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Mining taxation in Africa: the gold mining industry in 14 countries from 1980 to 2015

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Abstract

The lack of information about the sharing of mining resource rent between governments and investors is an easy statement to make for Africa. The existing datasets are often insufficient for a deep analysis of African tax law as applied to the natural resource sectors, which has limited the academic and operational approaches. This paper describes the first legal and tax database which specifies the tax regime applied to industrial gold mining companies in 14 African gold-producing countries from 1980 to 2015. The database has three major innovations: (i) an inventory of taxes and duties (rate, base and exemptions) payable during the prospecting phase and mining phase of a gold project; (ii) a new detailed historical record covering 1980 to 2015; (iii) the link between each piece of tax information and its legal source.

…/…

Keywords: Mining sector, Gold, Taxation of natural resources, Database
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… / …. This database is used to make a first analysis of mining tax regimes and rent sharing in the main gold-producing countries. The first results highlight the heterogeneity of tax regimes between English-speaking and French-speaking countries. There has been a convergence of the average effective tax rates across most of the countries, the effective tax rate has increased in most countries following the tax reforms undertaken since 2010. The database is downloadable following the link: http://www.ferdi.fr/en/programme-project/innovative-development-indicators

1. Introduction

The International Conference on Financing for Development which took place in July 2015 in Addis Ababa highlighted the importance for developing countries of increasing their mobilisation of internal tax resources.

More than half of African countries produce mineral resources. Twenty of the continent's 54 countries have been classified as natural resource-rich according to IMF criteria[1]. They collectively account for more than 80% of the entire continent's GDP, a quarter of which comes from the mining sector (Africa Progress Report, 2013). However, while the third raw materials super-cycle increased the global turnover of the African mining sector by a factor of 4.6 between 2002 and 2010 (World Bank, 2011), natural resource tax revenues only grew by a factor of 1.15[2].

The debate about the capacity of African governments to capture a 'fair' share of mineral resource rent is old (Gamaut and Clunies, 1975), and resurfaces as soon as mineral prices rise (Laporte and Rota-Graziosi, 2015). Rent is defined as 'the amount by which revenues exceed all costs of production, including those of discovery and development, as well as the normal return to capital' (IMF, 2012). According to the optimal tax theory, taxing up to 100 percent of the mineral rent is neutral and would not change investment and extraction decisions (Ricardo, 1817; Garnaut and Clunies Ross, 1975 and 1983). According to Tilton (2004), it is often difficult to know whether maximisation (or at least improvement) of the collective well-being which comes from mining activity is obtained by increasing or decreasing the level of taxation in the sector. Furthermore, the expectation linked to mining taxation is more than the question of level of taxation, and has to take account of the different risks for investor and state, or the administrative capacity of each country to tax the sector (Baunsgaard, 2001; Daniel et al, 2010). For all these reasons, mining taxation is a complex jungle of levies, with various properties (Heaps and Helliwell, 1985; Daniel et al, 2010) which makes it difficult to assess its impact on the sharing of mineral rent. Nevertheless, the debate about the natural resource curse has highlighted several times the role of institutions, particularly the tax system and its application, in turning this curse into a blessing (Mehlum et al, 2006; Van der Ploeg, 2011).

To date, there are no public datasets to compare mining tax systems or resource rent sharing in Africa. Mineral rent sharing modelling led to a number of studies, mainly on the oil and gold sectors (IMF, NRGI, Columbia University, Oxcare, etc.). However, the assessment methods, hypotheses used, or tax levies modelled vary from one study to another (Smith, 2013; Laporte and de Quatrebarbes, 2015). So the results are not really comparable, all else equal. The most well-known model applied to African countries is the 'Fiscal Analysis of Resource Industries Model' developed

[1] The International Monetary Fund (IMF) defines a country to be 'resource-rich' when exports of non-renewable natural resources such as oil, minerals, and metals account for more than 25% of the value of the country's total exports. The IMF classification was based on data from 2005-2010.

[2] Calculations based on the M. Mansour's database, 2014.

by the IMF, but no mineral rent sharing evaluation by country is publicly associated with the model. This lack of comparative studies concerning the mineral resource rent is explained by a lack of inventory of taxes, fees, and duties as applied to the sector in African countries.

Some accountancy firms (Wood Mackenzie, Ernst & Young, PwC, etc.) summarise tax legislation (rate, tax base) which apply to companies in Africa. However, this approach often concerns the last few years and English-speaking countries. Moreover, it focuses on the general tax regime, without taking derogatory regimes, like the mining regime, into account.

Public databases, like FERDI's (Mansour, 2014) or ICTD's (Prichard, 2016), disaggregate the revenues of the natural resource sector from the revenues of the other sectors, but they do not enable an analysis by mineral or by category of levy. The Extractive Industries Transparency Initiative (EITI) reports tax returns of companies and States for extractive industries (gas, oil and mine) since 2006 in 29 countries, 17 of which are African. However, to date, no database summarises by category of levy the information contained in the reports. The EITI is part of a general move to strengthen financial governance which goes beyond the extractive industry. The draft European directive (Country by Country Reporting) and the Dodd Franck Act in the United States may modify the regulation and the disclosure of financial information by multinational companies (Laporte and Rota-Graziosi, 2015). These initiatives will probably enable better knowledge of the taxes, fees, and duties really paid by mining firms, but this work is today impossible on a big enough sample of mines and African countries.

This paper presents a legal and tax database which enables comparisons across time of tax and non-tax measures used by African States to capture a part of the mineral rent. This database was built from more than 700 legal texts. It has three major innovative features: (i) an inventory of taxes, fees and duties (rate, base, exemptions) which applies year by year to a gold project during the prospecting phase and mining phase; (ii) a new detailed historical record with an inventory of legislation from 1980 until 2015 according to information available; (iii) each piece of tax information is linked to its legal source to be completely transparent as concerns restatement of legal information.

A first data analysis enables the drawing of a map of tax design, which could be developed in further works. Even if each country combines differently the main tax and non-tax instruments, two groups of countries nevertheless emerge: English-speaking and French-speaking countries. For example, the English-speaking countries often have higher mining royalty rates than French-speaking ones, conversely French-speaking countries have higher corporate income tax rates than English-speaking ones. However, the combination of the different tax and non-tax instruments has resulted in converging average effective tax rates for the two groups since 2010. Many countries have reformed their mining taxation since the beginning of the decade to push up their revenues after the gold price increased by a factor of 5 between 2005 and 2012.

The first part of this paper explains the choice of gold to build the database, the second part presents the legal and tax database, and the third part proposes a first analysis of tax regimes of mining companies in Africa. The last part presents some possible uses of this database, namely the analysis of gold rent sharing between states and investors in 14 English-speaking and French-speaking African countries.

2. Gold mining taxation: an issue in Africa

Gold occupies a dominant position among the eight most exploited metals in Africa. Over 34 African countries currently produce gold on an artisanal and/or industrial scale which represents almost a quarter of the world's total annual production (Appendix 1). Twenty of these 34 countries produce over a tonne per year (Gajigo et al, 2012).

Africa is the world's second-largest gold-producing continent. South Africa is the biggest African producer, followed by Ghana, Mali and Tanzania (World Mineral Statistics, 2014). Africa still has nearly 40% of global gold reserves[3], and given the scale of its resources, it could play a leading role in production and global trade in the future (Layland, 2005).

While South Africa's gold production has decreased by 80% in the last 40 years due to the depletion of its least profitable mines, the increase in the gold price, which rose by a factor of five between 2005 and 2012, and technological innovations[4] has encouraged the exploitation of mines in more difficult extraction conditions, particularly in Burkina Faso, Mali, Sudan and Tanzania. Within the West African Economic and Monetary Union (WAEMU), the number of prospecting licences issued each year rose from 5 in 2002 to 25 in 2003, and then an average of 65 per year between 2004 and 2010. In 2011 alone, around 200 licences were issued within WAEMU (Central Bank of West African States). Gold production within WAEMU rose by 66.1% between 2007 and 2011, and accounted for 3.1% of global production due to the increase in production in Mali, Burkina Faso and Côte d'Ivoire. Gold accounted for 20.5% of total WAEMU exports in 2012, ahead of oil and cocoa, compared with 20.1% in 2011 and 15.8% in 2010 (Central Bank of West African States). Gold mining in Africa is moving to countries where there has been little exploitation to date, which could help to improve their public finances and hence the development of these countries, which are often ranked amongst the world's poorest nations.

If small-scale and often unregistered businesses made up a considerable proportion of gold production in Africa[5] in the 1990s (World Bank, 1992), the increase in prices in the 2000s is attracting foreign investors and encouraging a transition from artisanal to industrial exploitation. Almost 50% of global gold exploitation is carried out by foreign businesses. The 15 largest gold

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[3] UNEP, Africa : Atlas of our changing environment, 2008, p. X.
http://www.unep.org/dewa/africaAtlas/PDF/fr/Africa_Atlas_Full_fr.pdf

[4] Several technological procedures enable gold extraction. The most widespread in Africa is cyanidation. Mercury amalgamation is primarily used in artisanal mining. New processes (biohydrometallurgy: chemical oxidation of sulphide and organic carbon) have enabled hard ore mining.

[5] In Mali, artisanal exploitation is 4 tonnes as compared to 47 tonnes for the industrial sector, in which key companies such as Randgold Resources and Iamgold operate, Reuters reports.

mining companies operate in 28 countries, including nine in Africa. AngloGold Ashanti (South Africa) and Gold Fields (United Kingdom), key companies in the sector that produce 5% and 4% of global gold output respectively,[6] carried out nearly 70% of their production activity in Africa in 2010).

3. Content of the legal and tax database

The database built for this paper lists the twelve main levies which constitute the statutory tax systems, excluding specific agreements, which apply to the gold mining industry, in 14 African countries, from 1980 to 2015.

3.1. Countries and period

The database covers the gold-producing countries declared as natural-resource rich[7], with at least one industrial mine and/or with significant potential for exploitation: Burkina Faso*, Côte d'Ivoire, Democratic Republic of the Congo*, Ghana*, Guinea*, Kenya, Madagascar, Mali*, Mauritania, Sierra Leone*, Senegal, South Africa*, Tanzania* and Zimbabwe*. Six English-speaking and eight French-speaking countries are included. The period covered by the database varies for each country according to the availability of information. In some cases it goes back to 1980.

3.2. Legal sources used

The database presents the taxation that should be in force based on public tax law information. The vast majority of the data comes from legal sources, such as Minerals and Mining Acts and Regulations, Income Tax Acts, annual Finance Acts, and all other tax-related laws. Most of the legislation has been taken from the websites of public institutions, such as Ministries of Mines, Chambers of Mines, Ministries of Finance, National Revenue Authorities, Government General Secretariats and National Assemblies and Parliaments. Over 700 legal texts were necessary to build the database[8]. Each piece of tax information (rate, base, exemptions) is linked to its legal reference, which enables confirmation of the source of the information, and facilitates further research, for example to understand a levy or a calculation rule. In the appendix, a history of the Minerals and

[6] International mining is dominated by giants such as Barrick Gold, with 8% of global production and over 27 mines, followed by Newmont Mining Corporation (6%), AngloGold Ashanti (5% of production and 20 mining sites in 10 different countries), Gold Fields (4%), Gold Corp (3%) and Kinross (3%).

[7] *Natural resource-rich countries according to the IMF criterion (2012). Although Madagascar does not belong to either of these categories, it has been added for geographical considerations (as a large island, with significant prospects for mining production) and a 'special' mining tax system.

[8] Access to national legal texts varies widely by country. Although most State institutions now have websites, this does not guarantee that they publish significant amounts of laws or that they are updated regularly. Other sources provided access to legal texts that were not available via these institutions (FAOLEX, Droit-Afrique, CIDCOM, etc.); several tax guides, published by accountancy and audit firms (PWC, KPMG, PKF, EY) were used to supplement and verify sources of information.

Mining Acts (Appendix 2) and a list of the main tax laws in force in 2015 concerning the general regime (Appendix 3) are available.

A tax law voted by parliament can be different from its effective enforcement: Gaps may exist between the legal text and its effective enforcement by administrative authorities, and specific mining agreements may be directly case-by-case negotiated between States and mining companies. Although an increasing number of provisions state that these agreements cannot depart from the system set out in the mining act, it still occurs in practice. Moreover, despite efforts instigated by certain states and international organisations to improve transparency, the agreements are rarely made public. As a result, the tax database provides the mining tax regime described in the law, but unfortunately cannot take account of every agreement made.

3.3. Review of the main levies of mining regimes

The database tracks changes in the main levies applied to industrial mining companies according to the project phase and the mineral right held[9].The tax instruments included in the database are classified in two sections, corresponding to the two main phases of a mining project: the prospecting phase and the mining phase, with a breakdown for each relating to the period for which the right is granted and possible renewals. We have also examined the case of a mineral right being transferred. This breakdown is essential because the prospecting and mining activities are technically distinct and are generally not undertaken by the same firm. Thus, the tax regime is not uniform for the total life cycle of a mine.

Anyone who wishes to engage in mining activities must first seek authorisation from the public authorities. Authorisation takes the form of a mineral right, which is separate from ownership of the land. The number of mineral rights proposed varies according to the country[10], and a company choses the one which corresponds to its activity (prospecting or mining) and its scale (artisanal, small-scale, or large-scale). Only large-scale mineral rights are present in the database to target the largest gold mining projects[11]. The mineral right grants its holder both rights and obligations within a specified area, for a defined period of time, and a defined mineral. The mineral right also determines the taxation that should apply according to the progress of the project. For example, an exemption from corporate income tax could be granted during the prospecting and development phases, then the general regime rate could apply during the mining phase. Knowing the project phase, the mineral right and its renewal date is an indispensable step to determining the corresponding tax system. Thus, the database lists the validity periods of the mineral rights, the period of attribution, and the renewal period(s).

[9] Differences may exist between gold and the other minerals.

[10] National legislation provides for several mineral rights in response to the various applications made by the parties concerned. In general terms, there are five types of right to choose from. Two are prospecting rights: a reconnaissance licence (one year, not renewable) and a prospecting licence (three years, renewable twice for the same term). Three are mining rights: an artisanal authorisation, a small-scale mining licence (five years, renewable) and a large-scale mining licence (between 20 and 30 years, renewable in tranches of 10 years).

[11] For this purpose, only the prospecting and mining rights with the longest life cycle have been considered.

The database identifies the main tax and non-tax instruments payable by mining companies, and for each of them lists the tax base, tax rate(s), lump sum, and any other information that might be useful in aiding understanding, such as the existence of tax reliefs. When the levy exists in the general regime and in the mining regime, the rate which applies for each of them is reported. The levies were selected based on their importance in terms of government revenue, or because they are specific to the sector.

During the prospecting phase, we have only listed fees, annual ground rent, and capital gains tax on mineral rights. During the mining phase, the 12 tax and non-tax instruments selected are classified in four categories: (i) the first one includes the duties: - fees, ground rent and mining royalties, (ii) the second one includes the direct taxes: - corporate income tax (and minimum tax), resource rent tax, (iii) the third one includes the indirect taxes:- value added tax,[12] customs duties on imports and single entry duties[13], (iv) the last category includes the other levies: withholding taxes on dividends, interest and services, capital gains tax on mineral rights and government equity.

The following tax information has therefore been excluded: (i) taxes and charges on wages payable by employees but deducted at source by the employer; (ii) stamp and registration duties - which can have a very broad base, with an often complex method of calculation, and often negligible amounts collected; (iii) land taxes - because of the impossibility of obtaining the exhaustive information required to define the tax base (in particular, the rental value of the mine's land and buildings), and because they are often subject to partial or total exemptions; (iv) taxes on oil products[14] - since rates vary regularly because of the way the prices of oil products are managed, with prices and taxes being index-linked to global prices in many African countries.

The information concerning taxes, fees, and duties payable by mining companies is supplemented by the information needed for assessing the tax bases, such as depreciation rules (method and rate for each category of fixed assets), and the rules relating to transfer prices or thin capitalisation. Depreciation allowances do not change the total amount of costs deductions allowable, but they do change how the costs are split by year over the course of the project. As a result, they are decisive for operators insofar as they influence the speed of replenishment of their cash flow. In a sector where initial investments are extremely high (for capital goods and industrial construction), they can represent a significant tax incentive. The same is true for the restrictions on cost deductions from the corporate income tax base (interest, head office costs) implemented within the framework of the fight against aggressive tax optimization practices.

[12] VAT credits not refunded by the tax authorities to mining companies result in a big increase in government revenue. However, the VAT credits are difficult to assess given just the tax law. So the database only covers the nominal rates of VAT and mining derogations.

[13] Concerning customs duties, only mining provisions and exemptions are included. The rates, often numerous, are not reported.

[14] Taxes on oil products, like VAT credits not refunded, can significantly increase the production costs, as the deposits are often in remote areas and barely connected to electricity network.

3.4. Terms and conditions of the stability clause

Any change to a Mining Act raises the question of the continuity of the taxation borne by investors: on the one hand, because mineral rights may no longer be defined in the same way and on the other, because the tax law and customs system may be changed over time.

With regard to mineral rights, the acts generally confirm continuity between the mining agreements signed and the rights granted up to that point. Holders of old rights can therefore be confident of maintaining their rights and obligations for the period originally anticipated[15]. If they apply for a renewal after this point, the new mining law will apply. As far as taxation is concerned, stability clauses are generally intended to go a step further in the guarantees granted to operators. They guarantee that the tax and customs system applied to companies will remain unchanged for a defined period. These practices exist also in the oil sector (Mansour and Nakhle, 2016). The database lists the scope, the duration and the conditions of the stability clause, according to the mineral right (Appendix 4).

For the countries in our sample, the period covered is generally the same as the validity period of the mineral right (South Africa, Tanzania, Burkina Faso, Côte d'Ivoire and Mali), but can be longer (prospecting and mining right in Mauritania and Senegal), or for a specific number of years (15 in Ghana, 10 with a possible extension for 5 years in return for an annual premium in Guinea, between 8 and 20 years depending on the amount of investment in Madagascar, and 10 years following the amendment of the Mining Act in the Democratic Republic of the Congo). Stability clauses are mainly aimed at mining rights but sometimes include prospecting rights (Mauritania, Mali, Senegal and the Democratic Republic of the Congo).

While the aim is to protect them from potential tax increases, stability clauses very often allow mining companies to take advantage of changes to the tax and customs system that would be more favourable to them. Some countries grant this benefit explicitly (South Africa, the Democratic Republic of the Congo, Madagascar and Mauritania) while others are less clear about it (Tanzania, Ghana, Guinea and Burkina Faso). The WAEMU Mining Act, of 2003, ratifies a practice that is less advantageous to businesses in the sector, namely that mining companies can take advantage of measures that are more favourable to them solely on the condition that they adopt the new tax and customs system in its entirety. This has been incorporated in Mali's national law since 1999, Senegal's since 2004, and Côte d'Ivoire's since 2014.The use of stability clauses has increased over time, in Tanzania since 1998, the Democratic Republic of the Congo since 2002, South Africa since 2009 and Côte d'Ivoire since 2014. English-speaking countries are less prompt to grant them than

[15] There have, however, been three exceptions: - 1. In the Malagasy Mining Act of 1999, the rights and obligations associated with mineral rights were imposed on old rights and only the validity periods remained unchanged. 2. In the Democratic Republic of the Congo, the Mining Act of 2002 requires all holders of old rights to appear within three months for validation, failing which they are assumed to have waived their rights. Once validated, the rights maintain their validity periods but must be converted to comply with the new legislation. 3. In South Africa, the Mineral and Petroleum Resources Development Act of 2002 allows old order prospecting rights to remain valid for up to two years and old order mining rights for up to five years. After this period, any rights that have not been converted are lost.

French-speaking countries. Sierra Leone and Kenya are the only countries not to provide them. In South Africa, the clause applies only to the method used to calculate mining royalties. In Zimbabwe, all aspects of the stability clause appear to be up for negotiation.

4. Presentation of the statutory tax systems in the gold mining industry in Africa

The tax database can be analysed in terms of both a temporal and spatial perspective, but can also be used to compare the specific characteristics of mining taxation compared with the general regime. This study is based on major tax categories. Some fiscal instruments are specific to the mining industry (fees, annual ground rent, mining royalties, resource rent tax, and government equity) while others are determined in accordance with the general regime rates, with exemptions to reflect the characteristics of the sector.

4.1. Fees, annual ground rent and mining royalties

Fees and annual ground rent are fixed sums[16]**.** In the countries included in the database, both generally increase at each renewal; in South Africa, Mauritania, Burkina Faso and Madagascar annual ground rent increases annually. The amount of both taxes is often higher in West African countries.

All countries apply fees when a mineral right is issued, renewed, and/or transferred. The value of fees varies widely, from just the amount of administrative costs in South Africa to several tens of thousands of dollars in Mali. They are applied in the same way to both national and foreign companies, except in Ghana, which charges foreign mining companies higher fees than their domestic counterparts. Conversely, not all countries require annual ground rent. Where they do, the amount tends to be more consistent across countries (in the order of a few hundred USD/km^2 for a prospecting licence and a few thousand USD/km^2 for a mining licence)[17].

The fees and rents are rarely revalued. Most countries are content to change them every 10 to 15 years, when a new Mining Act is enacted. In Kenya, it appears that annual ground rent has not changed in the last 30 years[18]. As a result, when a revaluation does take place it is often significant, particularly in countries where inflation is high[19].

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[16] Fees are payable on the attribution and renewals of rights, while annual ground fees are paid annually in proportion to the surface area granted under the mineral right.

[17] In Sierra Leone, holders of large-scale mining licences have to pay a high annual fee of USD 500,000 rather than a ground rent. Senegal is now planning to reintroduce a ground rent, having completely abolished it in 2003. The basis on which rent are charged also differs. In the Democratic Republic of the Congo, for example, the land unit is 0.84955km^2, whereas in Madagascar, it was 6.25km^2 from 1999-2006 from when it was changed to 0.390625km^2.

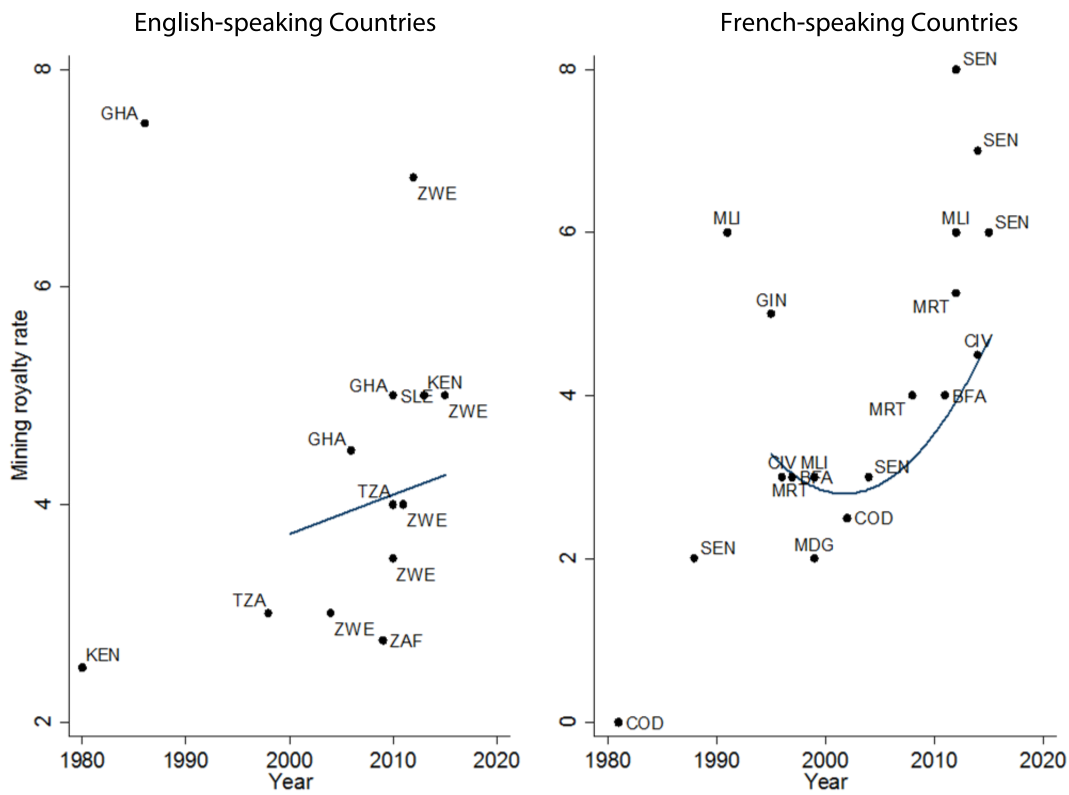
[18] According to the information available, the rents have not changed since at least 1986.

[19] The fees associated with obtaining a mining licence in Mali, for example, increased by 50 times between the 1999 Mining Act and the new act in 2012. Madagascar is the only country that frequently adjusts its annual ground fees, by index-linking them to the value of the International Monetary Fund's Special Drawing Right.

Mining royalties tax the value of minerals extracted (the royalty rates are available in Appendix 5 and the royalty base in Appendix 6). The royalty tax base consists of a value close to turnover, though the vocabulary used varies from country to country[20]. Deductions from the base are sometimes permitted, for example transport and refining costs in Côte d'Ivoire, and for example transport, analysis, insurance and marketing costs in the Democratic Republic of the Congo. These deductions can be large and may be manipulated by companies to reduce their royalty payments. To 'control' the base, some administrations adopt *de facto* tax rules which differ from tax law. These deductions are, for example, fixed at 15% of FOB value in the Democratic Republic of the Congo.

Gold and diamonds have the highest royalties. Royalty rates are tending to increase: from around 3% in 2009, many are now 4% or even 5%. A gap has appeared between the English-speaking and French-speaking countries, with rates often higher in the former than the latter. Most countries have opted for a fixed royalty rate. However South Africa applies a progressive rate, calculated based on a formula linked to the profitability of the mine. Ghana did the same until 2010. West African countries have recently adopted a variable rate based on the gold price: Burkina Faso introduced this in 2011, followed by Mauritania in 2012, and Côte d'Ivoire in 2014.

Graph 1: Mining royalty rates

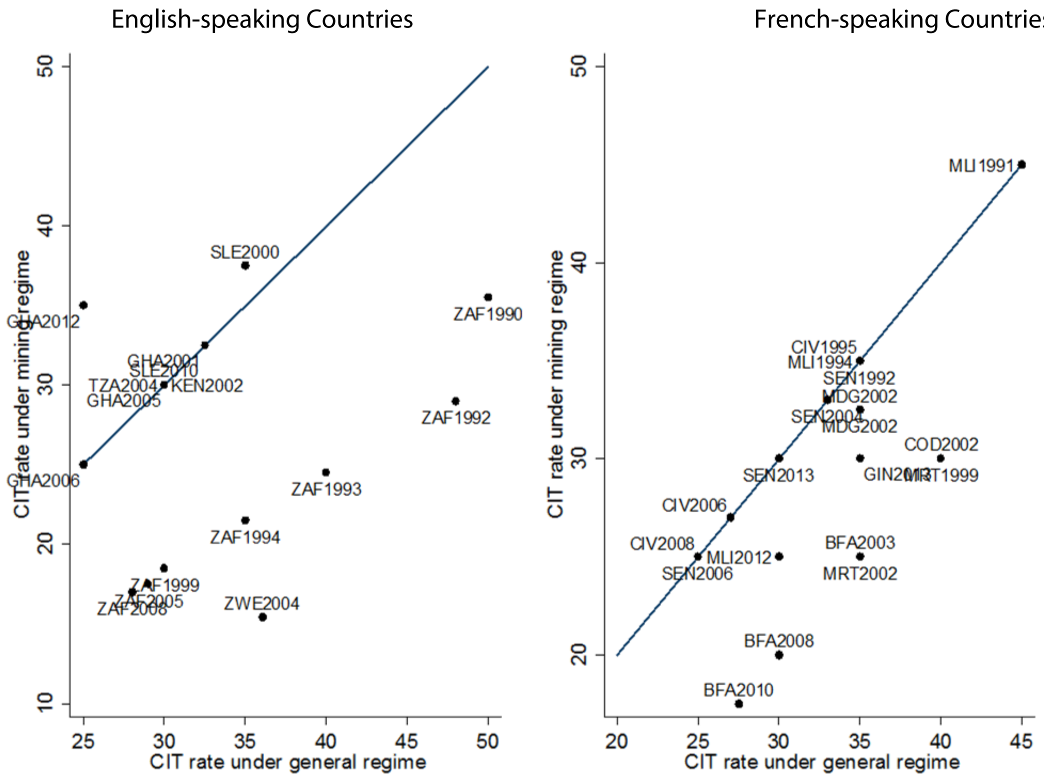


20 Sierra Leone refers to 'market value', Ghana to 'total revenue' and Madagascar to 'value at first sale'.

4.2. Direct taxes

Corporate income tax (CIT) is based on a company's annual net income (Appendix 7). Not all of the countries studied apply the same policy to the mining industry (Graph 2). Some countries apply the normal tax rate under general law, while others define a specific rate. Of the 14 countries studied, 4 have always applied the general rate, namely Tanzania, Kenya, Côte d'Ivoire and Senegal. 3 countries have repealed their mining rate in favour of the normal rate under general law, namely Mauritania in 2008, Sierra Leone in 2010 and Burkina Faso in 2015. 2 countries have moved from a normal rate to a mining rate that is lower than general law, namely Zimbabwe in 2008 and Mali in 2012. Ghana is a special case: having applied the normal rate under general law from 2000 to 2012, it has now re-established a higher special rate. 4 countries have never applied the normal rate, namely the Democratic Republic of the Congo, Burkina Faso, Madagascar and South Africa. The latter 2 use a specific calculation method: in Madagascar, 3 rates can be applied to businesses exploiting precious stones and metals, based on the project's internal rate of return, which is not the case for other minerals; in South Africa, there is a progressive rate based on the profitability of the mine, which makes it similar to a rent tax.

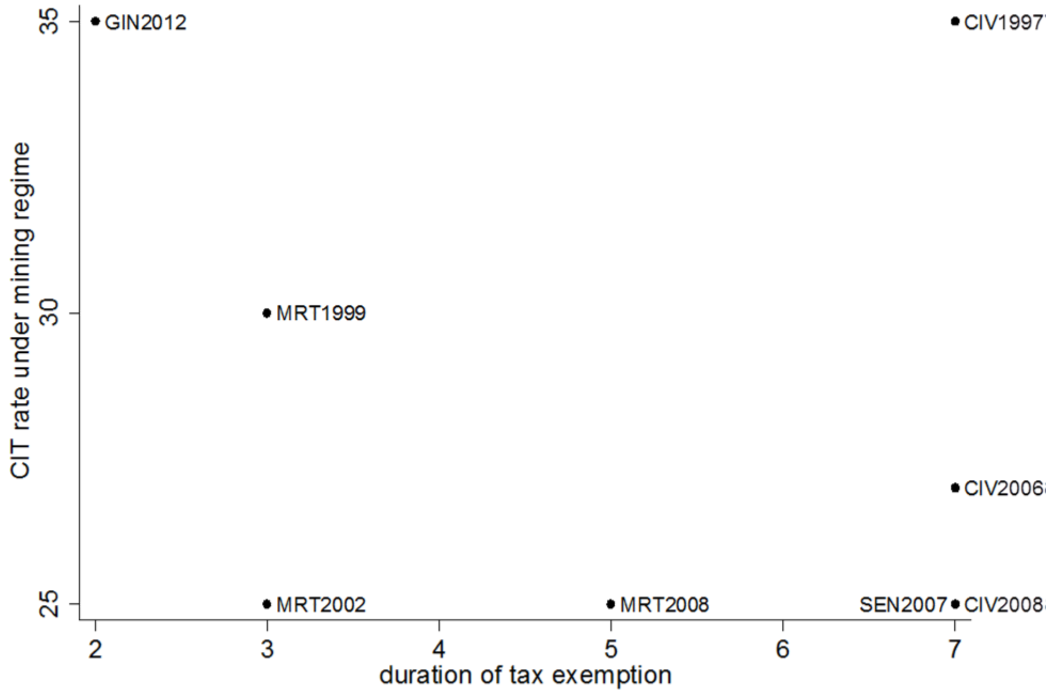
Graph 2: Comparison between the CIT rates under mining regime and under general regime



Finally, of the countries that apply the rate set under general law, an exemption (in Mauritania, Côte d'Ivoire and Senegal) or reduced rate (in Mali) is authorised during the first few years of exploitation before switching to the normal rate. It seems that there is no correlation between the duration of the tax exemption and the level of the corporate income tax rate (Graph 3).

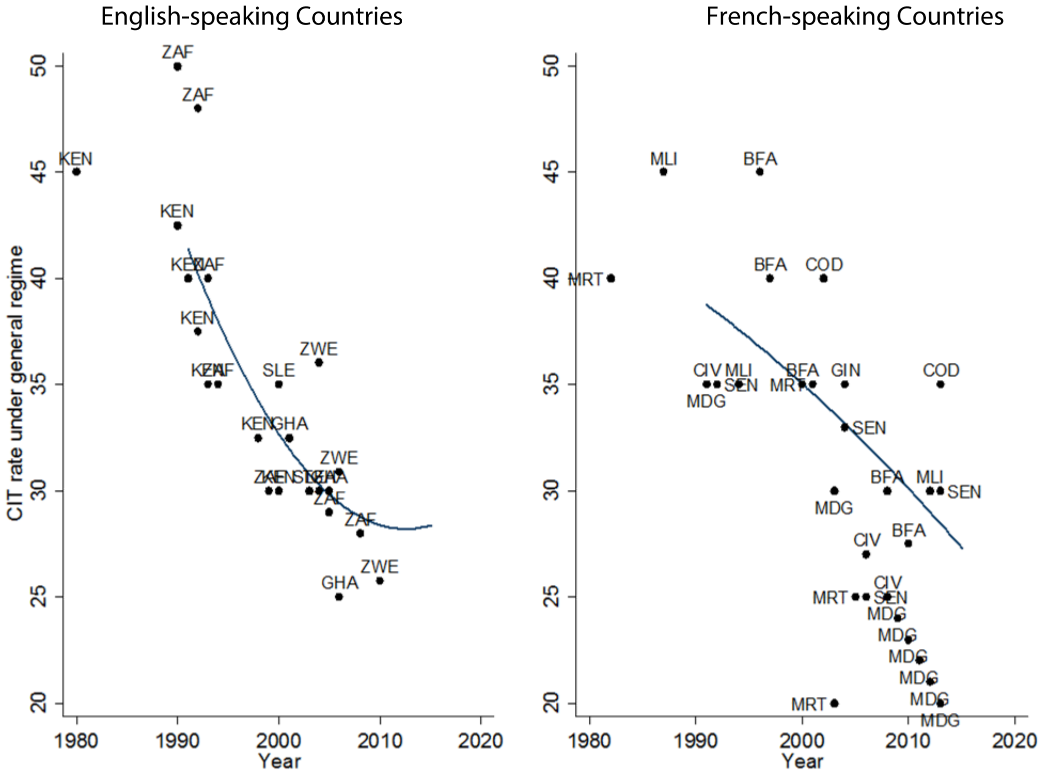
Cote d'Ivoire and Senegal are the countries with the longest durations of exemption (the first seven years of the project). So, despite the changes to CIT statutory rates, the effective rate borne by mining companies is always lower than the rate applied to companies under the general regime.

Graph 3: Comparison between the CIT rate of mining regime and the duration of tax exemption

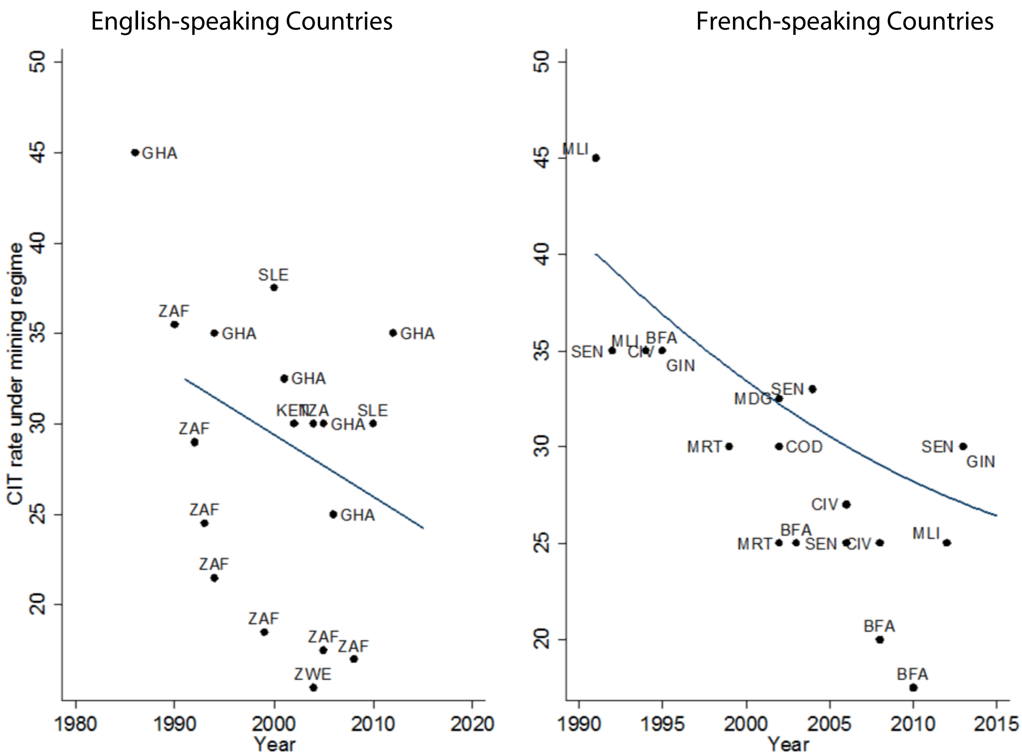


CIT rates decreased in all countries over the whole of the period studied both under general regimes and under mining regimes. While standard rates were typically between 30% and 50% in the 1990s, today they are all between 25% and 30%, except for Guinea (35%), the Democratic Republic of the Congo (35%) and Madagascar (20%). CIT rates increased again in just two cases: from 25% to 30% in Senegal when the Tax Act was reformed in 2012 and from 20% to 25% in Mauritania in the Finance Act of 2005 (Graph 4). Mining rates are more diverse and difficult to compare in principle because of their calculation methods (Graph 5).

Graph 4: CIT rates under general regime



Graph 5: CIT rates under mining regime



The CIT base is calculated as the difference between revenue and costs for the accounting year. However, the tax basis is influenced by the different pieces of legislation on depreciation rules, restrictions on the deduction of certain costs, and/or the possibility of carrying losses forward. These rules are relatively consistent in WAEMU countries because of the application of Directive No. 01/2008/CM/UEMOA on 'harmonisation of the procedures for determining taxable earnings for legal entities within WAEMU'.

Depreciation rules vary across countries and different categories of fixed assets. Under general law, the English-speaking countries apply the pooling method,[21] with a depreciation rate of between 10% and 40% for capital goods. The French-speaking countries apply depreciation to individual goods based on a straight-line depreciation rate of 20%, although some new items of equipment can be depreciated on a declining balance basis in the Democratic Republic of the Congo, Senegal, Mali (since 2007), Burkina Faso, Guinea, and Madagascar. An exceptional depreciation at the end of the first year applies in the Democratic Republic of the Congo, Senegal, Mali, Burkina Faso and Côte d'Ivoire. Depreciation of industrial construction is treated in the same way in both English- and French-speaking countries, based on a straight-line depreciation at a rate of between 5% and 10%. Just four countries operate differently: - in Mauritania, the straight-line rate is 20%; Sierra Leone and Ghana use a pooling method at a rate of 10% to 15%; and in Zimbabwe, the straight-line rate is 25%. In addition to the depreciation rules set out in general law, the mining industry may also benefit from special measures to enable faster depreciation of prospecting and development expenses. This is mainly found in countries in south-east Africa, where general law systems are less favourable to companies than in West Africa. In West Africa it is generally a case of straight-line depreciations permitted over a shorter period than usual.

The ***restrictions on allowable cost deductions*** have the purpose of controlling the issues associated with transfer prices and the thin capitalisation strategies[22] of the mining company subsidiaries, formed under local law as subsidiaries of multinationals. In most French-speaking countries, the interest on loans taken out by a mining company has to fulfil two conditions to be fully deductible from a CIT perspective: (1) the debt-to-equity ratio must not exceed a certain threshold of between 1:1 and 2:1 depending on the country, and (2) the interest rate on the loan must be equal to or lower than a reference rate[23] plus 2 or 3%. An upper limit may also be placed on deductible head office costs. For example, it is limited to 20% of general costs in Mali, 20% of accounting income in Senegal, and 1% of turnover in Madagascar. These rules are rarely amended. Where they deviate from general law, the aim is to offer the mining companies more favourable conditions, as in Mauritania where the ratio is 3:1. In English-speaking-countries, thin capitalisation

[21] The pooling method available under tax law in the English-speaking countries is a means of combining quantities of goods with similar characteristics and depreciating them all together.

[22] Multinational companies thin capitalise, i.e. their subsidiaries in their host countries are 'over-leveraged'. Interest charges are then deductible from these subsidiaries' corporate income tax and generate financial income for the parent companies, which are taxed at low rates in a tax haven.

[23] The discount rate, rediscount rate, advances rate and refinancing rate of the central bank or issuing institution or a reference to the London inter-bank lending rate (Libor), depending on the country.

rules also exist. In Ghana, the ratio is 2:1. In Sierra Leone, mining companies are permitted to borrow three times more funds from their shareholders than other companies. However, only 80% of the interest charges are deductible from the CIT base. Moreover, when the thin capitalisation rule is broken, the portion of interest charges that exceeds the permitted ceiling is half viewed as interest charges (15% tax rate) and half as dividends (10% tax rate). This practice is fairly common in English-speaking countries.

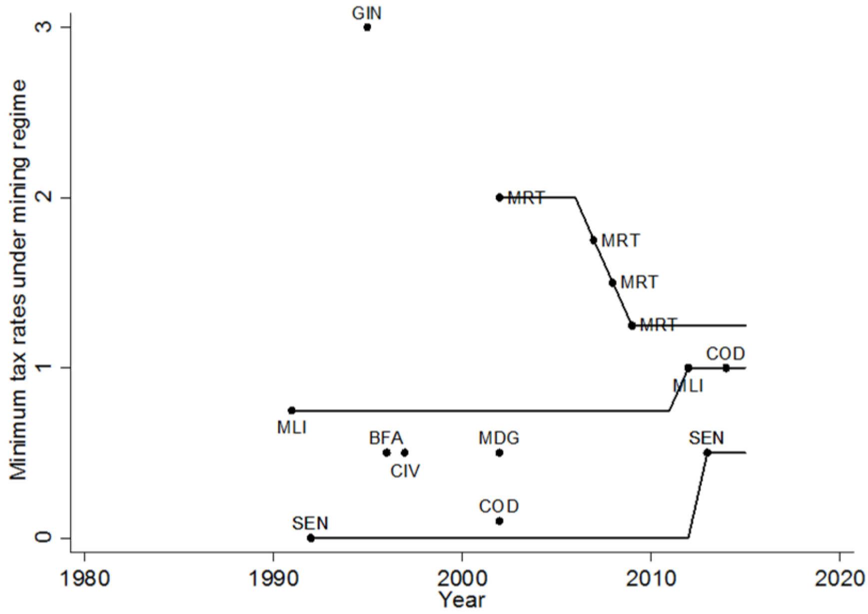
Finally, any accounting losses made during a financial year can be carried forward and deducted from the following years' net taxable earnings. In the English-speaking countries, there is rarely any time limit on losses carried forward; in the French-speaking countries deductions often have to be made within three to five years, and only depreciation charges can be carried forward for an indefinite period.

A ***minimum tax*** ('Impôt minimum forfaitaire') is a component of CIT. CIT tax is based on a company's profitability, while the minimum tax applies to turnover (the size of the company can be assessed from the number of employees)[24]. The aim is to ensure that the state receives a minimum level of revenue even if the company makes an accounting loss. The amount of minimum tax due is generally deducted from the amount of CIT. All French-speaking countries except Mauritania apply the general law rate to the mining industry. Rates are consistent across countries and vary little over time. The minimum tax rate remained stable at 0.5% throughout the period studied in Madagascar, Senegal, Burkina Faso and Côte d'Ivoire. It has recently increased in two countries: from 0.75% to 1% in Mali since 2012, and from 0.1% to 1% in the Democratic Republic of the Congo since 2014. The rates are higher in Guinea (3%) and Mauritania (2.5% under general law and half that under mining law). The minimum tax is always subject to a minimum and sometimes a maximum collection threshold (in Senegal, Côte d'Ivoire and Guinea). Mining companies are exempt from the minimum tax during the first few years of exploitation in all countries except the Democratic Republic of the Congo and Mali. The exemption period is often the same as for CIT.

English-speaking countries have no similar *minimum tax*, but some provisions aimed at the payment of a minimum amount are present in three countries: Kenya, Tanzania and Sierra Leone. In Kenya, companies with an annual turnover of between KES 500,000 and 5,000,000 have been taxed 3% of their turnover since 2007. In Tanzania, companies that have made losses for three consecutive years have been taxed at 0.3% of turnover since 2008. In Sierra Leone, companies whose accounts are not audited must pay a minimum 15% of their turnover when the company does its own accounting and 20% of turnover otherwise. Both rates were lower before 2007, at 10% and 15% respectively.

[24] The tax base is generally defined as turnover, without stipulating whether this refers to turnover excluding or including taxes. Just two countries make this distinction explicitly: Mali taxes turnover excluding tax, and Côte d'Ivoire uses turnover including taxes.

Graph 6: Minimum tax rates under mining regime



Resource rent tax and taxes on super-profits are specific to the mining industry. They are levied in addition to CIT to capture a higher proportion of rent.[25] Just four countries include resource rent tax in their mining acts: Ghana, Guinea, Côte d'Ivoire and Zimbabwe. The definition of the base is often unclear, and varies across countries. These taxes are tending to disappear because of the complexity of the calculations.[26] Ghana abolished its super-profits tax in 2006, and replaced it in 2012 with an increase in CIT to 35% for the mining sector. Guinea abolished it in 2011. Côte d'Ivoire introduced a rate of 40% for resource rent tax in its Mining Act of 1995, but the tax was never collected. As a result, it was replaced with a tax of 7% on turnover and finally abandoned in 2014. Only Zimbabwe still has a resource rent tax in its Income Tax Act, split into two parts: one tax and one super-tax applied to the tax base after payment, at rates of 31.5% and 27.778% respectively.

Withholding taxes on dividends, interest and services.[27] The dividends paid by a company to its shareholders and the interest paid to its creditors are taxed differently, depending on the beneficiary's place of residence. The rates applied are different for residents and non-residents on the one hand, and for dividends and interest on the other. Where they are not identical residents are subject to a lower rate than non-residents to encourage the use of local savings, and the rates applied to dividends are lower than those applied to interest, in order to combat the thin capitalisation of mining companies formed under local law (Graph 7). Just two exceptions should

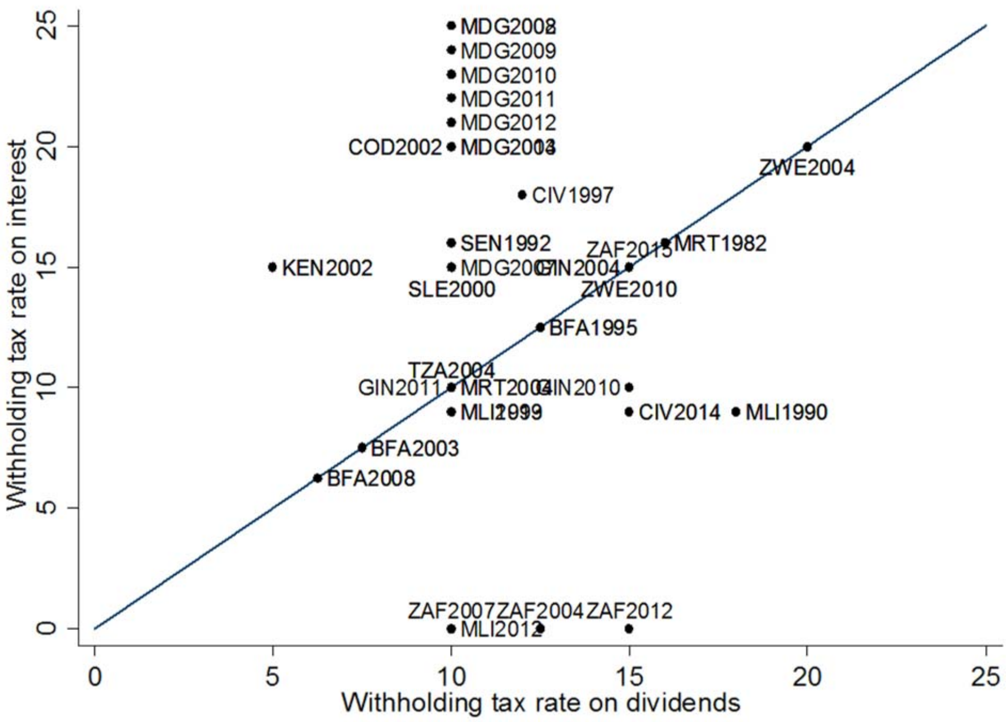
[25] Mining rent is defined as the 'excess of revenues over all costs of production, including those of discovery and development, as well as the normal return to capital'. 'The tax has as its base all current receipts less all current expenses (both non-financial), with immediate refund (or carry forward at interest) when this is negative. Accounting and tax depreciation do not feature—all capital is immediately expensed' (IMF, 2012).

[26] Among the main mining countries, only Australia has ever implemented a rent tax. The Mining Resources Rent Tax applied from July 2012 to July 2014 for iron and coal extraction projects and the resulting coalbed methane. Its abolition was largely linked to the difficulties of administering the tax and its low yield.

[27] The rates shown are those not covered by non-double-taxation treaties.

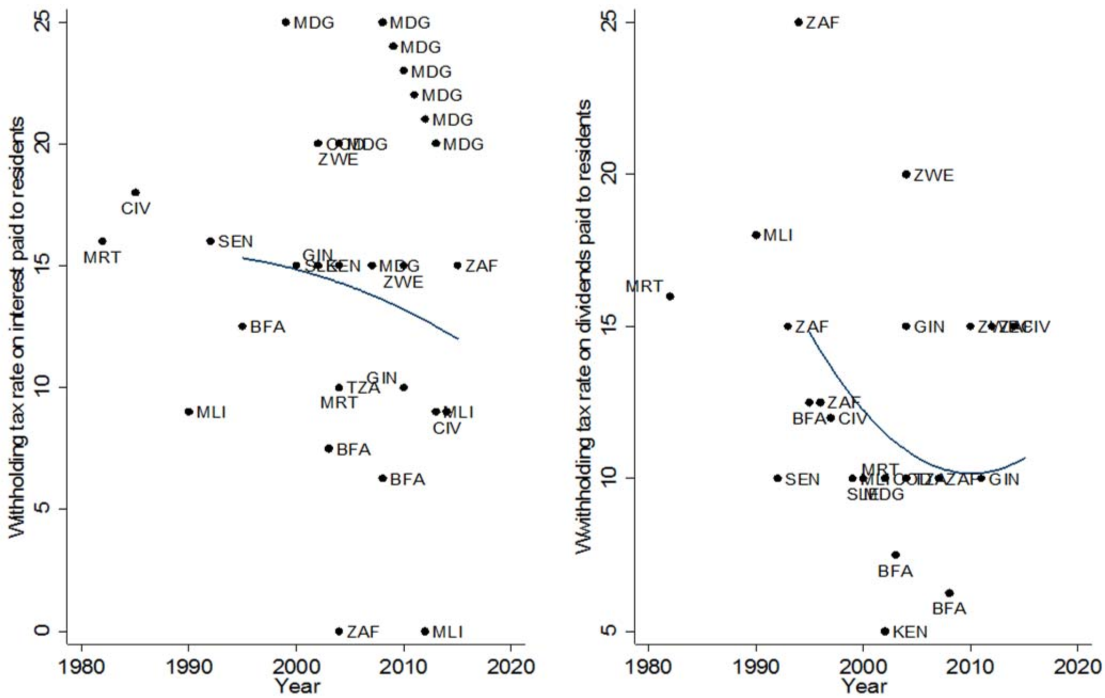
be noted: in Mali, dividends are taxed at a slightly higher rate (9%) than dividends, and have been since at least 1999; in Zimbabwe, withholding tax on interest was lower for non-residents (10%) than residents (20%) upto 2009, when it was abandoned (meaning correct ?).

Graph 7: Withholding taxes on dividends and interest paid to residents under mining tax regime



Tax rates on dividends and interest are converging across countries, mainly because of a reduction in the highest rates (Graph 8). Most rates under general law are now between 10% and 15%. Kenya taxes dividends at a low rate (5% for residents), while the highest rates are found in the Democratic Republic of the Congo and in Madagascar (20%). Until 2015, there was no withholding tax on interest in South Africa. Some French-speaking countries make adjustments to general law for the mining industry, such as exemptions and/or rate reductions. In Senegal, the period of tax exemption is particularly long: 15 years following the attribution of the mining right under the Mining Act of 1988, regardless of the actual length of the development phase. Since the Mining Act of 2004, it has been reduced to 7 years for the holders of mining concessions, although it can still be extended to up to 15 years for major projects. Rates have been halved for dividends and/or interest, in Burkina Faso, Côte d'Ivoire, the Democratic Republic of the Congo and Madagascar. In the Democratic Republic of the Congo and Madagascar, foreign currency borrowing is tax-exempt for mining companies.

Graph 8: Convergence between withholding taxes on dividends and interest paid to residents under mining tax regime



Withholding taxes may also exist on remuneration paid in return for external services provided by non-resident service providers, in order to reduce aggressive tax optimization practices. In general law, there has been a convergence in a number of countries to a rate of 15%: from 20% to 15% in Zimbabwe since 2010, from 17.5% to 15% in Mali since 2013, and from 10% to 15% in Guinea since 2011. On the other hand some countries have kept high rates: 20% in Kenya, Senegal and Burkina Faso. A withholding tax at a rate of 25% is scheduled to come into effect in South Africa in 2016. Three English-speaking countries also tax internal services provided by residents, namely Kenya, Tanzania and Sierra Leone, but at a low rate (5%). As far as mining law is concerned, Burkina Faso charges companies in the sector half the rate (10% instead of 20%) and Madagascar reduces the base by 45%.

Most of the time, these different levies are covered by non-double-taxation treaties. Thus, when the parent company of local subsidiary is located in a country which have signed this kind of treaty, the local mining company can partly or fully escape tax payment. Non-double-taxation treaties are, like mining agreements, sources of differences between the law and its implementation.

In the event of a ***right being transferred by its holder***[28], capital gains tax is due, in some cases in addition to fees. Under general law in the French-speaking countries, capital gains on the disposal

[28] Although non-double-taxation treaties are not listed in the database, it is important to highlight that most African countries have signed such treaties, with some partner countries from which come the parent companies of local mining

of assets are taxed by including them in the base for CIT, while the English-speaking countries have a specific capital gains tax. This is charged at the same rate as CIT, except in Ghana, South Africa, Zimbabwe and Kenya, where it is lower. The same system applies to capital gains on the disposal of mineral rights, except in four countries that have specific provisions. Since 2012, in addition to capital gains tax at 10%, Mali has collected a further tax of 2% of the value of prospecting work carried out previous to the date of transfer of the prospecting licence, and 1% of the estimated value of the project on the date of transfer of the mining licence. Mauritania amended its Mining Act in the same year and no longer includes capital gains from disposals in the CIT base, but includes them in the withholding taxes on dividends and interest base ('IRVM'). In 2012, Burkina Faso also created a 'specific tax on revenue from mineral rights transactions' at a lower rate than CIT (20%). Capital gains tax in Kenya has been suspended since 1985. Following an initial failure in 2007,[29] Kenya has been trying to reintroduce it into its general law since 2015 although it has been in place since 2013 in respect to the disposal of mineral rights. Capital gains tax is often payable in addition to fees, in an amount equal or similar to the fee charged on renewal. In Guinea and Kenya, prospecting rights are granted on an individual basis and are therefore not transferrable, unlike mining rights, which always are. Mali does not charge fees for transfer of a prospecting or mining right, and the Democratic Republic of the Congo does not charge fees for transfer of a prospecting right only. African legislations only anticipate taxation of direct transfers of property. In most cases indirect transfers occur, in particular by assignment of the shares held by the parent company of the local subsidiary. So, capital gains happen outside of the country and are not taxed in the country where mining production occurs[30].

Government equity (free of charge) may be demanded in return for granting a mining licence. This provision is becoming increasingly common. Before 1998, Côte d'Ivoire, Mali, Ghana and Guinea were the only countries to apply this, followed by Burkina Faso in the same year, then the Democratic Republic of the Congo in 2002, Senegal in 2004, Mauritania in 2009 and Tanzania in 2010. Most of the countries that have adopted this measure are French-speaking. The WAEMU Mining Act has ratified this rule since its introduction in 2003. The required free equity is generally 10%, but it is lower in the Democratic Republic of the Congo (5%), higher in Guinea (15%), and negotiable in Tanzania. Some mining acts stipulate that the State reserves the right to acquire an additional holding under normal commercial (i.e. by payment) conditions. Total State equity is capped at 15% of the capital of mining companies in Côte d'Ivoire, 20% in Mali, Ghana and Mauritania, and 35% in Guinea.

firms. These treaties aim at sharing power of taxation concerning international transactions (transfers of mineral rights, dividend payments, etc.) between the two countries concerned. They improve the attractiveness of African countries as regards foreign investments, but reduce tax revenue in the host country.

[29] The Finance Act of 2006 provided for a 10% rate on capital gains from disposals. However, the rate was not reported in the subsequent tax guides published by Ernst & Young.

[30] For example, the American group Freeport-McMoran sold its majority interest in the Bermuda holding company, which is the owner of the mining firm Tenke Fungurume Mining (TFM) in the Democratic Republic of the Congo, to the Chinese company China Molybdenum for 2,65 billion USD in May 2016.

4.3. Indirect taxes

For value added tax (VAT) and customs duties, countries mainly grant the suspension of fees and customs duties on imports of materials, equipment, capital goods, fuel, and chemical products used for prospecting and mining activities. Paying customs duties, and the risk of unrefunded VAT, would further increase the already high costs of initial investments. Two methods are used - temporary importation, and exemption. The temporary importation system allows equipment to enter the country free from any fees and customs duties on imports, provided it is later re-exported. If it is not re-exported the company must pay the corresponding duties retrospectively. The list of equipment the company wants to import under this system is appended to the mining agreement once it has been approved by the public authorities. Partial or total exemption from VAT and customs duties can also be granted in addition to temporary importation, mainly during the prospecting and development phases. These exemptions demand greater vigilance from the supervisory authorities to combat any misuse of the goods imported. The exemption period varies by country and the type of goods imported. Once the exemption period is over, the normal customs system applies unless otherwise stipulated.

5. A first analysis of resource rent sharing

Comparison of mining tax systems is difficult *a priori* because the multiplicity of possible levies makes each mining regime unique. However, analysis of national legislation seems to show a difference between French-speaking-countries and English-speaking countries. The assessment of resource rent sharing between state and investor which derives from the legislation provides a synthesis of the measures implemented by each country.

Mineral rent sharing depends on the tax system, but also on the economic structure of the mine and world prices. To analyse rent sharing between state and investors, and to neutralize the economic structure and world prices, an average effective tax rate (AETR) was calculated for a gold price of USD 1,100/oz on two projects representative of an African gold mine, which mainly differ in their ore grade (Table 1). The average production costs are USD 917/oz and USD 668/oz respectively. This is in the range for African gold mines, which extends from a little under USD 400/oz to more than USD 1,100/oz. (Gajigo, 2012). Globally, the average total cash cost is USD 749/oz (GFMS, 2015).

Table 1: Economic assumptions characterising the two representative mines

Description of mineral	Gold	
Measure of an ounce	31.1034768 g/oz (Troy ounce)	
Gold price per ounce	USD 1,100/oz (2015)	
Economic assumptions	Low-grade, open-pit	Medium-grade, open-pit
Life cycle	13 years	13 years
Area	150 km²	150 km²
Stripping ratio	1/9	1/9
Ore grade	1.8 g/t	3.0 g/t
Recovery rate	86%	88%
Gold production	1.59 million ounces	1.62 million ounces
Initial investment	USD 190 million	USD 150 million
Investment duration	2 years	2 years
Capital replacement cost	USD 18 million	USD 13.5 million
Extraction costs	USD 2.5/t of waste rock mined	USD 2.8/t of waste rock mined
Processing costs	USD 15/t of mineral processed	USD 20/t of mineral processed
Administrative costs	USD 3.5 million/year from the third year	
Refining and sales costs	USD 5/oz	USD 5/oz
IRR* (USD 1,100/oz)	20%	47%
IRR* (USD 1,400/oz)	43%	69%

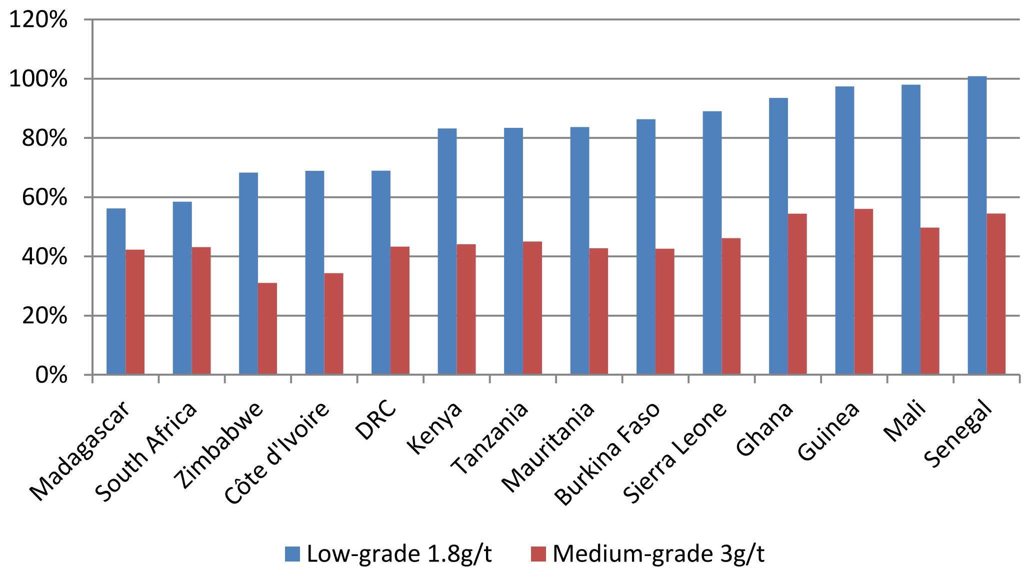
Source: Authors. *The internal return rate (IRR) of mining projects is calculated before application of tax regime, for a discount rate of 10%. The net cash flows of each mine are available in Appendix 8.

The model used to calculate the AETR is a cash flow model, which takes a similar approach to that used in the FARI model (Fiscal Analysis of Resource Industries model) developed by the IMF (Luca et Mesa Puyo, 2015). The AETR calculation takes account of 8 tax and non-tax instruments[31]: fees, ground rents, mining royalties, corporate income tax, minimum tax, withholding tax on dividends, tax on interest, and State equity. The model assumes that the company benefits from a stability clause guaranteeing the maintenance of the tax regime throughout the life cycle of the project.

For the year 2015, the results of the model show AETR at between 56% and 101% for the low-grade mine and between 31% and 56% for the medium-grade mine (Graph 10). Zimbabwe and Cote d'Ivoire are some of the countries with the lowest AETR, whereas Guinea and Senegal are some of the countries with the highest AETR.

[31] Three public levies which can particularly impact the AETR have not been taken account in the model, due to the complexity of the economic and tax information required to calculate them: VAT credits not paid back to mining companies by the tax authority, customs duties payable on the importation of capital goods and fuel, and taxes on oil products.

Graph 10: AETR for mining tax regimes legally in force in 2015



Source: Authors - at a discount rate of 10% and a gold price of USD 1,100/oz.

An AETR which is near 100% or higher than 100% should not be too strictly interpreted. It does not mean that the government is collecting all of the rent; rather it means that the tax burden makes the mine economically unviable at a gold price of USD 1,100/oz. This illustrates the impact of the tax system and the gold price on the profitability of a mining project. A standard mine which is economically viable in one country may not be in another. Equally, a standard mine which is economically viable at a given gold price may become unprofitable if the price falls, because of a mining tax system which is not progressive in relation to the profitability of the mine. Indeed, the government take is significantly higher when the levies apply to a mine of low profitability against a mine of medium profitability. In the countries studied, the difference in AETR can vary in the ratio of one to two. Tax systems do not strictly adapt to variations in the profitability of mines.

The historical spread of the AETRs calculated highlights the different developments which have taken place in different countries (Appendices 9 à 12). While AETRs increased over the entire period in the majority of cases, those of Madagascar and the Democratic Republic of the Congo remained stable, and those of Guinea, Mali and Côte d'Ivoire fell. In 2010, there was a significant increase reflecting the will of governments to increase taxes on mining following the surge in the gold price (which increased five-fold between 2005 and 2012). Senegal is the most striking example. While the Senegal Mining Act of 2003 was particularly favourable to investors, the reforms undertaken between 2012 and 2013 resulted in an increase of 53 points in the AETR for low-grade mines, and of 25 points for medium-grade mines. This can be explained by the introduction in 2012 of a second mining royalty known as the 'special tax on mining and quarrying products' (at a rate of 5%), followed by the adoption of the new Tax Act in 2013, which increased the corporate income tax rate (from 25% to 30%) and removed the majority of exemptions granted to the holders of mining rights. Similarly, in Ghana, the abandonment in 2010 of a variable-rate mining royalty (between 3% and 6%) in favour of a fixed-rate royalty (5%), followed in 2012 by the 10 point increase in the corporate income tax rate applied to mining companies, led to an increase of 25 points in the AETR for low-grade mines and of around 10 points for medium-grade mines. Thus, reforms made by the countries after the gold price boom significantly impact the sharing of mineral rent. The consequences of these reforms and the levies used could have an important effect in the future both for States and for investors if they are not adapted to variations in the price of gold, increases as well as decreases.

The AETR shows that mining tax regimes are regressive. The higher is the rent, the lower is its taxation. The government take can vary in the ratio of one to two according to the profitability of the mine. Tax systems are the most regressive when they are mainly based on levies which do not adapt, or do not adapt enough, to the earnings of the owner. This is particularly true for ground rent which raises big amounts; for mining royalties when their (fixed) rates are high (above 3%); and for minimum tax when its rates are high (above 1%) and there is no maximum amount. Reduced rates of, and exemptions of, CIT and withholding taxes strengthen the regressivity of tax systems. In 2015, the countries which had the most regressive regimes were Zimbabwe (due to a low CIT rate (15%)), Côte d'Ivoire (because of a long period of CIT exemption (5 years after the beginning of production)), Mali and Mauritania (because of very high rates of mining royalties (respectively 6% and 4.5% for a gold price fixed at USD 1,100/oz) and minimum tax (respectively 1% and 1.25%)). Ghana and Guinea have less regressive tax systems but high AETR because of high rates of mining royalties (5%) and CIT (respectively 35% and 30%). South Africa and Madagascar have the least regressive regimes because their CIT rates depend on profitability of the mine.

Finally, differences between French-speaking and English-speaking countries are statistically confirmed through the AETR analysis. The effect is only statistically significant for the low-grade mine because the low profitability exacerbates the heterogeneous impact of each levy. According to the Wilcoxon/Mann-Witney test (Table 2), the AETR of English-speaking and French-speaking countries were significantly different before 2010. However, this difference is not significant after 2010 because of the increase of AETR in English-speaking countries which have caught up with the level of AETR in French-speaking countries.

Table 2: Nonparametric signed-rank test (Wilcoxon/Mann-Witney)32

	Low-grade 1.8g/t		Medium-grade 3g/t	
Period	2004-2009	2010-2015	2004-2009	2010-2015
H0: French-speaking countries = English-speaking countries	r (0.037)	nr (0,6241)	nr (0,1556)	nr (0,807)

Notes: r, reject of H0; nr, not reject of H0; in brackets, p-value.

These first results illustrate some possible uses of this new legal and tax database, and demonstrate the utility of a such a database which enables a uniform analysis of mining tax systems, between English-speaking and French-speaking countries, over a long period.

6. Conclusion

This study presents the first database which summarises the main levies which, according to the national legal legislation, should apply to industrial gold-producing companies in 14 African countries, and makes a first comparison of tax regimes in the mining sector.

Over the period 1980 to 2015, the taxation which applies to the mining sector has changed differently for duties, taxes and fees which apply to the general regime on the one hand, and those which are specific to the mining sector on the other hand. The CIT and VAT rates have converged in the general regime, in all countries, both English-speaking and French-speaking ones. However, the basis of these taxes varies a lot between countries: depreciation rules, restrictions on allowable cost deductions, loss carry forward limit, VAT threshold, and VAT exemptions. WAEMU countries are an exception. Their tax harmonisation is strong and concerns both rates and basis[33]. Derogations from the general regime granted to the mining sector are numerous: exemptions, reduced rates, and progressive CIT rate.

The difference between countries increases with the application of taxes which are specific to the mining sector. Although their amounts are often low, fees and ground rent are more frequently used in Minerals and Mining Acts in French-speaking countries than in English-speaking ones. Conversely, English-speaking countries often fix higher mining royalty rates than French-speaking ones. Moreover, while most mining royalties are calculated at fixed rates, three French-speaking countries have recently adopted variable rates depending on the gold price. Consequently, mining royalty rates diverge when gold prices are low, and converge when prices are high.

[32] South Africa and Sierra Leone are not taken account in the test because the available information does not allow the calculation of their AETR before 2009 and 2010 respectively.

[33] Directive 01/2008/CM/UEMOA for CIT and Directives 02/98/CM/UEMOA and 02/2009/CM/UEMOA for VAT.

Moreover, gold-producing states have diversified the way they levy the mineral rent with the introduction of rent taxes, variable rates of mining royalties, and State equity. This diversification complicates the assessment of the impact of tax systems on the sharing of mineral rent between State and company, as the analysis of AETR highlights. It enhances the importance of this database for conducting this kind of research.

7. Appendix

Appendix 1: Gold production in Africa from 2004 to 2014 (kilograms)

Country	2004	2006	2008	2010	2012	2014
South Africa	**337,223**	**272,128**	**212,744**	**188,702**	**154,180**	**151,622**
Algeria	597	377	647	723	264	80
Saudi Arabia	8,268	5,182	4,527	4,400	4,285	4,789
Botswana	162	3,020	3,176	1,774	1,522	958
Burkina Faso	**1,008**	**1,571**	**6,033**	**23,525**	**29,873**	**37,200**
Burundi	3,229	4,313	2,170	2,933	2,046	1,000
Cameroon	600	600	600	600	600	600
Central African Republic		10				
Republic of the Congo	60	30				
Democratic Republic of the Congo	**10,500**	**10,300**	**10,000**	**10,000**	**17,000**	**36,000**
Côte d'Ivoire	**1,219**	**1,323**	**4,205**	**5,316**	**11,232**	**17,000**
Eritrea		45	32	30	9,735	840
Ethiopia	3,490	3,828	3,631	6,003	12,581	10,340
Gabon	300	300	300	300	684	1,012
Ghana	**63,139**	**72,323**	**80,503**	**92,380**	**89,768**	**98,528**
Guinea	**11,100**	**16,364**	**17,981**	**24,836**	**16,153**	**15,660**
Equatorial Guinea	150	200				
Kenya	**567**	**432**	**340**	**2,355**	**3,600**	**0**
Liberia	110	9	624	666	641	535
Madagascar	**40**	**30**	**50**	**46**	**157**	**0**
Mali	**37,911**	**58,382**	**41,160**	**44,300**	**41,200**	**45,400**
Morocco	1,493	1,300	587	650	532	377
Mauritania	**0**	**322**	**5,528**	**8,326**	**7,647**	**9,625**
Mozambique	56	85	298	106	178	197
Namibia	2,205	2,790	2,115	2,683	2,402	2,139
Niger	1,590	2,615	2,314	1,950	1,677	732
Nigeria	30	40	2,890	3,718	4,000	4,000
Uganda	1,447	2,192	2,055			
Senegal	**600**	**600**	**600**	**5,354**	**6,666**	**6,588**
Sierra Leone	**24**	**71**	**196**	**270**	**141**	**33**
South Sudan						
Tanzania	**48,176**	**39,750**	**36,434**	**39,448**	**39,012**	**40,598**
Chad		150				
Togo		7,184	11,835	10,452	18,551	20,583
Zambia	0	964	1,693	3,410	4,232	4,803
Zimbabwe	**21,330**	**11,354**	**3,579**	**19,240**	**14,743**	**15,386**

Source: World Mineral Statistics Data, https://www.bgs.ac.uk/. The data includes artisanal and industrial production.

Appendix 2: History of Minerals and Mining Acts (excluding amendments).

	Minerals and Mining Acts
South Africa	Minerals Act, 1991 Mineral and Petroleum Resources Development Act, 2002
Burkina Faso	Code des investissements miniers, 1993 Code minier, 1997 Code minier, 2003
Côte d'Ivoire	Code minier, 1964 Code minier, 1995 Code minier, 2014
Ghana	Minerals and Mining Law, 1986 Minerals and Mining Act, 2006
Guinea	Code minier, 1986 Code minier, 1995 Code minier, 2011
Kenya	Mining Act, 1933 Mining Act, 1940
Madagascar	Code minier, 1990 Code minier, 1995 Code minier, 1999
Mali	Code minier, 1970 Code minier, 1991 Code minier, 1999 Code minier, 2012
Mauritania	Code minier, 1977 Code minier, 1999 Code minier, 2008
DRC	Législation générale sur les mines et les hydrocarbures, 1981 Code minier, 2002
Senegal	Régime des substances minérales, 1961 Code minier, 1988 Code minier, 2003
Sierra Leone	Mines and Minerals Act, 1994 Mines and Minerals Act, 2009
Tanzania	Mining Act, 1979 Mining Act, 1998 Mining Act, 2010
Zimbabwe	Mines and Minerals Act, 1951 Mines and Minerals Act, 1961

Source: Summary by the authors based on national texts.

Appendix 3: Main tax laws in force in 2015 (excluding amendments).

	Tax laws
South Africa	Income Tax Act, 1962 Value Added Tax Act, 1991
Burkina Faso	Code des impôts directs et indirects et du monopole des tabacs, 1965 Code de l'enregistrement, du timbre et de l'impôt sur les valeurs mobilières, 1963 Impôt sur les sociétés, 2010
Côte d'Ivoire	Code des impôts, 1963 *Reformed, 2005*
Ghana	Internal Revenue Act, 2000 Value Added Tax Act, 2013 National Health Insurance Act, 2012
Guinea	Code des impôts, 1991 *Replaced, 2004*
Kenya	Income Tax Act, 1973 Value Added Tax Act, 2013
Madagascar	Code des impôts, 1977 *Replaced, 2000*
Mali	Code des impôts, 1970 *Replaced, 2006*
Mauritania	Code des impôts, 1982 *Reformed, 1994*
DRC	Impôt réel, 1969 Impôts cédulaires sur les revenus, 1969 Impôt exceptionnel sur les rémunérations des expatriés, 1969 Taxe sur la valeur ajoutée, 2010
Senegal	Code des impôts, 1992 *Replaced, 2013*
Sierra Leone	Income Tax Act, 2000 Goods and Services Tax Act, 2009
Tanzania	Income Tax Act, 2004 Value Added Tax Act, 1997
Zimbabwe	Income Tax Act, 1967 Capital Gains Tax Act, 1981 Value Added Tax Act, 2002 Finance Act, 1965

Source: Summary by the authors based on national texts.

Appendix 4: Existence of, and changes to, stability clauses in the gold-producing countries studied.

Country	Year	Prospecting right			Mining right		
		Scope	Duration	Condition	Scope	Duration	Condition
South Africa	2004	ne	ne	ne	ne	ne	ne
	2009	ne	ne	ne	Mining royalty	Validity period	Automatic reduction
Burkina Faso	1998	ne	ne	ne	Tax and customs, excluded mining fees and royalties	Validity period	Automatic reduction
	2005	ne	ne	ne	Tax and customs, excluded mining fees and royalties	Validity period	Not stipulated
Côte d'Ivoire	1995	ne	ne	ne	ne	ne	ne
	2014	ne	ne	ne	Tax and customs	Validity period	Global adoption
Ghana	2006	ne	ne	ne	Tax and customs	15 ans	Automatic reduction
Guinea	1995	Tax and customs	Validity period	Non-automatic negotiable reduction	Tax and customs	Validity period (25 years maximum)	Non-automatic negotiable reduction
	2011	ne	ne	ne	Tax and customs, excluded mining fees and royalties	10 years + 5 years in return for an annual premium	Not stipulated
Kenya	1986	ne	ne	ne	ne	ne	ne
Madagascar	1999 2006	ne	ne	ne	Tax and customs	Depending on amount of investment	Automatic reduction
Mali	1991	Tax and customs	Validity period	Automatic reduction	Tax and customs	Validity period	Automatic reduction
	1999 2012	Tax and customs, excluded mining fees and royalties	Validity period	Global adoption	Tax and customs, excluded mining fees and royalties	Validity period	Global adoption
Mauritania	2002 2012	Tax and customs	From first prospecting to first mining licence	Automatic reduction	Tax and customs	Validity period	Automatic reduction
DRC	1981	ne	ne	ne	ne	ne	ne
	2002	Tax and customs	10 years after amendment of the Mining Act	Automatic reduction	Tax and customs	10 years after amendment of the Mining Act	Automatic reduction
Senegal	1988	ne	ne	ne	Tax and customs	25 years	Automatic reduction
	2004	Tax and customs	Prospecting and mining license	Global adoption	Tax and customs	Validity period	Global adoption
Sierra Leone	2010	ne	ne	ne	ne	ne	ne
Tanzania	1980	ne	ne	ne	ne	ne	ne
	1998 2010	ne	ne	ne	Tax	Validity period	Not stipulated
Zimbabwe	2015	ne	ne	ne	Negotiable	Negotiable	Negotiable

Source: Summary by the authors based on national texts. Because of the lack of clarity in the legislation, the provisions of stability clauses have had to be deduced to some extent. ne: non-existent.

Appendix 5: Rates of mining royalties in the gold-producing countries studied.

<table>
<tr><th></th><th>1980</th><th>1981</th><th>1982</th><th>1983</th><th>1984</th><th>1985</th><th>1986</th><th>1987</th><th>1988</th><th>1989</th><th>1990</th><th>1991</th><th>1992</th><th>1993</th><th>1994</th><th>1995</th><th>1996</th><th>1997</th><th>1998</th><th>1999</th><th>2000</th><th>2001</th><th>2002</th><th>2003</th><th>2004</th><th>2005</th><th>2006</th><th>2007</th><th>2008</th><th>2009</th><th>2010</th><th>2011</th><th>2012</th><th>2013</th><th>2014</th><th>2015</th></tr>
<tr><td>South Africa</td><td colspan="29"></td><td colspan="7">0.5% to 5% *</td></tr>
<tr><td>Burkina Faso</td><td colspan="17"></td><td colspan="14">3%</td><td colspan="5">3% to 5% **</td></tr>
<tr><td>Côte d'Ivoire</td><td colspan="16"></td><td colspan="18">3%</td><td colspan="2">3% to 6%**</td></tr>
<tr><td>Ghana</td><td colspan="7"></td><td colspan="19">3% to 12% *</td><td colspan="4">3% to 6% *</td><td colspan="6">5%</td></tr>
<tr><td>Guinea</td><td colspan="15"></td><td colspan="21">5%</td></tr>
<tr><td>Kenya</td><td colspan="33"></td><td colspan="3">5%</td></tr>
<tr><td>Madagascar</td><td colspan="19"></td><td colspan="17">2%</td></tr>
<tr><td>Mali</td><td colspan="11"></td><td colspan="8">3% + 3%</td><td colspan="13">3%</td><td colspan="4">3% + 3%</td></tr>
<tr><td>Mauritania</td><td colspan="19"></td><td colspan="9">3%</td><td colspan="4">4%</td><td colspan="4">4% to 6.5% **</td></tr>
<tr><td>DRC</td><td colspan="1"></td><td colspan="21">ne</td><td colspan="14">2.5%</td></tr>
<tr><td>Senegal</td><td colspan="8"></td><td colspan="16">2% à 5% depending on agreement</td><td colspan="12">3%</td></tr>
<tr><td>Sierra Leone</td><td colspan="14"></td><td colspan="16">4%</td><td colspan="6">5%</td></tr>
<tr><td>Tanzania</td><td colspan="18"></td><td colspan="12">3%</td><td colspan="6">4%</td></tr>
<tr><td>Zimbabwe</td><td colspan="25"></td><td colspan="5">3%</td><td>4%</td><td>4.5%</td><td colspan="3">7%</td><td>5%</td></tr>
</table>

Source: Summary by the authors based on national texts. ne: non-existent (the tax does not exist). Dotted: not reported. *Progressive rate based on the profitability of the project. ** Variable rate based on gold price.

Appendix 6: Basis of mining royalties in the gold-producing countries studied.

	Legal name of tax	Years	Legal definition of the tax base	Source
South Africa	Royalty	2009-2015	Gross sales	Mineral and Petroleum Resources Royalty Act, 2008 (No. 28 of 2008) (section 3)
Burkina Faso	Redevance proportionnelle	1997-2004	FOB value of the substance extracted	Décret n°96-419/PRES/PM/MEM du 13 Décembre 1996 (article 12)
		2005-2009	FOB value of the substance extracted	Décret n°2005-048/PRES/PM/MCE/MFB du 3 Février 2005 (article 12)
		2010-2015	Turnover of substance extracted sold	Décret n°2010-075/PRES/PM/MEF du 3 Mars 2010 (article 12)
Côte d'Ivoire	Taxe ad valorem	1996-2013	Turnover reduced by transport and refining costs	Ordonnance n°96-600 du 9 Août 1996 (article 3)
		2014-2015	Turnover after deduction of transport and refining costs (FOB value)	Loi n°2014-138 du 24 Mars 2014 (article 151)
Ghana	Royalty	1986-2005	Total revenue of minerals	Minerals and Mining Law, 1986 (PNDCL 153) (section 22)
		2006-2009	Total revenue of minerals	Minerals and Mining Act, 2006 (Act 703) (section 25)
		2010-2015	Total revenue earned from minerals	Minerals and Mining (Amendment) Act, 2010 (Act 794)
Guinea	Taxe sur les substances minières	1995-2011	Market value of the substance (London fixing)	Loi L/95/036/CTRN du 30 Juin 1995 (article 139)
		2012	London fixing	Loi L/2011/006/CNT du 9 Septembre 2011 (article 161)
	Taxe sur la production industrielle ou semi-industrielle des métaux précieux	2013-2015	Value of the ingot […] determined by weighing at the Central Bank of Guinea taking account of the purity of the precious metal and of the price of precious metal according to London p.m. fixing	Loi L/2013/053/CNT du 8 Avril 2013 (article 2 modifiant l'article 161-I de la loi précédente)
Kenya	Royalty	1967-2012	Gross sales	Mining (Gold Royalty) (Migori Mine) Regulations, 1967 (Legal Notice No. 177 of 1967) (section 3)
		2013-2015	Gross sales value	Mining (Prescription of Royalties on Minerals) Regulations, 2013 (Legal Notice No. 187 of 2013) (section 2)
Madagascar	Redevance minière	1999-2005	First sale value	Loi n°99-022 du 19 Août 1999 (article 117)
		2006-2015	First sale value of substances extracted	Loi n°2005-021 du 17 Octobre 2005 (article 1 modifiant l'article 117 de la loi précédente)

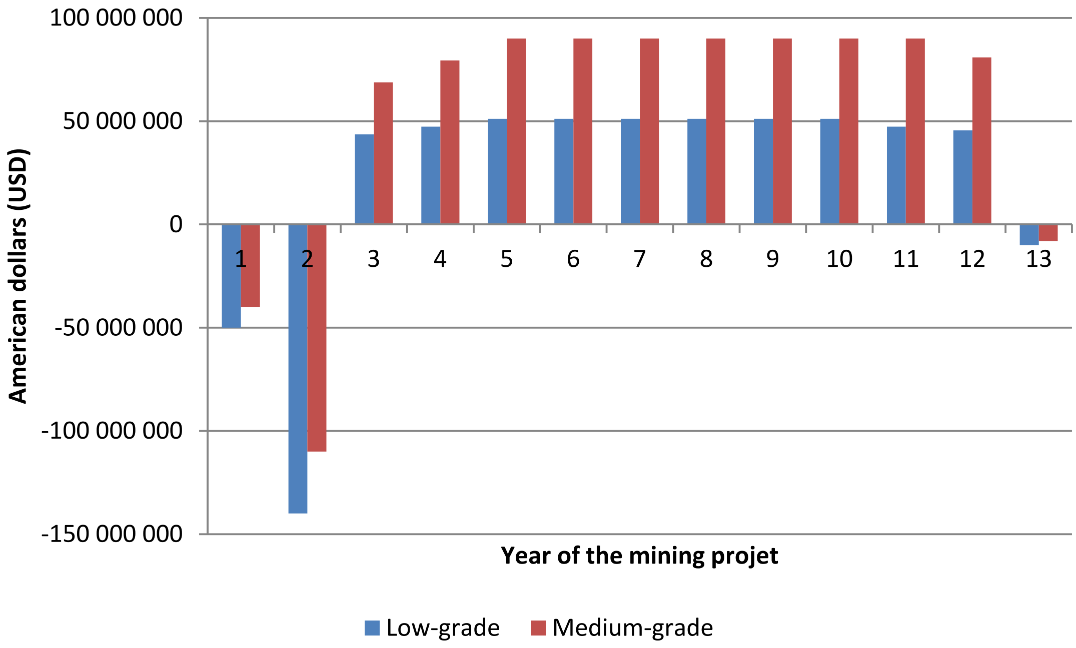
	Legal name of tax	Years	Legal definition of the tax base	Source
Mali	Contribution pour prestation de services	1991-1998	Not stipulated	Ordonnance n°91-065/P-CTSP du 19 Septembre 1991 (article 92)
	Taxe ad valorem	1991-1998	Not stipulated	Ordonnance n°91-065/P-CTSP du 19 Septembre 1991 (article 92)
		2012-2015	Net value of substance extracted […] after deduction of costs and intermediate charges	Loi n°2012-015 du 27 Février 2012 (article 121)
	Impôt spécial sur certains produits	1999-2011	Turnover excluding tax	Ordonnance n°99-032/P-RM du 19 Août 1999 (article 105)
		2012-2015	Turnover excluding VAT	Loi n°2012-015 du 27 Février 2012 (article 121)
Mauritania	Redevance minière	1999-2007	Sale price of substance at the final processing stage of mineral in Mauritania	Loi n°99-013 du 23 Juin 1999 (article 88)
	Redevance d'exploitation	2008-2011	Sale price of substance at the final processing stage of mineral in Mauritania or FOB value of mineral if it is exported before being sold	Loi n°2008-011 du 27 Avril 2008 (article 108)
		2012-2015	Sale price of substance at the final processing stage of mineral in Mauritania or FOB value of mineral if it is exported before being sold	Loi n°2012-014 du 16 Février 2012 (article 1 modifiant l'article 108 de la loi précédente)
DRC	Redevance minière	2002-2015	Sale value after deduction of transport, analysis […], insurance and selling costs	Loi n°007/2002 du 11 Juillet 2002 (article 240)
Senegal	Redevance ad valorem	1988-2003	Net value of substances sold	Loi n°88-06 du 26 Août 1988 (article 47)
		2004-2015	Net value	Loi n°2003-36 du 24 Novembre 2003 (article 57)
Sierra Leone	Royalty	2010-2015	Market value	Mines and Minerals Act, 2009 (No. 12 of 2009) (section 148)
Tanzania	Royalty	1998-2009	Net back value of minerals	Mining Act, 1998 (No. 15 of 1998) (section 86)
		2010-2015	Gross value of minerals : market value of minerals at the point of refining or sale or, in the case of consumption within Tanzania, at the point of delivery within Tanzania	Mining Act, 2010 (No. 14 of 2010) (section 87)
Zimbabwe	Royalty	2004-2015	Gross fair market value of minerals produced	Fixing of the Rate Royalty (General Notice No. 381 of 2003)

Appendix 7: Rates of corporate income tax under the Income Tax Act and Minerals and Mining Act in gold-producing countries studied.

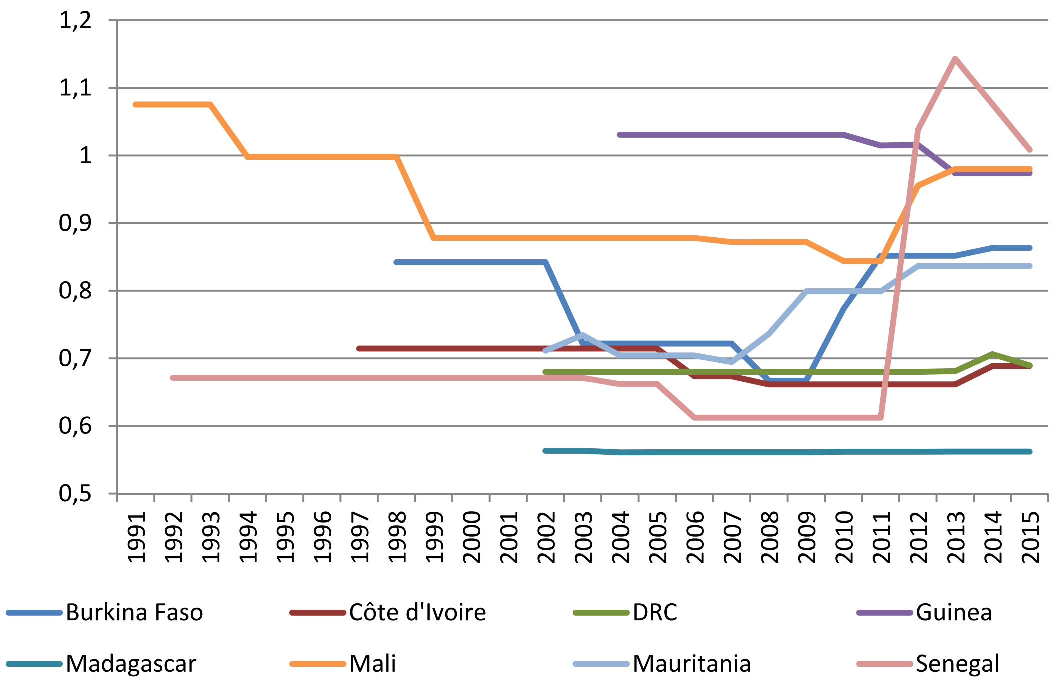
<table>
<tr><th></th><th>1980</th><th>1981</th><th>1982</th><th>1983</th><th>1984</th><th>1985</th><th>1986</th><th>1987</th><th>1988</th><th>1989</th><th>1990</th><th>1991</th><th>1992</th><th>1993</th><th>1994</th><th>1995</th><th>1996</th><th>1997</th><th>1998</th><th>1999</th><th>2000</th><th>2001</th><th>2002</th><th>2003</th><th>2004</th><th>2005</th><th>2006</th><th>2007</th><th>2008</th><th>2009</th><th>2010</th><th>2011</th><th>2012</th><th>2013</th><th>2014</th><th>2015</th></tr>
<tr><td>South Africa</td><td colspan="10"></td><td colspan="2">50%</td><td>48%</td><td>40%</td><td colspan="5">35%</td><td colspan="6">30%</td><td colspan="3">29%</td><td colspan="8">28%</td></tr>
<tr><td>South Africa (mines)</td><td colspan="10"></td><td colspan="22">Rate calculation amended regulary but always based on the profitability of the mine</td><td colspan="4">34% – 170/x</td></tr>
<tr><td>Burkina Faso</td><td colspan="16"></td><td>45%</td><td colspan="3">40%</td><td colspan="8">35%</td><td colspan="2">30%</td><td colspan="6">27.5%</td></tr>
<tr><td>Burkina Faso (mines)</td><td colspan="15"></td><td colspan="9">35%</td><td colspan="12">Normal rate less 10%</td></tr>
<tr><td>Côte d'Ivoire</td><td colspan="11"></td><td colspan="15">35%</td><td colspan="2">27%</td><td colspan="8">25%</td></tr>
<tr><td>Ghana</td><td colspan="21"></td><td colspan="4">32.5%</td><td>30%</td><td colspan="10">25%</td></tr>
<tr><td>Ghana (mines)</td><td colspan="6"></td><td colspan="8">45%</td><td colspan="7">35%</td><td colspan="11">Normal rate</td><td colspan="4">35%</td></tr>
<tr><td>Guinea</td><td colspan="24"></td><td colspan="12">35%</td></tr>
<tr><td>Guinea (mines)</td><td colspan="15"></td><td colspan="18">35%</td><td colspan="3">30%</td></tr>
<tr><td>Kenya (resident)</td><td colspan="10">45%</td><td>42.5</td><td>40</td><td>37.5</td><td colspan="5">35%</td><td colspan="2">32.5%</td><td colspan="16">30%</td></tr>
<tr><td>Kenya (non-resident)</td><td colspan="10">52.5%</td><td>50</td><td>47.5</td><td>45</td><td colspan="5">42.5%</td><td colspan="2">40%</td><td colspan="16">37.5%</td></tr>
<tr><td>Madagascar</td><td colspan="19"></td><td colspan="4">35%</td><td colspan="5">30%</td><td>25%</td><td>24%</td><td>23%</td><td>22%</td><td>21%</td><td colspan="3">20%</td></tr>
<tr><td>Madagascar (mines)</td><td colspan="22"></td><td colspan="14">Rate between 25% and 40%, progressive depending on the Internal Return Rate</td></tr>
<tr><td>Mali</td><td colspan="7"></td><td colspan="7">45%</td><td colspan="18">35%</td><td colspan="4">30%</td></tr>
<tr><td>Mali (mines)</td><td colspan="7"></td><td colspan="25">Normal rate</td><td colspan="4">25% during 15 years</td></tr>
<tr><td>Mauritania</td><td colspan="2"></td><td colspan="19">40%</td><td colspan="2">35%</td><td colspan="2">20%</td><td colspan="11">25%</td></tr>
<tr><td>Mauritania (mines)</td><td colspan="19"></td><td colspan="3">30%</td><td colspan="6">25%</td><td colspan="8">Normal rate</td></tr>
<tr><td>DRC</td><td colspan="22"></td><td colspan="11">40%</td><td colspan="3">35%</td></tr>
<tr><td>DRC (mines)</td><td colspan="22"></td><td colspan="14">30%</td></tr>
<tr><td>Senegal</td><td colspan="12"></td><td colspan="12">35%</td><td colspan="2">33%</td><td colspan="7">25%</td><td colspan="3">30%</td></tr>
<tr><td>Sierra Leone</td><td colspan="20"></td><td colspan="3">35%</td><td colspan="13">30%</td></tr>
<tr><td>Sierra Leone (mines)</td><td colspan="20"></td><td colspan="10">37.5%</td><td colspan="3">30%</td><td colspan="3">Normal rate</td></tr>
<tr><td>Tanzania</td><td colspan="24"></td><td colspan="12">30%</td></tr>
<tr><td>Zimbabwe</td><td colspan="24"></td><td colspan="2">36.05%</td><td colspan="4">30.9%</td><td colspan="6">25.75%</td></tr>
<tr><td>Zimbabwe (mines)</td><td colspan="24"></td><td colspan="12">15.45%</td></tr>
</table>

Source: Summary by the authors based on national texts. In some cases, two rates are set: one for general law and the other for the mining industry, although their value is the same (this is the case in Guinea, Sierra Leone and Zimbabwe). Dotted: not reported.

Appendix 8: Net cash flows of the two representative African gold mines.

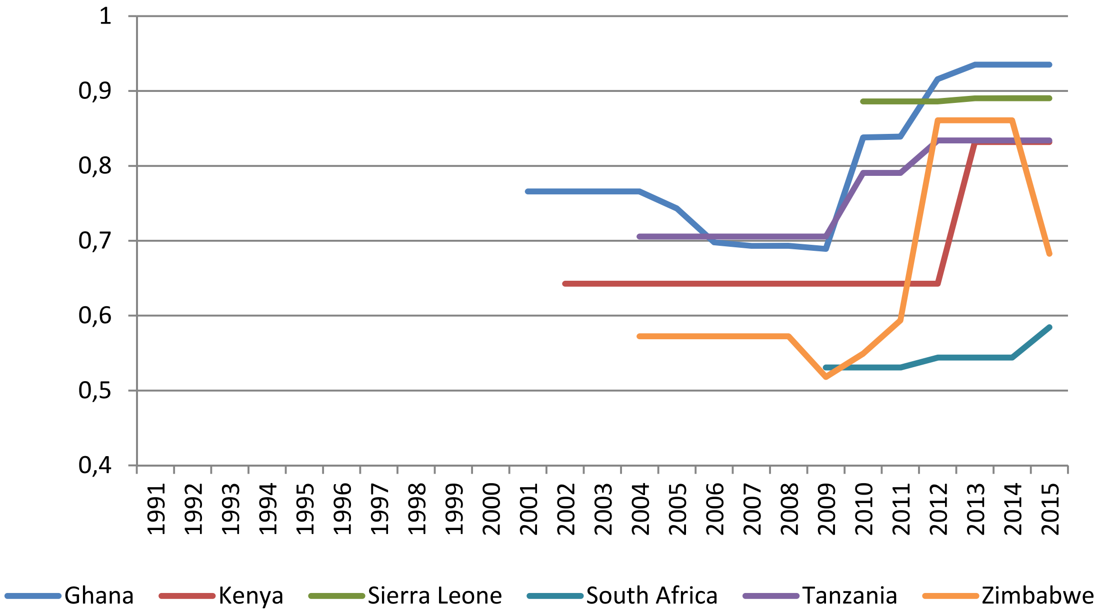


Appendix 9: Average effective tax rates in the French-speaking countries for the low-grade mine.



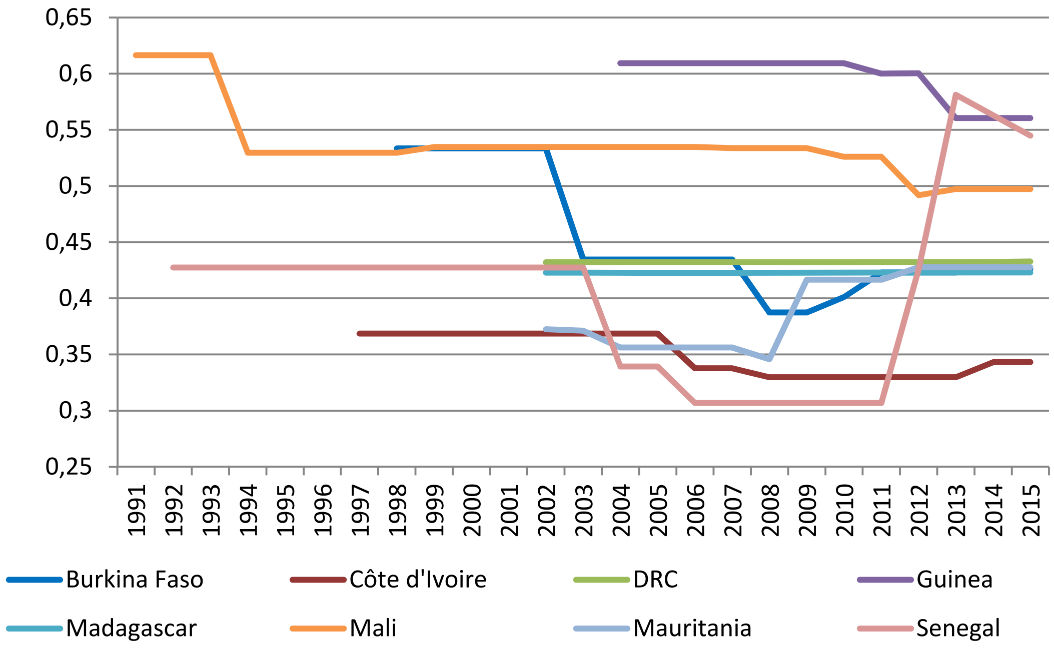
Source: Authors. For a discount rate of 10% and a gold price of USD 1,100/oz.

Appendix 10: Average effective tax rates in the English-speaking countries for the low-grade mine.



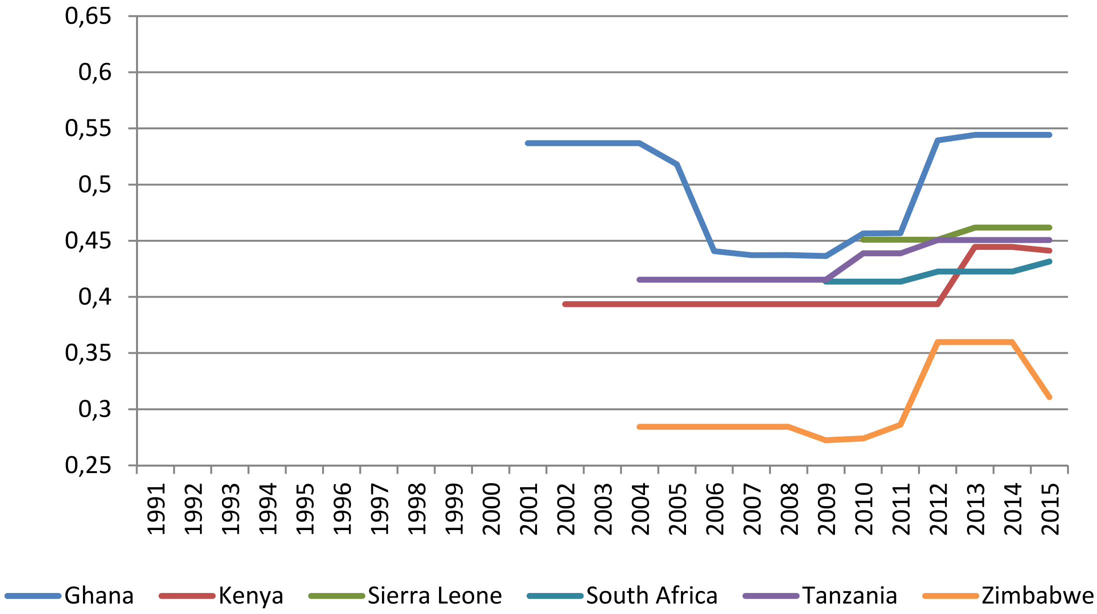
Source: Authors. For a discount rate of 10% and a gold price of USD 1,100/oz.

Appendix 11: Average effective tax rates in the French-speaking countries for the medium-grade mine.



Source: Authors. For a discount rate of 10% and a gold price of USD 1,100/oz.

Appendix 12: Average effective tax rates in the English-speaking countries for the medium-grade mine.



Source: Authors. For a discount rate of 10% and a gold price of USD 1,100/oz.

Appendix 13: Abbreviation used for the names of countries.

Abbreviation	Country
ZAF	South Africa
BFA	Burkina Faso
CIV	Côte d'Ivoire
GHA	Ghana
GIN	Guinea
KEN	Kenya
MDG	Madagascar
MLI	Mali
MRT	Mauritania
COD	DRC
SEN	Senegal
SLE	Sierra Leone
TZA	Tanzania
ZWE	Zimbabwe

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Pascal

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