Financing and Risk Management of Investments in Mining Sector

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ABSTRACT

This study aims for investigating the process of mining investments and calculating the level of risk to which mining companies are exposed. As a mining firm gets involved in a project, there are many risks to be assessed including environmental, social and reputational risks. Therefore, the presence of a sustainable development framework in the mining sector helps to consider all dimensions of mining projects in order to mitigate the risk exposure.

As undeveloped mineral resources are mostly located in the jurisdictions with high levels of risk, project finance is often the preferred financing strategy in the mining investments. In addition, the host country where all the key players of project financing are involved in the related activities plays an important role in the appraisal and risk assessment of the mining projects.

Since it is not possible to investigate the mining sector in a single study, the gold mining firms are chosen as the target of this study. In this respect, top five gold mining companies are identified. Then, in order to address country risks affecting project financing of these firms' properties in different countries, this study suggests a methodology in which risk scores are calculated. These risk scores evaluate four basic categories of risks: political, commercial, technical and legal. A calculated risk score is comprised of surveys and rankings that are most relevant to the four risk categories.

Results show that the production percentage and the risk score of the host country in each category are important factors to the overall risk exposure of these gold mining

companies. In addition, higher risk scores are associated with less risky jurisdictions and vice versa. These findings could be as the first step in the appraisal of mining investments by financiers.

Keywords: Gold Mining Firms, Project Finance, Political Risk, Legal Risk, Technical Risk, Commercial Risk, Risk Scores.

ÖZ

Bu çalışma madencilik yatırımlarının sürecini incelemeyi ve bu yatırımlar sonucunda ortaya çıkan risk seviyesini hesaplamayı amaçlıyor. Bir maden firması bir projeye dahil olduğunda, birçok çevresel ve toplumsal riskler değerlendirilmelidir. Dolayısıyla maden sektöründe sürdürülebilir bir gelişme taslağının olması, ortaya çıkan riski azaltmak için madencilik projelerinin tüm yönleriyle düşünülmesine yardımcı olur.

Gelişmemiş mineral kaynakları çoğunlukla yargı yetkisinde yüksek risk seviyesiyle yerleştirildiğinden, proje finansmanı madencilik yatırımlarında sıkça tercih edilen finansman stratejisidir. Ayrıca projenin finansmanını sağlayan kilit oyuncuların yer aldığı ülke madencilik yatırımlarının değerlendirilmesi ve risk belirlemelerinde önemli bir rol oynar.

Madencilik sektörünü tek bir çatı altında incelemek mümkün olmadığından, altın madeni firmaları bu çalışmanın hedefi olarak seçilmiştir. Bu çerçevede öncelikle beş üst altın madeni firmaları belirlenmiştir. Akabinde bu firmaların farklı ülkelerdeki varlıklarınının proje finansmanını etkileyen ülke risklerini ele almak için bu çalışma risk skorlarını hesaplayan bir metodoloji önerir. Bu risk skorları dört temel risk kategorilerini hesaplar: politik, ticari, teknik ve hukuki. Hesaplanan risk skoru anketlerden ve bahsedilen dört risk kategorileriyle en ilişkili sıralamalardan oluşuyor.

Sonuçlar üretim kapasitesi ve evsahibi ülkenin her kategorideki risk skorunun bu altın maden firmalarının tüm ortaya çıkan riskde önemli faktörler olduğunu gösteriyor. Sonuçlar ayrıca daha yüksek (az) risk skorlarının daha az (daha çok) riskli

yargı yetkisiyle bağdaştığını gösteriyor. Bu bulgular madencilik yatırımlarının değerlendirilmesinde ilk adım olabilir.

Anahtar kelimeler: Altın maden firmaları, proje finansmanı, politik risk, hukuki risk, teknik risk, ticari risk, risk skorları

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INTRODUCTION

1.1 Background

Uncertainties are undeniable part of any investment. Mining investments are also potentially exposed to a variety of risks threatening the exploration, development and closure of a mine. As mining industry undertakes high levels of risks, investments usually demand heavy amounts of capital investments. In addition, these kinds of investments have longer pay-back periods in comparison with other types of businesses.

All the above points confirm the necessity of having an accurate risk assessment in the minerals industry. Identification of the nature of the risks associated with the projects enables the decision-makers to lead strategically. It is believed that the mineral industry development has significantly helped to the development of the global economy (Pedro Bueno Da Silva et al, 2012). In addition, the upward trend of the demand for commodities has caused the rapid growth of demand for the appraisal of mining capital projects. Moreover, in recent years, the trading system for commodities, information systems and mining industry technology have evolved greatly. Therefore, mining companies have started to diversify their investments all over the world. Diversification of assets requires a non-stop dynamic portfolio optimization plan which is not an easy task for mining company's mangers and decision-makers.

International gold mining companies have developed their gold production properties across different continents including developed and developing countries. The nature of mining activities and the scarcity of capital in developing countries results in a great demand for foreign capital to finance mining investments. Therefore, millions of dollars are transferred via international project financing to the mining investments by financial institutions and development banks. Creditors believe that country risk status of the project site is an important factor when evaluating the mining investments project-finance viability.

Using country risk as a reference is not a new concept. As many sources of information about countries are available and many agencies, institutes, think tanks and NGOs are actively involved in providing annual rankings, country risk and its impact on various issues has been studied extensively in the literature. However, country risk status and its impact on the mining project-finance, especially gold mining companies, is a niche topic of study.

1.2 Aim of the Study

Our objective is to contribute to the information for use by international creditors that will enable them to evaluate their investments in the mining sector. The importance of country risk is demonstrated by the fact that even if a project is commercially viable, its ability to service its debt depends on the host country policies, which are beyond the control of the project entity (Mansoor Dailami and Danny Leipziger, 1998). Creditors have to consider the required rate of return or cost of debt financing in a particular project in a given country. This required rate of return can be expressed as the risk-free rate of interest (benchmarked by the US treasuries or LIBOR) plus a variable reflecting the assessment of country-specific and project-specific risk. In this respect, the aim of this study is established in a framework

which compares the country risk status of the top-five gold mining companies that takes into consideration each of the countries in which these companies operate. In addition, a set of country risk indices are estimated for the various countries that are host to gold mining operations. In this situation, the value of the index for each country is introduced by weighting the key country risk factors that are relevant for the mining investments. The level of the index can provide an understanding of the degree of country risks facing the mining investments in these countries. This study provides a framework in which the top gold mining companies are identified. The risk factors affecting them are assessed. Then, the databases are used to rank the operating projects of those companies and the companies' operating countries risk scores are calculated. Finally, risk scores are compared to discuss how different countries can affect gold mining firms distinctly.

1.3 Thesis Structure

A review of the related literature is done in chapter 2. The literature review is followed by chapter 3 that undertakes discussion of mining project financing and its associated risks. In chapter 4, the proposed research methodology of the study is described in detail. Chapter 5 depicts the results and outcomes of the analysis. Finally, conclusions and policy implications are addressed in chapter 6.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

As a financial institution gets involved in a project, there are many risks to be assessed including environmental, social and reputational risks. The environmental dimension of mining projects should deal with air and water pollutions, waste byproducts, environmental footprint and legacy issues. Similarly, the social dimension also plays an important role in the risk assessment of mining investments. Communities sometimes consider the mining companies as the central governments who are responsible to provide tangible benefits for the nearby communities. Therefore, mining companies are under scrutiny by many parties varying from governments to communities. Any failure by these companies would result in a negative reputation for both the respective company and the financial institution. Hence, the importance of sustainability in the mining sector is undeniable.

The mineral industry is among the most environmentally aggressive industries. In addition, mining operations result in air and water pollutions in the surrounding region and also use great amounts of power and energy sources. On average, waste byproducts account for approximately 99 percent of the total extraction. Although it is not possible to omit all environmental damage, there are some precautionary processes to mitigate these impacts (N. J. Coppin, Kevin d'Souza, 1999).

2.2 Sustainability in the Mining Sector

Mining is fundamentally known as an unsustainable activity by some groups, since this activity involves the exploration and development of non-renewable resources. The other point of view observes mining investments as production opportunities held by mining companies as production agents that enable the countries or communities to generate sustainable development. Moreover, in this point of view, values of non-renewable resources are classified as economic rents which are flowing wealth to countries and communities (Jonathon Porritt, 2005). Policy makers and industry leaders face this challenge and produced a variety of consequences.

National wealth determines a society's national income and well-being of the economy. National wealth consists of productive assets, natural capital, and human capital. Economic sustainability is generally accepted as keeping national wealth non-decreasing over time (Pearce et al. 1989). National economic accounts do not take into account the depletion of natural capital. These accounts record mineral exploitation as entirely a GDP contribution, but do not consider the loss of wealth caused by depletion. To provide a more accurate evaluation of sustainable development, environmental accounts can be employed which are helpful in estimating the cost of minerals depletion (United Nations, 1993b and 2001).

2.2.1 Hardin's Tragedy of Commons

In 1968, a concept was introduced by Hardin to explain how a conflict is created between individual interests and common good (Hardin, 1968). Hardin's statement indicates that a finite resource which is available freely could be over-exploited. In addition, he adds that an unlimited demand by an individual to satisfy personal interests would cause this process.

To serve all mutual benefits in a society, people need to accept a set of basic rules. So, these rules would act as a social contract in order to guarantee the presence of fairness. In addition, we are in a trade-off of social or professional conduct. In other words, our benefits are directly tied to social or professional behavior of others where their benefits are also tied to our social or professional behavior. Therefore, responsible acting is the only way to support the commons (Krol, 2001).

2.2.2 Sustainable Development in the Mineral Industry

As mentioned above, there should be a framework to serve the commons' interests. Sustainable development framework concerns about three issues: environmental, economic and social (Pearce, 1988). In the following sections, we develop this framework according to the mining activities.

Mining activities are attached to a series of environmental outcomes from the first phases of a mine creation up to the last phase. In addition, the types of pollutions depend on the mineral material which is being mined and the operation method.

Globally, there are lots of worries about the increasing amounts of emissions caused by the industrial activities. The mineral industry is also exposed to these issues. Therefore, there has been a worldwide effort to decrease the level of emissions of harmful components generated by the mining processes such as sulfur dioxides, nitrogen and etc. In addition, ore handling process causes air pollution in the surrounding environment. To sum up, environmental conditions should be carefully monitored regularly and safety standards should be kept at their best level.

While environmental management is being discussed, a sustainable rate of development should be taken into consideration. So, natural resources could be

divided into two categories: Renewable Resources and Non-renewable Resources. Each category has its specific sustainable rate of utilization. Technically, the sustainable rate of use for a renewable natural resource should not be more than the rate which it can be regenerated. Similarly, a non-renewable resource should be extracted with a sustainable rate of use lower than the rate of substitution by a renewable resource.

Socially, mining companies are expected to be responsive to the impacts exposed to the community due to their activities. To make a summarized list of potential impacts, one can mention labor safety, AIDS reduction programs, stakeholder engagement, human rights and closure plans of mining operations. In addition, it is believed that the communities who are suffering a larger extent of environmental impacts are simultaneously the lowest beneficiaries of the mining developments (Hanley and Atkinson, 2003).

It has been claimed that mining activities are not well-managed in order to reach the long-run sustainable development in economies. Therefore, a mining company which is going to maintain sustainable economic development should consider not only the common traditional factors such as sales value, costs and debts, but also the interests of the public and governments. Limiting the investments in infrastructure and institutions to the mine lifetime is one of the main obstacles to maintain the sustainable development of the exposed communities. In this situation, whenever the mine life cycle comes to an end, the local economy will face lots of problems. Therefore, it is suggested that mining companies plan to invest in a way to promote the development of infrastructures of in the mining areas or try to get what they need (materials, goods and services) from local communities (UNEP report, 2002).

Moreover, mining companies are advised to disclose all payments in terms of taxes, donations, concessions or etc. in order to decrease the possibility of corruptions. As these payments have to be distributed among many communities, some initiatives are introduced to put governments and companies under pressure to disclose any type of payment. Hence, host communities will have more awareness of its benefit from these revenues. The items mentioned above are just some of the dimensions of sustainable development of mining sector. There are many other factors which are project-specific (Ernst & Young, 2012).

2.3 Gold Mining Impacts

Many interests are tied to the mining activities. From the very beginning, gold ores may exist in locations which are being used for other purposes. For instance, historical areas could be affected by mining activities. Undoubtedly, developing a mine in a historical heritage could raise many social and environmental concerns. Therefore, the impacts of gold mining have to be monitored carefully in order to avoid such disturbances as much as possible.

As Oelofse (2007) mentions in his study, mining activities are associated with a huge volume of water consumption and energy resources. These resources are mutual between mining companies and local communities. In addition, the large amount of energy consumption results in a higher contribution to the global warming. The list of negative impacts is not limited to these two items; locals are affected by mining operations in different dimensions such as tolerating water pollution, abandoning agricultural fields, receiving air pollution and getting diseases.

In summary gold mining negative consequences can be categorized into following items (Munnik, 2005):

- Water resources pollution
- Huge levels of energy consumption and contribution to climate change.
- Waste disposal, often toxic wastes are disposed
- Deforestation of fertile fields with no closure and rehabilitation plans
- Geological negative consequences such as seismic movements and sinkholes
- Acid drainage due to extraction activities
- Chemical drainage and water pollution by chemicals such as Mercury and Cyanide
- Exposure to radioactive materials such as Uranium
- Dust dispersion in the air, causing diseases
- Noise pollution caused by explosions
- Environmental unfairness imposed to local communities, especially indigenous communities
- Gender inequality

Gold mining has received many criticisms regarding its negative effects on communities and the environment. Recently, a growing trend has been evolving in the mining policies indicating that mining practices are evolving in a way to serve the interests of all stakeholders. Hence, natural resources can be considered as an instrument to develop economy sustainably and try to distribute wealth to the host communities. Minerals industry leaders are trying to change traditional practices, getting more conscious about this fact.

In the following chapter, the process of investments in the minerals industry will be reviewed.

Chapter 3

MINING PROJECT FINANCING AND RISK IDENTIFICATION

3.1 Mining Investments Process

There are many parties involved in the investment process of mining development. They play important roles in different phases of mining activities. Figure 1 depicts all stakeholders, either they are investing in the project or they are affected by the mining operation in a region:

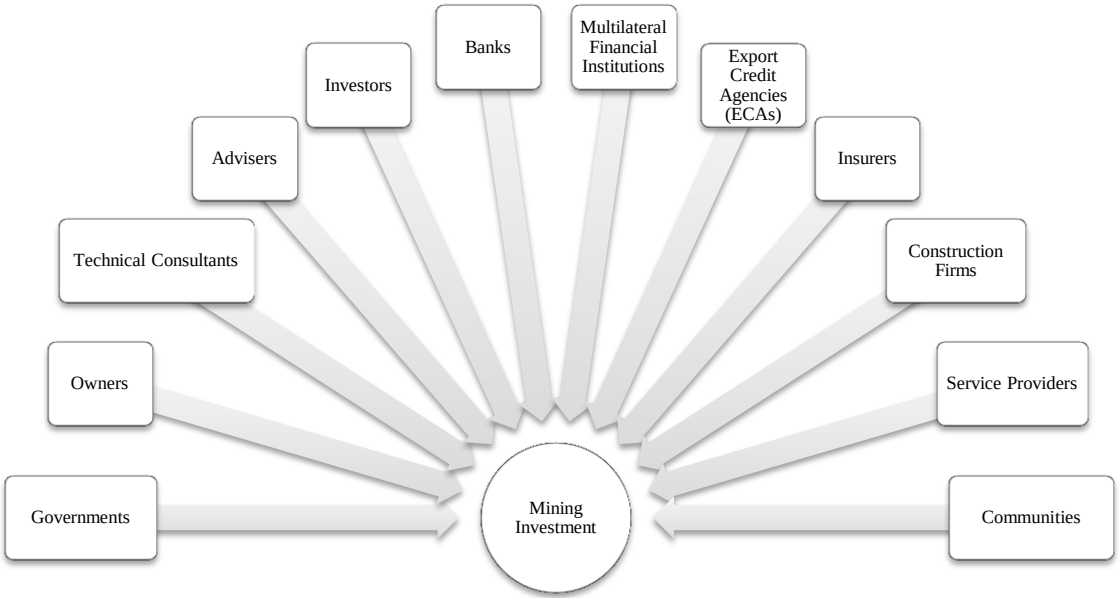

Figure 1: Stakeholders Involved in the Mining Investments
Source: UNEP report, 2002

Except communities, all other stakeholders are key players of project financing. Therefore, the complicated structure of project financing is potentially exposed to risks from different parties.

The host country is where all these key players are involved in related activities. Hence, it is significantly important to acquire a broad understanding of the degree of the risks in the host country.

3.2 Project Financing of Natural Resources Investments and Country Risk

Megginson's study (2010) reveals that project finance strategies have gained more attention in recent decades. Originally, the first ideas of project financing were introduced by international institutions such as World Bank and IFC. Among all the suggested sections, natural resources and mining investments were ranked first. So, as Moran (2001) indicates the targets of initial project financing strategies were energy and mining sectors.

One of the most useful characteristics of project finance strategy is the diversification of project's risks among all stakeholders which results in a reduction in the gross level of risk. Taking this advantage into account, project finance is usually the suggested strategy for countries or regions with high levels of uncertainties. Similarly, it is stated that project finance is an efficient approach in the emerging jurisdictions since it provides a well-organized structure of legal issues by a distinctive contractual framework (Kleimeier and Versteeg, 2010).

However, a high level of country risk requires the involvement of regional development banks and ECAs in order to decrease the overall risk of investment. Moreover, as Hainz and Kleimeier (2012) suggest, the public or public-private

companies play an important role in the process of increasing the creditworthiness of the projects.

Country risk analysis is currently known as a significantly worthy factor to be monitored in project financing since many Asian countries have experienced lots of problems in the 1990's. In recent years, project finance has shown some signals of recovery and growth in the total amount of loans. Project finance international magazine (2012) reports the gross amount of loans annually has approximately grown 2.5% from 2011 to 2012. The following table (Table 1) summarizes a global snapshot of the loan targets of project finance:

Table 1 : Targets of Project Finance Loans

Sector	Total Value of Loans
Power	80,498.80
Transportation	43,607.40
Oil And Gas	38,834.70
Leisure & Property	15,439.10
Industry	12,154.90
Mining	**10,822.60**
Telecommunications	5,314.00
Petrochemicals	4,614.80
Water and Sewerage	997.20
Waste and Recycling	724.10
Agriculture and Forestry	479.00
Total	**213,486.70**

Source: Project Finance International (2012)

It is also worth noting that there are recognized organizations such as Moody's, S&P and Fitch which provide risk reports of countries. These reports are extensively monitored by creditors and investors when they are evaluating an investment opportunity.

3.3 Resources Finance Risks

As mentioned above, mining firms are exposed to a variable level of risk depending on the country of operation. In order to evaluate the mining investment risk, there are two reliable and highly-referred annual surveys published by Fraser Institute and Behre-Dolbear Group. These reports suggest a ranking of countries due to the country risk. The annual survey of mining by Fraser Institute includes a comprehensive interview of a large number of active professionals in minerals industry. As McMahon and Cervantes (2012) indicate, the survey collects an overall understanding of the current situation of the industry from the involved company's point of view. Similarly, the Behre-Dolbear (2012) survey lists a ranking of countries which are ranked based on their potential for mining investment. This report is also prepared out of industry professionals and analysts.

3.4 Mining project finance risks

International financiers try to assess and control risks involved in the process of mining project financing. Therefore, as it is suggested by Hoffman (2007), the main target of these institutes is the assessment and diversification of risks in a broad extent. Technically, the risk assessment process becomes more and more complicated when a developing country is the host. A host country business environment basically should guarantee the stability of different aspects of the system including: political stability, security of economic transactions, basic required infrastructure and the reliability of the legal system (Hoffman, 2007). One can observe that there are different points of view among project partners. So, it is worth noting that in this context all risks are viewed from an international creditor point of view.

All professionals believe that stability in the host country is the most significant characteristic to guarantee a favorable outcome. Hence, the best target for international mining project finance would be a country with a stable political environment, reinforced economy and reliable legal system.

3.4.1 Political Risk

Political stability is the basic requirement of any successful international project. In addition, international participants of a project finance framework are inevitably constrained in the legal and governance system of the target country (UNCTAD, 2000). Therefore, the host country system can expose the foreign investors to risks leading to disputes.

Mining investments may experience expropriation, nationalism regarding the resources, regime changes, concession and permits risk.

Taking the project out of an owner's hands can be recognized as the most frequent risk imposed by the political system of the host country. As Hoffman (1998) signifies, this may happen without any compensation. Moreover, expropriation of assets may either occur in a single and sudden action (direct expropriation) or occur in a period of time in a creeping manner (indirect expropriation).

Resource nationalism is the tendency of people and governments toward the control over the natural resources on their territory. It is known as the most potential risk for mining activities (Ernst & Young, 2012). Resource nationalism is also a kind of expropriation which happens when the host country perceives that the operating companies are compensating them unfairly. Therefore, risk managers should meticulously monitor the factors which can stimulate the possibility of resource

nationalism. Among these factors, one would mention high values of commodities in global markets, low rates of royalty and unstable regime changes.

Being recognized economically viable, a mining project must start applying for permits and concessions in the host country. Therefore, the host country legal and management system could extensively affect the ability of the project to meet its debt service obligation.

Due to the extent of political risk exposure, mining project finance participants decide whether to take political risk insurance or not. These insurances are offered by different institutions all over the world which are managed by either public or private sector. It is worth noting that projects which are insured by publicly held insurers such as development banks and ECAs are more favorable for international investors. The last but not the least point about the political risk insurance is that premiums are set based on the level of risk. In other words, the higher the risk is, the higher the premium is.

3.4.2 Commercial Risk

It is not possible to neglect the effects of the host country economic system on international mining project finance. Mining projects are believed to be exposed to failures in case of: completion time over-runs, increase in capital expenditures and defaults of the principle suppliers of the project (Hoffman, 1998). The probability of commercial risk exposure increases when some factors' stability fluctuates. These factors can be listed as: currency, exchange rates, inflation, raw materials costs, demand, product price and other parties' (off-takers) probability of default.

Some countries, which are suffering from international sanctions or trading more locally than globally, may face exchange risks because of shortage of supply. In case of a mining investment, this risk can be identified in two situations:

- The dependent nature of project's materials, both inputs and outputs, on foreign exchange rates
- The dependent nature of project's funds on foreign currency loans

It should be noted that exchange rate risk can be mitigated to some extent by employing hedging contracts.

Obviously, the host country commercial environment plays an important role in the foreign investor's perception from the mining project overall commercial risks. So, any action from the host government which causes instability directly affects the lender's ability to transfer their capital (A.M. Best, 2012). However, due to Export Finance Insurance Corporation report (2012), it is possible to cover a portion of loss by using political risk insurances.

3.4.3 Technical Risk

In this context, technical risks are consisted of geological, environmental and infrastructure risks of a mining investment. It is important to notify that technical risks are analyzed and compared from the country-specific point of view in this study.

Extraction is a critical phase in a mine development framework. The mine evaluation is based on the geological information presented by mining engineers. So, any mistake in the reports or any deviation from the estimated values can cause severe risks to the project's cash flows. Mining companies, who are willing to receive

project financing loans from creditors, are obligated to prepare geological reports in order to make it possible for creditors to evaluate the project capability to generate sufficient cash flows. On the other hand, lenders can either trust the reports provided by the loan seekers, or, try to capture more data from host countries' governments, independent geologists or engineers and existing operators.

Every country should prepare a fundamental set of facilities in order to develop economy functionally. Infrastructure would be the first issue which is considered by both borrowers and lenders in a mining investment. The efficiency of a mine project is broadly dependent on host country's infrastructure condition; especially transportation facilities such as roads, railways, ports and air transportation. Farooki (2012) suggests that host country's public utilities are significantly important for financiers because projects require power system connections, IT facilities and water sources.

Countries behave differently in regulating the environmental protection laws. As environmental risks vary from water resources contamination to acid drainage, it is not an easy task for mining companies and project finance providers to assess all aspects of this risk. In addition, an arbitrary system of environmental regulations that is common in developing countries magnifies uncertainties.

3.4.4 Legal Risk

The legal system of a country is known as the most powerful tool in hands of governments. Therefore, legal risks are not similar to political risks because governments claim that their actions are legal. Legal risk category covers various decisions of governments including disputes managements, royalty rates, business laws and regulations, industry transactions and legal culture. Since the nature of legal

risks is different from political risks, political risk insurances do not cover the legal risk events.

While a mining investment is in the initial phases of development, the stability of the taxation system and royalty rate is critically decisive. Therefore, as McMahon (2012) signals in Fraser Institute Survey of Mining lenders should consider tax regime stability as a discriminative factor in monitoring countries risks.

In this chapter, a review of mining project financing was presented and the involved risks were introduced and discussed. Chapter four describes the proposed methodology employed in this study.

Chapter 4

RESEARCH METHODOLOGY

4.1 Introduction

This chapter of study describes how the gold mining companies' exposure can be measured by an index of risk characteristics. First of all, the top five gold mining firms are chosen based on their ranking of the market capitalization. Secondly, the most common risk factors which are likely to occur are listed and these risks are categorized in four main groups. Thirdly, the lists of databases to be used as sources of risk information are introduced. Finally, the risk scores are calculated based on the information provided by the databases. The following figure (Figure 2) depicts a summary of this study approach:

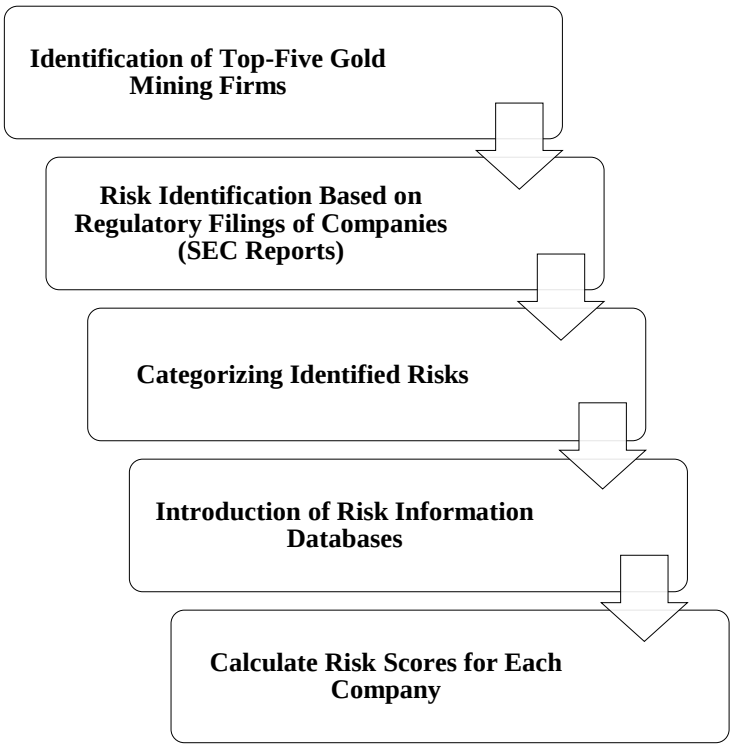

Figure 2: Summary of Risk Assessment Approach

4.2 Identification of Top-Five Gold Mining Firms

In order to compare the level of exposure of gold mining firms to risk factors, this study has identified the top-five gold mining companies. The ranking is based on their market capitalization (total value of a firm based on the total dollar value of all outstanding shares) appeared on Business Yahoo (finance.yahoo.com, as of June, 2013). The ranking result is shown in Table 2:

Table 2: Top Five Gold Mining Companies as of June, 2013

Company	Market Capitalization (USD Billion)	Total Production (000's oz.)	Headquarters	Countries of Operation
Yamana Gold Inc	519.54	1,201	Toronto, Canada	Mexico, Chile, Brazil and Argentina
AngloGold Ashanti Limited	464.49	3,944	Johannesburg, South Africa	South Africa, Ghana, Mali,Guinea, Namibia, Tanzania, Austrailia, Argentina, Brazil, US
Randgold Resources Ltd	438.45	916	Jersey, Channel Islands	Mali and Chile
Barrick Gold Corporation	110.08	7,423	Toronto, Canada	US, Canada, Dominican Republic,Argentina,Peru,Austrailia,Papua New Guinea and Tanzania
Newmont Mining Corporation	90.62	13,484	Colorado, US	US, Mexico, Ghana, Peru, Suriname, Australia, New Zealand and Indonesia

Source: Gold Mining Industry Top Performers Based on Their Market Capitalization, Industry Center - Industrial Metals and Minerals, Yahoo Finance, Available from (As of June, 2013): http://biz.yahoo.com/ic/133.html.

As it is depicted in figure 3, these companies have produced almost 28 percent of global gold production in 2012. Hence, as they are the pioneers of the gold mining industry, their risk exposure and mitigation strategies could be useful to provide a basic understanding of the nature of risk and the risk control practices.

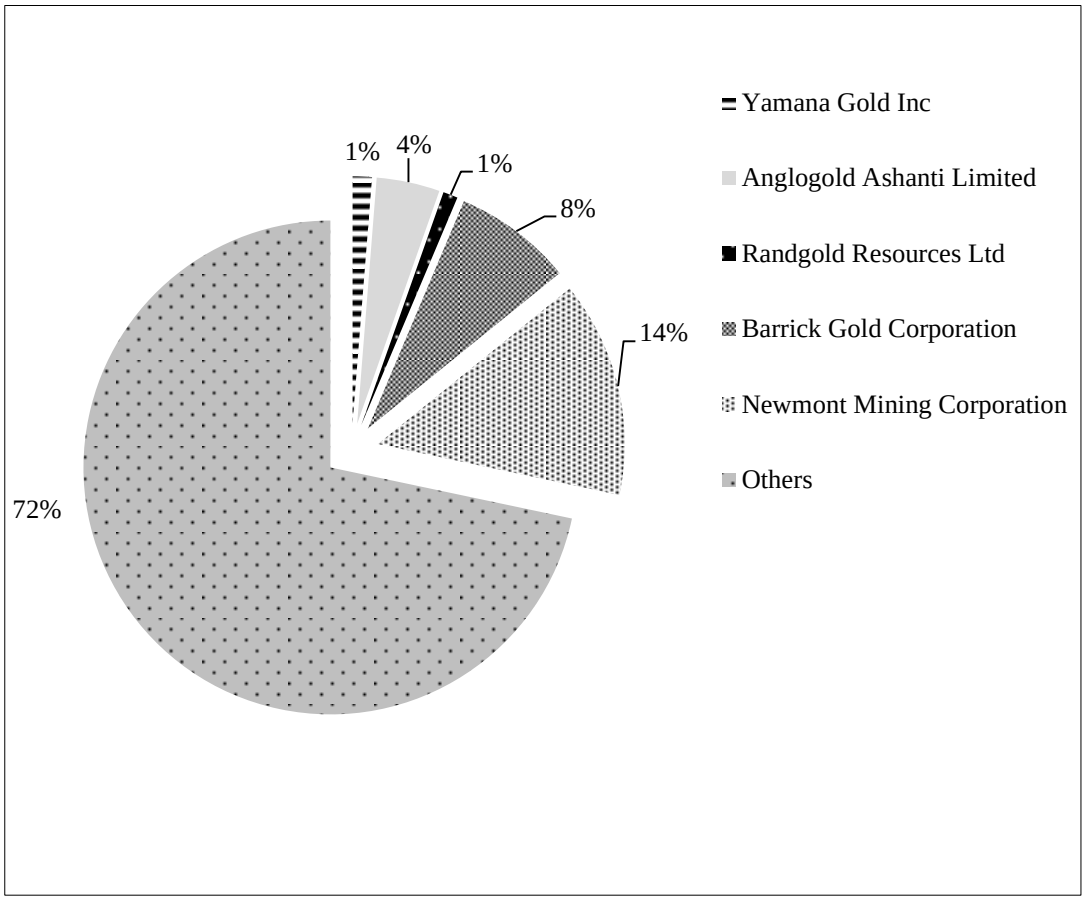

Figure 3: Gold Production of Top-Five Mining Firms
in 2012 versus the Global Gold Production

4.3 Risk Identification Based on Regulatory Filings of Companies (SEC Reports)

SEC regulatory filings are issued publicly by gold mining firms periodically. They list lots of information about their business operations including risk factors which might affect their business adversely. Therefore, these risk factors can be supposed as the most potential ones which are assessed by the company. It is worth noting that there might be other additional risks which are not known yet, which might affect

their business in future. The following table (Table 3) represents a summary of all top-five gold mining firms' reports:

Table 3: Risk Factors Listed In SEC Annual Reports (2012)

Risk Factors Listed in SEC Filings (Form 40-F or 20-F)		
Commodity Price Volatility	Government regulation and changes in legislation	Price volatility and availability of other commodities
Replacement of depleted reserves	Currency fluctuations	Mining risks and insurance risks
Inflation	Production and cost estimates	Joint Ventures
Foreign investments and operations	Interest rates	Security and human rights
Environmental, health and safety regulations; permits	Title to properties	
Mineral reserves and resources	Acquisitions and integration	
Liquidity and level of indebtedness	Shortages of critical parts, equipment and skilled labor	

Source: SEC Filings 2012(Form 40-F[1] or Form 20-F[2]) Published by Companies

4.4 Categorizing Identified Risks

The listed risk factors can be categorized into two main groups. The first group considers the country-specific risk category. In other words, each company may face a different degree of country-specific risk due to its operating locations. The second group includes the industry-specific risks. All gold mining firms are exposed to these risks representative of their operating locations. For instance, gold price volatility is

[1] A filing with the Securities and Exchange Commission (SEC) which is also known as the Registration and Annual Report for Canadian Securities Form. It is used by Canadian companies wishing to offer their securities to U.S. investors. It provides the standard information describing the security and the company.
[2] A form issued by the Securities and Exchange Commission (SEC) that must be submitted by all "foreign private issuers" that have listed equity shares on exchanges in the United States.

an industry-specific risk and all firms' exposures are inevitable. However, different levels of productions and strategies would affect the constraints of firms differently.

Therefore, accordingly, the mentioned risk factors could be categorized as below (Table 4):

Table 4: Categorization of Risk Factors Due to Country-Specific Issues

Country-Specific Risks			
Political Risks	Commercial Risks	Technical Risks	Legal Risks
Foreign investments and operations	Inflation and Interest Rates	Mineral reserves and resources	Environmental, health and safety regulations; permits
Security and human rights	Price volatility and availability of other commodities	Replacement of depleted reserves	Title to properties
Government regulation and changes in legislation	Production and cost estimates	Shortages of critical parts, equipment and skilled labor	Litigation
Acquisitions and integration *	Currency fluctuations	Acquisitions and integration	Acquisitions and integration
	Acquisitions and integration		

* denotes that Acquisitions and integrations can be affected by all aspects of country-specific risks

Where: Political risks stand for all the activities of the host country government. In addition, uncertainties regarding their actions and social changes of the host countries are included.

Commercial risks are those affecting the economics of the operations. In other words, if commercial risks occur, the mining projects might experience difficulties regarding the cash flows and service debt obligations.

Technical risks, in this study context, are defined as the exposure of the mining operations to the geological, environmental and infrastructure risks.

And finally, Legal risks are those accompanied with changes in the legal or regulatory structure.

As mentioned above, there is another group of risk which can be called industry specific. Identification of risks included in this group helps to widen the knowledge of risk in the industry. One can mention industry-specific risks such as gold price volatility, global financial conditions, mining investments force majeure risk and etc. This study mainly concentrates on country-specific risk exposures affecting gold mining firms operations.

4.5 Introduction of Risk Information Databases

As mining industry information is not easily available publicly, the process of analyzing the performance of the mining firms is subject to some data limitations. This study has proposed an approach in which companies of interest are discussed based on their locations of operations. Therefore, country risk publications are of great importance in this context. Annually, some free-access reports are published by development banks, institutions, NGOs, think tanks and other agencies. However, there are some other valuable publications by recognized professional institutes which are not available publicly. Technically, banks and financing institutes gather a collection of these databases in order to evaluate a company or project viability.

According to the categorization of the risk factors, the country-specific group analysis will be conducted by using the following databases:

- **The Fraser Institute Annual Survey of Mining Companies:** The Fraser Institute Annual Survey of Mining Companies has been sent to 5000 mining-related companies all over the world.
- **World Bank Ease of Doing Business:** An annual survey which ranks countries based on several factors using IFC and World Bank.
- **World Economic Forum Global Competitiveness Index:** This survey includes many sources of information provided by different agencies, institutions and think tanks.
- **Transparency International Corruption Perception Index:** An annual survey conducted by a German NGO providing perception of professionals about the potential of corruption in public sector of a country.

In the next two pages, a summary of these surveys are presented and critiques of these surveys are stated. It should be noted that some abbreviations are used in the tables in order to summarize such as:

- **WEDB:** World Ease of Doing Business
- **WEF GCI:** World Economic Forum Global Competitiveness Index
- **FI:** Fraser Institute
- **TI:** Transparency International

Table 5: A Summary of Surveys Used as Databases

Source	Survey Summary	Risk Categories	Assessment Criteria	Critique
WEDB (WorldBank Ease of Doing Business)	The survey is done by analysts of the International Finance Corporation (IFC) and the Worldbank.	Commercial	Ease of Starting Business Dealing with Construction Permits Getting Electricity Registering Property Getting Credit Protecting Investors Paying Taxes Trading Across Borders Enforcing Contracts Resolving Insolvency	This report is widely used by academic researches because it covers the business conducting conditions in most of countries. So, it is a valuable and unique source of information.
WEF GCI (World Economic Forum Global Competitiveness Index)	Compliation of data from a number of agencies, think tanks and institutes	Commercial	Subsections of Industries Infrastructure Macroeconomic Environment Health and Education Higher Education and Training Goods Market Labor Market Efficiency Financial Markets Technological Readiness Market Size Business Sophistication Innovation	The report covers many of the world's countries and addresses unique subject of global competition. The competitiveness of a specific country may not register too large in the decision of miners or the institutions that finance them, but an understanding of the host-countries position in the global economy is important
FI (The Fraser Institute Annual Survey of Mining Companies)	Highly-regarded, often-referenced report which is provided by a Canadian think tank. Approximately 5000 companies holding various positions within the global mining industry from exploration, development and other mining-related international firms. The survey reflects investor sentiment of various mining jurisdictions.	Legal	Legal processes that are fair,transparent, non-corrupt, timely and efficiently adminstrered	Information is first-hand and source from a variety of companies based around the world. The value of this survey is derived from seeking the opinions of mining companies executives who provide opinions on the uncertainty of many important decision-making factors. Unfortunately, this report lacks commercial and economic risks.

Table 6: A Summary of Surveys Used as Databases

Source	Survey Summary	Risk Categories	Assessment Criteria	Critique
FI (The Fraser Institute Annual Survey of Mining Companies)	Highly-regarded, often-referenced report which is provided by a Canadian think tank. Approximately 5000 companies holding various positions within the global mining industry from exploration, development and other mining-related international firms. The survey reflects investor sentiment of various mining jurisdictions.	Political	Corruption in mineral sector Uncertainty surrounding adminstration	Information is first-hand and source from a variety of companies based around the world. The value of this survey is derived from seeking the opinions of mining companies executives who provide opinions on the uncertainty of many important decision-making factors. Unfortunately, this report lacks commercial and economic risks.
FI (The Fraser Institute Annual Survey of Mining Companies)	Highly-regarded, often-referenced report which is provided by a Canadian think tank. Approximately 5000 companies holding various positions within the global mining industry from exploration, development and other mining-related international firms. The survey reflects investor sentiment of various mining jurisdictions.	Technical	Technical Potential	Information is first-hand and source from a variety of companies based around the world. The value of this survey is derived from seeking the opinions of mining companies executives who provide opinions on the uncertainty of many important decision-making factors. Unfortunately, this report lacks commercial and economic risks.
TI (Transparency International Corrupyion Perception Index)	Annual publication from Transparency International, a German NGO. The index is a survey of business professionals and analysts about the perception of a corruption within a countries public sector.	Political	Bribery Embezzlement Kickbacks of Public Funds Effectiveness of Anti-corruption Laws	The Corruption Perception Index uses 13 surveys as inputs, including African Development Bank, Freedom House Global Insight, World Economic Forum, and World Bank.

4.6 Calculated Risk Scores for Each Company

By referring to the listed databases, rankings are taken for countries of interest. In order to make the comparison process easier, risk scores can be converted to a 0-100 scale. Therefore, a country rank in a specific risk database would be converted to a risk score varying between 0 and 100, which higher score implies a more favorable and safer location to invest for gold mining companies. The following equation (1) can be employed to convert the country rank to a 0-100 score:

$$R = 100 - (\frac{x}{n}) \times 100 \qquad (1)$$

Where,

R stands for calculated risk score (variable between 0 and 100),

x represents the rank of country in a specified database,

n is the number of countries included in the specified database survey.

For instance, Ghana ranking in the World Bank Ease of Doing Business is 63. There are 183 countries in this survey. So, by plugging the inputs in this adjustment formula, R or risk score for Ghana in the World Bank Ease of Doing Business would be 65.57. This score cannot be interpreted solely and it should be compared to the other countries in the same survey. However, a higher risk score implies a better environment for investment and less risk.

It is believed by the author of this study that country risk scores are useful tools in hands of financiers to assess the riskiness of a mining investment according to its country of operation.

To sum up, in this chapter, the proposed methodology to study the risk management practices was discussed. By following this approach, there would be a table of outcomes which enables us to compare the risk status of each company among others. Next chapter represents the calculated risk scores and results.

Chapter 5

RESULTS

Rankings were extracted from the mentioned data sources and then based on those rankings risk scores were calculated in different categories for each company. The highest and lowest scores in each category are identified and examples of real events are mentioned where there are evidences.

5.1 AngloGold Ashanti Limited

As it is depicted in Table 7, AngloGold scores are calculated in different categories.

Table 7: AngloGold Ashanti Risk Scores 2012

Countries of Operation	Production Percentage	Risk Scale					
		Commercial WEDB[1]	Commercial WEF GCI [2]	Legal FI[3]	Technical FI	Political FI	Political TI[4]
South Africa	30.73%	80.87	65.28	32.18	33.33	41.94	60.8
Ghana	11.66%	65.57	20.83	55.21	81.72	53.76	63.64
Mali	5.32%	20.22	11.11	45.33	72.04	54.84	40.34
Guinea	6.26%	**2.19**	**9.86**	**15.25**	37.63	**10.75**	**12.5**
Namibia	1.88%	57.38	42.36	62.14	52.69	51.61	67.05
Tanzania	13.46%	30.6	16.67	46.27	73.12	32.26	42.05
Australia	6.54%	91.8	86.11	**92.64**	**89.24**	**85.09**	**96.02**
Argentina	5.55%	38.25	40.97	45.75	44.09	30.11	42.05
Brazil	12.32%	31.15	63.19	49.41	69.89	38.71	60.8
US*	6.26%	**97.81**	**96.53**	59.09	**17.21**	64.52	89.2
Overall Risk Score		57.01	47.86	45.81	54.78	44.11	57.65

*denotes that AngloGold production in U.S. is located in Colorado, so the rankings of FI are representative of Colorado State.

[1] World Ease of Doing Business
[2] World Economic Forum Global Competitiveness Index
[3] Fraser Institute
[4] Transparency International

In addition, overall risk score is calculated in each category based on the weight of productions in the countries of operation. According to the results, Guinea is the worst target while commercial risk is considered. On the other hand, U.S. has the best performance in providing a safe commercial environment. Although AngloGold has the same proportion of production in both Guinea and U.S., managers have to be more careful about the operations in Guinea since its commercial risk seems to be higher. Similarly, Global Competitiveness Index (GCI) rankings present the same results for Guinea and U.S.

Results reveal that AngloGold Company would face the least legal risk in Australia while the most concern should be about Guinea.

Technical risks, assuming the current regulations and land use restrictions, are the lowest in Australia because of the highest potential for mining activities. U.S. (Colorado) has the lowest mining potential among the AngloGold operating jurisdictions.

Unsurprisingly, the highest and lowest risks in political risk categories are titled to Guinea and U.S. As political condition of a country is highly correlated with commercial and trading system of that country, these results were expected.

In 2011, a protest in Guinea, Siguiri mine, impeded operation for three days. So, this delay caused a decrease in the project's production in comparison with 2010. Guinea disturbance confirms that Anglogold should monitor countries risk scores and be prepared for managing events like this for higher-risk countries.

5.2 Yamana Gold Inc.

In the following table (Table 8), risk scores are calculated for Yamana in accordance with their production countries. As it is shown, commercial risks of Yamana are in their lowest level in Chile. On the other hand, Brazil and Argentina represent higher risky situation according to WEDB and GCI rankings, respectively.

Table 8: Yamana Gold Inc. Risk Scores 2012

Countries of Operation	Production Percentage	Risk Scale					
		Commercial WEDB	Commercial WEF GCI	Legal FI	Technical FI	Political FI	Political TI
Mexico	10.49%	71.04	59.72	71.24	77.42	62.37	**40.34**
Chile	47.30%	**78.69**	**78.47**	**86.23**	**94.62**	**80.65**	**88.64**
Brazil	26.10%	**31.15**	63.19	59.27	69.89	38.71	60.8
Argentina	16.11%	38.25	**40.97**	**45.76**	**44.09**	**30.11**	42.05
Overall Risk Score		58.86	66.48	70.77	78.22	59.65	68.81

According to the other categories of risk, Chile is still providing a better environment for mining investments of Yamana Company. Therefore, it could be interpreted that this is why Yamana has allocated more than 47 percent of its operation in Chile. In addition, Argentina is an unfavorable location for mining investments due to its risk scores in legal, technical and political categories. It is also worth noting that Mexico shows the worst political potential in Transparency International ranking representing a high level of corruption.

5.3 Randgold Resources Ltd

Randgold is mainly operating just in two countries. So, diversification cannot be useful for risk transfer. However, its risk profile can provide some facts for our target which is a comparison of top-five gold mining companies risk scores.

Table 9: Randgold Resources Ltd. Risk Scores 2012

Countries of Operation	Production Percentage	Risk Scale					
		Commercial WEDB	Commercial WEF GCI	Legal FI	Technical FI	Political FI	Political TI
Mali	77.02%	20.22	11.11	45.36	72.04	54.84	40.34
Côte d'ivoire	22.98%	8.47	10.42	NA	NA	NA	26.14
Overall Risk Score		33.65	26.59	54.8	77.23	60.77	51.44

As it is shown in Table 9more than 77 percent of Randgold operations are done in Mali, risk scores show that Randgold managers and its lenders or investors have to assess risks associate with the operations in Mali. Randgold reports reveal why risk scores of Mali can be interpreted as extreme events.

Randgold is also active in Côte d'ivoire. Fraser Institute Survey does not include this country so we cannot investigate its technical and legal risks. As it is obvious from its risk scores, business environment is very instable there. Similarly, political risk is a probable event in mining investments of Côte d'ivoire.

For instance, Randgold SEC 20-F (2012) form notifies Mali's commercial and political risks in the risk factors section as follow:

> "We are subject to various political and economic uncertainties associated with operating in Mali that could significantly affect our mines in Mali and our results of operations and financial condition."

Therefore, as it can be inferred from the risk scores table, Randgold managers know that Mali instability could affect their financial performance significantly.

Another example which can confirm the risk scores of Randgold is the Mali coup d'état on March 21, 2012. Although Randgold did not experience any failure in

producing and selling in that period, an unstable political environment is not favorable for both investors and owners of the project.

In Côte d'ivoire, the managers also have learned be worried about political risks. A recent example mentioned in the Randgold SEC report (2012) validates our findings of risk scores:

> "The authorities in the Côte d'Ivoire and the DRC also indicated a desire to revise their mining codes and the related fiscal parameters. The year then drew to a close with a fire at the Tongon plant."

5.4 Newmont Mining Corporation

Newmont mining production and risk exposures are shown in the Table 10. Indonesia is presenting the highest risk scores in all categories except World Economic Forum Global Competitiveness Index. On the other hand, U.S. seems to be a favorable place to invest in mining section due to the highest score in almost all categories. According to the numbers, Australia could also be titled a favorable jurisdiction of investment.

Table 10: Newmont Mining Corporation Risk Scores 2012

Countries of Operation	Production Percentage	Risk Scale					
		Commercial WEDB	Commercial WEF GCI	Legal FI	Technical FI	Political FI	Political TI
US*	f31.77%	97.81	**96.53**	87.25	**92.47**	**91.4**	89.2
Mexico	3.77%	71.04	59.72	71.13	77.42	62.37	40.34
Ghana	9.99%	65.57	**20.83**	55.14	81.72	53.76	63.64
Peru	23.79%	77.6	53.47	44.23	46.24	39.78	52.84
Australia**	28.15%	91.8	86.11	**92.54**	89.26	87.1	96.02
New Zealand	1.74%	**98.36**	82.64	75.2	26.88	70.97	**99.43**
Indonesia	0.59%	**29.51**	68.06	**6.04**	**21.51**	**8.6**	**32.95**
Overall Risk Score		86.49	73.8	73.82	77.18	72.02	77.74

*denotes that US production is active in Nevada State; **denotes that Australia production is active in Western Australia

Our findings are confirmed by what it is stated by the Newmont's analysts in annual reports 2012. For instance, one can find in the risk factors section the following statement:

> "Our Batu Hijau operation in Indonesia is subject to political and economic risks."

Above statement is compatible with what it is calculated as political risk score. In addition, other evidences that are listed by company's analysts about Indonesia can be mentioned as follow:

- Historical possibility of currency devaluation since 1997
- Abrupt changes in national policies toward mineral concessions and permits; the recent example is the issuing of new regulations by Indonesian Ministry of Energy and Mineral Resources in 2012 obligating a certain level of processing and refining for minerals.

5.5 Barrick Gold Corporation

Table 11 shows Barrick company risk scores in 2012. U.S. production seems to be exposed to the least risks. As it is visible in the table, Dominican Republic has one of the worst technical potentials for mining activities. However, low portions of production in this country cannot make too much problem for Barrick. Papa New Guinea is very instable in terms of legal system and government corruptions.

Barrick financial managers should carefully monitor Tanzania because it is the most vulnerable jurisdiction regarding to commercial instability. However, no special evidence of commercial risk has been found in this country, decision makers should be aware of the high probability of this event.

Table 11: Barrick Gold Corporation Risk Scores 2012

Countries of Operation	Production Percentage	Risk Scale					
		Commercial WEDB	Commercial WEF GCI	Legal FI	Technical FI	Political FI	Political TI
US*	43.39%	**97.81**	**96.53**	87.25	**92.47**	**91.4**	89.2
Canada**	2.78%	92.9	91.67	84.14	75.27	86.02	94.89
Dominican Republic	0.90%	40.98	23.61	47.06	**1.08**	**27.96**	32.95
Argentina	10.32%	38.25	40.97	45.21	44.09	30.11	42.05
Peru	11.64%	77.6	53.47	44.09	46.24	39.78	52.84
Australia***	18.69%	91.8	86.11	**92.27**	89.25	87.1	**96.02**
Papua New Guinea	5.87%	44.81	40.26	**37.42**	82.8	29.03	**14.77**
Tanzania	6.25%	**30.6**	**16.67**	46.34	73.12	32.26	42.05
Risk Score		80.06	72.23	72.75	78.27	70.03	73.56

*denotes Barrick production in U.S. is located in Nevada, so the rankings of FI are representative of Nevada State; **denotes Canada production is located in Ontario, so the rankings of FI are representative of Ontario; ***denotes Australia production is located in Western Australia, so the rankings of FI are representative of Western Australia.

Papua New Guinea investments of Barrick are threatened by illegal miners. This evidence validates calculated risk scales. As it is shown, it is expected that Barrick experiences risks regarding the legal system. This problem is stated in Barrick's Corporate Social Responsibility (2012) as follow:

> "Initially, given the risks to persons and property, the Porgera mine made a request (in writing and via public statement) that the Papua New Guinea (PNG) government intervene to deal specifically with the problem of illegal mining directly at the site."

All the preceding sections in this chapter were representing the companies' production risk scales individually. In the next section, top-five gold mining firms will be compared together due to their scales in different categories of risk.

5.6 Top-Five Gold Mining Firms Risk Scores Comparison

It has been shown that how companies are exposed to various levels of risks in different jurisdictions and some evidences were represented where it was documented. Similarly, this study enables us to compare the calculated risk scores of a company with the others'. Assigning the appropriate weighting to each risk

category provides a single risk score representative of each company. In this respect, this study considers the four main risk categories with equal weightings. As there are two references for commercial and political categories, the weighting are equally distributed between two categories. To sum up, the weightings are as follow: Commercial Risk 25%(Commercial WEDB 12.5 % and Commercial WEF GCI 12.5%) , Legal Risk 25% (Legal FI 25%) , Technical Risk 25% (Technical FI 25%), Political Risk 25% (Political FI 12.5% and Political TI 12.5%). Hence, Table 12 depicts a summary of top-five gold miners risk profiles and can be used as a basis for comparing these companies performance in risk allocation.

Table 12: Top-five Gold Mining Firms Risk Scores 2012

Risk Categories and Weights	Mining Companies Risk Scores 2012				
	Anglogold	Barrick	Newmont	Randgold	Yamana
Commercial WEDB (12.5%)	57.01	80.6	86.49	8.47	58.86
Commercial WEF GCI (12.5%)	47.86	72.23	73.8	10.42	66.48
Legal FI (25%)	45.19	72.75	73.72	NA	70.77
Technical FI (25%)	54.78	78.27	73.82	NA	78.22
Political FI (12.5%)	44.11	70.03	72.02	NA	59.65
Political TI (12.5%)	57.65	73.56	77.74	26.14	68.81
Weighted Average Risk Score	**50.82**	**74.81**	**75.64**	**NA**	**68.97**

According to Table 12, Newmont and Barrick have the highest risk scores, since most of their properties are located in less risky and more favorable jurisdictions. In addition, the gold mining industry leaders can be compared by their risk score in each category:

- Commercial Risk: Newmont has the lowest commercial risk probability based on its operations. On the other hand, Randgold is exposed higher than other four companies to commercial risks.
- Legal Risk: Barrick has been expected to experience the least legal risk while Newmont has had the opposite condition.
- Technical Risk: Except Anglogold, all other mentioned firms have been ranked as their exposure to technical risk would not be critical.
- Political Risk: Newmont and Barrick have been perceived to experience a low level of political risk exposure while the other three have not been in a stable condition.

The following figure (Figure 4) depicts the risk scales of top-five gold mining firm:

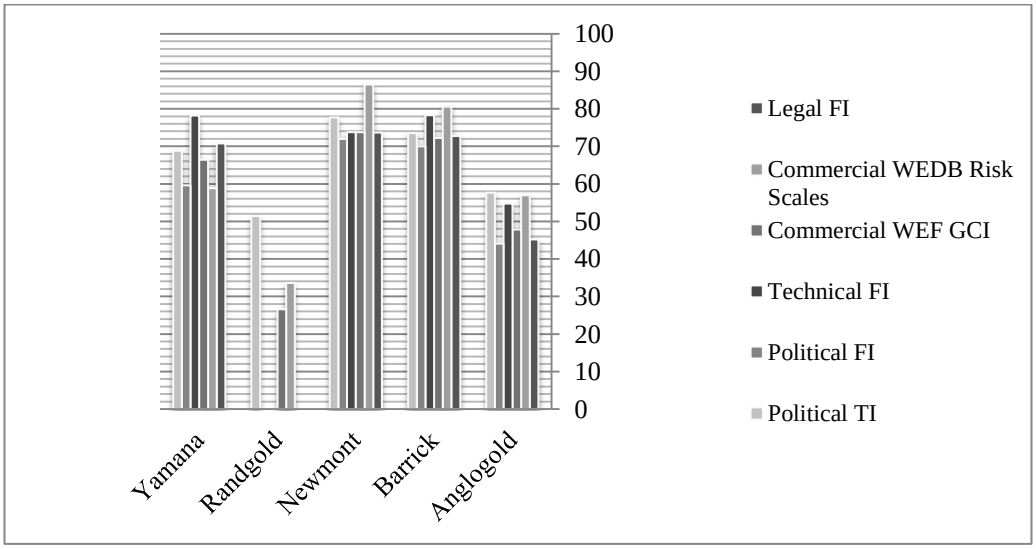

Figure 4: Top Five Gold Mining Firms Risk Scales

5.7 Risk Scores for Countries of Operations

As the main aim of this study is to contribute to the process of country risk evaluation by international creditors, the ranking of countries of operations could provide a summarized view of all countries in which these top-five gold mining companies operate. Table 13 depicts the ranking of these countries.

Table 13: 2012 Overall Weighted Risk Scores for Countries of Operation

Country of Operation	Overall Weighted Risk Scores (2012)
US (Nevada)	91.80
Australia	90.35
Chile	86.02
Canada (Ontario)	85.54
New Zealand	69.45
Mexico	66.35
US (Colorado)	62.58
Ghana	59.71
Namibia	56.01
Brazil	54.06
Peru	50.58
South Africa	47.49
Papua New Guinea	46.16
Mali	45.16
Tanzania	45.05
Argentina	41.38
Dominican Republic	27.72
Indonesia	24.28
Guinea	17.63

According to the Table 13, in 2012, the US state of Nevada and Australia can be considered as the most favorable locations for the gold mining operation, while Guinea is the least favorable location to allocate the gold mining operations. In the next page, a summary of all categories of risk scores is shown (Table 14).

Table 14: The Risk Scores for Countries of Operation and Overall Weighted Risk Scores for 2012

Countries of Operation	Commercial Risk Score WEDB (12.5%)	Commercial Risk Score WEF GCI (12.5%)	Legal Risk Score FI (25%)	Technical Risk Score FI (25%)	Political Risk Score FI (12.5%)	Political Risk Score TI (12.5%)	Weighted Overall Risk Score
US (Nevada)	97.81	96.53	87.25	92.47	91.4	89.2	91.80
US (Colorado)	97.81	96.53	59.09	17.21	64.52	89.2	62.58
Canada (Ontario)	92.9	91.67	84.14	75.27	86.02	94.89	85.54
Dominican Republic	40.98	23.61	47.06	1.08	27.96	32.95	27.72
Argentina	38.25	40.97	45.75	44.09	30.11	42.05	41.38
Peru	77.6	53.47	44.23	46.24	39.78	52.84	50.58
Papua New Guinea	44.81	40.26	37.42	82.8	29.03	14.77	46.16
Tanzania	30.6	16.67	46.27	73.12	32.26	42.05	45.05
Mexico	71.04	59.72	71.24	77.42	62.37	40.34	66.35
Ghana	65.57	20.83	55.21	81.72	53.76	63.64	59.71
Mali	20.22	11.11	45.33	72.04	54.84	40.34	45.16
Côte d'ivoire	8.47	10.42	NA	NA	NA	26.14	NA
New Zealand	98.36	82.64	75.2	26.88	70.97	99.43	69.45
Indonesia	29.51	68.06	6.04	21.51	8.6	32.95	24.28
Chile	78.69	78.47	86.23	94.62	80.65	88.64	86.02
Brazil	31.15	63.19	49.41	69.89	38.71	60.8	54.06
South Africa	80.87	65.28	32.18	33.33	41.94	60.8	47.49
Guinea	2.19	9.86	15.25	37.63	10.75	12.5	17.63
Namibia	57.38	42.36	62.14	52.69	51.61	67.05	56.01
Australia	91.8	86.11	92.64	89.24	85.09	96.02	90.35

In this chapter, the calculated risk scores were reviewed and discussed via two approaches: Firstly, based on company-specific risk scales, and secondly, based on a comparison among top-five gold mining firms. Next chapter summarizes what it is concluded from the results.

Chapter 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Project finance has transferred millions of dollars in investments and has also experienced lots of risks in this process. Lenders have been the main risk bearers among involved parties. Therefore, risk assessment is defined as a vital instrument for international financiers. This study proposed a methodology to evaluate mining investments in a country-basis framework.

First of all, a conclusion of this study could be this fact that although top gold mining companies are exposed to a high level of risk in the operating jurisdictions and their revenues are heavily in danger, the gold industry market capitalizations are high.

Technically, it is not possible to concentrate all risk factors in a single index. However, risk score calculation can present a useful tool in order to compare countries and then companies. In addition, a comparison of gold mining leaders risk scores can be monitored as a snapshot of the industry.

This study results showed that risk scores are higher in more stable countries which means those countries are more favorable for mining investments. It can also be concluded that African countries' environments are more volatile than developed countries such as U.S., Canada and Australia.

Findings of this study shows that no matter how much the market capitalization of gold mining firm is, the lenders should carefully monitor the target jurisdictions risk profile. For instance, Randgold has shown the highest market capitalization in gold mining industry but its risk scores show that this company is operating in an unstable environment.

In summary, if an international project finance lender is going to invest in mining section, this study suggests that an analysis of country-specific risk profile is vital. Since categories of risks imposed by the countries of operation are out of investors' control, it is suggested to acquire a general view of country status.

6.2 Recommendations

According to this study results, developing countries and especially African countries are highly exposed to political risks. So, the first recommendation could be establishing a global mining reference to define certain codes for mining activities. This reference can then rank countries due to their performance for employing their best practice in risk reduction.

Another recommendation could be defining certain mitigation strategies for each risk category in a phase-specific framework. More precisely, phases-specific risk mitigation strategy empowers mining project managers to enforce the investment gradually against risks.

Finally, it can be suggested that more transparency in the mining operations and the government administration is the main key for more favorable environments. Historically, the gold mining industry has experienced activities with a low level of

transparency. In order to have a lower level of risk exposure, more transparency among all stakeholders seems to be vital.

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