This can be a sign of dissatisfaction within UNITA since they maybe were too weak to continue fighting. If the war ended without a peace agreement that satisfies both, it is likely that this may not be a lasting peaceful solution. A sharing of the rent that satisfies both is required to succeed in finding a long-lasting peace, and that has not happened so far so $H_1$ is not rejected.

A third party, namely the oil companies, could possibly assist the country in achieving lasting peace. They can have an influence on the conflict through reporting of their income from oil and the size of their investments in the oil sector. The oil companies’ activities may resolve the prisoner’s dilemma. From a starting point increased transparency in oil revenue can both increase and decrease the risk for further fighting, depending on whether the numbers reveals higher or lower oil reserves than the belligerents expected it to be. On the one hand: Reducing the risk for further conflict seem not to be the case if the reporting of oil revenue reveals that the rent is higher than FAA and UNITA expects. A high rent without a peace agreement that satisfies both can increase the risk for further conflict. On this basis the test of my second hypothesis $H_2$ is uncertain.

In the case that increased transparency reveal that rent is higher than expected the hypothesis is rejected, since a higher rent will increase the extent of the fight, according to the model. One may argue that since the payments from the oil companies to the government are kept secret it is likely that the rent is higher than the parties expect it to be. This result is opposed to the recommendation of increased transparency in public finances by the IMF.

Reasoning outside the model and from the point of the civilian population instead of from the view of the warlords the results of increased transparency can differ. The expectations of the oil reserves of the Angolan population could be wrong. It is likely to assume that they have underestimated the oil reserves. Increased reporting of oil payments can change their expectations about the rent. If the reporting reveals a higher rent, the population could demand a higher share of the oil income. Then it would be less to fight over for FAA and UNITA. The risk for further conflict will then be reduced, and the poverty in the country can
decrease if the locals get their part of the oil income. Increased transparency could help sustain peace and in next turn establish the foundation for an equal distribution of income. In my thesis I have also discussed the potential influence of rate of oil extraction. The size of the oil companies’ investments is reflected in the rate of oil extraction. The rate was likely to be higher than optimal during the conflict, and this could have change the relative strength between the two groups. If the oil companies increased the rate of extraction, FAA could be strengthened, and this could have deterred UNITA from further fighting. If new fighting, starts FAA could be so strong that they wins the battle and gets control over the resource rent from oil and diamonds.

It is, however, possible to argue that the oil companies and warlords could have benefited from war, since the extraction rate is likely to be higher than optimal and since transparency is low. For some groups low-intensity war may be preferred to peace, since it is possible to grasp a larger part of the rent from oil and diamonds. The minority that can benefit from war is powerful and the consequence is that the majority suffers a huge loss for war. If the warlords get higher expected profit form war than in peace they can have a preference for conflict. One may say that in such a case the prisoner’s dilemma exists for the majority only, and not for the gaining groups in war.

It is possible to argue that a solution for a lasting peace in Angola requires a peace agreement that both groups are satisfied with, strong democratic institutions without corruption and a diversified economy. This should result in the income from oil and diamonds being distributed in a fair manner to the Angolan population, and not only to corrupt bureaucrats and to profit maximizing oil companies.
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Appendix 1 - Acronyms

FAA: Angolan Armed Forces
FNLA: National Liberation Front of Angola
MPLA: People’s Movement for the Liberation of Angola
PSA: Production-sharing agreement
UNITA: National Union for the Total Independence of Angola
SMP: Staff Monitoring Program
SONANGOL: National Fuels Company
Appendix 2 – Map of Angola

Source: Sited in Cilliers & Dietrich (2001:X)
Appendix 3 – UNITA’s partners

Source: Sited in Power (2001:495)
Appendix 4 – Oil blocks

Source: Sited in Clarke (2001:209)
Appendix 5 – Diamond areas

Source: Dietrich (2001:143)
Appendix 6 – Government controlled areas

Source: Sited in Le Billon (1999:30)
Appendix 7 – The model

1) $v_k = \rho_k R - \alpha_k y_k$ where $\rho_k = \frac{y_k}{y_1 + y_2}$ and $k = 1, 2$

Nash-equilibrium of the duopoly game:

Optimal fighting effort group 1:

2) $\frac{\partial v_1}{\partial y_1} = \frac{y_2}{(y_1 + y_2)^2} R - \alpha_1 = 0$

Equivalent for group 2

3) $\frac{\partial v_2}{\partial y_2} = \frac{y_1}{(y_1 + y_2)^2} R - \alpha_2 = 0$

Second order condition is fulfilled:

$\frac{\partial^2 v_1}{\partial y_1^2} = -\frac{y_2}{(y_1 + y_2)^4} R < 0$

Equivalent for group 2

$\frac{\partial^2 v_2}{\partial y_2^2} = -\frac{y_1}{(y_1 + y_2)^4} R < 0$

From 2) and 3) we get:

4) $\frac{y_2}{y_1} = \frac{\alpha_1}{\alpha_2}$

Group 1 and 2’s fighting effort, winning probability and expected payoff in equilibrium:

Fighting efforts in equilibrium:

From equation 2) we get:
\[
\frac{R}{\left(\frac{y_1}{y_2} + 1\right)^2} = \alpha_1 y_2
\]

\[
\frac{R}{\left(\frac{y_1}{y_2} + 1\right)^2} = y_2 \text{ make use of } \frac{y_1}{y_2} = \frac{\alpha_2}{\alpha_1}
\]

5) \[\frac{\alpha_1 R}{(\alpha_1 + \alpha_2)^2} = y_2\]

Partial effects:
A change in the size of R on group 2’s fighting effort
\[
\frac{\partial y_2}{\partial R} = \frac{\alpha_1}{(\alpha_1 + \alpha_2)^2} > 0
\]

Equivalent for group 1:
6) \[\frac{\alpha_2 R}{(\alpha_1 + \alpha_2)^2} = y_1\]

Probability of winning in equilibrium:
Make use of:
\[
\rho_1 = \frac{y_1}{y_1 + y_2} \quad y_1 = \frac{\alpha_2 R}{(\alpha_1 + \alpha_2)^2} \quad y_2 = \frac{\alpha_1 R}{(\alpha_1 + \alpha_2)^2}
\]

7) \[\rho_1 = \frac{\alpha_2}{\alpha_2 + \alpha_1}\]

Equivalent for group 2:
8) \[\rho_2 = \frac{\alpha_1}{\alpha_2 + \alpha_1} = 1 - \rho_1\]

Partial effects:
A change in group 1’s opportunity costs on the probability of winning for group 1
\[ \frac{\partial \rho_1}{\partial \alpha_1} = \frac{-\alpha_2}{(\alpha_2 + \alpha_1)^2} < 0 \]

A change in group 2’s opportunity costs on the probability of winning for group 1

\[ \frac{\partial \rho_1}{\partial \alpha_2} = \frac{\alpha_1}{(\alpha_2 + \alpha_1)^2} > 0 \]

Expected payoff in equilibrium:
Insert \( \rho_i, y_i \) in \( v_i \)

\[ v_1 = \frac{\alpha_2}{\alpha_1 + \alpha_2} R - \frac{\alpha_1 \alpha_2}{(\alpha_1 + \alpha_2)^2} R \]

\[ v_1 = \frac{\alpha_2}{\alpha_1 + \alpha_2} R - \frac{\alpha_1}{(\alpha_1 + \alpha_2)} \frac{\alpha_2}{(\alpha_1 + \alpha_2)} R \]

\[ v_1 = \rho_1 R - (1 - \rho_1) \rho_1 R \]

\[ v_1 = \rho_1 R - \rho_2 \rho_1 R \]

9) \( v_1 = \rho_1^2 R \)

Partial effects:

A change in \( R \) on the expected payoff of group 1

\[ \frac{\partial v_1}{\partial R} = \rho_1^2 > 0 \]

Equivalent for group 2:

10) \( v_2 = \rho_2^2 R \)

Reaction functions:

11) \( R_1(y_2) = \sqrt{\frac{y_2 R}{\alpha_1}} \)

12) \( R_2(y_1) = \sqrt{\frac{y_1 R}{\alpha_2}} \)
Condition for collusion:

13) \((\sigma_k - \rho_k^2)R > 0\)

Total social waste:

14) \(W = \alpha_1 y_1 + \alpha_2 y_2\)

\[ W = \alpha_1 y_1 + \alpha_2 y_2 = 2 \frac{\alpha_1 / \alpha_2}{(\alpha_1 / \alpha_2 + 1)^2} R = \frac{2\alpha_1 \alpha_2}{(\alpha_1 + \alpha_2)^2} R = oR \]

Partial effects of changing group 1’s war effort:

\[ \frac{\partial W}{\partial y_1} = \alpha_1 \quad \text{where} \quad \alpha_1 > 0 \]

15) \(\frac{\partial W}{\partial y_1} > 0\)

Partial effects of a change in group 1’s opportunity costs:

From 14) we get:

16) \(\frac{\partial W}{\partial \alpha_1} = \frac{2R\alpha_2 (\alpha_2 - \alpha_1^2)}{(\alpha_1 + \alpha_2)^4} = \frac{2R\alpha_2}{(\alpha_1 + \alpha_2)^3} (\alpha_2 - \alpha_1)\)

\[ \frac{\partial W}{\partial \alpha_1} \leq 0 \quad \text{when} \quad \alpha_2 \leq \alpha_1 \]

\[ \frac{\partial W}{\partial \alpha_1} \geq 0 \quad \text{when} \quad \alpha_2 \geq \alpha_1 \]

Partial effect on \(W\) of a change in the resource rent:

17) \(\frac{\partial W}{\partial R} = 2 \frac{\alpha_1 / \alpha_2}{(\alpha_1 / \alpha_2 + 1)^2} > 0\)

Partial effect on the probability of winning of a change in group 1’s fighting effort:

18) \(\frac{\partial \rho_1}{\partial y_1} = \frac{y_2}{(y_1 + y_2)^2} > 0\)
Power dominance and social waste:

19) \( \omega = 1 - \mu \)

Social waste after expansion of equation 14):

20) \( W = \alpha_1 y_1 + \alpha_2 y_2 + c(y_1 + y_2) \)
Appendix 8 - The groups’ opportunity costs

The cost of fighting effort for each group is given by $\alpha_1$ for the government army and $\alpha_2$ for UNITA. These are the opportunity costs. The opportunity costs measure how costly it is to use Angolans as soldiers and not as producers, and enters as a negative value in the expected payoff function. The opportunity costs of UNITA can be written as:

$$\alpha_2 = \frac{\gamma_2}{\beta_2}$$

Where $\gamma_2$ is the productivity of members of UNITA used as producers, and $\beta_2$ productivity if the members are used as soldiers. The opportunity costs, $\alpha_2$ can increase if $\gamma_2$ increases more than $\beta_2$.

If some of their members become producers instead of soldiers their opportunity costs is subject to increase. Working as a diamond digger in the alluvial deposits found in riverbeds requires no technical and advanced equipment, therefore it is easy for people to operate on their own (Global Witness, 2000:38). The country’s kimberlite deposits require more advanced equipment, and have not yet been exploited (Hodges, 2001:147). There are two sources that can increase UNITA’s opportunity costs. If some of UNITA’s soldiers choose to work as diamond diggers instead, their opportunity costs are likely to be higher. The second source is that diamond diggers working under UNITA becomes independent diggers. Since diamond digging, in the informal sector, is an important employment opportunity for many of the civilians in Angola it may be easy for UNITA to recruit diamond diggers. If it is attractive to stay in the business in need of wage, this can reduce UNITA’s opportunity costs.

Equivalent FAA’s opportunity costs can be written:

$$\alpha_1 = \frac{\gamma_1}{\beta_1}$$
The oil sector is the only sector growing in Angola. It is reasonable to assume that the soldiers of FAA could either work as a soldier or as oil producers. Many of the soldiers have long experience as fighters, since the war has been going on for such a long period. Angola has few educated people. Soldiers with low education and long experience as fighters could be afraid to start as oil workers, because they may end up as unemployed without a wage since they lack the experience that is required. This is an argument for FAA having low opportunity costs.

FAA’s fighters also have the opportunity to start working in other sectors of the economy. All sectors except from the oil sector have declined since the 1970s resulting in creation of few new jobs. The informal sector is an alternative place to earn the living for FAA’s soldiers. According to Dietrich (2001) informal diamond digging is one of the few ways to earn money for Angolans. As I mentioned earlier UNITA recruits soldiers to work as diamond diggers from FAA. FAA could lose soldiers to the informal diamond industry. If the do or not depends on the relative wage. It is likely that the soldiers of FAA have long experience and for many it is the most attractive way to earn their livelihood.