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Taxation of mineral resources in Africa: the case of gold

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Dédicace

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Executive Summary

The taxation of mineral resources constitutes a major strategic lever for domestic revenue mobilization and economic development in Africa, particularly in the gold sector. Gold extraction generates substantial revenues in the form of economic rents. However, the ability of African States to capture a significant share of these rents often remains limited due to political, institutional, and infrastructural constraints. The importance of resource taxation in strengthening public finances in Africa was emphasized at the Addis Ababa Conference in 2015 and reaffirmed at the International Conference on Financing for Development held in Seville in July 2025, where the "Seville Compromise" stressed the need for more effective taxation of natural resources in order to enhance the fiscal capacity of African States and support their development ambitions. These challenges are also embedded in the broader frameworks of the 2030 Agenda for Sustainable Development and the African Union's Agenda 2063, which aim to promote inclusive growth, reduce inequalities, and improve governance.

In this context, understanding how government ideology, infrastructure development, and electoral cycles influence mining taxation is essential for designing policies capable of maximizing the share of resource rents captured by the State, strengthening governance in the extractive sector, and supporting sustainable and equitable development. This thesis contributes to this objective by empirically analyzing the determinants of mining taxation across several African countries and by identifying the mechanisms through which states can enhance their fiscal capacity and improve their contribution to both national and regional economic development.

Chapter 2 examines how the political orientation of heads of government (left vs. right) influences the adoption of legal and fiscal reforms in the extractive sector across a sample of 54 African countries over the period 2000-2020. The results show that, although ideology does not significantly affect the likelihood of reform implementation, the reforms themselves have a tangible impact on the *de facto* average effective tax rate (AETR), which measures the share of extractive rents captured by the State. In particular, left-leaning governments tend to increase the share of rents captured by the State, whereas right-leaning governments are associated with a reduction in that share.

Chapter 3 investigates the effect of infrastructure development on the *de jure* average effective tax rate (AETR) in 22 African gold-producing countries over the period 2005-

2020. The analysis shows that more developed infrastructure - particularly roads and railways - is associated with more effective mining taxation. Institutions play a mediating role: regime durability, overall institutional quality, and control of corruption amplify this effect by creating conditions conducive to improved resource rent capture.

Chapter 4 examines the impact of presidential elections on the *de jure* average effective tax rate (AETR) in 20 African countries over the period 2000-2020, while incorporating regional spillover effects. The results indicate that presidential elections temporarily reduce the AETR, suggesting the presence of fiscal manipulation or clientelist practices. However, these negative effects are mitigated in countries with higher levels of democracy, transparency (particularly membership in the Extractive Industries Transparency Initiative - EITI), and institutional quality. In such contexts, elections may even strengthen mining taxation.

Keywords: Political ideology; Mining sector; Legal and fiscal reform; Rent-sharing; Africa; Infrastructure; Institutions; Elections; Spatial Durbin Model.

JEL Codes: C23; D72; H20; H25; H30; O55; P00; Q30; Q38.

Resumé Exécutif

La taxation des ressources minières constitue un levier stratégique majeur pour la mobilisation des recettes intérieures et le développement économique en Afrique, en particulier dans le secteur aurifère. L'exploitation de l'or génère des revenus substantiels appelés rentes. La capacité des États à capturer une part significative de ces rentes reste souvent limitée, en raison de facteurs politiques, institutionnels et infrastructurels. L'importance de cette fiscalité pour renforcer les finances publiques africaines a été soulignée dès la Conférence d'Addis-Abeba en 2015, puis réaffirmée lors de la Conférence internationale sur le financement du développement à Séville en juillet 2025, où le "Compromis de Séville" a insisté sur la nécessité d'une taxation plus efficace des ressources naturelles afin d'accroître la capacité fiscale des États africains et de soutenir leurs ambitions de développement. Ces enjeux s'inscrivent également dans les cadres plus larges de l'Agenda 2030 pour le développement durable et de l'Agenda 2063 de l'Union africaine, qui visent à promouvoir une croissance inclusive, la réduction des inégalités et l'amélioration de la gouvernance.

Dans ce contexte, comprendre comment l'idéologie des gouvernements, le développement des infrastructures et les cycles électoraux influencent la fiscalité minière est essentiel pour concevoir des politiques capables de maximiser la part des rentes captée par l'État, renforcer la gouvernance du secteur extractif et soutenir un développement durable et équitable. Cette thèse s'inscrit dans cette perspective en analysant empiriquement les déterminants de la fiscalité minière dans plusieurs pays africains, en mettant en évidence les mécanismes par lesquels les États peuvent accroître leur capacité fiscale et améliorer leur contribution au développement économique régional et national.

Le chapitre 2 analyse comment l'orientation politique chefs des gouvernements (gauche vs. droite) influence l'adoption de réformes juridiques et fiscales dans le secteur extractif sur un échantillon de 54 pays africains entre 2000 et 2020. Les résultats montrent que, bien que l'idéologie n'affecte pas significativement la probabilité de mise en œuvre des réformes, ces dernières ont un impact tangible sur le taux effectf moyen d'imposition (TEMI) *de facto* mesurant la part des rentes extractives de l'Etat. En particulier, les gouvernements de gauche tendent à accroître la part des rentes captée par l'État, tandis que les gouvernements de droite l'abaissent.

Le chapitre 3 explore l'effet du développement des infrastructures sur le taux effectif moyen d'imposition (TEMI) *de jure* dans 22 pays africains producteurs d'or sur la période

2005–2020. L'analyse montre que des infrastructures plus développées, notamment les routes et chemins de fer, sont associées à une fiscalité minière plus efficace. Les institutions jouent un rôle médiateur : la durabilité des régimes, la qualité institutionnelle et le contrôle de la corruption amplifient cet effet en créant des conditions favorables à une meilleure capture de la rente.

Le chapitre 4 examine l'impact des élections présidentielles sur le taux effectif moyen d'imposition (TEMI) *de jure* dans 20 pays africains entre 2000 et 2020, en intégrant les effets de voisinage régionaux. Les résultats indiquent que les élections présidentielles réduisent temporairement le TEMI, suggérant des manipulations fiscales ou des pratiques clientélistes. Cependant, ces effets négatifs sont atténués dans les pays où la démocratie, la transparence (adhésion à l'Initiative pour la Transparence des Industries Extractives - ITIE) et la qualité institutionnelle sont élevées ; dans ces contextes, les élections peuvent même renforcer la fiscalité minière.

Mots Clés: Idéologie Politique ; Secteur Minier ; Réforme juridique et fiscale ; Partage de la Rente ; Afrique ; Infrastructures ; Institutions ; Élections ; Modèle Spatial de Durbin.

JEL Codes: C23; D72; H20; H25; H30; O55; P00; Q30; Q38.

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Introduction générale

1.1 Contexte et justification

L'Afrique est un continent riche en ressources naturelles. Les estimations chiffrent à 30% les réserves minérales mondiales qui seraient localisées sur le continent Africain, dont 90% pour le platine, 60% pour le cobalt et 40% pour l'or[1]. Les enjeux liés à la sécurité et à l'approvisionnement en minéraux suscitent un intérêt croissant à l'échelle internationale. En 2022, le gouvernement du Royaume-Uni a créé le «Critical Minerals Intelligence Centre» (CMIC). Sa mission est de recueillir et d'analyser des informations sur les minéraux et les matières premières dites critiques afin d'aider l'activité économique du pays et de garantir la sécurité nationale. En 2023, dans le but de renforcer l'économie des États-Unis, la sécurité nationale et de diversifier les chaînes d'approvisionnement en minéraux essentiels, le «United Sates Institute of Peace» (USIP) crée un programme d'études de haut niveau. À cette fin, l'USIP recrute des personnes ayant une connaissance approfondie de l'exploitation minière, du continent africain lui-même, de la politique africaine des États-Unis. L'objectif de ce programme n'est pas seulement de formuler des recommandations sur la façon dont les États-Unis peuvent établir des partenariats mutuellement bénéfiques dans le domaine des minéraux essentiels en Afrique, mais aussi de contrer l'expansion chinoise qui ne cesse de croître depuis des décennies. Compte tenu de l'intérêt croissant pour ces minerais, illustré par l'attention portée aux minerais essentiels, l'imposition de taxes (Hotelling, 1931) sur ceux-ci apparaît comme une opportunité pour les pays africains d'accroître leurs recettes fiscales (Ossowski and Gonzáles, 2012; Thomas and Trevino, 2013; Crivelli and Gupta, 2014; Cust and Zeufack, 2023). Ainsi, si la Conférence d'Addis-Abeba de 2015 avait déjà souligné l'importance de la taxation des ressources naturelles dans la mobilisation des recettes intérieures en Afrique, la Conférence internationale sur le financement du développement tenue à Séville en juillet 2025 est venue réaffirmer et renforcer cet enjeu. Le *Compromis de Séville* insiste en effet sur la nécessité d'une taxation plus efficace des ressources naturelles afin d'accroître la capacité fiscale des États africains.

L'or est extrait dans quarante[2] des cinquante-quatre pays qui composent le continent, selon les derniers rapports du British Geological Survey (Idoine et al., 2023, 2024). Ce qui fait de l'or, le minerai le plus exploité en Afrique. Si la découverte de l'or fait naître l'espoir d'un développement accéléré, elle peut également engendrer le désespoir. Il est en effet difficile de prédire la trajectoire d'un tel développement basé sur l'exploitation du minerai d'or. En Afrique, le Mali et le Burkina Faso ont vu l'exploitation de l'or

[1] Ce chiffre est estimé. En réalité, une grande partie des réserves minérales du continent est encore inexplorée. Ce chiffre pourrait donc être légèrement supérieur à 30%.

[2] Ces pays sont: Afrique du Sud; Algérie; Angola; Bénin; Botswana; Burkina Faso; Burundi; Cameroun; République Centrafricaine; Congo (Brazaville); Congo (Kinshasa); Côte d'Ivoire; Égypte; Guinée Équatoriale; Érythrée; Eswatini; Éthiopie; Gabon; Ghana; Guinée; Kenya; Libéria; Madagascar; Mali; Mauritanie; Maroc; Mozambique; Namibie; Niger; Nigeria; Rwanda; Sénégal; Sierra Leone; Soudan; Soudan du Sud; Tanzanie; Togo; Ouganda; Zambie; Zimbabwe.

jouer un rôle important dans leur économie; toutesfois, le Ghana peut être cité comme un exemple de réussite. En effet, ce pays a su tirer parti de cette activité pour amorcer son développement. Les exportations ghanéennes d'or sont ainsi passées de 1,09 million de dollars américains en 1995 à 9,53 milliards de dollars américains en 2022 (Observatoire de la Complexité Économique - OEC, 2024)[3]. Sur la même période, le Produit Intérieur Brut (PIB) par habitant en parité de pouvoir d'achat a plus que triplé en 28 ans puisqu'il est passé de 1946 dollars américains en 1995 à 7209 en 2022. À l'inverse, il existe des exemples de déception quant au développement économique d'un pays, suite à la découverte de ressources naturelles (Cust and Mihalyi, 2017). La découverte et/ou l'exploitation de l'or n'a pas permis d'amorcer un développement économique durable au Soudan. Cette situation est due à l'instabilité politique, à la mauvaise gestion de l'or, à la corruption, aux sanctions économiques et aux faibles infrastructures existantes. En 2022, le PIB par habitant en parité de pouvoir d'achat se situait à 3355 dollars américains, soit un niveau similaire à celui de 2005 qui était de 3407 dollars americains (Banque Mondiale, 2024)[4].

À ce titre, la découverte de l'or ne peut être considérée ni comme une bénédiction ni comme une malédiction. Cependant, une bonne gestion de celui-ci en fait une bénédiction. La gestion de l'or repose en partie sur la manière dont les pays africains producteurs d'or taxent la rente aurifère, c'est-à-dire la richesse générée par l'exploitation de l'or. Cottarelli (2012) définit la rente comme étant «le montant par lequel les recettes dépassent tous les coûts de production, y compris ceux de la découverte et du développement, ainsi que le rendement normal du capital».

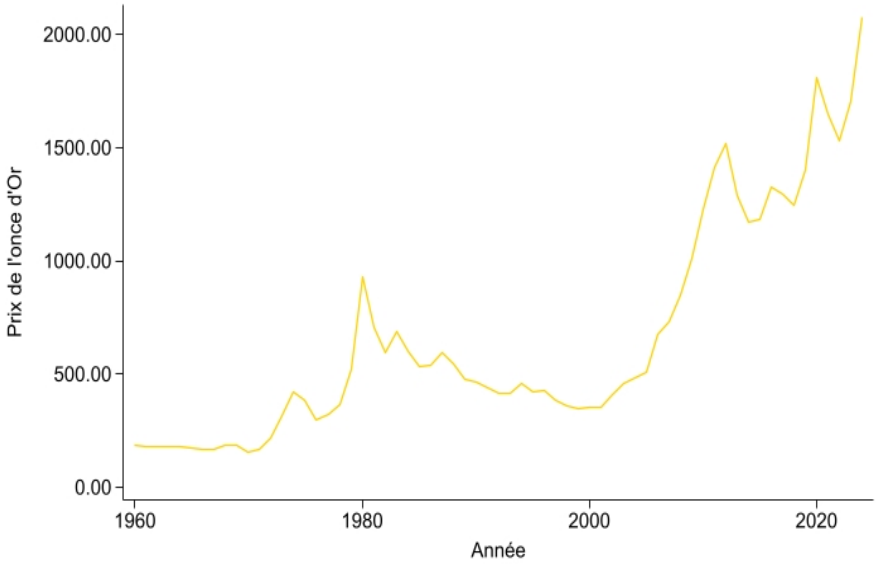
Au cours des dernières décennies, l'augmentation du prix de l'or et la multiplication des découvertes ont nourri d'avantage l'espoir d'un développement économique axé sur l'or. L'Uninon Africaine (2009) considère le secteur minier comme un levier central pour la croissance économique et le développement socio-économique du continent. La Figure 1.1 présente l'évolution du prix de l'once d'or entre 1960 et 2024. Bien que des périodes de baisse aient été observées[5], la tendance générale est restée haussière tout au long de cette période. La Figure 1.2 illustre l'évolution du nombre de découvertes minérales par taille et type de produit en Afrique entre 1990 et 2019. Les pays africains ont connu un véritable boom des matières premières durant les années 2000 et 2010, l'or constituant la principale ressource. En parallèle, le prix de l'or a également connu une forte hausse. Toutefois, malgré cet essor, la croissance économique des pays africains est restée modeste. En effet,

[3]Le site de l'Observatoire de la Complexité Économique a été consulté le 18/18/2024. Il est accessible via le lien suivant: Observatoire de le Complexité Économique - OEC.

[4]Le site de la base de données de la Banque Mondiale sur les indicateurs du développement dans le monde a été consulté le 19/12/2024. Il peut être consulté via le lien suivant: WDI database.

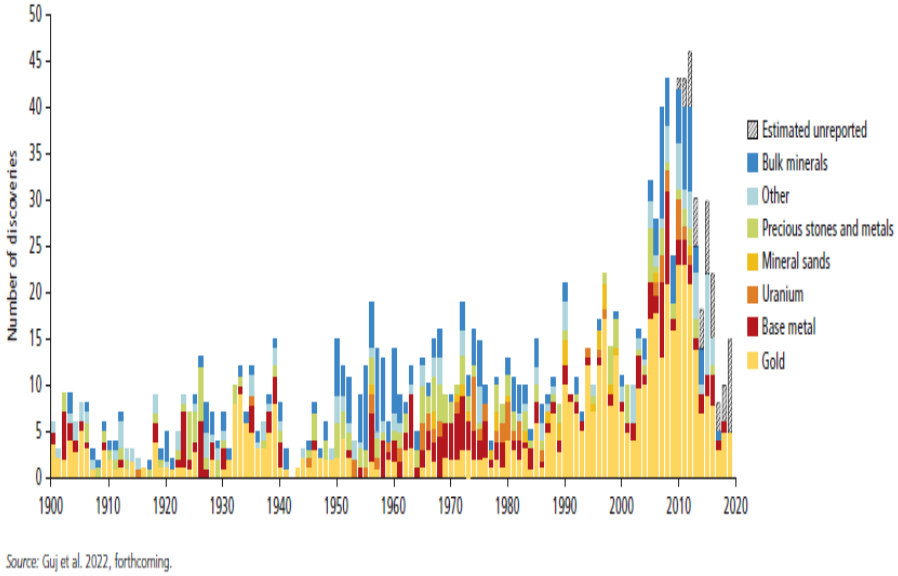
[5]Il convient de mentionner que la période considérée a été marquée par des changements extrêmes dans les fondamentaux économiques sous-jacents (inflation, taux d'intérêt, crises économiques), qui ont nécessairement une incidence sur la valeur intrinsèque de l'or. Par exemple, entre 2012 et 2015, les changements sont en partie dus à la crise de la dette souveraine européenne qui a augmenté le risque dans plusieurs pays (Białkowski et al., 2015).

Figure 1.1: Évolution du prix de l'once d'or entre 1960 et 2024



Source: Auteur

Figure 1.2: Nombre de découvertes minérales en Afrique par taille de gisement, 1900–2019



Source: Guj et al. 2022, forthcoming.

entre 2004 et 2014, le PIB par habitant a progressé de 2,5% dans les pays africains riches en ressources naturelles[6], contre 4% dans d'autres pays riches en ressources naturelles et 2% dans les pays africains non riches en ressources naturelles (Ouedraogo, 2023). Cust and Zeufack (2023) considère cette période comme une "occasion manquée" pour le continent. Cette situation, marquée par l'espoir suscité par la découverte de ressources naturelles et la désillusion qui s'ensuit, préoccupe les chercheurs et les décideurs politiques.

Bien que le partage de la rente soit au cœur des préoccupations des économistes et des décideurs, les questions d'idéologies politiques, du rôle des infrastructures et de l'impact des élections sur la répartition de la rente minière sont largement sous-explorées. Les études existantes se concentrent souvent sur l'évolution de la taxation de la rente minière, sur des comparaisons entre les pays en terme de convergence fiscale, sur le design fiscal dans la taxation de la rente, sur les conventions fiscales et sur le risque pays (Adebayo et al., 2021; Amedanou and Laporte, 2024) lié au partage de la rente minière de l'or, laissant ainsi de côté certaines problématiques essentielles pour la durabilité économique et sociale des États africains. C'est dans cette optique que cette thèse se propose d'explorer de façon empirique ces questions sous trois angles complémentaires : (i) l'influence des idéologies politiques sur les réformes fiscales dans le secteur extractif, (ii) le rôle des infrastructures et des institutions dans la captation de la rente minière, et (iii) les effets électoraux et institutionnels sur les choix fiscaux des gouvernements africains. L'objectif de cette thèse est de démontrer qu'une approche multidimensionnelle de la gestion de la rente minière permettrait aux États africains d'optimiser leurs ressources fiscales et d'assurer un développement économique.

1.2 Revue de littérature

La taxation des ressources minières constitue un enjeu stratégique pour les économies africaines, en particulier dans les pays riches en or. En effet, les rentes générées par l'exploitation de l'or représentent une source importantes de revenus publics, susceptibles de financer le développement économique, les infrastructures et les services sociaux (Corden and Neary, 1982; Corden, 1984; Tanzi, 1989; Stotsky and WoldeMariam, 1997; Botlhole et al., 2012; Ossowski and Gonzáles, 2012; Thomas and Trevino, 2013; Crivelli and Gupta, 2014). Toutefois, la mise en place d'un régime fiscal "optimal" demeure un défi. De nombreux États africains se trouvent confrontés à des arbitrages complexes entre attractivité pour les investisseurs, captation de la rente et stabilité politique.

Dans ce contexte, la littérature académique a largement exploré les déterminants de la fiscalité minière, en mettant en lumière le rôle des facteurs économiques, institutionnels et internationaux. Néanmoins, plusieurs dimensions restent encore insuffisamment étudiées,

[6]Est considéré comme un pays riche en resources naturelles, celui qui tire au moins 20% de ses exportations ou 20% de ses recettes publiques de ces ressources.

notamment l'influence des idéologies politiques, l'effet des infrastructures sur le partage de la rente ou encore les dynamiques électorales qui entourent la fiscalité du secteur extractif.

Cette revue de littérature vise à synthétiser les contributions majeures sur le sujet, tout en identifiant les lacunes que cette thèse cherche à combler. Elle s'articule autour de trois axes : (1) l'influence des idéologies politiques sur les réformes fiscales dans le secteur extractif, (2) le rôle des infrastructures et des institutions dans la captation de la rente minière, et (3) les effets électoraux et institutionnels sur les choix fiscaux des gouvernements africains.

1.2.1 Réformes fiscales minières et idéologies politiques

La fiscalité des ressources naturelles ne résulte pas seulement de considérations techniques ou économiques (Rodrik, 2007; Andrews et al., 2013). Elle s'inscrit également dans un cadre politique et idéologique plus large. La littérature en économie politique souligne depuis plusieurs décennies que l'orientation partisane des gouvernements influence leurs choix budgétaires, fiscaux et réglementaires (Hibbs Jr, 1977; Alesina and Rosenthal, 1995; Alesina and Tabellini, 2007). Appliquée au domaine extractif, cette perspective permet de mieux comprendre les trajectoires divergentes en matière de réforme fiscale minière entre pays, voire au sein d'un même pays au fil des alternances politiques.

Les gouvernements de gauche sont généralement porteurs d'une vision plus interventionniste du rôle de l'État dans l'économie. Ils tendent à remettre en question les privilèges des entreprises extractives, à renégocier des contrats jugés déséquilibrés, et à imposer des normes sociales, fiscales et environnementales plus strictes. Ces orientations s'inscrivent souvent dans un projet plus large de souveraineté économique et de redistribution. Haslam and Tanimoune (2016) montre par exemple que des gouvernements dits progressistes, comme ceux d'Evo Morales en Bolivie ou de Rafael Correa en Équateur, ont engagé d'importantes réformes visant à renationaliser les ressources, renforcer la fiscalité extractive et accroître les obligations sociales des entreprises. Des dynamiques similaires ont été observées en Afrique : la révision du code minier en République Démocratique du Congo en 2018, sous la présidence de Joseph Kabila, a introduit une hausse significative des taxes minières, élargi les responsabilités sociales des compagnies et restreint certaines exonérations fiscales, malgré l'opposition des acteurs internationaux. De même, la Guinée a procédé à une réforme ambitieuse de son code minier en 2011, dans une logique de rupture avec les pratiques opaques antérieures et de reprise du contrôle sur les ressources naturelles. Depuis l'arrivée au pouvoir de Mamadi Doumbouya en 2021, plusieurs dispositions de ce code ont fait l'objet de renégociations, notamment sur les taux de redevances, les clauses de stabilité fiscale et les engagements contractuels avec les compagnies minières, dans une logique de rééquilibrage du partage de la rente minière au profit de l'État.

À l'inverse, les gouvernements de droite, voire centristes, adoptent en général une approche plus favorable au marché (Garrett, 1998; Mahler et al., 2014). Ils considèrent l'investissement étranger comme un levier essentiel de croissance et cherchent à maintenir un environnement juridique stable et attractif. Cela se traduit par une aversion pour les réformes perçues comme hostiles aux investisseurs, une tendance à préserver les régimes fiscaux existants, voire à introduire des clauses de stabilité juridique et fiscale très favorables aux investisseurs. Kurtz and Brooks (2008) souligne ainsi que dans de nombreux pays d'Amérique latine, les gouvernements de droite ont rarement engagé des réformes minières ambitieuses, préférant éviter les signaux négatifs aux marchés. Le cas du Chili illustre cette logique : malgré des alternances entre gouvernements de centre-gauche et de centre-droit, le pays a maintenu un cadre fiscal stable et compétitif, régulièrement salué dans les classements internationaux sur l'attractivité minière (Fraser Institute, Mejía and Aliakbari, 2023). Néanmoins, la réalité politique impose parfois aux gouvernements de dépasser leurs orientations idéologiques initiales. Des contraintes telles que la dépendance à l'investissement étranger, les pressions exercées par les institutions financières internationales, ou encore la faiblesse des institutions internes, peuvent freiner ou infléchir des projets de réforme. Ross (2012) montre qu'un gouvernement de gauche peut maintenir un code minier favorable aux entreprises si le contexte économique ou institutionnel l'impose. À l'inverse, certains gouvernements modérés peuvent introduire des mesures de régulation plus strictes sous l'effet de pressions sociales ou d'enjeux électoraux.

Enfin, la littérature récente insiste sur le fait que l'impact des réformes sur la captation de la rente extractive dépend non seulement de leur contenu juridique, mais aussi de leur mise en œuvre effective. Même dans les pays ayant adopté des réformes ambitieuses, l'insuffisance des capacités fiscales, l'existence de contrats stabilisés ou les stratégies d'optimisation des entreprises limitent parfois les gains réels pour l'État (Otto, 2000; KPMG, 2014). Inversement, des réformes perçues comme hostiles peuvent décourager l'investissement et, paradoxalement, réduire la rente globale disponible (International Council on Mining and Metals, 2016). Il apparaît donc que les réformes minières doivent s'inscrire dans une stratégie plus large de renforcement de la gouvernance, incluant la transparence des contrats, la lutte contre la corruption, et le développement des capacités institutionnelles (McMahon, 2010; Collier, 2010; Aaronson, 2011; Ross, 2012). Cependant, peu d'études empiriques se sont penchées sur l'impact mesurable de l'idéologie politique sur la fiscalité minière dans les pays africains. Les recherches disponibles portent souvent sur des études de cas (par exemple le Ghana ou la Zambie), ou se concentrent sur l'influence des institutions internationales dans la diffusion des normes fiscales, en minimisant la dimension politique interne (Campbell, 2009). Ce déficit de preuves empiriques représente une lacune importante dans la compréhension des déterminants de la fiscalité extractive sur le continent. Le premier chapitre de cette thèse contribue à combler cette lacune en analysant l'effet de l'idéologie gouvernementale sur la probabilité de réforme

fiscale et sur le niveau de captation de la rente minière.

1.2.2 Infrastructures, institutions et partage de la rente minière

La qualité des infrastructures et le fonctionnement des institutions jouent un rôle déterminant dans la capacité des États africains à capter efficacement la rente issue de l'exploitation minière. Dans la littérature économique et politique, ces deux dimensions sont souvent abordées conjointement, car elles s'inscrivent dans un cadre plus large de gouvernance et de développement économique (Estache, 2009; Robinson and Acemoglu, 2012).

Les infrastructures constituent un déterminant majeur dans le développement du secteur extractif, notamment minier, tant au niveau de la production que de la rentabilité économique des projets. En particulier, les infrastructures de transport (routes, chemins de fer, ports), d'énergie (accès à une électricité fiable et abordable), et de télécommunications (réseaux numériques) sont considérées comme des catalyseurs de l'investissement et de la compétitivité dans le secteur minier. Calderón and Servén (2010) montrent ainsi que des infrastructures de qualité permettent de réduire significativement les coûts logistiques et opérationnels, de limiter les interruptions de production, et de faciliter l'accès aux marchés internationaux. Cela rend les projets extractifs plus attractifs et plus rentables, augmentant ainsi leur contribution potentielle aux recettes publiques.

Dans le cas spécifique de l'Afrique, où les déficits d'infrastructures demeurent criants dans de nombreuses régions, la question de l'investissement dans les infrastructures revêt une importance stratégique. C'est dans cette optique que la Banque Africaine de Développement (AfDB) a mis en place l'Indice Africain de Développement des Infrastructures (AIDI), qui permet de mesurer de manière composite la qualité, l'accès et la couverture des infrastructures dans les différents pays du continent. Des études ont établi un lien positif entre la hausse de cet indice et l'augmentation des recettes fiscales issues du secteur extractif (Fay and Yepes, 2003; Badel and Lyngaas, 2023; Isshaq et al., 2024). L'amélioration des infrastructures réduit non seulement les risques opérationnels pour les entreprises, mais elle contribue également à une meilleure intégration des zones minières isolées aux circuits économiques nationaux, ce qui facilite la régulation, la supervision et la taxation des activités minières (Bell and Chauvin, 2016). De plus, les infrastuctures jouent également un rôle symbolique et politique : leur développement est souvent perçu comme un signe tangible de l'engagement de l'État envers le développement économique, ce qui peut renforcer la légitimité des gouvernements et la confiance des acteurs économiques. Par ailleurs, des infrastructures bien développées permettent un meilleur contrôle territorial, ce qui limite les activités informelles ou illégales dans le secteur minier artisanal, particulièrement prégnant dans l'orpaillage en Afrique (Badel and Lyngaas, 2023).

Cependant, les infrastructures, aussi efficaces soient-elles, ne suffisent pas à garantir une captation optimale de la rente minière. Leur impact réel dépend largement de la

qualité des institutions chargées de réguler, superviser et taxer le secteur extractif. La littérature sur la malédiction des ressources a largement démontré que, dans les pays aux institutions faibles, les revenus tirés des ressources naturelles tendent à être mal utilisés, capturés par des élites ou dilapidés dans des dépenses improductives (Leite and Weidmann, 1999; Mehlum et al., 2006a,b; Collier et al., 2010; Humphreys et al., 2007). Parmi les faiblesses institutionnelles, la corruption figure comme un obstacle majeur. Une administration minière corrompue est incapable de faire respecter les normes fiscales, de collecter les taxes dues, ou de résister aux pressions exercées par les compagnies pour obtenir des exemptions injustifiées. Dans de tels contextes, même les cadres légaux les plus progressistes perdent toute portée concrète (Papyrakis et al., 2019; Villar and Papyrakis, 2017). De plus, la transparence dans la gestion des revenus extractifs, y compris la publication des contrats, la traçabilité des paiements, et l'audit indépendant des recettes, est essentielle pour renforcer la redevabilité et éviter les détournements (Sovacool et al., 2016; Cust and Mihalyi, 2017; Kinda and Thiombiano, 2024). Enfin, la capacité administrative constitue un autre pilier fondamental (Bohn and Deacon, 2000; Luong and Weinthal, 2010). Elle se manifeste à travers la compétence des agents publics, l'efficacité des mécanismes de contrôle, et l'existence d'un cadre institutionnel clair et stable. Dans de nombreux pays africains, les administrations fiscales manquent de personnel qualifié, d'outils d'analyse économique, ou de bases de données fiables pour estimer les profits réalisés par les compagnies minières. Ce déficit de capacités techniques limite fortement la capacité des États à appliquer une fiscalité adaptée à la réalité économique du secteur. Le développement de systèmes d'informations géologiques, fiscaux et douaniers intégrés apparaît dès lors comme une condition essentielle pour améliorer la captation de la rente[7].

Au-delà de leurs aspects techniques, les institutions jouent un rôle clé dans la stabilité politique et la durabilité des régimes au pouvoir, deux facteurs essentiels pour la mise en œuvre de réformes fiscales ambitieuses. Selon la théorie du « *selectorate* » de De Mesquita et al. (2005), la longévité d'un régime dépend de sa capacité à redistribuer efficacement les ressources à sa coalition de soutien. Dans ce cadre, des infrastructures bien développées améliorent les conditions économiques générales, augmentent la satisfaction des populations et renforcent la légitimité des gouvernants, créant ainsi un environnement politique stable et favorable à l'adoption de politiques fiscales structurelles. En retour, cette stabilité prolonge la durée des gouvernements en place et leur permet de mener à bien des réformes fiscales soutenues (Keefer and Vlaicu, 2008)[8].

Le second chapitre de cette thèse analyse précisément cette dynamique en mettant en

[7] Dans les contextes où prévalent la transparence, la responsabilité publique et une administration fiscale efficace, les ressources naturelles peuvent constituer un levier puissant de développement et de transformation économique (Tornell and Lane, 1999).

[8] À l'inverse, dans des contextes politiquement instables, les gouvernements peuvent hésiter à alourdir la fiscalité des compagnies minières, craignant de compromettre les investissements ou d'attiser les tensions sociales.

lumière le rôle médiateur des institutions, notamment le contrôle de la corruption, dans l'amélioration des parts des rentes minières de l'État.

1.2.3 Élections et manipulation de la fiscalité minière

La fiscalité dans le secteur extractif est traversée par des dynamiques politiques complexes, particulièrement dans les pays africains riches en ressources naturelles, où les cycles électoraux influencent fortement les politiques fiscales.

La littérature sur les cycles budgétaires politiques (PBC) montre que les motivations électorales modifient les niveaux de recettes, de dépenses et de déficits publics autour des élections (Shi and Svensson, 2002, 2006; De Haan and Klomp, 2013). Trois approches principales structurent ce champ. (i) L'approche partisane, qui met en évidence les différences idéologiques entre partis, par exemple une gauche favorable à une fiscalité plus redistributive sur les rentes minières, à l'inverse d'une droite plus libérale (Hibbs Jr, 1977; Shi and Svensson, 2006). (ii) Le modèle de sélection adverse, où les gouvernants cherchent à signaler leur compétence par des politiques visibles, souvent coûteuses mais parfois inefficaces (Rogoff, 1990; Robinson and Torvik, 2005). (iii) L'approche du risque moral, selon laquelle les dirigeants manipulent opportunément les politiques budgétaires en profitant d'asymétries d'information vis-à-vis des électeurs (Persson and Tabellini, 2002). Ces comportements sont d'autant plus fréquents dans les démocraties peu consolidées ou les systèmes institutionnels fragiles (Brender and Drazen, 2005).

Parallèlement, la littérature sur la fiscalité des ressources naturelles s'est concentrée sur les effets de substitution entre revenus extractifs et recettes fiscales classiques. Les gouvernements préfèrent souvent les premiers, moins exigeants en termes de redevabilité démocratique (Thomas and Trevino, 2013; Crivelli and Gupta, 2014).

Dans le contexte des pays africains producteurs d'or, ces deux dimensions - fiscalité extractive et cycles électoraux - s'entrecroisent fortement. Le secteur minier y constitue à la fois une source stratégique de revenus et un enjeu majeur de redistribution. Il devient aussi un terrain propice aux manipulations politiques : certains groupes d'intérêt liés à l'industrie minière financent les campagnes électorales en échange de concessions fiscales favorables (Ross, 2012), tandis que les candidats promettent des réformes fiscales plus dures pour séduire l'électorat médian, créant une tension entre attractivité économique et justice sociale (Bates, 1981).

Plusieurs travaux, à partir de la base de données développée par Laporte et al. (2015) ou d'autres approches methodologiques distinctes de partage de la rente, ont analysé la structure et l'évolution des taux effectifs moyens d'imposition (TEMI) dans le secteur minier africain. Ces études révèlent une forte hétérogénéité des régimes fiscaux, une convergence partielle entre pays francophones et anglophones (Charlet et al., 2019), ainsi qu'une sensibilité importante aux prix mondiaux de l'or (Laporte et al., 2022), au risque

pays (Adebayo et al., 2021; Amedanou and Laporte, 2024) et à des facteurs géographiques comme l'accès à la mer (Sanou, 2024). De plus, Leiva (2020) trouve que la qualité institutionnelle influence fortement la capacité d'un État à capter la rente, et qu'une allocation excessive au secteur privé peut persister même dans des États bien gouvernés.

Cependant, peu de recherches se sont penchées sur l'interaction spécifique entre fiscalité minière et dynamiques électorales. Or, les logiques électoralistes peuvent induire des stratégies divergentes. D'un côté, les gouvernements sortants peuvent alléger la pression fiscale sur les entreprises extractives pour attirer des financements politiques ou maintenir la stabilité sociale. De l'autre, les candidats challengers promettent souvent une renégociation des contrats miniers afin de renforcer la part de l'État dans la rente (Rakner, 2017). Des exemples empiriques illustrent ces tensions, notamment au Sénégal avec les débats électoraux autour des contrats pétroliers, ou encore l'implication d'acteurs privés comme le groupe Bolloré dans des campagnes électorales en Afrique de l'Ouest, en échange de régimes fiscaux préférentiels[9]. C'est à cette interface encore peu explorée - celle des liens entre fiscalité minière et cycles électoraux - que se consacre le troisième chapitre de cette thèse.

1.3 Fondements théoriques

La gestion des ressources minières en Afrique soulève des enjeux économiques et politiques majeurs, notamment en matière de fiscalité. Pour analyser ces enjeux, cette thèse s'appuie principalement sur trois grandes familles de théories économiques et politiques. La théorie du syndrome hollandais permet de comprendre les risques macroéconomiques liés à l'exploitation intensive des ressources naturelles. La théorie du comportement de recherche de rente éclaire les dynamiques d'acteurs et les conflits d'intérêts qui influencent la répartition de la rente minière. Enfin, la théorie de la taxation optimale de la rente minière offre un cadre analytique pour concevoir des politiques fiscales efficaces qui maximisent les revenus publics tout en préservant l'attractivité du secteur extractif.

1.3.1 Théorie du syndrôme hollandais

The economist, journal britanique, utilisait le terme «*dutch disease*» pour la première fois en 1977 pour désigner la situation que traversait les Pays-Bas depuis la decouverte des gisements de gaz dans la mer du Nord en 1959. The Economist (1977) identifie trois causes principales de cette situation. La première est l'appréciation de la monnaie locale, le Guilder dans le cas des Pays-Bas. L'afflux massif de devises étrangères, résultant de l'exportation des ressources naturelles - notamment le gaz naturel - engendre une forte demande pour la monnaie nationale. Cette pression à l'achat provoque une appréciation

[9] https://france3-regions.francetvinfo.fr/

du taux de change réel, rendant les produits d'exportation non liés aux ressources plus chers sur les marchés internationaux. En conséquence, les secteurs manufacturiers et agricoles exportateurs voient leur compétitivité diminuer, ce qui peut entraîner un recul relatif de ces secteurs au sein de l'économie nationale.

La deuxième cause est l'augmentation des coûts de production. L'appréciation de la monnaie locale n'affecte pas seulement la compétitivité à l'exportation, elle exerce également une pression à la hausse sur les salaires et les prix des services. En effet, le secteur des ressources, souvent plus rémunérateur, attire les facteurs de production tels que le travail qualifié et le capital, provoquant ainsi une « surchauffe » des coûts internes. Cette hausse des coûts rend la production dans les secteurs non liés aux ressources plus coûteuse, affectant leur rentabilité et leur capacité à rester compétitifs, ce qui freine la diversification industrielle.

Enfin, la troisième cause réside dans l'utilisation des revenus tirés de l'exploitation des ressources, ici le gaz, principalement à des fins de dépenses courantes plutôt que d'investissements productifs. Lorsque ces revenus sont consacrés majoritairement à la consommation publique, aux salaires et aux transferts sociaux, plutôt qu'à des investissements dans les infrastructures, la recherche ou le capital humain, cela amplifie l'effet de demande intérieure. Cette dynamique contribue à renforcer l'appréciation réelle de la monnaie et les pressions inflationnistes dans l'économie locale. Entre 1973 et 1975, les dépenses publiques représentaient environ 50% du PIB néerlandais, dont seulement 3% étaient consacrés à l'investissement, contre plus de 40% pour la consommation et les transferts, illustrant cette tendance.

Le sujet a rapidement attiré l'attention de la communauté scientifique, faisant l'objet de plusieurs recherches approfondies. Corden and Neary (1982) modélisent le syndrome hollandais dans une petite économie ouverte et identifient deux effets clés : l'effet de « déplacement » (resource movement effect), où les facteurs de production migrent vers le secteur des ressources, et l'effet d'« appréciation » (spending effect), lié à la hausse des revenus intérieurs qui pousse à la contraction des autres secteurs exportateurs. Harberger (1983) confirme que l'appréciation réelle de la monnaie est le canal central de cette déstabilisation économique. Enfin, Edwards and Aoki (1983), dans une économie à taux de change fixe, concluent que la «*maladie hollandaise*» n'est pas une maladie au sens strict, mais un ajustement économique qui peut être temporaire ou permanent, selon la gestion des revenus et les politiques mises en place. Leur travail théorique reste une base solide pour de nombreuses études empiriques sur le lien entre ressources naturelles et développement.

1.3.2 Théorie du comportement de recherche de rente

La théorie du comportement de recherche de rente (rent-seeking behavior) a été formalisée dans les années 1960 et 1970 par des économistes analysant les mécanismes par lesquels certains acteurs économiques investissent temps, énergie et ressources non productives afin d'obtenir des avantages économiques ou politiques, appelés « rentes », sans création de richesse supplémentaire. Le terme « rent-seeking » a été popularisé par Tullock (1967) dans son article « *The Welfare Costs of Tariffs, Monopolies, and Theft* », où il met en lumière les coûts sociaux engendrés par ces comportements, notamment une allocation inefficace des ressources. Krueger (1974) a été l'une des premières à formaliser ce concept dans son article fondamental « *The Political Economy of the Rent-Seeking Society* », où elle définit la recherche de rente comme « l'effort d'un individu ou d'un groupe pour obtenir des avantages économiques, des profits ou des ressources par des moyens non productifs, souvent en influençant ou en manipulant les politiques publiques ». Elle souligne que ce phénomène est particulièrement répandu dans les économies caractérisées par une forte régulation ou la présence de privilèges accordés par le pouvoir politique.

Ces travaux pionniers ont ouvert la voie à un champ plus large de recherche étudiant les conséquences économiques, politiques et institutionnelles de la recherche de rente. Par exemple, Buchanan et al. (1980) ont approfondi la théorie en intégrant ses dimensions institutionnelles et politiques. Plus récemment, des auteurs comme Baland and Francois (2000) ont appliqué ce cadre au secteur des ressources naturelles, démontrant que la présence de rentes peut intensifier les conflits entre groupes d'intérêt, exacerber la corruption et dégrader la qualité de la gouvernance, notamment dans le secteur extractif où entreprises, élites politiques et communautés locales rivalisent pour s'approprier une part des revenus miniers.

Par ailleurs, l'idéologie politique du gouvernement, notamment la position sur l'axe gauche-droite, joue un rôle central dans la gestion et le partage des rentes minières. Hibbs Jr (1977) est un des pionniers dans l'étude de l'impact des partis politiques sur les politiques macroéconomiques. Il démontre que les gouvernements de gauche favorisent généralement des politiques économiques plus interventionnistes, caractérisées par une fiscalité plus élevée et une redistribution accrue, tandis que les gouvernements de droite tendent à privilégier des politiques favorisant la libre entreprise et une fiscalité plus basse. Ces conclusions ont été largement reprises et appliquées au secteur extractif, où les gouvernements de gauche adoptent des politiques fiscales plus progressistes visant à augmenter la part des rentes captée par l'État et redistribuée à la population. Inversement, les gouvernements de droite favorisent des politiques plus attractives pour les entreprises extractives, en réduisant la fiscalité pour attirer les investissements, au risque de diminuer la part des rentes revenant à l'État (Ross, 2001; van der Ploeg, 2011). Ces différences idéologiques influencent directement les réformes légales et fiscales dans le secteur extrac-

tif, ainsi que la manière dont la rente est partagée.

Un aspect complémentaire, souvent peu exploré dans l'analyse classique, concerne les manipulations électorales liées à la rente minière. Les revenus issus des ressources naturelles peuvent être instrumentalisés par les dirigeants pour influencer les résultats électoraux, notamment en promettant des baisses d'impôts ou des redistributions ciblées afin d'attirer le vote des électeurs (Brollo et al., 2013; Robinson and Torvik, 2009). Dans ce cadre, les rentes deviennent un levier politique essentiel permettant aux gouvernements en place de renforcer leur légitimité et leur durée au pouvoir, parfois au détriment de la maximisation optimale des revenus publics.

Plusieurs chercheurs ont étudié la manipulation des politiques publiques à des fins électorales. Bates (1981) souligne que des ressources comme l'or, source importante de revenus étatiques (Corden, 1984; Corden and Neary, 1982), peuvent être utilisées dans des stratégies clientélistes, où ces revenus financent les campagnes électorales plutôt que des programmes de développement. Ce phénomène contribue à renforcer les régimes en place, comme l'expliquent également Keefer and Vlaicu (2008). Robinson and Acemoglu (2012) identifient ce type de politiques comme cause majeure d'inefficacité économique et d'inégalités persistantes. De plus, les groupes d'intérêts, y compris ceux des industries extractives, peuvent financer les campagnes électorales de certains politiciens en échange de politiques favorables à leurs activités. Ces politiques, qui peuvent aller de la réduction des taux d'imposition à l'exonération totale des taxes, favorisent les intérêts privés. Ce type de financement crée un lien direct entre les intérêts privés et la politique publique, renforçant ainsi le phénomène de comportement de recherche de rente (Buchanan, 2008).

1.3.3 Théorie de la taxation optimale de la rente minière

La théorie de la fiscalité optimale s'est progressivement étendue au secteur extractif afin de répondre à une problématique centrale : comment concevoir un régime fiscal qui permette à l'État de capter une part significative de la rente minière, tout en maintenant l'attractivité de l'investissement et en minimisant les distorsions économiques. L'élaboration de cette approche repose sur des travaux fondateurs en économie publique, qui ont ensuite été adaptés aux spécificités des ressources naturelles non renouvelables.

Dès 1927, Ramsey pose les bases de la théorie de l'imposition optimale en cherchant à minimiser les distorsions causées par les taxes, pour un niveau donné de recettes publiques. Cette approche est approfondie par Mirrlees (1971), qui formalise une théorie de l'impôt optimal dans un contexte d'information asymétrique, ouvrant la voie à une réflexion plus fine sur la taxation des revenus. Ces travaux soulignent l'importance de concevoir des systèmes fiscaux qui respectent à la fois l'efficacité économique, l'équité et la capacité de financement de l'État.

Dans le cas des ressources naturelles épuisables, les travaux de Hotelling (1931) appor-

tent une contribution essentielle. Il démontre que la valeur d'une ressource non renouvelable augmente au rythme du taux d'intérêt, ce qui définit un sentier optimal d'extraction dans le temps. Une fiscalité mal conçue peut perturber cette trajectoire naturelle en modifiant artificiellement le rythme d'exploitation. Dans cette optique, la neutralité de l'impôt devient une exigence fondamentale : un impôt optimal ne doit ni accélérer ni ralentir la production de la ressource.

La réflexion moderne sur la fiscalité optimale appliquée au secteur extractif trouve son point de départ dans les travaux de Brown et al. (1948), qui propose la *Cash-Flow Tax*, souvent appelée *Brown Tax*. Celle-ci consiste à taxer exclusivement les flux de trésorerie positifs d'un projet, après déduction intégrale et immédiate des investissements. Dans sa forme pure, cette taxe est considérée comme parfaitement neutre, car elle ne modifie ni les décisions d'investissement ni le profil d'extraction : l'État devient un partenaire financier proportionnel aux résultats, sans affecter le rendement marginal attendu. Toutefois, comme le souligne également le Fonds Monétaire International (FMI), cette neutralité repose sur des conditions strictes - notamment la possibilité pour l'État de rembourser immédiatement les flux négatifs - ce qui en limite l'applicabilité dans les pays où la capacité budgétaire est contrainte. Stiglitz (1976) prolonge cette analyse en montrant que, sous des conditions idéales - en particulier de parfaite information - un État peut capter 100% de la rente minière sans affecter les décisions économiques des investisseurs. En effet, la rente ne rémunère ni le capital marginal ni le travail marginal, et sa taxation n'introduit donc pas de distorsions. La condition, cependant, est que seule la rente soit taxée, et non les revenus normaux.

Dans la continuité de Brown et al. (1948), Garnaut and Ross (1975, 1983) développent la *Resource Rent Tax (RRT)*, souvent confondue avec la *Brown Tax* mais conceptuellement distincte. La RRT reprend l'idée de ne taxer que la rente, mais repose sur un mécanisme différent : plutôt que de rembourser les pertes, l'État autorise l'investisseur à reporter les coûts non récupérés d'une année à l'autre, en les capitalisant à un taux prédéterminé (souvent un taux de rendement normal). Ce système permet de préserver la neutralité tout en évitant les déboursements immédiats de l'État, ce qui le rend plus réaliste que la *Brown Tax* dans un contexte institutionnel limité.

Toutefois, en pratique, cette neutralité de la taxation de la rente est difficile à atteindre. Comme l'indique Land (2008), les États cherchent souvent à capter environ 50% de la rente, car l'investissement ne dépend pas uniquement du partage actuel des rentes, mais aussi des anticipations concernant l'évolution future du cadre fiscal. Des contributions ultérieures ont cherché à opérationnaliser ces principes dans des cadres institutionnels concrets. C'est pourquoi des approches hybrides ont été proposées pour répondre aux contraintes spécifiques des pays en développement. Boadway and Keen (2010) recommandent une combinaison pragmatique : une redevance modérée pour garantir des recettes stables dès le début du projet, un impôt sur les bénéfices classiques pour assurer une

contribution continue, et une taxe sur la rente pour capter les surprofits. Cette approche permet de conjuguer efficacité, équité et faisabilité administrative, dans des contextes où les capacités institutionnelles sont souvent limitées.

La fiscalité minière reste ainsi confrontée à une tension structurelle. D'un côté, la théorie affirme qu'il est possible de taxer la rente à 100% sans affecter les décisions économiques (Boadway and Keen, 2010). De l'autre, les réalités économiques, politiques et institutionnelles imposent des compromis. Sandmo (1979) rappelle que toute fiscalité engendre, dans une certaine mesure, des distorsions, et la fiscalité minière ne fait pas exception. Dans un environnement caractérisé par l'incertitude, la volatilité des prix et la concurrence internationale pour attirer l'investissement, la conception d'un système fiscal doit également garantir la prévisibilité, la transparence et la stabilité.

La neutralité fiscale reste un objectif central. Elle suppose que la fiscalité n'influence ni la décision d'investir, ni le choix du site d'exploitation, ni le rythme d'extraction. En théorie, les taxes fondées exclusivement sur la rente - comme la RRT - respectent ce critère. Toutefois, la mise en œuvre effective d'une fiscalité optimale nécessite une administration compétente, capable de contrôler les coûts et les profits réels déclarés par les entreprises. C'est dans cet équilibre fragile entre rigueur théorique, faisabilité institutionnelle et incitations économiques que se joue la réussite d'un régime fiscal minier optimal.

1.4 Le taux effectif moyen d'imposition comme indicateur de partage de la rente

L'analyse des régimes fiscaux dans le secteur extractif s'est enrichie, depuis les années 1990, de l'utilisation croissante du Taux Effectif Moyen d'Imposition (TEMI) comme indicateur de référence. Initialement développé dans le champ de la fiscalité générale par Devereux and Griffith (1998), puis approfondi par King and Fullerton (2010), le TEMI a été progressivement adapté aux spécificités des industries extractives dans les travaux du Fonds Monétaire International (FMI) et de la Banque mondiale, notamment par Daniel et al. (2010) et Boadway and Keen (2010). Ces derniers ont contribué à formaliser son application à la fiscalité des ressources naturelles, en soulignant son rôle central dans l'évaluation de la neutralité et de l'efficience des systèmes fiscaux miniers.

Dans le prolongement des travaux fondateurs de Garnaut and Ross (1975, 1983) et de Stiglitz (1976), Boadway and Keen (2010) insistent sur le fait qu'un régime fiscal bien conçu doit permettre de capter une part significative de la rente économique sans distordre les décisions d'investissement, à condition de ne pas affecter les rendements marginaux. Dans ce cadre, le TEMI constitue un outil de mesure indirect mais robuste de la capacité d'un système fiscal à atteindre cet équilibre, en tenant compte des effets

combinés de l'ensemble des instruments fiscaux mobilisés. Il permet ainsi d'évaluer, de manière comparative, la pression fiscale réelle exercée sur les projets miniers, tout en intégrant la complexité des dispositifs fiscaux en vigueur.

Dans le secteur extractif, le TEMI est couramment utilisé pour évaluer la part de la rente minière captée par l'État à travers l'ensemble du système fiscal appliqué à un projet donné. Il constitue un outil d'analyse comparative permettant d'apprécier l'intensité fiscale entre différents pays ou régimes, et d'en évaluer l'attractivité pour les investisseurs. En tenant compte de la diversité et de l'interaction des instruments fiscaux - tels que l'impôt sur les bénéfices, les redevances, les taxes sur la rente ou encore les contributions spécifiques - le TEMI synthétise la charge fiscale globale supportée par un investisseur au cours du cycle de vie d'un projet minier. Comme le soulignent Boadway and Keen (2010), cet indicateur agrégé permet de rendre compte du partage effectif de la valeur entre l'État et l'investisseur, ce qui s'avère particulièrement pertinent dans un secteur caractérisé par des profits volatils, concentrés dans le temps, et fortement influencés par les conditions géologiques et les fluctuations des marchés internationaux.

Dans la littérature appliquée, on distingue classiquement deux formes de TEMI : le TEMI « de jure », calculé à partir des dispositions fiscales prévues par la loi ou les textes réglementaires, et le TEMI « de facto », calculé à partir des paiements réellement effectués par les entreprises, en tenant compte des déductions, exemptions et ajustements appliqués dans la pratique. Cette distinction permet de mettre en lumière les écarts éventuels entre le cadre légal et la mise en œuvre effective de la fiscalité minière.

1.4.1 Le taux effectif moyen d'imposition de jure

Le TEMI *de jure* désigne le niveau de taxation moyen que subirait un projet minier, s'il était intégralement soumis au régime fiscal tel que défini par la législation en vigueur. Il s'agit donc d'une mesure normative (production annuelle, durée de vie, prix des matières premières, coûts d'exploitation, investissement initial, etc.). À partir de ce scénario de base, on applique l'ensemble des règles fiscales - impôt sur les sociétés, redevances, droits d'exportation, taxes spécifiques sur la rente, déductions, amortissements - afin de déterminer les flux financiers après impôt. Le TEMI *de jure* se calcule alors en comparant la valeur actuelle nette (VAN) du projet avant et après impôts, selon la formule :

$$TEMI_{dejure} = \frac{VAN_{avantimpôt} - VAN_{aprèsimpôt}}{VAN_{avantimpôt}}$$

Cette approche a été largement adoptée dans la littérature institutionnelle. Le FMI a développé un cadre analytique robuste à travers les travaux de Daniel et al. (2010), où le TEMI *de jure* est utilisé pour évaluer la compétitivité et la neutralité des régimes fiscaux extractifs. Le modèle d'analyse fiscale des industries de ressources (FARI) développé par le FMI (Luca and Puyo, 2016) illustre cette démarche en simulant l'impact de différentes

combinaisons fiscales sur un projet minier théorique, afin d'estimer le rendement fiscal potentiel d'un pays. Des études telles que Boadway and Keen (2010) ou Baunsgaard (2001) ont également utilisé cette méthode pour comparer les régimes fiscaux de différents pays producteurs de ressources naturelles.

Dans cette thèse nous utilisons un TEMI *de jure* issu de la base de données sur la fiscalité minière de la Fondation pour les Études et la Recherche sur le Développement International (FERDI) developeée par Laporte et al. (2015). Pour calculer le TEMI *de jure*, les auteurs utilisent un modèle de flux de trésorerie dont la logique est proche de celle du modèle FARI développé par le FMI (Luca and Puyo, 2016). Il s'agit du ratio des recettes publiques actualisées d'un projet minier par rapport au flux de trésorerie net avant impôt du même projet. En d'autres termes, le TEMI représente la part de la rente minière perçue par l'État sur un projet minier, à condition que le taux d'actualisation soit suffisamment élevé pour refléter le coût d'opportunité du capital (Laporte et al., 2015). Il est important de noter que le modèle prend en compte les spécificités de la législation de chaque pays concernant chaque instrument fiscal[10]. Le modèle suppose également que l'exploitant de la mine bénéficie d'une clause de stabilité garantissant le maintien du régime fiscal sur toute la durée du projet, soit en moyenne 13 ans. Ainsi, dans un pays donné et pour une année donnée, les TEMIs ainsi obtenus reflètent la répartition des rentes aurifères définie par la législation en vigueur.

1.4.2 Le taux effectif moyen d'imposition de facto

En revanche, le TEMI *de facto* mesure la charge fiscale réellement supportée par une entreprise minière, sur la base de ses données comptables ou fiscales réelles. Il s'agit donc d'une mesure empirique, qui s'appuie sur l'observation des paiements effectivement réalisés par l'entreprise au titre des différents impôts et taxes, rapportés à la valeur économique effectivement générée par le projet. Ce TEMI *de facto* permet de refléter la mise en œuvre concrète du régime fiscal, y compris ses éventuelles failles : exonérations fiscales, stabilisation contractuelle, retards de paiement, non-conformité, ou encore pratiques d'optimisation et d'évitement fiscal. Sa formule reste identique à celle du TEMI *de jure*, mais les flux utilisés sont ceux effectivement observés, et non simulés.

Le calcul du TEMI *de facto* dans cette thèse s'inspire du modèle proposé par Amedanou et al. (2025) et se déroule en trois étapes principales. La première consiste à estimer la valeur nominale des recettes fiscales directement liées à l'exploitation des ressources naturelles. Pour cela, nous utilisons les données fournies par l'UNU-WIDER, qui donnent

[10]Parmi les instruments fiscaux utilisés pour calculer le TEMI, les redevances foncières annuelles, les redevances fixes, les redevances minières, les retenues à la source sur les intérêts et les taxes minimales sur le chiffre d'affaire des entreprises minières constituent des impôts basés sur la production ou *in-rem taxes* (Otto, 1998, 2006), tandis que les retenues à la source sur les dividendes, l'impôt sur le revenu des sociétés et le versement de dividendes à l'État constituent des impôts basés sur les bénéfices ou *in personam taxes* (Otto, 1998, 2006).

les recettes fiscales provenant du secteur extractif exprimées en pourcentage du PIB. Ces données sont converties en valeurs monétaires absolues en appliquant ce pourcentage au PIB en dollars américains. La deuxième étape vise à déterminer la valeur nominale des rentes totales générées par l'exploitation des ressources naturelles. Pour ce faire, nous nous appuyons sur les statistiques de la Banque Mondiale, qui rapportent la rente économique issue des ressources naturelles également en pourcentage du PIB. Comme précédemment, ces ratios sont convertis en valeurs monétaires pour permettre des comparaisons directes. Enfin, le TEMI *de facto* est calculé en divisant les recettes fiscales liées aux ressources naturelles (déterminées à l'étape 1) par la valeur totale des rentes extraites (déterminée à l'étape 2). Ce rapport, exprimé en pourcentage, reflète la part effective de la rente minière captée par l'État, tenant compte des pratiques fiscales réelles, telles que les exemptions, les stabilisations contractuelles ou les mécanismes d'optimisation mais aussi de la qualité des institutions en charge du secteur. Ce TEMI permet ainsi de mesurer l'imposition réelle des ressources naturelles, en opposition au TEMI *de jure* qui se base sur le cadre légal théorique.

1.5 Faits stylisés

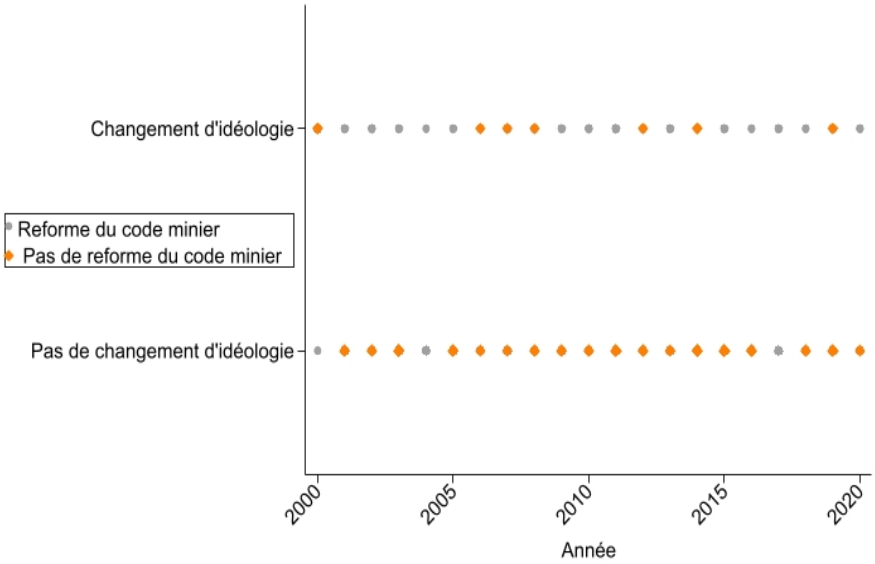
1.5.1 Dynamiques politiques et réformes fiscales dans le secteur minier africain

L'analyse des trajectoires idéologiques des chefs de gouvernement africains sur la période 2000-2020 montre que les réformes du code minier ne se produisent pas principalement lors de changements idéologiques majeurs. Comme l'illustre la Figure 1.3, la majorité des réformes a eu lieu durant des périodes où la position idéologique du chef de gouvernement est restée stable. Ce constat remet en question l'hypothèse selon laquelle les réformes minières seraient essentiellement déclenchées par des alternances politiques significatives.

Cette observation est confirmée par la Figure 1.4, qui présente la fréquence moyenne des réformes en fonction de la présence ou non d'un changement idéologique. Bien que l'on note une légère augmentation des réformes lors de changements politiques, cette différence reste faible. Le Tableau 1.1 (test du chi²) confirme l'absence d'une association statistiquement significative entre les changements dans le code minier et les variations d'idéologie, avec une p-value élevée (0,545). Ce résultat suggère que les réformes sont davantage liées à des dynamiques internes aux gouvernements en place qu'à des ruptures politiques idéologiques.

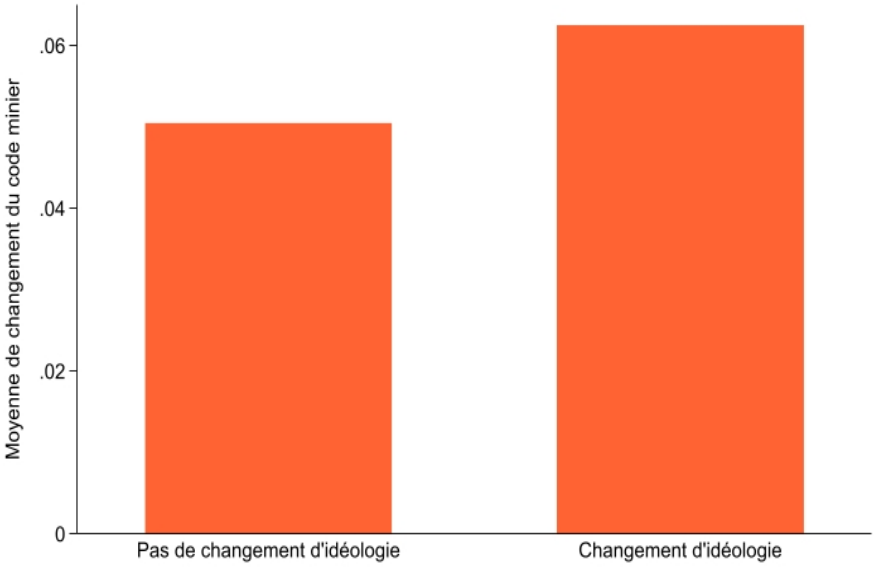
En termes d'impact, la Figure 1.5 montre que la part des rentes minières captée par l'État, mesurée par le TEMI *de facto*, tend à augmenter après l'adoption d'un nouveau code minier. La hausse de la médiane après réforme traduit un renforcement du contrôle étatique sur les ressources extractives. Cependant, la dispersion importante des valeurs

Figure 1.3: Chronologie du changement d'idéologie du chef du gouvernement et du code minier



Source: Auteur à partir des données de Global Leader Ideology Dataset et des codes miniers

Figure 1.4: Proportion du changement du code minier en fonction du changement d'idéologie du chef du gouvernement



Source: Auteur à partir des données de Global Leader Ideology Dataset et des codes miniers

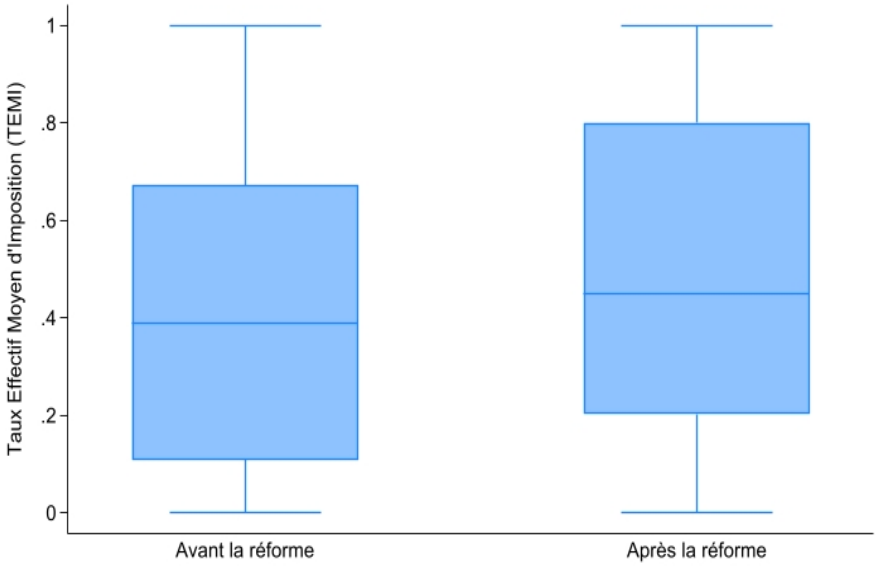
Table 1.1: Analyse du lien entre changements du code minier et changements d'orientation politique

	Changement dans l'idéologie		
Changement du code minier	0	1	Total
0	940	135	1075
1	50	9	59
Total	990	144	1134
Pearson chi2(1) = 0.3667		Pr = 0.545	

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

indique que cet effet n'est pas uniforme, reflétant une diversité de contextes nationaux et institutionnels.

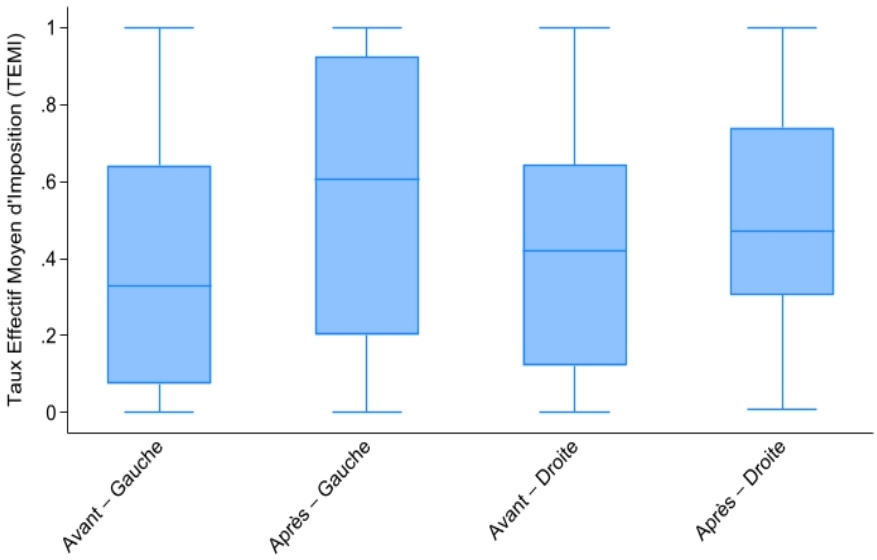
Figure 1.5: Taux effectif moyen d'imposition avant et après la réforme du code minier



Source: Auteur à partir des données de la Banque Mondiale, UNI-WIDER ICTD et des codes miniers

Une analyse plus fine, présentée dans la Figure 1.6, révèle que cette évolution diffère selon l'orientation politique du gouvernement. Sous les administrations de gauche, l'augmentation de la part de l'État est marquée, ce qui suggère une politique fiscale plus volontariste visant à capter une plus grande part des rentes minières. En revanche, sous les gouvernements de droite, la part captée reste relativement stable après réforme, témoignant d'une approche plus prudente, orientée vers la stabilité fiscale ou la compétitivité du secteur.

Figure 1.6: Taux effectif moyen d'imposition par idéologie avant et après la réforme



Source: Auteur à partir des données de la Banque Mondiale, UNI-WIDER ICTD, Global Leader Ideology Dataset et des codes miniers

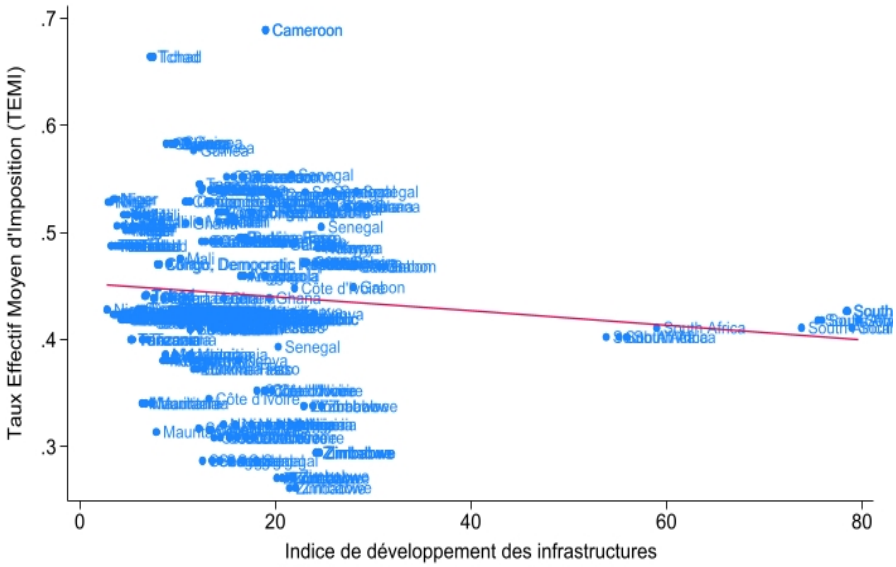
1.5.2 Effets des infrastructures, des institutions et de la durabilité du régime sur la fiscalité minière

La Figure 1.7 représentant la relation entre l'indice africain de développement des infrastructures (AIDI) et le TEMI, pour un échantillon de 22 pays africains, révèle une tendance négative globale. Ainsi, les pays affichant un indice AIDI plus élevé tendent, en moyenne, à appliquer un taux d'imposition plus faible. Ce résultat rejoint les observations de Sachs and Warner (2001) qui montrent que le développement des infrastructures ne garantit pas systématiquement une meilleure capture fiscale, notamment en présence de facteurs institutionnels variables.

Pour mieux comprendre cette relation contre-intuitive, l'échantillon a été segmenté en deux groupes : pays à « infrastructures faibles » et pays à « infrastructures fortes ». La Figure 1.8 montre que la médiane du TEMI est en réalité plus élevée dans les pays à infrastructures développées. Cette observation, en accord avec les travaux de Pivovarsky et al. (2003), indique que la relation globale masque une dynamique plus complexe, en raison notamment de l'hétérogénéité au sein du groupe à infrastructures faibles et de la présence d'effets extrêmes.

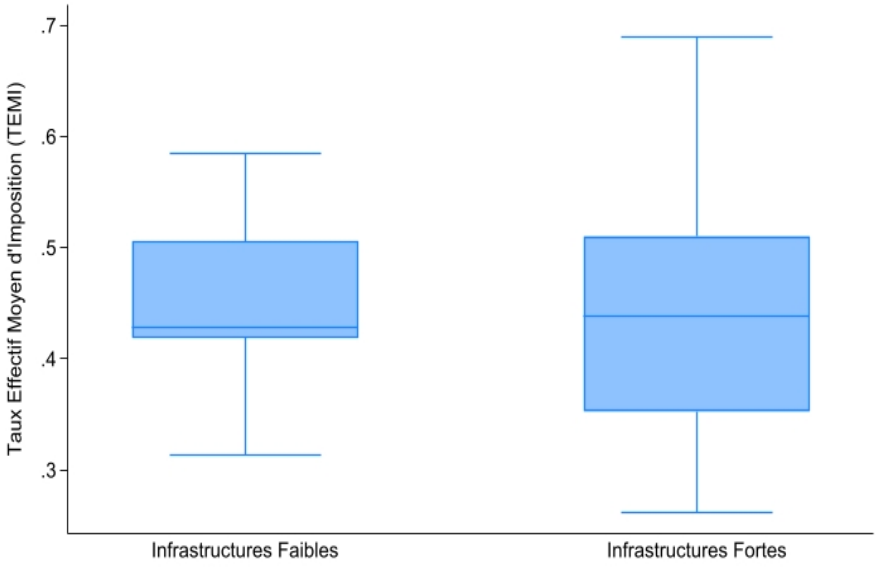
Pour approfondir l'analyse, des dimensions institutionnelles et politiques ont été intégrées. Premièrement, la segmentation selon la durabilité du régime politique (Figure 1.9) révèle que les pays caractérisés par une forte stabilité politique présentent des médianes de TEMIs significativement plus élevées. Ces résultats corroborent les conclusions de Robinson and Acemoglu (2012) qui soulignent l'importance de la stabilité politique pour

Figure 1.7: Relation entre le taux effectif moyen d'imposition et l'indice du développement des infrastructures



Source: Auteur à partir des données de la FERDI et la Banque Africaine de Développement (BAD)

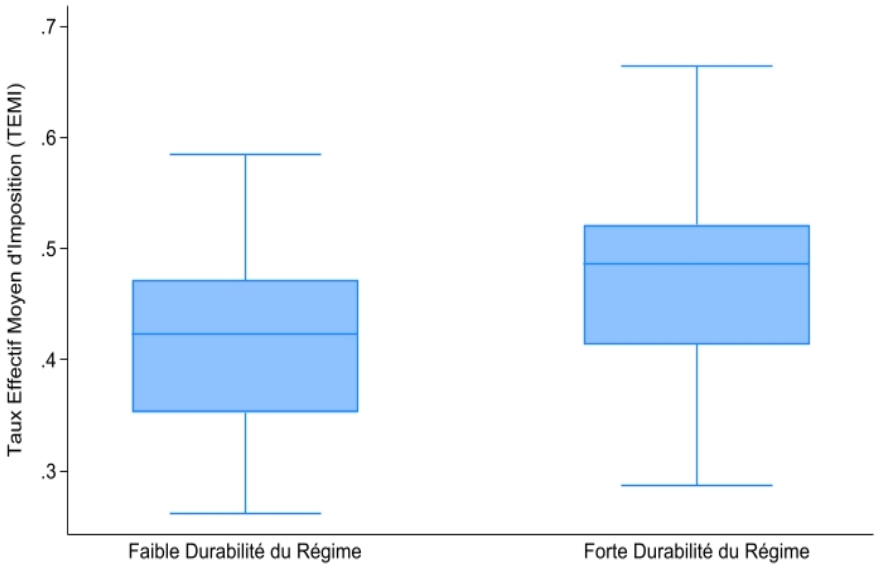
Figure 1.8: Distribution du taux effectif moyen d'imposition selon le niveau de développement des infrastructures



Source: Auteur à partir des données de la FERDI et la Banque Africaine de Développement (BAD)

la mise en œuvre efficace de politiques publiques, y compris fiscales.

Figure 1.9: Distribution du taux effectif moyen d'imposition selon le niveau de durabilité du régime



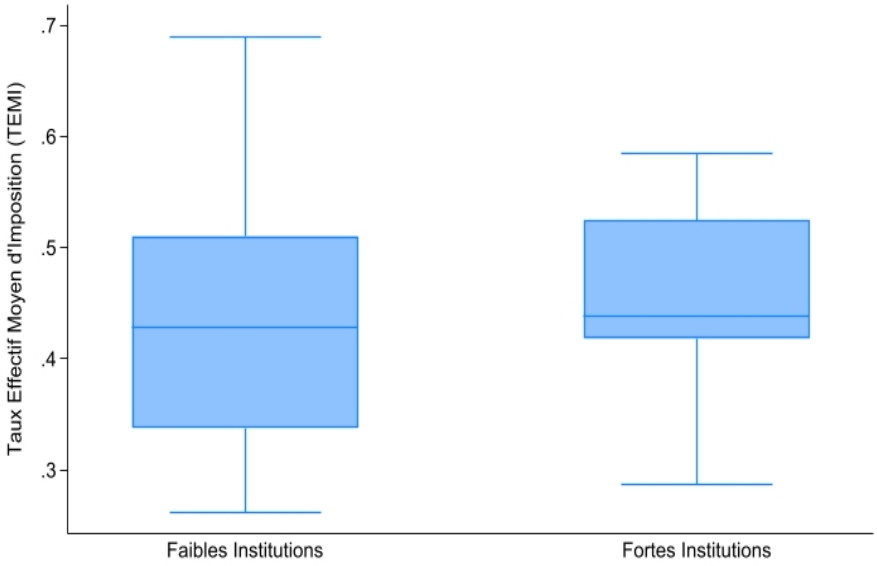
Source: Auteur à partir des données de la FERDI et de Policy V

Par ailleurs, l'évaluation de la qualité des institutions (Figure 1.10) – englobant la gouvernance, la transparence et la capacité administrative – montre également son influence majeure : les pays dotés de bonnes institutions disposent d'une capacité fiscale plus élevée. Cette conclusion rejoint les analyses de Bird and Zolt (2005) et de Moore (2007), qui démontrent que la qualité institutionnelle est un facteur clé de la mobilisation fiscale dans les économies en développement.

L'analyse des interactions entre le niveau d'infrastructure et la qualité des institutions (Figure 1.11) souligne une synergie importante. En classant les pays selon ces deux critères, il apparaît que, pour un même niveau d'infrastructure, ceux disposant de bonnes institutions affichent systématiquement un TEMI plus élevé. De plus, la combinaison de niveaux élevés d'infrastructures et de bonnes institutions correspond aux TEMIs les plus élevés, montrant que les infrastructures facilitent la mobilisation fiscale uniquement dans un cadre institutionnel solide.

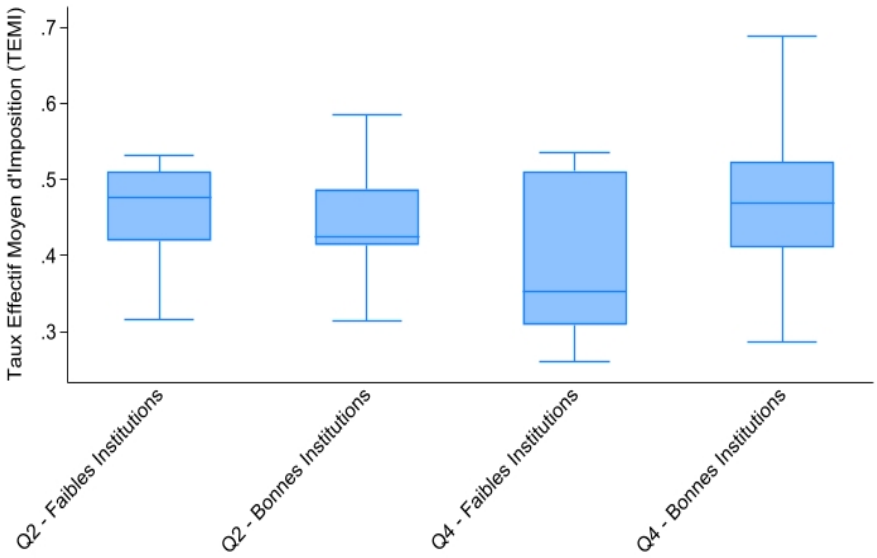
Une logique comparable se retrouve dans l'interaction entre infrastructures et durabilité politique (Figure 1.12). Les pays combinant une forte infrastructure avec une stabilité politique affichent les TEMIs les plus élevés, tandis que ceux à infrastructures comparables mais régimes peu durables obtiennent des résultats plus faibles. Ce constat confirme que les infrastructures seules ne suffisent pas à maximiser la capacité fiscale sans un environnement politique stable, comme le soulignent Gelb et al. (2002) dans leurs travaux sur la gouvernance et la croissance en Afrique.

Figure 1.10: Distribution du taux effectif moyen d'imposition selon le niveau des institutions



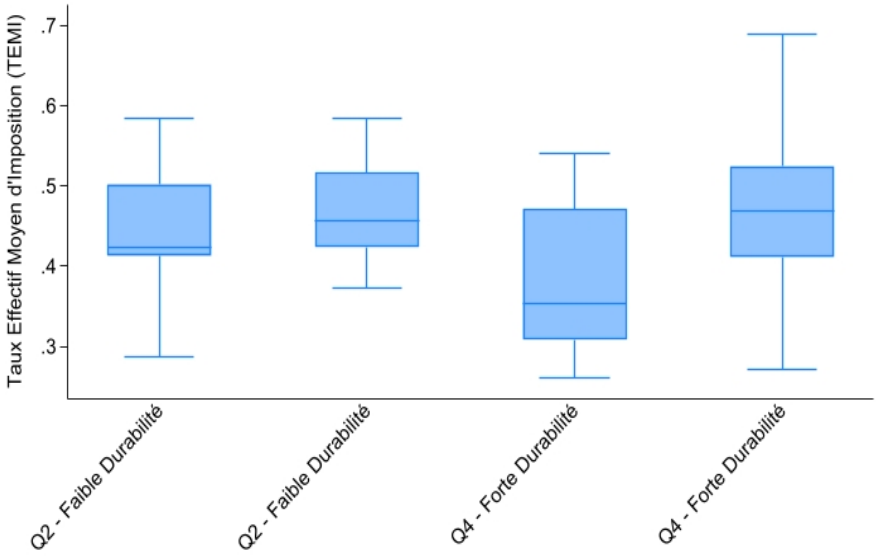
Source: Auteur à partir des données de la FERDI et la Banque Mondiale

Figure 1.11: Distribution du taux effectif moyen d'imposition selon le niveau de développement des infrastructures et des institutions



Source: Auteur à partir des données de la FERDI et la Banque Mondiale

Figure 1.12: Distribution du taux effectif moyen d'imposition selon le niveau de développement des infrastructures et la durabilité du régime



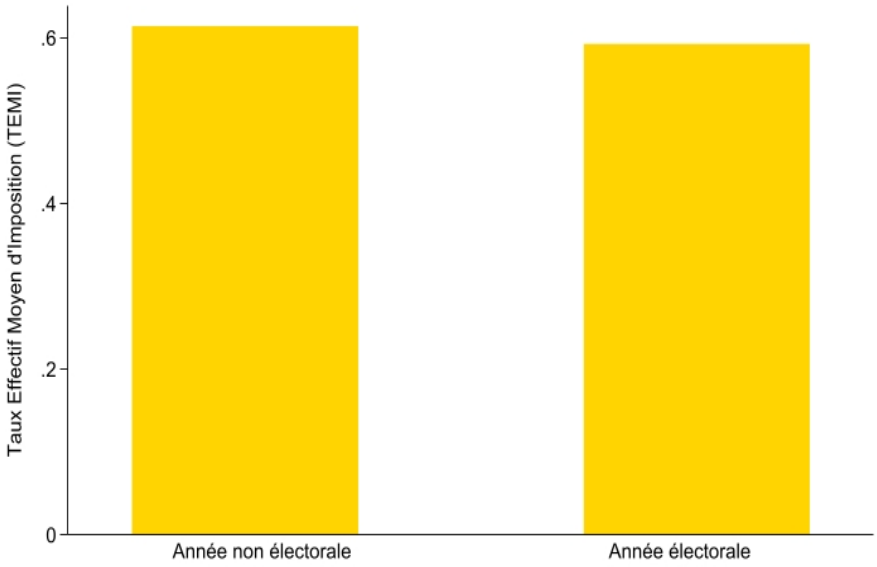
Source: Auteur à partir des données de la FERDI et la Banque Mondiale

1.5.3 Cycle électoral et dynamique du TEMI minier

La Figure 1.13 illustre l'évolution du TEMI selon que l'année est électorale ou non, dans le cas des élections présidentielles. On y observe une baisse significative du TEMI par rapport aux années non électorales. Cette tendance suggère une utilisation stratégique potentielle de la fiscalité minière à des fins électorales, dans le but de favoriser un climat des affaires plus attractif ou de satisfaire certains intérêts économiques en période préélectorale. La Figure 1.14 présente une comparaison similaire entre les années électorales législatives et les années non électorales. Le graphique révèle également une baisse du TEMI en année électorale, ce qui indique que les élections législatives sont également associées à une certaine flexibilité fiscale.

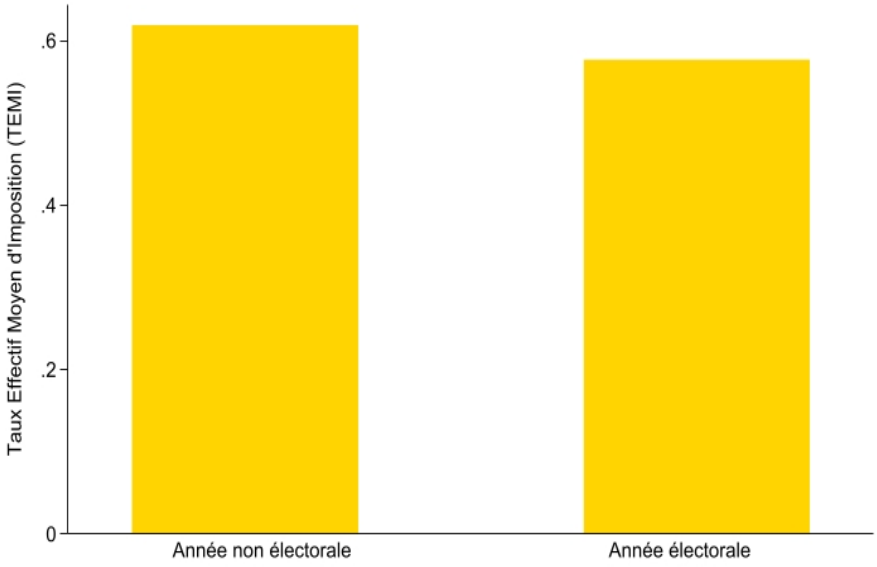
Ainsi, bien que les deux types d'élections soient associés à une baisse du TEMI, la nature centralisée du pouvoir dans les régimes présidentiels africains rend les élections présidentielles particulièrement déterminantes pour la fiscalité extractive. La majorité des pays de notre échantillon fonctionnent sous un régime présidentiel - à l'exception notable de l'Afrique du Sud - ce qui justifie un recentrage analytique sur ce type d'élections. Comme le souligne Ehrhart (2013), l'analyse électorale doit être adaptée au type de régime politique. Dans les régimes présidentiels, le pouvoir exécutif, notamment en matière fiscale et réglementaire, est largement concentré entre les mains du président. Par conséquent, les élections présidentielles constituent un moment clé de reconfiguration du pouvoir décisionnel, avec un impact direct potentiel sur la fiscalité minière. Ces élections attirent également une plus grande attention médiatique, suscitent une forte mobilisation des acteurs économiques, et favorisent des stratégies de lobbying, en particulier de la part du

Figure 1.13: Comparaison du taux effectif moyen d'imposition en année electorale et non électorale (élections présidentielles)



Source: Auteur à partir des données de la FERDI et la Banque Africaine de Développement (BAD)

Figure 1.14: Comparaison du taux effectif moyen d'imposition en année electorale et non électorale (élections législatives)

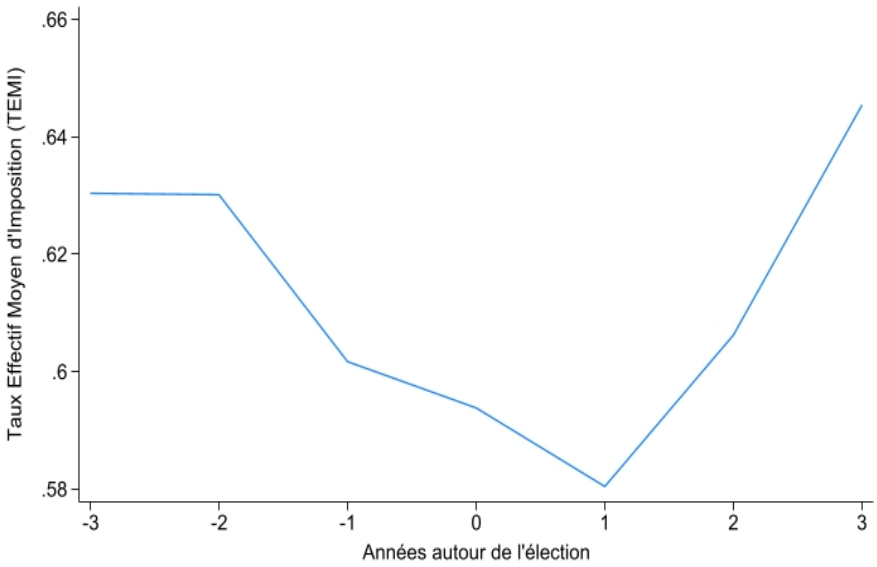


Source: Auteur à partir des données de la FERDI et la Banque Africaine de Développement (BAD)

secteur extractif, qui peut chercher à influencer les promesses électorales ou à obtenir des concessions fiscales avantageuses.

La Figure 1.15 présente l'évolution moyenne du TEMI autour des élections présidentielles. T désignant l'année des élections présidentielles, l'analyse du TEMI de l'or autour de cette année T révèle une dynamique non linéaire, interprétable comme un cycle électoral asymétrique de la fiscalité minière. Sur la période étudiée, le TEMI reste relativement stable entre T-3 (3 ans avant les élections) et T-2 (2 ans avant les élections). Cette phase de stabilité suggère une neutralité fiscale, durant laquelle les autorités gouvernementales ne modifient pas significativement la fiscalité appliquée au secteur minier. Elle peut refléter également une période où la politique fiscale suit son cours normal, sans influence notable des enjeux électoraux, correspondant souvent à la moitié du mandat présidentiel.

Figure 1.15: Évolution moyenne du taux effectif moyen d'imposition autour des élections présidentielles (±3 ans)



Source: Auteur à partir des données de la FERDI et de DPI

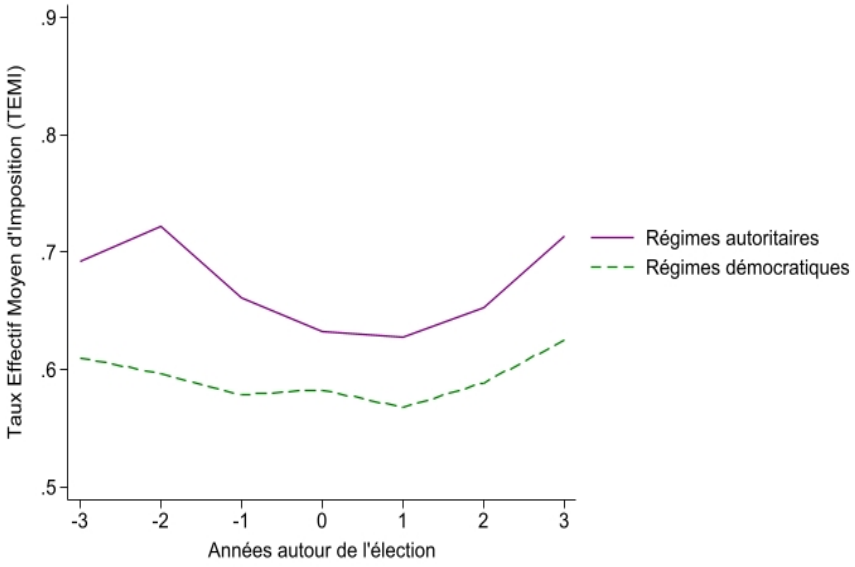
À partir de T-2, on observe une diminution progressive du TEMI, qui se prolonge jusqu'à l'année suivant l'élection (T+1). Cette baisse progressive indique un relâchement de la pression fiscale exercée sur les entreprises minières, possiblement lié à des stratégies électoralistes. Plusieurs interprétations peuvent être avancées. D'une part, les gouvernements peuvent chercher à maintenir un climat d'investissement favorable à l'approche des élections, en évitant d'imposer de nouvelles charges fiscales susceptibles de provoquer des tensions économiques. D'autre part, dans des contextes institutionnels plus fragiles, ce relâchement pourrait aussi refléter des arrangements politiques informels avec les acteurs du secteur minier, en échange d'un soutien financier ou logistique durant la période électorale. Enfin, un relâchement volontaire de l'effort de collecte fiscale, à travers une moindre application des règles fiscales ou une suspension temporaire des contrôles, peut

également être une stratégie visant à conserver des appuis politiques locaux ou sectoriels.

La baisse du TEMI jusqu'à T+1 montre que cette stratégie ne s'arrête pas immédiatement après l'élection. Cela peut s'expliquer par une période de transition politique, où le gouvernement nouvellement élu (ou réélu) cherche à stabiliser ses alliances, éviter des mesures impopulaires immédiates ou se donner un temps d'adaptation avant de réformer à nouveau le secteur. Cependant, à partir de T+2 (2 ans après les élections), la tendance s'inverse nettement. Le TEMI commence à augmenter rapidement, atteignant à T+3 (3 ans après les élections) un niveau supérieur à celui observé avant l'élection (T-3). Cette hausse post-électorale peut s'interpréter comme un effet de rattrapage fiscal. Le gouvernement cherche alors à compenser les pertes de recettes enregistrées pendant la période électorale ou à renforcer la mobilisation des ressources pour répondre aux besoins budgétaires post-électoraux. Ce mouvement peut également refléter un renforcement du pouvoir exécutif une fois l'incertitude électorale dissipée, permettant au gouvernement de mettre en œuvre des mesures fiscales plus strictes sans en craindre immédiatement les conséquences politiques.

L'analyse du TEMI autour des élections selon le type de régime politique (Figure 1.16) révèle des dynamiques électorales différenciées entre les régimes autoritaires et les régimes démocratiques.

Figure 1.16: Évolution du taux effectif moyen d'imposition autour des élections selon le régime politique (±3 ans)



Source: Auteur à partir des données de la FERDI, DPi et de Policy V

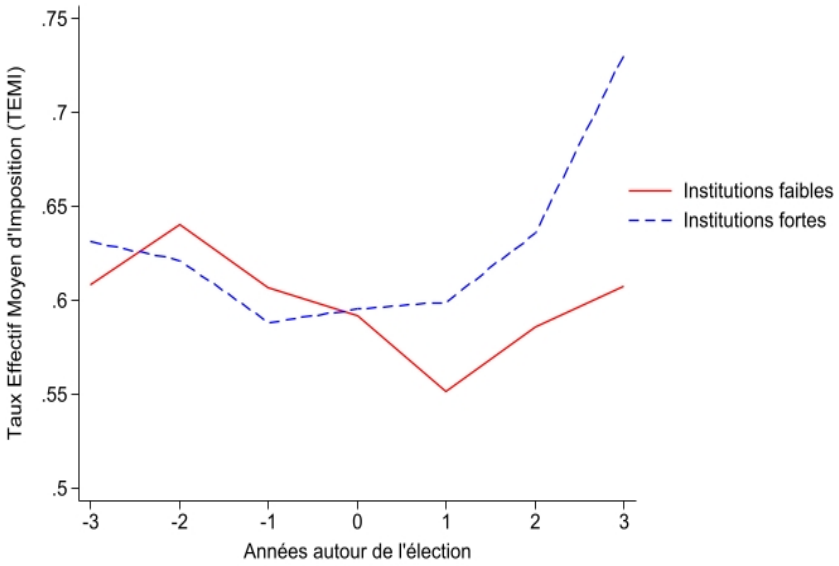
Dans les régimes autoritaires, on observe une courbe en U autour de l'élection : une hausse du TEMI entre T-3 et T-2, suivie d'une diminution marquée entre T-2 et T+1, puis d'une remontée progressive entre T+1 et T+3. Cette séquence suggère une stratégie de relâchement fiscal ciblée sur la période électorale, après un durcissement préalable.

Le gouvernement pourrait, dans ces contextes, resserrer la pression fiscale en amont pour maximiser les recettes avant d'adopter des mesures de relâchement à visée électoraliste. La remontée post-électorale peut être interprétée comme un rattrapage fiscal ou une reprise en main autoritaire une fois les enjeux électoraux passés. Ce profil en U reflète une forme de cycle électoral stratégique, dans lequel la fiscalité est utilisée de manière opportuniste, avec peu de contraintes institutionnelles ou de contre-pouvoirs pour modérer les décisions fiscales.

En revanche, dans les régimes démocratiques, la dynamique est plus complexe et moins symétrique. Le TEMI diminue progressivement entre T-3 et T-1, illustrant un relâchement fiscal progressif. Cependant, une hausse temporaire intervient entre T-1 et T, avant une nouvelle baisse entre T et T+1, suivie d'une hausse continue jusqu'à T+3. Cette fluctuation autour de T suggère que les gouvernements démocratiques peuvent être contraints de composer entre les incitations électorales à alléger la pression fiscale et les exigences de transparence, de responsabilité budgétaire ou d'équilibre politique. La présence d'un rebond temporaire du TEMI juste avant l'élection pourrait indiquer un ajustement de dernière minute pour éviter des déséquilibres trop marqués ou une réponse à des pressions institutionnelles (exemple : opposition parlementaire, société civile, partenaires extérieurs).

L'analyse du TEMI autour des élections en fonction de la qualité des institutions (Figure 1.17) permet d'affiner la lecture du cycle électoral fiscal et de mettre en évidence le rôle modérateur ou amplificateur joué par le cadre institutionnel.

Figure 1.17: Évolution du taux effectif moyen d'imposition autour des élections selon la qualité des institutions (±3 ans)



Source: Auteur à partir des données de la FERDI, DPI et de la Banque Mondiale

Dans les pays caractérisés par des institutions faibles, on observe une dynamique en

forme de U, similaire à celle relevée dans les régimes autoritaires. Le TEMI augmente entre T-3 et T-2, avant de chuter sensiblement entre T-2 et T+1, puis de remonter fortement jusqu'à T+3. Cette séquence traduit une utilisation opportuniste de la fiscalité à des fins électorales, rendue possible par un faible encadrement institutionnel. L'absence de mécanismes robustes de contrôle, de transparence ou de redevabilité permet au pouvoir exécutif d'ajuster librement la pression fiscale selon les besoins électoraux, quitte à sacrifier la cohérence des recettes fiscales à court terme. Le relâchement fiscal précédant l'élection apparaît ici comme un instrument politique, avec une correction post-électorale brutale une fois la stabilité politique retrouvée.

À l'inverse, dans les contextes où les institutions sont fortes, le cycle électoral du TEMI apparaît plus contenu et progressif. On observe une baisse modérée entre T-3 et T-1, suivie d'une légère remontée entre T-1 et T+1, puis d'une accélération de la hausse à partir de T+1. Cette trajectoire en pente douce avant l'élection, puis en pente plus prononcée après, suggère que les gouvernements disposent d'une moindre marge de manœuvre pour manipuler la fiscalité à court terme. La présence de contre-pouvoirs institutionnels, de règles fiscales encadrées, ou d'une pression citoyenne accrue contribue à limiter les ajustements abrupts. La reprise post-électorale plus forte du TEMI pourrait refléter un retour à une discipline budgétaire ou une mise en œuvre différée de réformes fiscales préparées de longue date, dans un cadre institutionnel plus prévisible.

1.6 Résultats et valeur ajoutée de la thèse

Cette thèse contribue aux débats sur l'exploitation des ressources naturelles et le développement. À travers trois chapitres empiriques, elle met en lumière des dimensions souvent négligées dans l'analyse du partage de la rente extractive, telles que l'idéologie politique, le risque pays lié aux infrastructures et les dynamiques électorales.

1.6.1 Idéologie politique et partage de la rente minière

Ce premier chapitre examine la manière dont l'idéologie politique des gouvernements influence les réformes juridiques et fiscales dans le secteur extractif à travers un échantillon de 54 pays africains sur la période 2000–2020. Il part du constat que, malgré l'abondance de travaux sur les réformes minières, peu d'entre eux prennent en compte la dimension idéologique des gouvernements. La littérature dominante met davantage l'accent sur les facteurs économiques, institutionnels ou encore les pressions externes exercées par les acteurs internationaux. L'objectif de ce chapitre est donc de combler ce vide, en testant empiriquement l'effet de l'orientation politique des gouvernements (gauche vs. droite) sur la probabilité de mise en œuvre de réformes extractives, ainsi que sur leur impact en matière de partage de la rente.

Pour ce faire, une stratégie empirique en deux étapes a été mise en œuvre. Dans un premier temps, un modèle probit a été estimé pour évaluer la probabilité d'adoption de réformes en fonction des changements d'idéologie gouvernementale. Dans un second temps, une méthode de différences-en-différences échelonnées (staggered DiD) a permis de mesurer l'impact des réformes adoptées sur la part de la rente minière captée par l'État, mesurée par le TEMI. Les résultats obtenus montrent que les changements d'idéologie politique ne sont pas significativement corrélés à la probabilité d'adoption de réformes. Toutefois, une fois mises en œuvre, les réformes ont un impact significatif sur le partage de la rente. En particulier, les gouvernements de gauche tendent à augmenter la part de rente captée par l'État, tandis que les gouvernements de droite sont associés à une diminution de cette part.

Ces résultats apportent plusieurs contributions importantes. Sur le plan théorique, ils enrichissent la compréhension des réformes dans le secteur extractif en intégrant une variable politique souvent négligée. En remettant en cause la neutralité idéologique des réformes minières, ce chapitre souligne que les politiques publiques en matière de ressources naturelles sont largement façonnées par les préférences idéologiques des gouvernants. Cela remet en question l'universalité des modèles de réforme promus par les institutions internationales et plaide pour une prise en compte plus fine du contexte politique local dans la conception des réformes. Sur le plan méthodologique, l'approche adoptée permet de distinguer les mécanismes d'initiation des réformes de leurs effets concrets sur le partage de la rente. L'utilisation combinée d'un modèle probit et d'un modèle de DiD échelonné offre une rigueur supplémentaire en tenant compte des effets dynamiques et du calendrier d'implémentation des réformes dans un cadre de données de panel. Enfin, du point de vue empirique et pratique, ce chapitre fournit des éléments importants pour les décideurs publics et les partenaires au développement. Il suggère que la réussite d'une réforme ne dépend pas uniquement de sa nature technique, mais aussi du contexte politique dans lequel elle est élaborée et appliquée. La reconnaissance explicite de cette dimension peut aider à anticiper les résistances, à mieux calibrer les instruments de réforme, et à adapter les stratégies d'accompagnement aux réalités politiques nationales.

1.6.2 Contraintes structurelles et partage de la rente minière

Le deuxième chapitre s'intéresse à l'effet du développement des infrastructures sur la capacité de l'État à capter une part plus importante de la rente dans le secteur minier. L'analyse est menée sur un échantillon de 22 pays africains producteurs d'or entre 2005 et 2020. L'objectif principal est d'évaluer dans quelle mesure l'amélioration des infrastructures - mesurée par l'Indice Africain du Développement des Infrastructures (AIDI) développé par la Banque Africaine de Développement (BAD) - influence le taux moyen effectif d'imposition (TEMI), et d'identifier les canaux institutionnels et politiques par

lesquels cet effet s'opère. L'hypothèse sous-jacente est que de meilleures infrastructures réduisent les risques opérationnels, renforcent les institutions, et contribuent à la stabilité des régimes, créant ainsi des conditions plus favorables à une fiscalité minière plus équitable.

L'analyse économétrique, fondée sur un modèle à effets fixes, révèle trois résultats majeurs. Premièrement, l'indice AIDI est positivement corrélé avec le TEMI, indiquant que les pays disposant d'infrastructures plus développées tendent à mettre en oeuvre des politiques visant à capter une plus grande part de la rente minière. Ce résultat s'explique notamment par la diminution du risque perçu par les investisseurs, qui permet à l'État de négocier des conditions fiscales plus avantageuses. Deuxièmement, cette relation est principalement portée par les infrastructures de transport, notamment les routes et les chemins de fer, qui sont essentielles pour l'acheminement des ressources vers les usines de traitement et les marchés. Troisièmement, les variables institutionnelles jouent un rôle de médiation important : la durabilité des régimes politiques, la qualité des institutions, et en particulier le contrôle de la corruption, modulent l'effet des infrastructures sur le TEMI.

Sur le plan théorique, ce chapitre introduit une perspective innovante en montrant que les infrastructures ne sont pas seulement un levier de croissance économique, mais aussi un vecteur indirect de renforcement fiscal. Il établit un pont entre l'économie politique des infrastructures et celle de la gouvernance extractive, contribuant à une vision plus intégrée du développement. Du point de vue méthodologique, l'originalité réside dans l'intégration explicite de variables médiatrices institutionnelles, ce qui permet de mieux comprendre les mécanismes de transmission entre infrastructures physiques et performance fiscale. Cette approche contribue à dépasser les analyses purement corrélationnelles en identifiant les chaînons manquants entre facteurs matériels et résultats fiscaux. Enfin, sur le plan empirique et pratique, les résultats soulignent que le développement des infrastructures, en particulier de transport, constitue une stratégie efficace pour améliorer la gouvernance fiscale du secteur extractif. Cependant, cet effet positif ne peut se réaliser pleinement que dans un environnement institutionnel solide. Cela implique que les politiques d'investissement dans les infrastructures doivent être accompagnées de réformes institutionnelles, notamment en matière de transparence, de lutte contre la corruption, et de consolidation des capacités administratives de l'État.

1.6.3 Élections, gouvernance et partage de la rente minière

Le troisième chapitre explore la manière dont les cycles électoraux influencent la fiscalité minière, en mettant un accent particulier sur les dynamiques spatiales et institutionnelles. En analysant un panel de 20 pays africains entre 2000 et 2020 à l'aide d'un modèle spatial de Durbin (MDS) développé par LeSage and Pace (2009), ce chapitre cherche à

comprendre comment les élections présidentielles affectent le TEMI dans le secteur minier, et comment ces effets peuvent se diffuser aux pays voisins. Il examine également le rôle modérateur de la démocratie, de la transparence et de la qualité des institutions dans cette relation.

Les résultats mettent en évidence trois dynamiques essentielles. Premièrement, le TEMI minier présente des effets de voisinage significatifs : les politiques fiscales adoptées dans un pays ont des répercussions sur les pays voisins, ce qui confirme l'existence de spillovers régionaux dans la gouvernance fiscale du secteur extractif. Deuxièmement, les élections présidentielles ont un effet négatif sur le TEMI, suggérant que ces périodes sont propices à des manipulations fiscales en faveur d'intérêts privés ou dans une logique clientéliste. Toutefois, cet effet négatif ne concerne pas les élections parlementaires. Troisièmement, le niveau de démocratie, la transparence (notamment l'adhésion à l'Initiative pour la Transparence dans les Industries Extractives - ITIE), ainsi que la qualité des institutions (contrôle de la corruption, efficacité gouvernementale, redevabilité) atténuent cet effet négatif. Dans les pays démocratiques, les élections peuvent même avoir un effet positif sur le TEMI, en raison de la pression exercée par les citoyens et la société civile.

Sur le plan théorique, ce chapitre enrichit la compréhension des liens entre politique électorale et fiscalité extractive, en soulignant l'ambivalence des élections : elles peuvent être à la fois un levier de réforme ou un vecteur de clientélisme, selon le contexte institutionnel. Il introduit également une dimension spatiale originale, en démontrant que les politiques nationales ne peuvent être analysées isolément dans un environnement régional interconnecté. D'un point de vue méthodologique, l'utilisation d'un modèle spatial (SDM) constitue une avancée importante, car elle permet de capter les interdépendances entre pays. En intégrant des effets directs et indirects, cette méthode offre une lecture plus complète des dynamiques fiscales dans le secteur extractif africain. Enfin, les implications empiriques et pratiques sont multiples. Les résultats montrent l'importance de renforcer les institutions démocratiques et la transparence pour limiter les manipulations fiscales électoralistes. Ils appellent également à une coordination régionale accrue en matière de politique fiscale, afin de prendre en compte les effets de diffusion des décisions nationales. Les bailleurs de fonds et les institutions régionales pourraient jouer un rôle important dans cette dynamique, en soutenant la mise en place de cadres de coopération fiscale régionale.

Chapter 2

When Politics Meets Policies: How Political Ideology Shapes Resource Reforms and Rent Sharing in Africa?

[1]

[1]This chapter is a joint work with Bertrand Laporte and Isaac Amedanou.

2.1 Introduction

The extractive sector plays a fundamental role in the economic development of many countries, particularly in Africa, where natural resources are often the main source of public revenue (Auty, 1993; Sachs and Warner, 2001). This sector presents significant opportunities and challenges for governments, as they must strike a balance between optimal resource exploitation, social justice, and environmental sustainability. In this context, States use various legal, regulatory, instruments to regulate extractive activities and, in particular, to ensure that the community receives a fair share of the extracted rent. This legal framework is regularly reformed to adapt to market developments, institutional constraints, and public policy objectives (Baunsgaard, 2001; Brunnschweiler and Bulte, 2009; Collier et al., 2010).

In the 1990s, many countries rich in natural resources, particularly in Africa and Latin America, adopted a legal framework that was very favorable to private investors, in a context of low mineral exploitation and neoliberal reforms. Since the third commodity supercycle at the beginning of the 21st century, many countries have modified their mining tax regimes in an attempt to rebalance the sharing of rent between the State and investors, while maintaining an attractive legal and fiscal framework (Otto, 2006; Lederman, 2007). Although "best practices" are widely discussed to increase the share of rent accruing to the State (McMahon, 2010; Daniel et al., 2010), building an "optimal" mining tax regime remains a challenge for governments. Not all reforms have had the same impact on rent sharing and the level of revenue collected by governments (KPMG, 2014). These differences result from the tax design of each reform, but also from their often-flawed implementation (poor administrative capacity and enforcement) and the weak bargaining power of States vis-à-vis multinational mining companies. Stability clauses, which remain generous in most mining codes and contracts (Nikiéma et al., 2024), and tax optimization practices by multinationals (Beer and Devlin, 2021; Albertin et al., 2021), contribute, for example, to the often-disappointing results of tax reforms in the extractive industries in Africa. The issue of good governance is therefore at the heart of debates on the choice and effectiveness of mining policies (Collier et al., 2010; Ross, 2012; Diallo, 2025). This issue is raised by civil society (Campbell, 2009; Aaronson, 2011), but also by various local, regional and international institutions, notably the Extractive Industries Transparency Initiative (EITI), which features prominently in recent literature (Haufler, 2010; Asgill, 2012; Sovacool and Andrews, 2015; Epremian et al., 2016; Malden, 2017; Papyrakis et al., 2019, etc.).

Mining law reform thus reflects a State's desire to adjust relations between public, private, and even community actors (Bebbington et al., 2008) in a sector as strategic as mining. It also aims to redefine the terms of access to and sharing of mining rents. While economic, social, and institutional factors have been widely studied in the literature, the

role of government ideology in the adoption of such reforms has been much less explored. Ross (2006) and van der Ploeg (2011), for example, discuss the ideological orientations of governments in the mining sector, but do not empirically isolate their impact on legal and fiscal changes.

Left-wing governments have historically been more inclined to intervene in the economy. They are generally perceived as favoring stricter regulation, higher taxes on the private sector, and more redistributive taxation (Ross, 2006; van der Ploeg, 2011). Reforms of the mining legal framework therefore aim to strengthen public control, review contracts deemed too favorable to multinationals, and introduce stricter social and environmental standards. Haslam and Tanimoune (2016) show that in Latin America, governments such as those of Evo Morales in Bolivia and Rafael Correa in Ecuador, known as "progressive," have launched ambitious reforms to renationalize resources, strengthen foreign investment rules, and redistribute profits to the population. These reforms are part of an ideology of national sovereignty over natural resources. Similar examples exist in Africa, notably in Guinea and the Democratic Republic of Congo. The reform of the mining code in the Democratic Republic of Congo in 2018, under the presidency of Joseph Kabila (allied with a coalition close to the nationalist left), aimed to increase mining taxes, extend the social responsibilities of mining companies, and limit certain tax exemptions. This change took place despite strong criticism from foreign investors, confirming a logic of reaffirming economic sovereignty (Kubokoso, 2020). Conversely, right-wing or centrist governments tend to implement policies that are more favorable to the private sector, particularly in the extractive industries. They consider foreign investment to be essential for growth and generally adopt a position of regulatory stability or even deregulation. In a comparative study of several Latin American countries, Kurtz and Brooks (2008) show that right-wing governments have rarely undertaken ambitious mining reforms. Their priority has been to avoid any changes that might scare off investors by maintaining stable mining regimes, often inherited from the neoliberal reforms of the 1990s. Chile, for example, has long maintained a stable and attractive mining code (Mejía and Aliakbari, 2023), despite repeated political shifts between the center-left and center-right.

While some authors consider the mining codes currently in force in Africa to be the fifth generation of reforms (Cissé, 2021), the literature says little about the role of governments' political ideologies in triggering these reforms and about their nature. Most research considers mining reforms and their impacts as homogeneous processes, even though African contexts are characterized by unstable political cycles and significant institutional variations. Humphreys et al. (2007), for example, consider that reforms are mainly motivated by economic factors or pressure from international actors, thereby downplaying the role of the ideologies of the governments in power. The role of contexts, as social engineering (de Sardan, 2025) in public policy reforms in developing countries, particularly in Africa, is widely debated in the social anthropology literature on "travelling models" (Rottenburg,

2009; Behrends et al., 2014; de Sardan, 2025), which are models designed by international experts based on supposedly universal mechanisms and accompanied by precise operational mechanisms, and disseminated by networks of professionals and decision-makers. This is an important question because their implementation in diverse local contexts leads to differences in application, unintended effects, and results that are often far from the initial objectives (de Sardan, 2025).

Three questions therefore seem important in African contexts: Is political ideology a trigger for mining legal framework reforms? Do reforms have an impact on the share of rent captured by the State? If so, does this impact differ according to the political ideology of the government that designs it? To answer these questions, our quantitative approach is based on panel data covering 54 African countries between 2000 and 2020. This period allows us to take into account the dynamics of mining reforms and political changes on the continent. To answer the first question, we use a probit model to estimate the conditional probability of reform based on changes in political ideology during elections. For the other two questions, we use the difference-in-differences (DiD) method adapted to staggered treatments, as developed by Callaway and Sant'Anna (2021), distinguishing between the ideological orientation of the incumbent head of government. This recent approach corrects for potential biases in traditional methods resulting from multiple and heterogeneous treatment periods, thereby improving the causal validity of the estimates. We construct a rent-sharing indicator, namely the de facto average effective tax rate (or government take), either the share of the extractive rent that goes to the State, which we compare before and after the legal framework reform in countries that implemented reforms with that of a control group of countries that did not introduce such reforms during the same period. To examine the policy impact in more detail, we conduct this analysis according to the ideology of the head of government, estimating the conditional effect of the reform under left-wing and right-wing governments using subsamples or conditional estimates. This approach allows us to determine whether the impact depends on political orientation without resorting to a classic interaction model, which is consistent with recent literature on heterogeneity of effects (Callaway and Sant'Anna, 2021). Thus, by discussing the results of policy choices based on a *de facto* indicator of rent sharing, we complement the analysis of Amedanou and Laporte (2024), who considered the determinants of policy choices based on a *de jure* indicator of rent sharing.

This dual approach constitutes a methodological deepening, combining a probabilistic assessment of policy decisions with a rigorous causal measure of the impact of reforms in a little-studied African context. The explicit consideration of political ideology in the analysis of the impact of reforms on rent sharing is an original contribution that helps explain the disparity in results observed in the literature.

The results of the probit model indicate that a change in the ideology of the head of government has no statistically significant impact on the probability of reforming the

mining legal framework. In other words, reforms on the African continent seem to occur independently of political change. The absence of a direct ideological effect calls into question the assumption that political change is a factor in changing the legal framework for extractive industries, leaving room for other factors traditionally cited in the literature (economic constraints, institutional contexts, external pressures, etc.). However, the DiD analysis reveals a positive and significant impact of legal framework reforms on rent sharing, indicating that reforms generally lead to a larger share of the rent being captured by the State. Thus, reforms aim to strengthen the mining tax regime in order to maximize public revenues in the face of economic and social challenges. However, this overall effect masks significant heterogeneity depending on the political ideology of the government in power. Under left-wing governments, reforms increase the share of rent captured by the State, confirming the idea that these "progressive" governments favor interventionist and redistributive policies (Ross, 2006). Conversely, under right-wing governments, reforms have a negative effect on the share of rent captured by the State, suggesting a preference for fiscal stability and economic competitiveness rather than increased State levies on the sector (van der Ploeg, 2011). These results highlight that while political ideology is not a trigger for reforms, it significantly influences the nature of the reforms that are implemented, and show that contexts have an impact on the outcomes of "standardised" reforms (de Sardan, 2025).

The rest of the chapter is organized as follows: the section 2.2 presents theoretical and analytical framework. The section 2.3 presents the data, followed by the econometric model in the section 2.4. The section 2.5 presents and discusses the estimation results. The sections 2.6 and 2.7 respectively present the tests of robustness and heterogeneity. The section 2.9 concludes and presents the policy implications.

2.2 Theoretical and analytical framework

This study is part of a broader reflection on the governance of natural resources, particularly focusing on the institutional dynamics that shape reform in the extractive sector and the redistribution of mining rents. The analytical framework is structured around two complementary dimensions: on the one hand, the potential political drivers - especially ideological - of mining code reform; and on the other, the mechanisms through which such reforms may affect the State's ability to capture extractive rents.

The first dimension investigates whether changes in the political ideology of the head of government influence the likelihood of initiating a mining code reform. Political economy research has long emphasized the role of ideological preferences in shaping public policy, particularly in areas related to taxation, regulation, and resource allocation (Alesina and Tabellini, 2007; Hibbs Jr, 1977). In the extractive sector, such influence may be reflected in decisions over the degree of State intervention, ownership regimes, or the prioritization

of social redistribution. Governments with more interventionist (typically left-leaning) ideologies are often associated with efforts to assert national control over natural resources and to increase public capture of resource rents (Boix, 2003; Persson and Tabellini, 2002). Conversely, more market-oriented (typically right-leaning) governments may emphasize regulatory stability and investor confidence (Jensen and Wantchekon, 2004). Ideological change at the executive level can thus be hypothesized as a factor shaping the political space for legal and fiscal reform in the mining sector.

However, this relationship is often conditioned by multiple mediating factors. Institutional constraints such as bureaucratic inertia, entrenched elite interests, and the structure of political coalitions can limit the extent to which ideological shifts translate into concrete reforms (Acemoglu and Robinson, 2013; North, 1990). Furthermore, external pressures - including global commodity price fluctuations, international financial institutions' recommendations, and transnational norms - may drive reforms independently of domestic political changes (Ross, 2012; Humphreys et al., 2007). Consequently, reforms to mining legislation may occur with a certain degree of independence from political ideology, reflecting broader economic imperatives and institutional dynamics.

The second dimension of the framework considers the potential impact of mining code reform on the State's capacity to appropriate a larger share of the mineral rent. The fiscal literature identifies several channels through which legal and regulatory changes can affect rent capture: adjustments in royalty and tax rates (Daniel et al., 2010; Otto, 2006), the introduction of progressive fiscal instruments indexed to resource prices (International Monetary Fund, 2012), improved administrative capacity and tax enforcement (McGuirk, 2013), and enhanced transparency and accountability provisions (Mejía Acosta, 2013; Kolstad, 2009). Beyond technical adjustments, reforms may also respond to domestic social pressures or international policy norms around sustainable development, environmental justice, or intergenerational equity (Bebbington et al., 2008; Sachs and Warner, 2001). In this sense, reforming the mining code may be viewed as a strategy through which the State reasserts its economic sovereignty over resource governance.

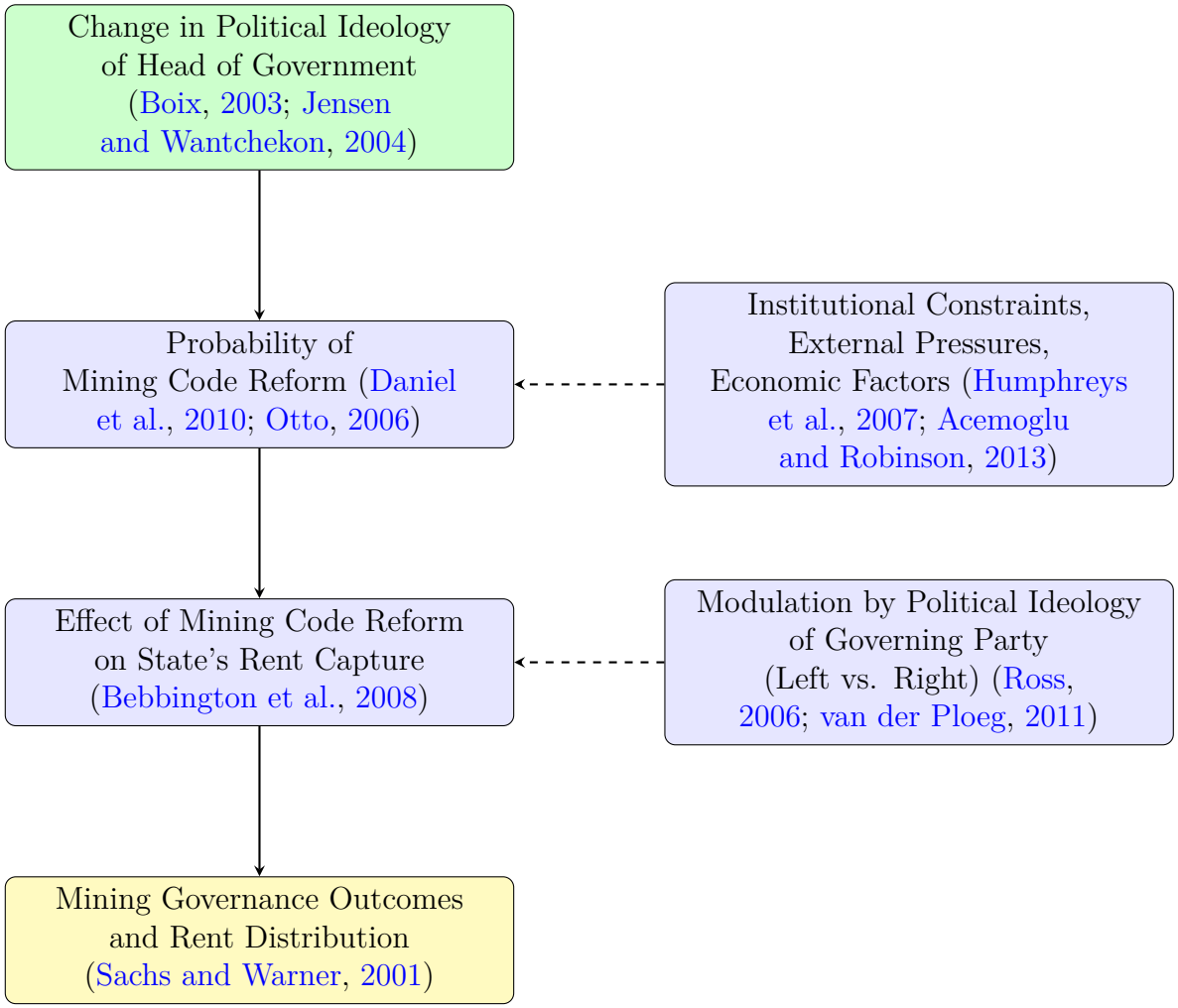
Importantly, the effect of reforms on government's rents is not necessarily uniform. Political ideology continues to shape the nature and orientation of reform policies once implemented. Left-leaning governments may leverage reforms to enhance redistribution and increase the State's share of mineral rents, consistent with their interventionist and redistributive preferences (Ross, 2006). In contrast, right-leaning governments might prioritize policies that favor fiscal stability and economic competitiveness, potentially limiting the extent to which reforms increase State revenues from mining (van der Ploeg, 2011). This heterogeneity underscores the complexity of reform outcomes and challenges simplified assumptions that political ideology directly triggers reform initiatives.

By linking these two dimensions - the political determinants of institutional change and the economic mechanisms of rent redistribution - the analytical framework offers a

conceptual lens to understand how mining governance evolves in response to political and economic incentives. It emphasizes the interaction between domestic political dynamics (such as ideology, institutional structures, and elite interests) and structural constraints (including commodity cycles, investor strategies, and transnational norms) in shaping outcomes in the extractive sector.

Figure 2.1 summarizes the analytical framework described above. It illustrates the dual pathways through which political ideology and mediating institutional and economic factors influence mining code reforms, and how these reforms in turn affect the State's ability to capture mineral rents. The framework also highlights the moderating role of political ideology on the nature and impact of reforms, reflecting the complex interplay of political and economic incentives in mining governance.

Figure 2.1: Analytical framework linking political ideology, mining code reform, and rent capture



2.3 Data

2.3.1 Sample

This study covers a comprehensive set of African countries with available data spanning the period 2000–2020, a timeframe marked by significant developments in the extractive sector. The analysis is divided into two parts, each relying on a specific sample tailored to the methodological objectives and data constraints.

The first part, which aims to estimate the probability of mining legal framework reforms in relation to changes in government political ideology, includes a broad panel of African countries selected based on the availability of political and institutional data. The complete list of countries comprising this sample is provided in Appendix (Country list A).

The second part, which assesses the actual impact of reforms on rent sharing using a staggered difference-in-differences (DiD) methodology, utilizes a more restricted sample. This subset consists only of countries with reliable fiscal and mining data, as well as confirmed implementation of legal reforms during the study period. The detailed composition of this sample is presented in Appendix (Country list B).

This structure allows for analyses that are adapted to the specific data requirements, while ensuring robustness and relevance of the findings within the African context.

2.3.2 Measuring political direction of the head of government

This binary variable takes the value 1 when a change of political ideology of the head of government is observed from one year to another, and 0 in the absence of ideological change. It allows to measure the impact of significant political alternations on major institutional decisions, such as legislative reforms in the extractive sector. A change in ideology is defined here as a shift between ideologically opposed political families (from the left to the center or the right, for example), which may reflect a strategic repositioning of the country's economic and sectoral policies. The variable was constructed from the Global Leader Ideology Dataset, developed by Herre (2023), which provides comparable information on the ideological orientation of world leaders (Brambor and Lindvall, 2018; Volkens et al., 2021; Jolly et al., 2022; Huber et al., 2012; Manzano, 2017; Norris, 2020; Cruz et al., 2021; Armingeon et al., 2023). This type of variable is frequently used in studies on the impact of partisan preferences on economic policies, particularly in areas related to natural resources.

2.3.3 Measuring changes to the mining code

In the first part of our analysis, the dependent variable is the change in mining code. This is a binary variable that takes the value 1 when a country adopts, changes or replaces its mining code in a given year, and 0 if not. This variable aims to capture major institutional reforms in the extractive sector, often influenced by political, economic or resource governance factors. The change in the mining code may reflect governments' desire to attract foreign investment, strengthen the regulatory framework, reduce conflicts related to mining or meet transparency and sustainability requirements. The variable was constructed from a database of different versions of mining codes adopted by the sample countries. It should be noted that some countries did not change their codes during the period under review, while others reformed their mining legislation several times (Table 2.1).

2.3.4 Measuring average effective tax rate de facto

In the second part of our analysis, the dependent variable in our model is the government's take on extractive resources. This indicator provides a *de facto* measure of the share of resource rents effectively captured by the State. It is commonly used in the fiscal analysis of extractive sectors to evaluate the government's ability to appropriate a fair portion of the economic rent generated by resource extraction.

The average effective tax rate (AETR) is calculated as the ratio between total government revenues from extractive resources (in local currency) and total natural resource rents (in millions of USD), after adjusting for exchange rate and GDP-related scaling. To construct this variable, we used data from multiple sources: total resource rents, nominal GDP, and the real exchange rate are drawn from the World Bank's World Development Indicators (WDI) database. Information on government revenues from the exploitation of extractive resources is obtained from the UNU-WIDER ICTD Government Revenue Dataset. This variable allows us to assess the effectiveness with which the government captures revenues from mining and oil/gas activities, while accounting for both macroeconomic and exchange rate factors.

2.3.5 Measuring other control variables

The **presidential election** variable is a binary variable that takes the value 1 when a presidential or executive election takes place during the year in question, and 0 otherwise. It aims to capture the potential impact of the electoral cycle on political decisions, particularly with regard to legal framework reform in the extractive sector. This variable is derived from the Database of Political Institutions (DPI), developed by Cruz et al. (2021) and regularly updated by the World Bank. It identifies the years in which executive elec-

Table 2.1: Mining code reform status in 54 African countries

Country	Mining Code Reformed?	Year(s) of Reform	Number of Reforms
South Africa	Yes	2002	1
Algeria	Yes	2001, 2014	2
Angola	Yes	2011	1
Benin	Yes	2006	1
Botswana	Yes	2007	1
Burkina Faso	Yes	2003, 2015	2
Burundi	Yes	2013	1
Cameroon	Yes	2001, 2016	2
Cape Verde	Yes	2003	1
Comoros	No	-	0
Republic of the Congo	Yes	2005	1
Côte d'Ivoire	Yes	2014	1
Djibouti	Yes	2016	1
Egypt	Yes	2014, 2019	2
Eritrea	No	-	0
Eswatini	Yes	2011	1
Ethiopia	Yes	2010	1
Gabon	Yes	2000, 2014, 2019	3
Gambia, The	Yes	2005	1
Ghana	Yes	2006	1
Guinea	Yes	2011	1
Equatorial Guinea	Yes	2015	1
Guinea-Bissau	Yes	2014	1
Kenya	Yes	2016	1
Lesotho	Yes	2005, 2014	2
Liberia	Yes	2000, 2011	2
Libya	No	-	0
Madagascar	No	-	0
Malawi	Yes	2019	1
Mali	Yes	2012, 2019	2
Morocco	Yes	2015	1
Mauritius	No	-	0
Mauritania	Yes	2008	1
Mozambique	Yes	2014	1
Namibia	Yes	2008	1
Niger	No	-	0
Nigeria	Yes	2007	1
Uganda	Yes	2003	1
Rwanda	Yes	2008, 2014, 2018	3
São Tomé and Príncipe	Yes	2020	1
Senegal	Yes	2003, 2016	2
Seychelles	Yes	2012	1
Sierra Leone	Yes	2009	1
Somalia	No	-	0
Sudan	Yes	2015	1
South Sudan	Yes	2012	1
Tanzania	Yes	2010	1
Chad	Yes	2011	1
Togo	Yes	2003	1
Tunisia	Yes	2003, 2012	2
Zambia	Yes	2015	1
Zimbabwe	No	-	0
Central African Republic	Yes	2009	1
Democratic Republic of Congo	Yes	2002	1

Source: Authors from information on the mining codes of countries.

tions are held, allowing for an examination of the effect of political cycles on the legislative agenda. Inclusion of this variable is based on the idea that leaders may be tempted to promote certain reforms in the run-up to a poll, for legitimization or political reporting purposes.

The **legislative election** variable is a binary variable that takes the value 1 when a legislative election is held during the year in question, and 0 otherwise. It allows us to observe whether the reforms of the mining code are influenced by the renewal of legislative power and the partisan dynamics that accompany it. Like presidential election variable, this variable comes from the Database of Political Institutions (DPI) developed by Cruz et al. (2021). It provides an analysis of the extent to which parliamentary elections create a favourable environment for the adoption of reforms, by changing the political balance or by strengthening transparency requirements. This type of institutional event may indeed offer a window of opportunity to push changes in mining legislation.

The **natural resource wealth** variable is a binary variable that takes the value 1 when a country is classified as rich in natural resources, and 0 if not. It identifies contexts where the abundance of extractive resources creates specific incentives to adopt or reform the legal framework for the mining sector. This variable is constructed from the IMF's World Revenue Longitudinal Database developed by Mansour et al. (2025), which establishes a typology of countries according to their resource wealth, based on criteria such as production volume, the value of resource exports, or the relative importance of extractive industries in the national economy. The objective is to test whether resource-rich countries are more likely to adopt a specific mining code to regulate exploitation and maximize the economic benefits of the sector.

Dependence on natural resources and having wealth in natural resources are two different things. According to UNCTAD (2019), a country is considered to be dependent on commodity exports if these products make up more than 60% of its total merchandise exports. Consequently, a country may be resource-rich yet not dependent on its resources (USA), while conversely, a country may be resource-poor yet highly dependent on its resources (Tanzania and Burundi) (Ding and Field, 2005). The natural resource dependency variable is a binary variable that takes the value 1 when a country has a high dependence on natural resources, and 0 otherwise. It distinguishes economies where the extractive sector is a major source of income, growth or currency from more diversified economies. This variable is constructed from data from the Atlas of African Mining Legislation (AMLA), which provides a classification of African countries according to their level of dependence on natural resources, based in particular on the share of resources in GDP, government revenues or exports. The objective is to analyse whether countries that are heavily dependent on resources are more likely to adapt their legal framework in order to secure income flows, attract investment or strengthen sector governance.

The **commodity cycle** variable is a binary variable that takes the value 1 when

the country is in a bullish phase of the commodity price cycle, and 0 when it is in a bearish phase. It captures the influence of international economic conditions on reform decisions in the mining sector. This variable is constructed from the World Bank's Real Commodity Price Index (World Bank Commodity Price Data). By looking at the annual trends in world prices of major resources (metals, energy, etc.), the cycle is called bearish when a significant decline in prices is recorded, reflecting a deterioration in market conditions. The objective is to test whether governments react differently depending on the economic situation, adapting or not their mining legislation to respond to economic pressures, attract new investors or adjust fiscal arrangements.

The **democracy** variable measures the level of democracy in a given country. It ranges from -10 (strongly autocratic regime) to +10 (fully democratic regime), with higher values indicating more democratic political institutions. This variable is drawn from the Polity V dataset developed by Marshall and Gurr (2020) at the Center for Systemic Peace. Democratic institutions may influence the likelihood of mining code reforms by increasing government accountability, strengthening transparency requirements, and enhancing public scrutiny over the management of natural resources. In more democratic settings, reforms may be adopted either to respond to electoral pressures or to improve governance standards in the extractive sector. Conversely, in more autocratic regimes, reforms may reflect centralized decision-making processes or strategic control over resource rents. Including this variable allows us to assess whether the level of democracy shapes the political incentives to undertake legal reforms in the extractive sector.

The **institutional quality** variable captures the overall strength and effectiveness of political and administrative institutions in a given country. It is constructed using principal component analysis (PCA), a statistical method that aggregates several correlated indicators into a single composite index in order to summarize their common variation. The index is based on six governance indicators drawn from the World Bank's World Governance Indicators (WGI) database: control of corruption, government effectiveness, rule of law, regulatory quality, political stability, and voice and accountability. By combining these dimensions, the variable reflects the capacity of the State to design, implement, and enforce public policies, including those governing the extractive sector. Countries with stronger institutions may be better equipped to design coherent legal frameworks, enforce fiscal rules, and manage extractive rents transparently. Conversely, weak institutional environments may either hinder reform implementation due to limited administrative capacity or encourage reforms aimed at improving governance and revenue collection. The objective is to assess whether the probability of reform is shaped by the institutional capacity of the State to regulate and oversee extractive activities.

The **Extractive Industries Transparency Initiative** (EITI) membership variable is a binary indicator that takes the value 1 from the year in which a country officially joins the initiative and remains equal to 1 as long as the country maintains its membership

status. It takes the value 0 for all years prior to accession, for countries that never joined, and from the year of suspension or withdrawal onward. Data used to construct this variable are obtained from official information published on the EITI website[2]. This variable captures the influence of international transparency and governance standards on domestic extractive policies. The EITI promotes the disclosure of information on revenues, contracts, and institutional arrangements in the extractive sector, with the objective of strengthening accountability and reducing corruption. As argued by Haufler (2010), transparency initiatives often emerge as a response to governance weaknesses in resource-rich countries. Membership in the EITI may therefore increase the likelihood of mining code reforms by encouraging governments to align their legal frameworks with international best practices, enhance fiscal transparency, and improve the management of extractive revenues. Including this variable allows us to assess whether adherence to international governance norms creates incentives for adopting legal reforms in the extractive sector.

GDP per capita (in constant 2015 US dollars) is used as an indicator of the overall economic size and relative wealth of countries in our sample. It is defined as the ratio of gross domestic product (GDP) to total population at the midpoint of the year, measuring the average economic output per person. Data are drawn from the World Bank's World Development Indicators (WDI). For the regression, we take the natural logarithm of GDP per capita. In fact, wealthier countries often have more developed administrative and fiscal capacities, allowing for more efficient tax collection and enforcement of mining-related fiscal obligations. They may also have stronger bargaining power in negotiations with extractive firms, enabling the State to secure a larger portion of resource rents. Including this variable allows us to control for differences in economic capacity that could affect rent capture.

Trade openness is measured as the sum of exports and imports of goods and services expressed as a share of GDP. Higher values indicate a more externally oriented economy, while lower values reflect a more introverted trade structure. Data are drawn from the World Bank's World Development Indicators (WDI). For the regression, the natural logarithm of trade openness is used. In more open economies, governments may face stronger competitive pressures from international investors, potentially limiting their ability to impose high taxes or royalties on extractive firms. At the same time, exposure to global markets may also encourage the adoption of international best practices and fiscal transparency measures, which can enhance rent capture. The objective is to control for differences in external economic integration that may affect the State's capacity to secure revenues from the extractive sector.

Foreign Direct Investment (FDI) measures the sum of short-term and long-term capital inflows recorded in the balance of payments. Data are drawn from the World

[2]It can be accessed via the following link: https://eiti.org/countries

Bank's World Development Indicators (WDI), and the natural logarithm of FDI is used in the regression. Higher levels of FDI can strengthen the presence of multinational extractive firms, which may affect governments' bargaining power when setting tax rates, royalties, and other fiscal obligations. On one hand, countries that attract large FDI inflows may be reluctant to impose high fiscal burdens on investors, potentially reducing rent capture. On the other hand, greater foreign investment can be associated with improved fiscal management and adoption of international best practices, enhancing transparency and revenue collection. The aim is to take into account the role of foreign capital in the State's ability to generate revenue from extractive activities.

Foreign aid (% GNI), or net official development assistance (ODA), measures concessional loans (net of principal repayments) and grants provided by official agencies of Development Assistance Committee (DAC) members, non-DAC countries, and multilateral institutions to support development and welfare in recipient countries. Data are drawn from the World Bank's World Development Indicators (WDI). The natural logarithm of ODA is used in the regression. In fact, higher levels of aid can strengthen institutional capacity, improve fiscal management, and provide technical support, which can facilitate more effective collection of taxes and royalties from the extractive sector. In addition, substantial aid inflows could reduce the government's reliance on domestic resource revenues, potentially lowering the incentive to maximize rent capture. The objective is to control for the role of external financial assistance in shaping the State's ability and incentive to secure revenues from extractive activities.

2.3.6 Stylized facts

Change of the mining code and change of ideology of the head of government

To explore the relationship between mining reforms and political ideology, Figure 2.2 presents the average proportion of mining code reforms based on whether there is a change in the head of government's ideology. The bar corresponding to cases of ideological change is slightly higher, indicating a tendency for reforms to be more frequent in contexts of political alternation. However, this difference appears modest and should be interpreted with caution.

Table 2.2 presents a contingency table and the results of a Pearson chi-squared test assessing the association between changes in the mining code and shifts in political ideology. Among the 1,134 observations, 1,075 correspond to no change in the mining code, while 59 correspond to a change.

The test's hypotheses are as follows:

Figure 2.2: The proportion of change in the mining code according to change in ideology

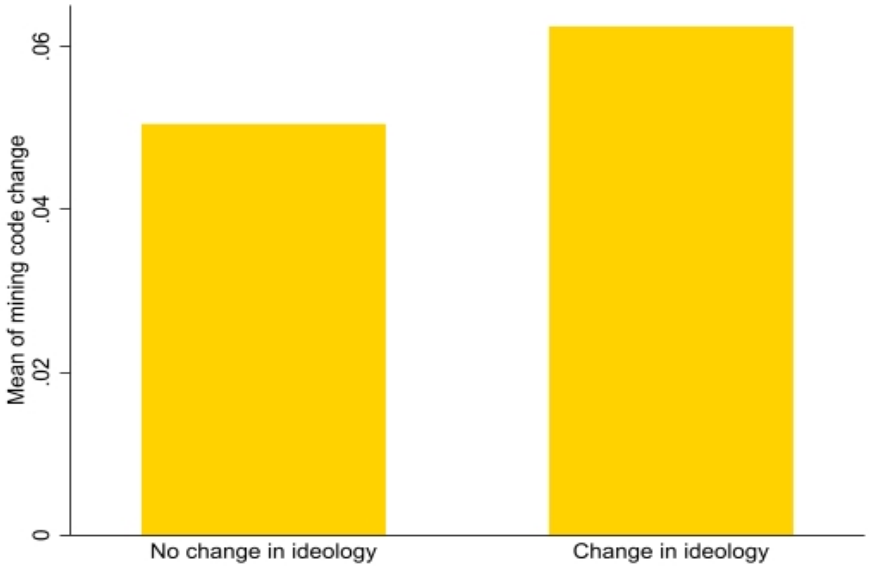


Table 2.2: Analysis of the link between changes to the mining code and shifts in political orientation.

	Change in Ideology		
Mining code change	0	1	Total
0	940	135	1075
1	50	9	59
Total	990	144	1134
Pearson chi2(1) = 0.3667		Pr = 0.545	

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

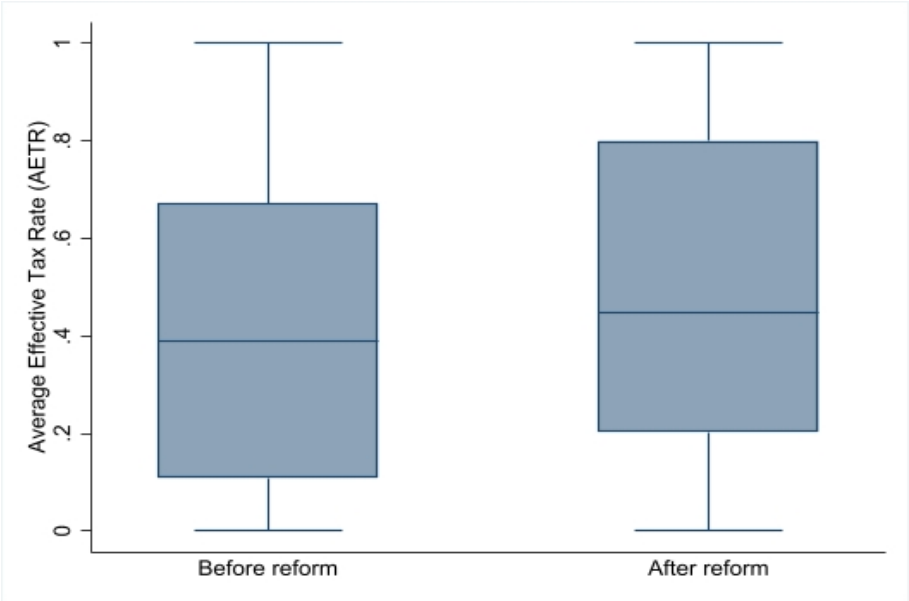
$$Hypothesis: \begin{cases} H0: & \text{No association between ideology change and mining code change,} \\ & Versus \\ H1: & \text{There is an association.} \end{cases}$$

With a chi-squared statistic of 0.367 (degree of freedom = 1) and a p-value of 0.545, we fail to reject the null hypothesis at the 5% significance level. This suggests that there is no statistically significant association between changes in the mining code and shifts in political ideology in the data.

Change of the mining code and average effective tax rate

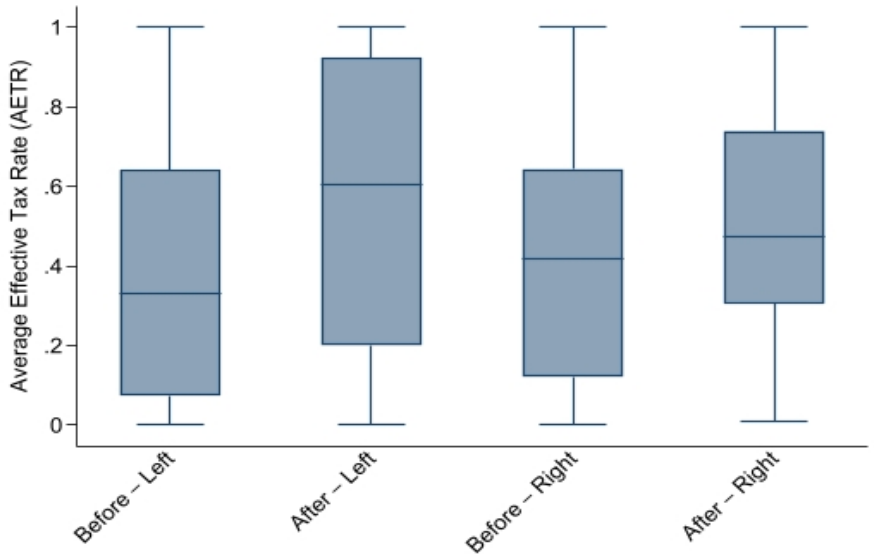
Figure 2.3 shows a boxplot comparing the distribution of the AETR before and after the mining code was reformed. The median AETR is higher after the reform, suggesting that taxation on mining activities tends to increase following legislative revisions. This can be interpreted as the State strengthening its control over mining revenues as part of an effort to improve the tax benefits of the extractive sector. Apart from the increase in the median, however, the dispersion of values does not appear to have decreased significantly. This indicates that the impact of reforms varies across countries or contexts, despite a general upward trend. This finding aligns with theoretical assumptions that mining reforms are frequently accompanied by tax adjustments to optimise profitability for the State. However, these results will need to be confirmed by multivariate analyses that consider other potential determinants, such as institutions, mining wealth and political ideology. Figure 2.4 shows the distribution of the AETR applied to the mining sector before and

Figure 2.3: Average effective tax rate before and after reform of mining code



after the mining code reform, categorised by the ideology of the head of government (left or right). It can be seen that under left-wing governments, the median AETR increases significantly following the reform. This suggests that progressive governments can use reform of the mining code to increase taxation on extractive resources, probably with the aim of redistributing or capturing more mining revenues. Conversely, in contexts where the head of government is on the right, the evolution of the AETR after reform is less pronounced. The median level remains relatively stable, potentially reflecting a preference for fiscal stability or a reform focused more on competitiveness than State profitability. These results therefore suggest that reforms have a different effect according to political ideology, which we explore more systematically in our econometric models.

Figure 2.4: Average effective tax rate by ideology before and after reform



2.4 Empirical strategy

2.4.1 The Probit Model

The chapter's objectives include evaluating the probability of the ideology of the head of government changing in response to changes in the mining code on the African continent. The analysis uses annual data from 2000 to 2020. The continent is particularly relevant for studying the probability of amending the mining code in response to changes in the ideology of heads of government because it is rich in natural resources and mining plays a central role in many African economies (Auty, 2001; Sachs and Warner, 2001). The diversity of the political ideologies of heads of government and the influence of external pressures, such as the demands of international institutions such as the World Bank and the IMF, as well as the recent reform of mining codes across Africa, make the continent

an ideal place to observe the influence of ideological changes on mining policy. Furthermore, the impact of political ideology on economic decisions such as mining code reforms (Campbell, 2004, 2010; Wakenge et al., 2021) has been extensively explored in the literature, which highlights that governments can modify their mining policies according to their ideological priorities (Kolstad, 2009). Given this complexity and the diversity of factors influencing mining reforms, it is necessary to use a statistical model that accurately captures this dynamic. The Probit econometric model is especially well-suited for examining the probability of a shift in the mining code in line with changes in the ideology of the head of government. This is due to the binary nature of the dependent variable (i.e. whether or not there is a change in the mining code) and the non-linear relationship between the explanatory variables (Greene, 2012). This model will provide a better understanding of how political, economic, and social factors influence reforms to the mining code across Africa and can be writen as follow:

$$P(Code_{it} = 1|X_{it}, \alpha_i) = \Phi(X_{it}\beta + \alpha_i) \tag{2.1}$$

where:
$Code_{it}$ is the dependent dummy variable for country i at year t. X_{it} is a vector of control variables discussed in the previous section for country i at year t. α_i represents the fixed effects for country i, capturing unobserved heterogeneity across countries that does not vary over time, taking into account the multiple possible changes. Φ is the cumulative distribution function of the standard normal law.

The model also estimates the marginal effect of institutional and political factors on the likelihood of a country changing its mining code, while accounting for the specifics of each observed entity. In our specific case, the marginal effect of the variable of interest, i.e. a change in the ideology of the head of government, is the impact of infinitesimal variations in this variable on the probability of a change in the mining code, taking into account the fixed effect. Thus, for any explanatory variable X_j in a fixed effects probit model, the marginal effect is given by:

$$\frac{\partial P(Code_{it} = 1|X_{it}, \alpha_i)}{\partial X_{it,j}} = \phi(X_{it}\beta + \alpha_i).\beta_j \tag{2.2}$$

where:

ϕ is the probability density of standard normal law. β_j is the estimated coefficient for the explanatory variable X_j. $X_{it}\beta + \alpha_i$ is the linear combination of explanatory variables and fixed effects for country i.

2.4.2 The Difference-in-difference Model

To analyze the effect of reforms to the mining code on the State's ability to capture a significant proportion of income from extractive resources, we use the difference-in-differences (DiD) approach proposed by Callaway and Sant'Anna (2021). This approach is particularly well suited to the structure of our processing variable. Some countries, such as Burkina Faso and Niger, modified their mining codes two or three times during the study period, meaning there were multiple treatments for the same country. In such a context, the classical DiD approach, based on a single binary treatment, can introduce biases and does not reliably estimate the effect of the treatment. With their method, Callaway and Sant'Anna (2021) offer a robust alternative by taking into account the multiplicity and differentiated timing of treatments. It enables the estimation of both an overall average effect and specific effects at each treatment period. This approach enables analysis of the temporal evolution of the impact of reforms, rather than assuming a constant post-treatment effect. Additionally, this method uses both untreated units (i.e. countries that have not changed their mining codes) and pre-treatment periods as a reference group. This enables more accurate monitoring of differences in trends between treated and non-treated countries and reduces bias related to the heterogeneity of policies over time. We therefore estimate an event study specification as follow:

$$AETR_{it} = \alpha_i + \beta_t + \sum_{k=1}^{K} \lambda k * (PostChange_{it,k}) + \varepsilon_{it} \tag{2.3}$$

where:

$AETR_{it}$ is the dependent variable, measuring the proportion of State-owned extractive resources for country i at year t. $PostChange_{it,k}$ is a binary variable that indicates whether country i has undergone a mining code change in period t, taking into account the multiple possible changes. λk is a parameter that captures the average effect of the mining code change for each period k where a change has occurred. α_i represents the fixed effects for country i, capturing unobserved heterogeneity across countries that does not vary over time. β_t is represents fixed effects for each period, which allows for the control of common factors affecting all countries in each period t.

We assume homogeneous treatment effects among treated countries at different time periods and employ Ordinary Least Squares (OLS) estimation. However, as highlighted by Goodman-Bacon (2021), this estimator can be biased when treatment effects differ across treated groups. To overcome this issue, we apply the adjusted event study estimators proposed by Borusyak et al. (2024), and Callaway and Sant'Anna (2021). These methods ensure robust estimation, even when treatment effects are heterogeneous both over time and across groups.

2.5 Core results

The results presented in this section fall into two main categories. First, we examine the impact of ideological shifts in the head of government on the likelihood of mining code reforms. This analysis addresses the question of whether changes in political leadership, especially in terms of ideology, are associated with a greater probability of initiating legal reforms in the mining sector. In a second stage, we turn to the analysis of how political ideology influences the government's ability to capture natural resource rents. This allows us to explore whether different ideological orientations affect the fiscal outcomes of resource exploitation, particularly in resource-rich countries.

2.5.1 Ideological shifts in government and the likelihood of mining code reforms

Table 2.3 presents the baseline estimates assessing the impact of a change in the head of government's political ideology on the likelihood of reforming mining code in the sample countries. The dependent variable is a binary indicator that takes the value 1 in years when a country undertakes a revision or substantial modification of its mining code, and 0 otherwise. The key explanatory variable reflects a change in the political ideology of the head of government following a presidential election, specifically transitions between left-wing and right-wing leadership. Column (1) presents a baseline estimate using a fixed-effects probit model that includes only this ideological change variable. Starting from column (2), we progressively introduce control variables and additional political covariates, and others relevant variables such as the adoption of the EITI standard and the quality of institutions. Column (9) reports our preferred specification, which includes the full set of explanatory variables and offers a more comprehensive account of the potential drivers of mining code reforms.

The findings suggest that a change in political ideology following presidential elections does not significantly increase the likelihood of mining code reform. Across all specifications, the coefficient on Change in Ideology is positive but statistically insignificant, indicating that ideological shifts are not a robust predictor of reform in this context.

This finding contrasts with parts of the political economy literature, which argue that the ideological orientation of governments systematically influences economic policy choices. For example, Alesina and Rosenthal (1995) and Hibbs Jr (1977) show that left-leaning governments typically favor redistribution and greater public intervention, while right-leaning parties support market liberalization and fiscal conservatism. In the domain of resource governance, Cust and Harding (2020) suggest that ideological preferences, such as nationalism versus liberalism, may shape how countries manage natural resource rents and structure extractive sector institutions. However, our findings suggest that ideology

Table 2.3: Ideological shifts in government and likelihood of mining code reforms

	Dependent variable: Change in mining code								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Change in Ideology	0.106	0.140	0.123	0.125	0.125	0.0829	0.0577	0.0574	0.0586
	(0.186)	(0.188)	(0.188)	(0.188)	(0.188)	(0.181)	(0.190)	(0.188)	(0.188)
Legislative Election		-0.00887	-0.142	-0.146	-0.146	-0.169	-0.161	-0.160	-0.173
		(0.177)	(0.197)	(0.198)	(0.199)	(0.216)	(0.215)	(0.215)	(0.216)
Presidential Election			0.308*	0.309*	0.308*	0.291	0.286	0.270	0.321*
			(0.175)	(0.175)	(0.175)	(0.191)	(0.189)	(0.189)	(0.194)
Rich in Resources				-0.0710	-0.0730	-0.0587	-0.0605	-0.0702	-0.0668
				(0.159)	(0.159)	(0.173)	(0.173)	(0.173)	(0.167)
Dependency on Resources					0.0249	0.0789	0.0795	0.0515	0.0427
					(0.0850)	(0.0920)	(0.0917)	(0.0988)	(0.0984)
Polity2 Score						-0.0105	-0.0108	-0.0110	-0.0193**
						(0.00841)	(0.00839)	(0.00836)	(0.00923)
Price cycle							-0.112	-0.105	-0.134
							(0.134)	(0.134)	(0.134)
EITI								0.129	0.159
								(0.115)	(0.128)
Institution									0.0631**
									(0.0277)
Marginal Effect	0.011	0.015	0.013	0.013	0.014	0.010	0.006	0.006	0.006
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.021)	(0.021)	(0.021)
Constant	-1.640***	-1.631***	-1.659***	-1.650***	-1.662***	-1.649***	-1.589***	-1.608***	-1.588***
	(0.0445)	(0.0585)	(0.0633)	(0.0651)	(0.0804)	(0.0787)	(0.112)	(0.116)	(0.116)
Observations	1,134	1,069	1,069	1,069	1,069	958	958	958	907
Number of id	54	52	52	52	52	52	52	52	52

Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

plays a limited role in driving mining code reform in the African context. One possible explanation is the weak programmatic differentiation between parties in many African countries. As highlighted by van de Walle (2003), political competition in Africa is often driven more by personal networks and clientelism than by coherent ideological platforms. As such, even when elections bring about leadership turnover, the policy agenda may remain relatively stable, especially in sectors like mining that are heavily influenced by external economic pressures and donor interests.

Interestingly, the Presidential Election variable is statistically significant in several specifications (columns 3-5 and 9), suggesting that the years of presidential elections provide an opportune moment for launching mining reforms, regardless of the ideological orientation of the new leader. This is consistent with Drazen (2000), who emphasizes the political timing of reforms, and Grindle and Thomas (1991), who describe how critical junctures, such as elections, can open the political space for major policy changes, especially in developing countries. Additionally, the Polity2 Score, a measure of democratization, is negatively and significantly associated with mining reform in column (9). This somewhat counterintuitive result may imply that authoritarian regimes are more capable of enacting mining reforms, possibly due to fewer institutional constraints or weaker opposition. This finding aligns with Arezki and van der Ploeg (2007), who argue that authoritarian governments may be more agile in reforming extractive policies, though often at the cost of transparency and long-term sustainability.

In addition, the results show that the institutional quality index is positively associated

with the likelihood of reform. The coefficient is statistically significant at the 5% level, suggesting that better institutional environments increase the probability of changes to the mining code, possibly reflecting more responsive and reform-oriented governance.

Our findings imply that mining code reforms should not be expected to follow automatically from ideological shifts in government. Instead, stakeholders -including civil society actors, donors, and reform advocates- should view electoral moments as strategic entry points to promote reform, while recognizing that actual policy change depends on a broader set of institutional, political, and economic factors.

To identify which institutional dimensions drive this result, we decompose the composite institutional index into its six components in columns 1-6 in Table 2.4. The results indicate that control of corruption (column 1), government effectiveness (column 2), and regulatory quality (column 4) are the most influential sub-indicators, with positive and statistically significant effects at the 1% or 5% levels. These findings suggest that institutional environments marked by strong anti-corruption measures, capable bureaucracies, and sound regulatory frameworks are more conducive to legal and policy reforms in the mining sector. We also find that rule of law (column 5) and voice and accountability (column 6) are positively associated with the probability of reform, although with slightly weaker statistical significance. Conversely, political stability (column 3) appears unrelated to reform dynamics, with a coefficient close to zero and statistically insignificant.

Overall, the results highlight that beyond general institutional quality, specific dimensions such as corruption control and regulatory effectiveness are critical for enabling reforms in the extractive sector. This implies that policy interventions aiming to improve these dimensions could have a meaningful impact on reform outcomes.

Table 2.4: Decomposition effect of institutional quality

	Dependent variable: Change in mining code					
	(1)	(2)	(3)	(4)	(5)	(6)
Change in Ideology	0.0460	0.0615	0.0642	0.0364	0.0580	0.0370
	(0.189)	(0.188)	(0.189)	(0.188)	(0.187)	(0.187)
Legislative Election	0.334*	0.321*	0.293	0.323*	0.317	0.309
	(0.193)	(0.193)	(0.196)	(0.195)	(0.193)	(0.199)
Presidential Election	-0.172	-0.177	-0.158	-0.171	-0.172	-0.166
	(0.214)	(0.216)	(0.218)	(0.217)	(0.216)	(0.221)
Rich in Resources	-0.109	-0.0783	-0.132	-0.0208	-0.0882	-0.0863
	(0.175)	(0.165)	(0.165)	(0.159)	(0.164)	(0.163)
Dependency on Resources	0.0461	0.0432	0.0531	0.0317	0.0570	0.0244
	(0.0962)	(0.0982)	(0.0949)	(0.0999)	(0.0941)	(0.101)
Polity2 Score	-0.0195**	-0.0149*	-0.0104	-0.0167*	-0.0160*	-0.0273***
	(0.00933)	(0.00875)	(0.00830)	(0.00877)	(0.00885)	(0.0104)
Price cycle	-0.137	-0.130	-0.126	-0.130	-0.128	-0.134
	(0.135)	(0.134)	(0.132)	(0.134)	(0.134)	(0.134)
EITI	0.182	0.178	0.125	0.145	0.147	0.113
	(0.129)	(0.131)	(0.121)	(0.123)	(0.126)	(0.119)
Control of Corruption	0.263***					
	(0.0978)					
Government Effectiveness		0.205**				
		(0.0982)				
Political Stability			0.0365			
			(0.0490)			
Regulatory Quality				0.225**		
				(0.0937)		
Rule of Law					0.160*	
					(0.0926)	
Voice and Accountability						0.182**
						(0.0898)
Marginal Effect	0.005	0.007	0.007	0.004	0.006	0.004
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
Constant	-1.424***	-1.442***	-1.567***	-1.434***	-1.481***	-1.424***
	(0.132)	(0.141)	(0.122)	(0.136)	(0.142)	(0.146)
Observations	908	907	908	908	908	908
Number of id	52	52	52	52	52	52

Robust standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

2.5.2 Impact of mining code amendment on State revenue from natural resources

This section assesses the impact of mining code reforms on the share of natural resource rents captured by the State. The dependent variable is expressed as a percentage of the total rent generated from natural resource extraction. Estimations are based on the staggered difference-in-differences approach developed by Callaway and Sant'Anna (2021), which accounts for treatment timing heterogeneity and the dynamic nature of the effects.

The results reported in Table 2.5 present the average treatment effect on the treated (ATT) across two model specifications. In the first specification (column 1), which excludes country fixed effects, the ATT is estimated at 0.322 and is statistically significant at the 1% level. The second specification (column 2), which includes country fixed effects to control for time-invariant unobserved heterogeneity at the national level, yields a slightly lower ATT of 0.307, significant at the 5% level. These findings suggest that the adoption of a new mining code is associated with a substantial and statistically significant increase in the share of resource rents captured by the State.

The stability of the coefficient across specifications reinforces the robustness of the relationship. The magnitude of the effect indicates a meaningful improvement in the mobilization of extractive revenues useful for all. These findings confirm that reforms to the legal and fiscal framework of the extractive sector can significantly enhance governments' capacity to recover a greater share of the rents. They are consistent with the conclusions of previous studies (Daniel et al., 2010; Osmundsen et al., 2005). The International Monetary Fund (2012) also notes that well-designed fiscal regimes can significantly increase revenues without necessarily deterring investment, which appears to be the case here. However, as emphasized by Manley et al. (2017), the effectiveness of such reforms also heavily depends on their practical implementation and the quality of local fiscal institutions. The effectiveness of such reforms appears to be contingent upon broader institutional factors, highlighting the need for a comprehensive approach that couples legal reform with capacity-building and improved governance frameworks.

Table 2.5: Impact of amending mining code on State revenue share

	ATT of amending mining code on State revenue share	
Average Treatment Effect	0.322***	0.307**
	(0.082)	(0.135)
Country FE	No	Yes
Observations	302	295

Standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1
Dependent variable is average effective tax rate.

2.6 Robustness Checks

To address potential concerns about omitted variable bias related to institutional quality and governance capacity, and building on the findings of Hilson and Maconachie (2008), who argue that the outcomes of such reforms are strongly conditioned by institutional quality and transparency in resource governance, we perform a series of robustness checks by sequentially adding control variables that capture key institutional characteristics, governance in the resource sector, and political dimensions.

The baseline estimate is reported in column (1) of the Table 2.6 to serve as a reference for comparison with the results obtained after introducing additional controls in columns (2) through (6). The result remains remarkably stable when controlling for EITI adoption (column 2) and quality of institutions (column 3), with the ATT fluctuating only marginally. When introducing political regime controls, democracy (column 4) and autocracy (column 5), the ATT even increases slightly to 0.338 and 0.346, respectively, indicating that political institutions may reinforce the effect. In the final specification (column 6), which includes all control variables simultaneously, the ATT remains positive and significant (0.337), suggesting that the estimated impact is not driven by omitted institutional or governance-related variables. These findings strengthen the credibility of our baseline results and align with the broader literature emphasizing the role of institutional context in the effectiveness of fiscal reforms in the resource sector.

More interestingly, we decompose the institutional quality variable to investigate whether different types of institutions have heterogeneous effects on the estimated average treatment effect (ATT) of mining code reforms on the share of resource rents captured by the State. To this end, we sequentially introduce, in separate regressions, each of the six institutional indicators provided by Worldwide Governance Indicators: control of corruption, government effectiveness, political stability, regulatory quality, rule of law, and voice and accountability. For each specification, we retrieve the corresponding ATT. The results are presented in Table 2.7. The estimate including the aggregated institutional quality index is reported in column (1) to facilitate comparison with the specifications in the subsequent columns, where individual institutional dimensions are introduced. The findings reveal that regardless of the type of institution considered, the estimated effect of the reform on the government's share of resource rents remains statistically significant and of similar magnitude, which reinforces the robustness of our baseline results.

Table 2.6: Additional control variables

	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline	EITI-adoption	Quality of Institution	Democracy	Autocracy	All control variabes
Average Treatment Effect (ATT)	0.307**	0.307**	0.306**	0.338**	0.346**	0.337**
	(0.135)	(0.135)	(0.135)	(0.154)	(0.152)	(0.155)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	295	295	272	266	266	243

Standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.
Dependent variable is average effective tax rate.

Table 2.7: Decomposition effect of institutional quality

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Quality of Institution	Control of Corruption	Government Effectiveness	Political Stability	Regulatory Quality	Rule of Law	Voice and Accountability
Average Treatment Effect (ATT)	0.306**	0.306**	0.306**	0.306**	0.306**	0.306**	0.306**
	(0.135)	(0.135)	(0.135)	(0.135)	(0.135)	(0.135)	(0.135)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	272	272	272	272	272	272	272

Standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1
Dependent variable is average effective tax rate.

2.7 Heterogeneity Analysis

This section conducts a heterogeneity analysis to better understand under what conditions mining code reforms effectively enhance the government's share of natural resource rents. While the baseline results suggest that reforms can improve fiscal outcomes, this effect is unlikely to be uniform across countries with different institutional characteristics, economic structures, or political regimes. To address this, we explore whether the treatment effects of mining reforms vary systematically across three key dimensions: the quality of public sector management, the degree of dependence on natural resources, and the political ideology and regime type of the country.

2.7.1 Heterogeneity effects of quality of public sector management

To assess whether administrative capacity conditions the effectiveness of mining fiscal reforms, we investigate the heterogeneity in the impact of mining code reforms on the government's share of mining rents, using the Country Policy and Institutional Assessment (CPIA) "Public Sector Management and Institutions Cluster Average" index. This index, ranging from 1 (low) to 6 (high), captures five core dimensions of public governance: property rights and rule-based governance, quality of budgetary and financial management, efficiency of revenue mobilization, quality of public administration, and transparency, accountability, and control of corruption in the public sector.

Following the assertion by Lundstøl (2018) that mining fiscal reforms in African countries are more successful when supported by adequate administrative capacity, we split the sample at the median value of the CPIA index. Countries above the median are classified as having high public sector management (high PSM), while those below are classified as low PSM. The results reveal substantial heterogeneity (Table 2.8). In low-PSM countries, the average treatment effect of reforms is statistically insignificant and slightly negative (-2.2%). In contrast, in high-PSM countries, reforms are associated with a statistically significant increase in the government's share of mining rents by 14.3%. This asymmetry confirms that the effectiveness of mining reforms crucially depends on the strength of the institutional environment in which they are implemented.

To further identify which institutional features drive this heterogeneity, we decompose the composite index into its five underlying components. First, property rights and rule-based governance appear to play a key role: in countries with strong legal and institutional frameworks, reforms are associated with a 17.8% increase in government rent share, highlighting the importance of stable, predictable, and enforceable rules. Second, countries with high scores in budgetary and financial management experience a 14.4% gain, suggesting that effective public financial management systems enhance the ability

to retain and allocate mining revenues efficiently. Third, efficiency of revenue mobilization emerges as the most critical component. In countries with robust revenue authorities and administrative systems, the estimated effect of reforms reaches 23.6%, implying that institutional capacity to collect taxes is a fundamental determinant of fiscal reform success. Fourth, quality of public administration is also positively correlated with reform effectiveness: countries with competent and professional bureaucracies see a gain of 18.6% in rent capture, indicating that the human capital and organizational performance of the civil service matter greatly. Finally, transparency, accountability, and control of corruption are strongly associated with positive outcomes; countries scoring high in this area experience a 13.4% increase, confirming that transparency mechanisms and anti-corruption measures reduce revenue leakages and elite capture.

These findings provide strong evidence that mining fiscal reforms yield better results when implemented in countries with a supportive institutional environment. Specifically, higher capacities in revenue mobilization, administrative professionalism, public financial management, legal governance, and transparency are critical to enhancing the government's ability to capture a greater share of mining rents. The results emphasize the importance of sequencing policy efforts appropriately. Strengthening public institutions should be considered a necessary condition or at least a key complement to fiscal reform initiatives. Without such institutional support, reforms may be poorly executed or even counterproductive, particularly in settings with limited State capacity.

2.7.2 Heterogeneity of effects by resource dependence

This section investigates whether the impact of mining code reforms on the government's share of resource rents varies with a country's dependence on natural resources. Following the AMLA classification, we define resource-dependent countries as those with "high" dependence, i.e. whose exports of natural resources represent more than 60% of total exports (UNCTAD, 2019). In such countries, extractive industries tend to play a central role in the economy and public finances, which may influence how reforms are designed, implemented, and enforced.

The results presented in Table 2.9 reveal significant heterogeneity. In resource-dependent countries, the average effect of reform treatment is positive but not statistically significant, while in non-resource-dependent countries, the effect is both positive and significant at a conventional level of 1%. These findings suggest that reforms of the mining code are substantially more effective in improving rent capture in countries with more diversified economic structures.

Although this pattern may appear counterintuitive, since countries that rely heavily on extractive revenues should, in theory, have stronger incentives to reform their fiscal frameworks, our results align with the broader literature on the resource curse. This lit-

Table 2.8: Country Policy and Institutional Assessment (CPIA)

	Low	High
	(1)	(2)
Public sector management and institutions cluster average		
Average treatment effect (ATT)	-0.022	0.143***
	(0.060)	(0.056)
Observations	32	198
Property rights and rule-based governance		
Average treatment effect (ATT)	-0.022	0.178**
	(0.060)	(0.072)
Observations	26	210
Quality of budgetary and financial management		
Average treatment effect (ATT)	-0.021	0.144**
	(0.060)	(0.062)
Observations	51	164
Efficiency of revenue mobilization		
Average treatment effect (ATT)	-0.038	0.236*
	(0.044)	(0.127)
Observations	81	106
Quality of public administration		
Average treatment effect (ATT)	0.047	0.186**
	(0.077)	(0.077)
Observations	92	119
Transparency, accountability, and corruption in the public sector		
Average treatment effect (ATT)	-0.022	0.134***
	(0.060)	(0.044)
Observations	39	195
Country FE	Yes	Yes

Standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1
Dependent variable is average effective tax rate.

erature posits that the wealth of natural resources can undermine institutional quality, reduce accountability, and increase the risk of elite capture, thus reducing the effectiveness of public policies (Sachs and Warner, 2001; Mehlum et al., 2006b; Ross, 2001). Previous studies have shown that in highly resource-dependent settings, natural resource rents often displace efforts to build robust fiscal institutions and increase vulnerability to rent-seeking and corruption (Collier and Goderis, 2007). In this context, our findings indicate that legal and fiscal reforms in the mining sector are more likely to yield tangible results in non-resource-dependent countries, where institutions may be stronger, the economy more diversified, and political incentives less distorted by extractive rents. In contrast, in resource-dependent economies, the implementation of reforms may be hindered by governance constraints or a lack of enforcement capacity, leading to limited or no observable improvement in rent capture.

Table 2.9: Dependency on natural resources

	Dependency on Resources	No dependency on Resources
Average treatment effect (ATT)	0.012	0.142***
	(0.046)	(0.034)
Observations	143	146
Country FE	Yes	Yes

Standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1
Dependent variable is average effective tax rate.

2.7.3 Heterogeneity by political ideology and regime type

To better understand the conditions under which political reforms influence the government's share of natural resource rents, we also explore heterogeneity in treatment effects based on the ideology of the head of government and its interaction with regime type (democratic vs. non-democratic). The corresponding estimates are presented in Tables 2.10 and 2.11.

As shown in Table 2.10, the estimated effects differ significantly depending on whether the head of government is left- or right-leaning. In countries led by leftist governments, reforms tend to increase the government's share of natural resource rents. In contrast, under rightist governments, reforms are associated with a decline in the rent share accruing to the State. This asymmetry aligns with the broader literature on the political economy of taxation and natural resource governance, where left-leaning governments are typically associated with stronger redistributive preferences, greater public ownership, and more active State involvement in resource management (Mahon, 2004; Fairfield, 2015). Right-leaning governments, by contrast, often adopt pro-business strategies that involve reducing tax burdens on capital, offering fiscal incentives to attract private investment, and limiting State intervention in strategic sectors, including extractives. More

recent studies emphasize that conservative parties use tax policy as a tool to enhance competitiveness and investor confidence (Martin, 2023; Rixen and Rohlfing, 2020).

The interaction between ideology and regime type, shown in Table 2.11, reveals even sharper distinctions. In democratic regimes, reforms implemented by rightist governments tend to reduce the government's share of rents, whereas reforms under leftist governments increase it. These findings suggest that in democratic contexts, ideological preferences are more transparently translated into public policy, influenced by electoral competition, institutional checks, and pressures from interest groups.

In non-democratic regimes, reform effects remain positive under leftist governments and are even more pronounced than in democracies. More unexpectedly, right-wing non-democratic governments also appear to implement reforms that significantly increase the government's rent share. Although this may seem counterintuitive given the traditional market-friendly orientation of the political right, it can be interpreted through the lens of rent-seeking dynamics typical of authoritarian regimes. In the absence of electoral constraints and accountability mechanisms, ruling elites, regardless of ideological orientation, can centralize resource control to finance patronage, stabilize ruling coalitions, or maintain regime survival (Robinson et al., 2006; Haber and Menaldo, 2011; Wright et al., 2015).

Our findings underscore that the effects of political reforms on rent capture are shaped not only by ideological preferences but also by the political institutional context. Left-leaning governments, whether democratic or not, are more likely to pursue reforms that increase public control over natural resources. Right-leaning governments in democracies tend to favor more market-oriented outcomes. In authoritarian regimes, however, ideology appears subordinate to political survival strategies, with rent centralization serving as a tool for regime maintenance regardless of partisan orientation.

Table 2.10: Head of government ideology

	Head of government is rightist	Head of government is leftist
Average treatment effect (ATT)	-0.014***	0.022**
	(0.003)	(0.009)
Observations	80	44
Country FE	Yes	Yes

Standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1
Dependent variable is average effective tax rate.

Table 2.11: Democracy and head of government ideology

	Democratic	Undemocratic
	(1)	(2)
Head of government is rightist		
Average treatment effect (ATT)	-0.022***	0.044***
	(0.000)	(0.021)
Observations	34	134
Head of government is leftist		
Average treatment effect (ATT)	0.030***	0.103**
	(0.000)	(0.046)
Observations	22	238
Country FE	Yes	Yes

Standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1
Dependent variable is average effective tax rate.

2.8 Endogeneity issues

To address potential endogeneity concerns in estimating the effect of mining code reforms on the government's share of resource rents, we consider three key sources of bias: reverse causality, omitted variable bias, and measurement error. Reverse causality may arise if governments tend to adopt fiscal reforms in reaction to fluctuations in their revenue share from the extractive sector. For example, a decline in rent capture might trigger a reform initiative. Measurement errors may arise from imprecise coding of reform episodes or tax outcomes, which could bias estimates toward zero.

Most importantly, omitted variable bias could result if unobserved factors jointly influence both the likelihood of reform and fiscal outcomes. To reduce this risk, we included a comprehensive set of additional control variables capturing political and institutional environments. These include the adoption of the EITI standard, institutional quality indicators, and political regime characteristics such as democracy and autocracy scores. These variables are crucial for isolating the effect of mining reforms from broader governance and transparency dynamics that might also affect fiscal performance.

To further address endogeneity, especially reverse causality, we estimate a system GMM model, which corrects for potential simultaneity, dynamic bias, and unobserved country-level heterogeneity by using internal instruments derived from lagged variables. This estimator is particularly well suited for our panel structure with a moderate time dimension.

Table 2.12 reports the results of the system GMM estimation. In both specifications, the lagged dependent variable is statistically significant, highlighting the dynamic nature of mining tax policy. The coefficient on mining code reforms (column 1)is positive and

significant, suggesting that reforms are associated with an increase in the government share. The effect persists when time-fixed effects are included (column 2), indicating robustness even after accounting for temporal shocks.

Importantly, diagnostic tests support the reliability of our estimate. The Hansen test yields p-values of 0.103 and 0.129, suggesting that the instruments are valid and not overidentified. The Arellano-Bond tests confirm the presence of first-order but not second-order autocorrelation, indicating a correct specification of the dynamic model. Overall, these results suggest that once we control for potential endogeneity and omitted variables, particularly institutional and governance-related factors, mining code reforms are robustly associated with an increased government share of resource rents. This supports the hypothesis that well-designed fiscal reforms, reinforced by institutional quality and transparency commitments, can significantly enhance domestic revenue mobilization in the extractive sector.

Table 2.12: Estimates using System GMM

	Dependent variable: Average effective tax rate (AETR)	
	(1)	(2)
L.AETR	0.623***	0.560***
	(0.213)	(0.191)
Change in mining code	1.243**	1.031**
	(0.549)	(0.497)
GDP per capita (log)	0.0260	0.0556
	(0.0874)	(0.0759)
Foreign Direct Investment (log)	-0.0311	-0.0257
	(0.0290)	(0.0287)
Trade Openness (log)	0.0386	0.00953
	(0.113)	(0.0881)
Foreign aid	-0.00693	-0.00510
	(0.0125)	(0.00815)
Constant	-0.227	-0.303
	(0.370)	(0.342)
Observations	327	327
Number of id	23	23
Instruments	12	13
Hansen test	0.103	0.129
Arellano-Bond test for AR(1)	0.044	0.052
Arellano-Bond test for AR(2)	0.895	0.830
Time FE	No	Yes

Standard errors in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

2.9 Conclusion

This chapter empirically analyses the relationship between the political ideology of government leaders and fiscal governance in the mining sector in African countries between 2000 and 2020. We used a probit model and an extended difference-in-differences (DiD) approach to study two key aspects: the probability of a country reforming its mining code following a change in ideology and the effect of such a reform on the the government take or AETR *de facto*, a measure of the proportion of extractive revenues collected by the State.

Our results show that a change in the head of government's ideology does not significantly affect the probability of reforming the mining code. This suggests that reform is driven more by economic or institutional constraints than ideological changes. Conversely, we observe that mining reforms tend to strengthen mining taxation, although this effect is contingent on the ideology of those in power: left-wing governments tend to use reforms to increase levies on extractive rents, whereas right-wing governments generally maintain or reduce this tax pressure.

By highlighting the asymmetrical fiscal impacts of reforms enacted by left- and right-leaning governments, this research brings new insight into how political agency influences the design and implementation of extractive policies. It bridges political science and public finance by showing that ideology not only matters for electoral or redistributive policies, but also for how States govern and tax their natural resources. These findings contribute to current policy debates on balancing the need to attract foreign investment with the imperative of maintaining fiscal sovereignty and achieving fair resource redistribution.

Finally, our results contribute to question the implementation of "best practices" in diverse local contexts, and effectiveness of technical assistance as social engineering.

Appendix A

Country list A: Algeria; Angola; Benin; Botswana; Burkina Faso; Burundi; Cabo Verde; Cameroon; Central African Republic; Chad; Comoros; Democratic Republic of Congo; Republic of Congo; Côte d'Ivoire; Djibouti; Egypt; Equatorial Guinea; Eritrea; Eswatini; Ethiopia; Gabon; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Lesotho; Liberia; Libya; Madagascar; Malawi; Mali; Mauritania; Mauritius; Morocco; Mozambique; Namibia; Niger; Nigeria; Rwanda; Sao Tome and Principe; Senegal; Seychelles; Sierra Leone; Somalia; South Africa; South Sudan; Sudan; Tanzania; Togo; Tunisia; Uganda; Zambia; Zimbabwe.

Country list B: Algeria; Angola; Burkina Faso; Cameroon; Chad; Democratic Republic of Congo; Republic of Congo; Côte d'Ivoire; Egypt; Equatorial Guinea; Gabon; Ghana; Guinea; Liberia; Libya; Madagascar; Mali; Mauritania; Niger; Nigeria; South Sudan; Sudan; Togo; Tunisia; Zambia.

Chapter 3

Structural Constraints and Mining Rent Sharing in Africa

3.1 Introduction

Like the Addis Ababa development conference in July 2015, mobilising internal resources has become more important with the COVID 19 health crisis and the current geopolitical context namely the war in Ukraine and the conflict in Gaza and Israel. The global economy continues to feel the effects of this pandemic, the war in Ukraine and the conflict in Gaza (International Monetary Fund, 2023, 2024). In this way, the mobilisation of own resources makes it possible to limit the problems. The aid dependency of some developing countries makes them even more vulnerable when it is known that some donors themselves need help in these times of crisis.

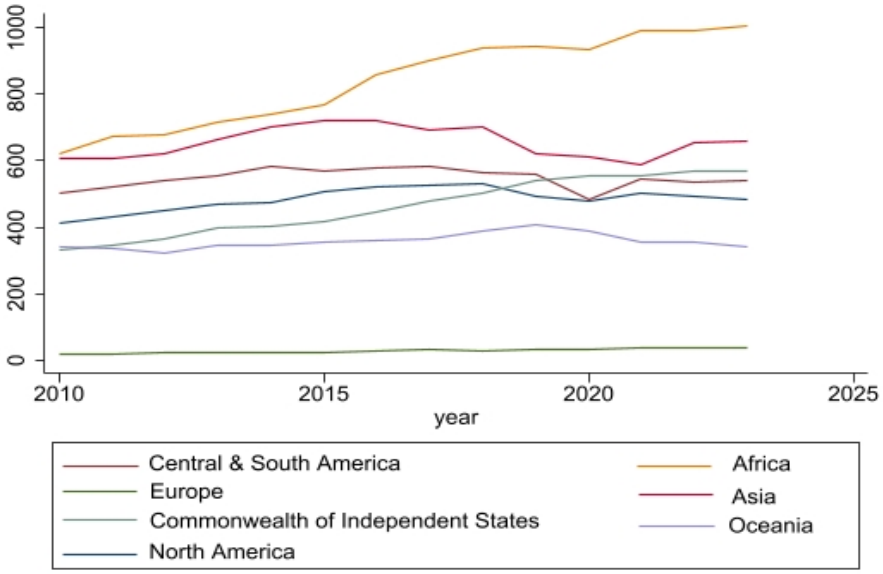
The African continent has a particular wealth: natural resources on which it could build to improve its fiscal performance and enhance its sustainable development[1]. African countries hold thirty per cent (30%) of the world's mineral reserves, including gold, bauxite, diamonds, cobalt, copper, iron and many others[2]. The most recent British Geological Survey (BGS) publications (Idoine et al., 2023, 2024) identified forty of the continent's fifty-four countries where gold is mined, making gold, the only mineral mined in the majority of African countries. Table 3.B7 in appendix presents these countries and their gold production in kilograms over the period 2017-2022. South Africa is expected to produce the most gold in 2021, at 105,019 kilograms. In addition, Burkina Faso, Côte d'Ivoire and Mali collectively produced 148 tonnes of gold annually (50.3 tonnes from Burkina Faso, 32.5 tonnes from Côte d'Ivoire and 65.2 tonnes from Mali), according to the 2019 Extractive Industries Transparency Initiative (EITI) reports.

The continent's gold production has been rising steadily in recent years (Figure 3.1). According to Word Gold Council, it rose from 621.8 tonnes of gold in 2010 to 1,004 tonnes in 2023, representing 27.54% of worldwide global production in 2023. In the same year Ghana is the 6th country in terms of gold production worldwide and first in Africa with an annual production of 135 tonnes as we can observe toward the Figure 3.2. Given this significant growth and the substantial mineral wealth of the continent, the mining sector plays a crucial role in economic development and fiscal performance.

[1]To build a strong State, the Sustainable Development Goals call for a minimum performance for collecting tax revenues (15% of GDP). According to Okunogbe and Santoro (2023), tax revenues account for 20% of GDP in developed countries, compared to 11% in developing countries.

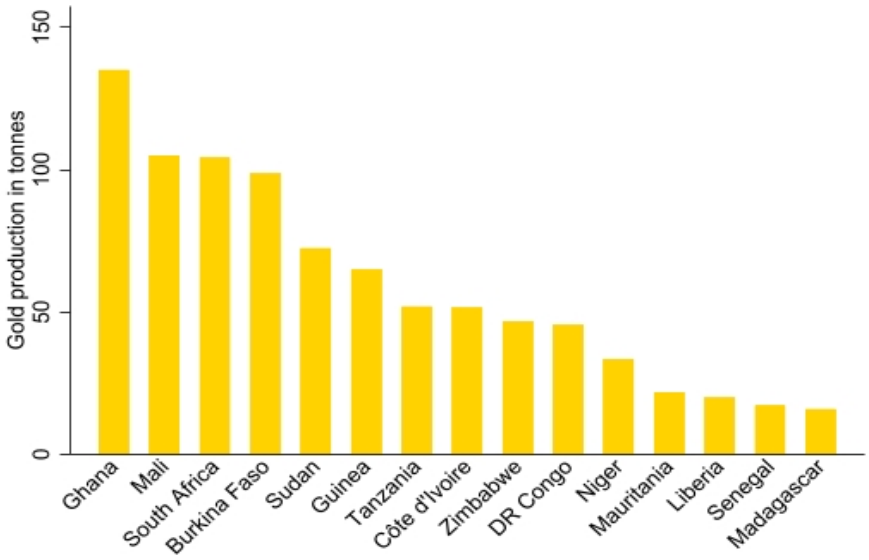
[2]This percentage is estimated. In reality a large part of the mineral reserves of the African continent is still unexplored. This could suggest a slightly higher percentage than the 30%.

Figure 3.1: Gold production evolution in the world



Source: Author from data of World Gold Council.

Figure 3.2: Gold production across African countries in 2023



Source: Author from data of World Gold Council.

The mining sector has the characteristic of generating a surplus of income called rent[3]. The rent is shared between the investors and the government. Therefore, the objective of internal resource maximisation is also to maximise the share of the rent that goes to the government. This means taxing one hundred per cent (100%) of the rent. In fact, according to the theory of optimal rent taxation, taxing 100% of the rent is economically neutral because the investment decision and the production path should not be changed (Boadway and Keen, 2010). The government cannot accurately assess the upstream rent due to uncertainties related to operating conditions, which may be geological, economic or even political. In reality, there is heterogeneity in the way countries define the fiscal system. Depending on its priorities or objectives (Baunsgaard, 2001) in the short or long term, each country develops a tax system that allows it to capture an important part of the rents. As a result, there is a complexity of mining tax regimes (Laporte et al., 2022; Sanou, 2024), with several tax instruments that can deviate from the general regime, sometimes with special levies that can lead to economic distortions.

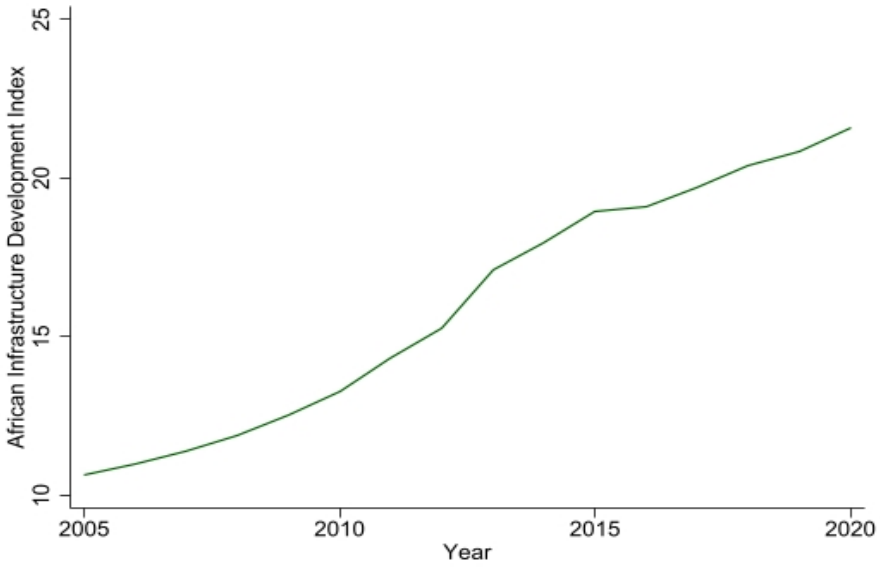
In the 1990s, shortly after Aschauer (1989) empirical work linking infrastructure provision to economic growth in the US, several authors, such as Hulten and Schwab (1991); Eisner (1994) and Harmatuck (1996), turned their attention to the subject and confirmed the significant impact of public infrastructure. Similar studies have been carried out using data from other countries (Yoshino and Nakahigashi, 2000; Arslanalp et al., 2010). The impact of infrastructure on tax revenues was the subject of studies by Yoshino and Abidhadjaev (2017). They assessed the impact of the Kyushu high-speed rail line on tax revenues and the economy of the dismantled regions in Japan. They found that tax revenues in the regions crossed by the rail line increased significantly from the start of the line's construction. Shortly before, Yoshino and Pontines (2015) established a link between infrastructure provision and fiscal performance in the Philippines. Using the difference-in-difference estimation strategy, they are able to show that the Star Highway has had a significant positive impact on the tax revenues of the regions it passes through. While these studies underline the fiscal and economic benefits of infrastructure investment, they do not address the question relevant to extractive industries: whether the improvement in infrastructure quality reduces investors' perceived risk, and whether, in return, investors are willing to accept a higher fiscal burden.

Although progress has been made in recent years (AfDB, 2023), there is still enormous scope for improvement in the quality of the continent's infrastructure. Figure 3.3 above is a depiction of the evolution of infrastructure quality between 2005 and 2020 in our sample.

Mining companies are generally attracted by the quantity of ore that can be mined, but also by the country risk and existing infrastructure. A recent study by Amedanou

[3]According to Cottarelli (2012), rent is "the amount by which revenues exceed all production costs, including those of discovery and development, as well as the normal return on capital".

Figure 3.3: African Development Infrastructure Index evolution



Source: Author from data of the African Development Bank.

and Laporte (2024) showed that the government's share of mining rents, referred to as "*de jure* government take", is negatively associated with country risk. The higher the country risk, the lower the *de jure* government take. Infrastructure can therefore be seen as a means of mitigating this risk. Risk reduction through increasing infrastructural quality has two effects: it increases the taxable rent and it can change the rent-sharing. The aim of this chapter is to examine this second issue, which has not been addressed in the literature. In the presence of sufficient, good-quality infrastructure, some of the costs borne by mining companies, such as transport, electricity and telecommunications cost, can be reduced. As a result, mining companies will find it easier to accept "normal" taxation and a sharing of rents favorable to the State, as the activity will be less risky. It is therefore important to consider the infrastructure constraints that countries may face in maximizing their share of rents. If better infrastructure helps to facilitate international trade by reducing transport costs (Ando and Kimura, 2013), does this also apply to the State's share of mining rent? In other words, how will infrastructure influence the sharing of rents? Is there a channel through which the effect of infrastructure is mediated?

In this chapter, we test the effect of infrastructure development on the State's share of mining rents through fixed-effect model on a sample of 22 gold-producing countries in Africa over the period 2005-2020. We use the African Infrastructure Development Index (AIDI) developed by the African Development Bank which measures the quality of infrastructure and the average effective tax rate (AETR)[4] which measures the State's share of gold rent. The AETR is a synthetic measure of fiscal policy choice in the mining sector. It is based on the legislation in force, i.e. *de jure* (Amedanou and Laporte, 2024), as opposed

[4]In the rest of this chapter, the term AETR refers to the average effective tax rate of gold rent.

to some of the literature that deals with *de facto* (Adebayo et al., 2021). As for the AIDI, it's a synthetic indicator of the quality and development of infrastructure in the African continent's countries. It is a measured as composite of transport, power or energy, information telecommunication technologies (ICT) and water and sanitation infrastructure (WWS) indexes. Furthermore, good infrastructure can strengthen the quality of institutions by enhancing State capacity, improving public service delivery, and fostering citizen trust (Calderón and Servén, 2010; Sachs et al., 2004). In many contexts, infrastructure also contributes to the durability of political regimes by reinforcing elite coalitions and increasing regime legitimacy (North et al., 2009; Collier, 2007). We analyze how regime durability and institutional quality mediate the relationship between the AETR and infrastructure development as measured by the Africa Infrastructure Development Index (AIDI). This approach is grounded in the assumption that infrastructure development can influence both the stability and longevity of political regimes (North et al., 2009; Collier, 2007) and the quality of institutions (Calderón and Servén, 2010; Acemoglu et al., 2001). In turn, these institutional and political factors shape the environment in which tax policy is formulated and public investment decisions are made (Rodrik, 2007).

Ours results are threefold. First, we find that the infrastructure development is positively related to AETR. This result can explained by the willingness of mining companies to pay these taxes when risk decreases with better quality of infrastructure. Mining companies have an incentive to pay taxes, which is increased when they see that some of the taxes they pay are used to improve the quality of the infrastructure they use on a daily basis (del Saz-Salazar et al., 2016; Wieczerak et al., 2020). Second, our results indicate that among the various components of the infrastructure index, only the transport infrastructure component is positively and significantly associated with the AETR. This suggests that transport infrastructure plays a dominant role in explaining the overall positive effect of infrastructure on AETRs. One plausible explanation for this finding is that transport networks - such as roads and railways - are essential for the delivery of inputs, heavy machinery, fuel, and other equipment to remote mining sites, particularly in the extractive industries. While gold itself is often transported by air due to its high value and low volume, the broader mining operations rely heavily on land-based infrastructure, which affects both the cost structure of projects and the fiscal space available to host governments. Third, we find that regime durability and the quality of institutions play mediating roles in the relationship between AETR and infrastructure development. In particular, the results highlight the control of corruption as a key institutional factor in improving the government's share of mining rents. These findings remain robust across several sensitivity checks, including variations in mine grade, confirming the stability of the observed relationships.

This study contributes to the literature in several ways. First, it extends the literature on the taxation of mining rents and infrastructure in African countries, and more

specifically in the continent's gold-producing countries. Second, it identifies the types of infrastructure in which States need to invest more in order to attract more mining companies and get them to accept a share of mining rents that is favourable to the State. Finally, it contributes to the literature by identifying the mediating role played by regime durability and institutions in the relationship between the infrastructure development and rent-sharing.

The rest of the chapter is structured as follows: the section 3.2 presents the rent-sharing indicator. The section 3.3 presents the data and the econometric methodology. The section 3.4 presents and discusses the estimation results. The section 3.5 presents the robustness check. The last section i.e section 3.6 presents the conclusion and policy implications.

3.2 An indicator of rent-sharing: the average effective tax rate (AETR)

How mining rents are shared depend not only on the tax system, but also on the mine's economic structure[5] and world prices. To analyze the rent-sharing between governments and investors, an AETR was calculated for a given gold price on three representative projects[6] of African gold mines. It is based on national legislation and economic data available at the Foundation for Studies and Research on International Development (FERDI) (Laporte et al., 2015). The AETR obtained is therefore *de jure* and not *de facto*. The model used to calculate the AETR is a cash flow model whose logic is close to that of the Fiscal Analysis of Resource Industries (FARI) model developed by the International Monetary Fund (Luca and Puyo, 2016). It is the ratio of discounted government revenues from a mining project to pre-tax net cash flow of the same project. In other words, the AETR represents the share of mining rents captured by the State in a mining project, provided that the discount rate is high enough to reflect the opportunity cost of capital (Laporte et al., 2015).

Among the tax instruments used to calculate the AETR, annual ground fees, fixed fees, mining royalties, withholding taxes on interest and turnover minimum tax constitute *production-based taxes*, while withholding taxes on dividends, corporate income tax, and the payment of dividends to the State constitute *profit-based taxes*[7]. Other tax instruments that may affect the AETR have not been considered since the information needed to calculate their value is not available. These include fuel and petroleum product taxes,

[5]The characteristics of the economic structure of a mine are: (i) the life of the mine, (ii) its production potential, (iii) the ore grade of the deposits, (iv) capital costs (CAPEX), and (v) operating costs (OPEX) (Laporte et al., 2015).

[6]According to the ore content, the mines are classified into three categories: low-grade mines, medium-grade mines and high-grade mines.

[7]For more details, see Laporte et al. (2015), Laporte et al. (2022), Sanou (2024) and Otto (1998, 2006).

value added tax (VAT) credits not reimbursed by the tax authorities to operating companies, and customs duties levied on imports of capital goods. It is important to note that the model considers the specificities of each country's legislation with respect to each tax instrument. The model assumes that the company operating the mine benefits from a stability clause[8] guaranteeing the maintenance of the tax regime over the life of the project (on average over 13 years). As mining reforms have progressed, the scope for special agreements to operate within the general framework of common law and mining codes has narrowed (Laporte and Diallo, 2022). Thus, in a given country and a given year, the AETRs obtained reflect the rent sharing defined by the legislation in force that are *de jure*.

Based on strong economic assumptions, three types of mines have been identified according to the ore grade of the mine to calculate the AETR: the low-grade mine (1.8g/t), the medium-grade mine (3.0g/t) and the high-grade mine (4.g/t, 5.5g/t). Table 3.1 presents these economics assumptions.

Table 3.1: Economic assumptions for the three types of mine

	Law-grade, open-pit	Medium-grade, open-pit	High-grade, open-pit and underground
Life cycle	13 years	13 years	13 years
Area	150 km2	150 km2	150 km2
Stripping ratio	1/9	1/9	1/9
Mineral grade	1.8g/t	3.0g/t	4.0g/t(open-pit); 5.5g/t(underground)
Recovery rate	86%	88%	88%(open-pit); 95%(underground)
Initial investment	USD 190 million	USD 150 million	USD 290 million
Length of investment	2 years	2 years	2 years
Renewable investment	USD 18 million	USD 13.5 million	USD 22.5 million
Extraction costs	USD 2.5/t of waste rock mined	USD 2.8/t of waste rock mined	USD 3/t of waste rock mined
Processing costs	USD 15/t of mineral processed	USD 20/t of mineral processed	USD 22/t of mineral processed
Administrative costs	USD 3.5 million/year from year 3	USD 4 million/year from year 3	USD 5.1 million/year from year 3
Refining and sales costs	USD 5/oz	USD 5/oz	USD 5/oz

Source: FERDI database.

[8]The guarantee period covered by the stability clause stability clause is usually the duration of the validity of the mining title (South Africa, Tanzania, Burkina Faso, Côte d'Ivoire and Mali), but it can also be longer it may also be longer (Mauritania and Senegal) or be counted in years (Ghana).

3.3 Data and Methodology

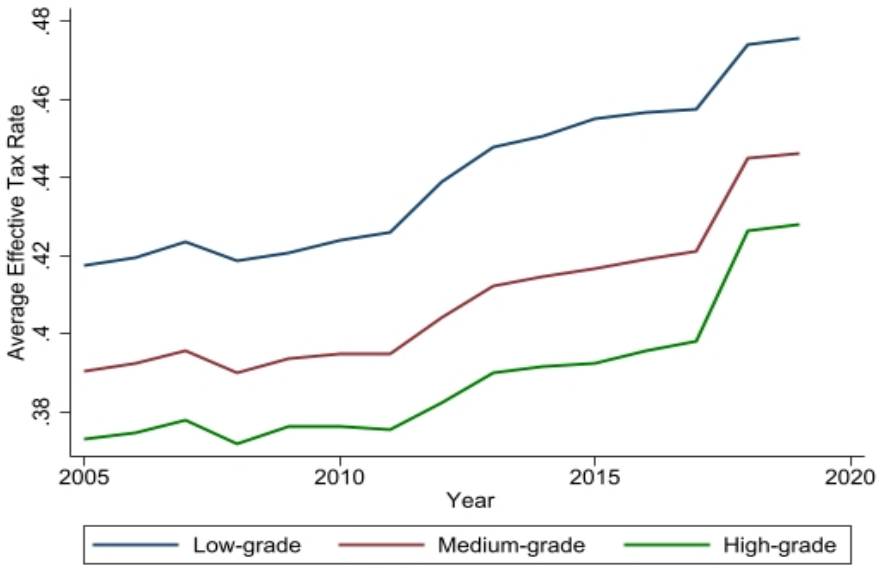
3.3.1 Data

Measuring government 's share of rents in mining sector

The Average Effective Tax Rate (AETR) of the low-grade mine is our dependent variable and is provided from the FERDI database set up by Laporte et al. (2015). The estimates are based on the government's share of the rent, calculated for a gold price of 1600 U.S. dollars per oz. This price level is chosen because it represents a long-term average price of gold that is commonly used in fiscal simulations, allowing for comparability and stability in tax policy analysis. It avoids the distortions caused by short-term volatility in gold markets and reflects a realistic pricing scenario used by international institutions and mining project assessments[9]. AETRs for medium- and high-grade mines are used to test the robustness of our results with regard to the link AETR-AIDI.

Figure 3.4 shows the annual trend in the government's share of mining rents for the three representative mines. While there is a slight decrease in the government's share of rents from 2007 to 2008, the overall trend over the study period is upward. In response to the growing demand[10] for gold in the mid-2000s, many countries revised their mining codes to capture a significant share of rents.

Figure 3.4: Average effective tax rate evolution



[9]Recent studies, such as Benninger et al. (2024) and Amedanou and Laporte (2024), use gold prices in the order of 1,500 USD/oz for their tax simulations. Our of 1,600 USD/oz therefore remains in an already practiced range, slightly conservative or realistic.

[10]For example, the number of exploration permits increased to an average of 65 per year between 2004 and 2010. According to the 2013 report of Central Bank of West African States, in 2011 alone, some 200 permits were issued in the West African Economic and Monetary Union (WAEMU).

The Figure 3.5 shows the average share of gold rents accruing to the State in the countries in our sample. The higher the grade of the mine, the lower the State's share of the rent.

Figure 3.5: Average effective tax rate across mine grades

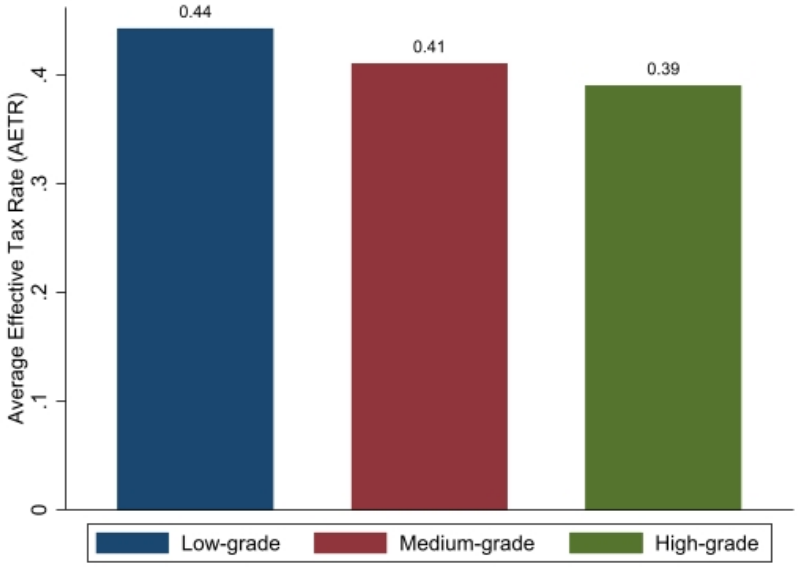
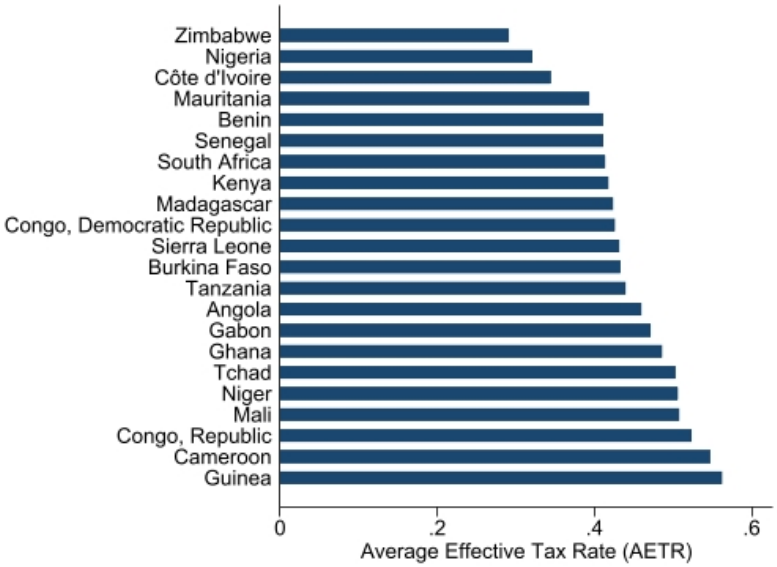


Figure 3.6: Average effective tax rate across countries



On average over the period of our study, 44%, 41% and 39% of mining rents accrue to the State respectively for low-grade, medium-grade and high-grade mines. Moreover, in the countries in our sample, there is an observed heterogeneity in government's part of rents. Figure 3.6 is a heterogeneity display of the AETR of low-grade mine accross countries. While countries like Guinea, Cameroon, Congo Republic and Mali manage to achieve higher AETRs, Zimbabwe, Nigeria, Côte d'Ivoire and Mauritania lag behind.

Measuring infrastructure development index

The African Infrastructure Development Index (AIDI) is our interest variable. Just as the rest of the world, infrastructure development in Africa is important for kick-starting economic development and improving people's living standards. Investing in infrastructure is a step towards achieving sustainable development goals. That's why infrastructure development remains one of the African Development Bank's (AfDB, 2023) key missions on the continent in its transformation program 2015-2025, through the establishment of the African Infrastructure Knowledge Program (AIKP). The AIDI is a synthetic indicator produced by the AfDB's Africa Infrastructure Knowledge Program (AIKP) that measures the quality and progress of infrastructure development on the African continent[11]. This infrastructure development index is made up of 4 components: (i) power or electricity (electricity index); (ii) transport (transport index); (iii) Information Communication Technologies (ICT index); and (iv) Water and Sanitation (WWS index). It is calculated using data from the World Bank. The composite index for each component is calculated as a weighted average of sub-components that include more than one indicator. After standardization of each component, the weights are based on the inverse of the standard deviation of each component[12].

$$Y_t = \left(\frac{\sigma_{tot}}{\sigma_x}\right) * X_t$$

Where
σ_{tot} is given by:

$$\sigma_{tot} = \frac{1}{\sigma_{tot}} \sum X \left(\frac{1}{\sigma_x}\right)$$

and σ_x is the standard deviation of the normalized component x. This method reduces the effect of component volatility on the composite. AIDI scores range from 0 to 100, with higher scores indicating better infrastructure development.

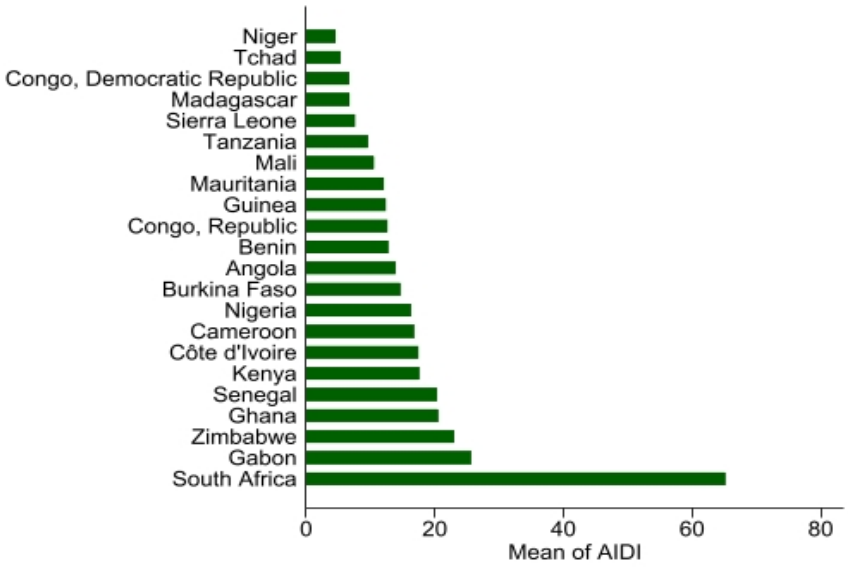
The Figure 3.7 shows the performance of the countries in our sample in terms of the infrastructure development index. There is great heterogeneity in the quality of existing infrastructure in our sample countries. As can be seen, South Africa is the country with the highest score, while Niger has the lowest.

Other control variables

Based on the existing literature on rent sharing, we identify some macroeconomic and institutional variables such as GDP per capita, EITI membership, Foreign Direct Investment (FDI), trade openness, foreign aid, inflation, corruption, bureaucracy quality and law and order (Sachs and Warner, 1995; Auty, 2001; Sachs, 2006; Collier, 2007; Laporte

[11] The use of infrastructure quality and infrastructure development refers to AIDI in the chapter.
[12] For more details, see The Africa Infrastructure Development Index (AIDI) - V2 (afdb.org)

Figure 3.7: African Development Infrastructure Index across countries



et al., 2022; Amedanou and Laporte, 2024; Kinda and Thiombiano, 2024).

Gross Domestic Product (GDP) per capita (constant 2015 U.S. dollars), one of our control variables, is introduced into our model for measuring a country's level of development. Developed countries are characterized by relatively good institutions, and their tax administration has the capacity to manage less distortionary tax regimes (Laporte et al., 2022). We therefore expect this variable to have a positive impact on AETR. Data provided from Worldwide Development Indicators (WDI) published by the World Bank and are expressed in natural logarithms.

EITI variable indicates membership of the Extractive Industries Transparency Initiative (EITI). In each member country, a multi-stakeholder group is formed. This group is composed of representatives from civil society, companies, and government and works together with the sole purpose of improving natural resource governance. The primary objective of the EITI is to promote open and responsible management of natural resources. In other words, the EITI is recognized as a leading anti-corruption program promoting transparency, accountability and good governance of public revenues from oil, gas and mining (Kinda and Thiombiano, 2024). Indeed, the promotion of global transparency is presented as a solution to the poor governance experienced in the extractive sector on an almost daily basis in resource-rich developing countries (Haufler, 2010). The EITI variable, which is expected to have a positive effect on the AETR, is a dummy variable that takes the value 1 in the year the country joins the initiative and 0 otherwise. It is constructed on the basis of information received from the official EITI website[13].

Foreign Direct Investment (FDI) is the sum of short-term capital and long-term capital as shown in the balance of payments. Countries rich in mineral resources often

[13]It can be accessed via the following link: https://eiti.org/countries

seek to attract foreign direct investment to develop their mining sectors. FDI brings both capital and technology (Sachs and Warner, 1995) necessary for gold extraction and large-scale mining operations. However, in order to attract such investment, governments frequently offer more favorable fiscal terms, which may reduce their immediate share of mining rents. There is often a trade-off between attracting FDI and capturing rent: fiscal incentives offered to foreign investors may reduce short-term government revenue, but they are intended to stimulate long-term production, investment, and broader economic activity. Given these contrasting mechanisms, the expected sign of the relationship between FDI and AETR is theoretically ambiguous. While fiscal competition may lead to lower AETRs, increased investment could expand the tax base and lead to higher revenues for governments. This variable is included in our regressions in its natural logarithmic form, using data from the World Development Indicators (WDI) published by the World Bank.

Trade openness is measured as the sum of exports and imports of goods and services as a percentage of gross domestic product (GDP). A high level of trade openness reflects greater integration into the global economy and increased participation in international trade flows. Greater trade openness facilitates foreign direct investment (FDI) by reducing trade barriers and improving access to both inputs and export markets, which is particularly important for resource-rich countries seeking to develop their mining sectors (Helpman et al., 2004; Balasubramanyam et al., 1996). Additionally, trade openness allows gold-producing countries to sell their commodities on larger, more competitive international markets, often resulting in better prices (Arndt and Kierzkowski, 2001). Since the AAETR depends partly on commodity prices - higher gold prices increase the economic rent and thus the government's fiscal take (Laporte et al., 2022) - improved market access through trade openness can indirectly lead to a higher AETR. For these reasons, we expect a positive relationship between trade openness and AETR. This variable is included in logarithmic form in our regressions, with data sourced from the World Development Indicators (WDI) published by the World Bank.

Foreign aid (% GNI) or net official development assistance (ODA) is defined as loans and grants provided by official agencies of Development Assistance Committee (DAC) members, non-DAC countries, and multilateral institutions, with the aim of supporting the development and welfare of recipient countries. Indeed, in resource-rich economies, foreign aid may influence the government's fiscal performance by supporting the development of public goods that improve the investment climate and facilitate rent mobilization. In addition, foreign aid can strengthen institutional frameworks through technical assistance, capacity building, and governance reforms (Sachs, 2006; Collier, 2007). These efforts - targeting tax administration, public financial management, and anti-corruption - enhance the government's ability to capture and manage mining rents. In this way, aid can contribute positively to the AETR by increasing fiscal capacity and reducing ineffi-

ciencies in revenue collection (Clist and Morrissey, 2011). However, some authors warn of a potential substitution effect, where large aid inflows reduce the incentive for domestic revenue mobilization (Clist and Morrissey, 2011; Brun et al., 2015). As a result, the expected effect of foreign aid on AETR is ambiguous and likely depends on the effectiveness and targeting of aid flows. The variable is introduced in logarithmic form, and data are sourced from the World Development Indicators (WDI) published by the World Bank.

Inflation, measured as the annual rate of change in the GDP deflator, is sourced from the World Bank's World Development Indicators (WDI). While the gold price is held constant in the computation of AETR (at 1600 USD/oz), domestic inflation may still influence the government's effective fiscal capacity in the extractive sector. High inflation environments can erode the real value of revenues, increase operational costs, and complicate fiscal planning, even under fixed-price assumptions (Auty, 2001; Sachs, 2006; Collier, 2007; Rodrik, 2007). Additionally, inflation can affect the valuation of cost deductions in mining tax regimes (e.g., depreciation schedules, loss carry forwards), thus influencing the taxable base and the effective tax burden faced by firms. As such, even if the nominal rent is fixed in the model, the real fiscal effort sustained by the government may vary across inflationary contexts. Therefore, we include inflation as a control variable to account for macroeconomic distortions that may affect fiscal performance. We expect a negative relationship between inflation and AETR, consistent with the idea that high inflation may reduce the government's ability to capture rents in real terms.

As mediator variables, we first use the regime durability variable from the Policy V database (Marshall and Gurr, 2020) to monitor the stability and longevity of the political regime. This regime durability variable is measured to quantify the time elapsed since the last regime change or the end of a transition. The first year of a new regime is considered the base year, or year zero, with a value of 0. Each additional year without a regime change adds one to the value, and so on until the next regime change, when the value returns to 0. Long years without a regime change inevitably result in a high value for the regime durability variable. In other words, in a country where the value of the variable is high, the regime in place in that country is more durable, indicating institutional stability over time. To the extent that natural resources enable the holder to maintain power (Wantchekon, 2002), they contribute to regime durability in countries with low political and institutional risk (Cabrales and Hauk, 2011; Zallé, 2023). Second, we use the institution variable through the "ICRG Quality of Institutions Index". It assumes that good institutions imply greater respect for the rule of law, a reduction in the level of corruption, and the establishment of a better bureaucracy. Anything that can affect both the mining rent-sharing and the quality of existing infrastructure in a country. Following Knack and Keefer (1995) and Bräutigam and Knack (2004), we constructed our institution variable with a 16-point scale by adding three variables, including "law and order, quality of bureaucracy, and corruption", which are a 6-point, a 4-point, and a 6-

point scale, respectively. A low score indicates poor institutional quality and, conversely, a high score indicates good institutional quality. Annual data are available from Political Risk Services (PRS) Group.

Tables 3.2 and 3.3 show summary statistics and correlation between variables respectively. Given the size of our sample, we lost some observations due to missing data, mainly on AETRs and our institutional variables (corruption, bureaucracy, and law and order). On average, the low-grade mine is the most beneficial to the State, with a AETR of 0.44, compared with 0.41 for the medium-grade mine and 0.39 for the high-grade mine. At the same time, WSS infrastructure is the dominant component of our infrastructure quality index. In addition, There is little correlation between our interest variables except GDP per capita and foreign aid. So, they can be integrated into the same model.

Table 3.2: Summary statistics

	(1)	(2)	(3)	(4)	(5)
	N	mean	sd	min	max
AETR Low-grade mine	291	0.44	0.08	0.26	0.69
AETR Medium-grade mine	291	0.41	0.08	0.24	0.80
AETR High-grade mine	291	0.39	0.09	0.22	0.88
Infrastructure index	352	16.00	12.93	2.82	79.63
Transport index	352	5.55	4.10	1.09	23.44
Electricity index	352	6.25	15.72	0.06	82.38
ICT index	352	5.85	8.54	0.00	58.90
WSS index	352	52.43	17.19	13.25	92.57
GDP per capita (log)	352	7.10	0.76	5.87	8.88
Foreign Direct Investment (log)	334	1.33	0.76	-1.83	3.71
Foreign Aid (log)	352	1.65	0.78	0.03	3.70
Trade Openness (log)	351	4.12	0.34	2.85	5.01
Inflation	352	10.33	37.29	-21.17	604.95
EITI	352	0.55	0.50	0.00	1.00
Regime Durability	308	9.73	7.12	0.00	27.00
Corruption	285	1.86	0.67	0.00	4.00
Law and Order	285	2.63	0.81	1.00	5.00
Bureaucracy Quality	285	1.14	0.72	0.00	2.50

Source: Author.

Table 3.3: Corelation between variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. AETR Low-grade mine	1.000													
2. AETR Medium-grade mine	0.662***	1.000												
	(0.000)													
3. AETR High-grade mine	0.495***	0.965***	1.000											
	(0.000)	(0.000)												
4. Infrastructure index	-0.268***	-0.135**	-0.101*	1.000										
	(0.000)	(0.018)	(0.080)											
5. GDP per capita (log)	-0.179***	-0.167***	-0.167***	0.693***	1.000									
	(0.002)	(0.004)	(0.003)	(0.000)										
6. EITI	-0.112*	0.183***	0.205***	-0.212 ***	-0.265***	1.000								
	(0.050)	(0.001)	(0.000)	(0.000)	(0.000)									
7. Foreign Direct Investment (log)	0.025	0.153***	0.164***	-0.224***	-0.105*	0.210***	1.000							
	(0.674)	(0.009)	(0.005)	(0.000)	(0.056)	(0.000)								
8. Trade Openness (log)	0.014	0.080	0.109*	-0.077	0.146***	0.097*	0.449***	1.000						
	(0.813)	(0.166)	(0.059)	(0.150)	(0.006)	(0.069)	(0.000)							
9. Foreign Aid (log)	0.139**	0.008	-0.003	-0.551***	-0.829***	0.156***	0.137**	-0.044	1.000					
	(0.015)	(0.896)	(0.964)	(0.000)	(0.000)	(0.003)	(0.012)	(0.407)						
10. inflation	-0.045	-0.126**	-0.113**	0.025	-0.013	-0.116**	-0.047	0.001	0.012	1.000				
	(0.433)	(0.029)	(0.049)	(0.639)	(0.809)	(0.029)	(0.397)	(0.989)	(0.821)					
11. Regime Durability	0.072	0.317***	0.366***	0.259***	0.244***	-0.044	-0.033	0.007	-0.268***	-0.102*	1.000			
	(0.237)	(0.000)	(0.000)	(0.000)	(0.000)	(0.437)	(0.568)	(0.908)	(0.000)	(0.073)				
12. Law and Order	-0.009	-0.096	-0.122*	-0.064	-0.041	-0.022	-0.012	-0.128**	0.200***	-0.018	0.022	1.000		
	(0.893)	(0.130)	(0.054)	(0.280)	(0.488)	(0.714)	(0.838)	(0.030)	(0.001)	(0.766)	(0.717)			
13. Corruption	0.070	0.237***	0.291***	0.173***	0.066	0.160***	0.106*	-0.045	-0.057	-0.129**	0.244***	0.226***	1.000	
	(0.269)	(0.000)	(0.000)	(0.003)	(0.267)	(0.007)	(0.079)	(0.451)	(0.340)	(0.029)	(0.000)	(0.000)		
14. Bureaucracy Quality	0.054	0.197***	0.232***	0.411***	0.367***	-0.290***	-0.101*	0.038	-0.385***	0.108*	0.233***	-0.073	0.059	1.000
	(0.390)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.096)	(0.527)	(0.000)	(0.068)	(0.000)	(0.217)	(0.324)	

P-values are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

3.3.2 Empirical strategy

This chapter aims to empirically explain the relationship between AETR and the infrastructure development index in 22 gold-producing countries in Africa (see Table 3.B7 in the appendix), defined by the FERDI database. We use annual data between 2005 and 2020. We build on the existing literature on rent sharing and fiscal revenue mobilization by identifying some explanatory variables such as the African Infrastructure Development Index (AIDI), GDP per capita, adoption of the Extractive Industries Transparency Initiative (EITI), Foreign Direct Investment (FDI), trade openness, foreign aid and inflation (Sachs and Warner, 1995; Auty, 2001; Collier, 2007; Feyrer, 2019; Laporte et al., 2022; Tandrayen-Ragoobur et al., 2023; Amedanou and Laporte, 2024).

We perform with a fixed effects model, our baseline model, specified as follows:

$$AETR_{it} = \beta_1 AIDI_{it} + \beta_X X_{it} + \mu_i + \delta_t + \varepsilon_{it} \tag{3.1}$$

Where:
$AETR_{it}$ which is our dependent variable, represents the *de jure* average effective tax rate for country i at time t and β_0 the constant term. $AIDI_{it}$ refers to our interest variable, i.e African Infrastructure Development Index, for country i at time t. X_{it} is a vector of control variables for country i at time t. β_1 is the coefficient for the variable of interest. β_X represents the direct effect coefficients for the control variables. μ_i and δ_t are country and year fixed effects respectively and ε_{it} is the disturbance term.

This research also examines whether regime durability and institution have indirect effects on the mechanism by assuming that infrastructure development can affect the stability and longevity of a political regime or institution and then affect the AETR. To examine the mediating effect of regime durability and institution, we rely on the model of Baron and Kenny (1986). Using a stepwise regression approach, we develop the following models:

$$Mediator_{it} = \alpha_0 + \alpha_1 AIDI_{it} + \alpha_X X_{it} + \mu_i + \delta_t + \varepsilon_{it} \tag{3.2}$$

$$AETR_{it} = \theta_0 + \theta_1 AIDI_{it} + \theta_2 Mediator_{it} + \theta_X X_{it} + \mu_i + \delta_t + \varepsilon_{it} \tag{3.3}$$

Where:
$Mediator_{it}$ is regime durability or institution variables for country i at time t. α_0, α_1, α_X and θ_0, θ_1, θ_X, represent the constant term, the coefficient for infrastructure development index and the coefficients for the control variables in equations 3.2 and 3.3 respectively. θ_2 refers to the coefficient of the mediator variables.

Three conditions are necessary for the validity of the mediating effect of each mediator variable in the AIDI-AETR relationship. First, the coefficient associated with infrastruc-

ture development (β_1) in equation 3.1 must be significant. If it isn't, we can't proceed. Second, if the coefficient (β_1) is significant, the coefficients associated with infrastructure development in equations 3.2 and 3.3 (α_1 and θ_1) and the coefficient associated with the mediator variable in equation 3.3 (θ_2) are tested. Third, according to Baron and Kenny (1986), if all three coefficients are significant, i.e., α_1, θ_1 and θ_2, and the coefficient associated with the infrastructure development index in equation 3.3 is smaller than the coefficient associated with the infrastructure development index in equation 3.1 ($\theta_1 < \beta_1$), a partial mediating effect of the mediator variable can be considered. A full mediating effect of the mediator variable is observed when the coefficient θ_1 is insignificant and the coefficients of α_1 and θ_2 are significant.

3.4 Results and discussions

3.4.1 The effect of infrastructure development index on AETR

Table 3.4 displays the estimates results, with the AETR of the low-grade mine being the dependent variable. We first estimate a naïve equation (column 1), including only our variable of interest, infrastructure quality, in our fixed-effects model without times-fixed effects. The results show that the coefficient on infrastructure quality is positive and significant at the one percent (1%) level of significance. This implies that government's share of mining rents is positively affected by infrastructure quality. In other words, increasing infrastructure quality leads to increasing government's rents. This can be explained by the fact that the existing infrastructure of a country can be a risk for investors. It should be noted that most mining companies present on the continent are of foreign origin, and prior to any investment, country risk assessment is an integral part of investment decisions. Thus, if the infrastructure is of good quality, investors can more easily accept the normal taxation of rents, which is more favorable to the State, as the activity becomes less risky. In column 2, we challenge the naïve equation by controlling for time-fixed effects. The effect of infrastructure quality on the government's share of mining rents is always positive and significant at the 1% level. From column (3) to column (8), we include our control variables such as GDP per capita, EITI, foreign direct investment (FDI), trade oppenness, foreign aid (Official Development Aid) and inflation. All other controls have their log terms, except for EITI and inflation. The effect of infrastructure quality on government's share of mining rents remains positive and significant at 1% level of significance. Our preferred specification is column (8), where we include all our control variables.

We find that infrastructure quality has a positive effect on AETR. This positive effect can be achieved through several mechanisms. First, good infrastructure can facilitate tax collection and the establishment of an effective tax system to increase the share of

government revenues from mining. Such a system relies on well-organized administrative infrastructure and processes, from tax processing to business registration and collection in remote areas. Indeed, mining sites are often located dozens of kilometers from cities and are difficult to access. In addition to facilitating access to sites and efficient mining, good infrastructure allows the State to monitor mining activities and collect more taxes. For example, a good transport infrastructure allows the State to establish local tax collection offices near mining companies to better monitor their activities and collect taxes. These local collection offices with technological infrastructure allow the State to monitor gold flows, track production and determine exact volumes, while ensuring that mining taxes or royalties are properly collected. As a result, poor infrastructure can make it difficult for the State to monitor mining activities, leading to under-reporting of production or tax evasion, which reduces AETR. Second, good quality infrastructure enables a broader tax base through profitability[14], competitiveness[15], and attractiveness[16]. On the one hand, improved infrastructure reduces logistics and operating costs, which in turn improves the profitability of mining companies. Improving profitability of mining companies leads to an increase in profits, which form the tax base for corporate income tax. In other words, the increase in profits of mining companies, following a reduction in production costs (Limao and Venables, 2001; Faye et al., 2004; Lee, 2021; Sanou, 2024), leads to an increase in rents and certain tax bases, such as corporate income tax, which make up a large part of the AETR. According to Laporte et al. (2022), the share of corporate income tax paid by mining companies in the AETR is 46%. On the other hand, infrastructure is a key determinant of competitiveness. A country's economic performance, which is a factor in investment decisions, can be improved by investing in infrastructure quality. All things being equal, in a context where mining companies in Africa are foreign owned, a competitive country will attract more investors and mining companies than another country that is seen as a competitor. This results in an increase in the tax base for certain taxes that are part of the AETR. The final point about increasing the tax base is that good infrastructure makes a country more attractive. Massive mining investment increases the initial taxable base and thus increases government revenues (Amedanou and Laporte, 2024). The final mechanism is the willingness to pay taxes. And just as citizens are willing to pay taxes to improve the quality of the infrastructure they use on a daily basis (del Saz-Salazar et al., 2016; Wieczerak et al., 2020), we can observe a willingness to pay taxes on the part of businesses in countries with good infrastructure. They use this infrastructure for their operations. It should also be remembered that public capital makes private capital more efficient. Indeed, a government that invests heavily

[14] A mine's profitability is determined by factors that can have an impact on the costs and revenues associated with the mining and sale of minerals.

[15] Competitiveness, the ability to perform effectively relative to competitors, should not be confused with attractiveness.

[16] Attractiveness is the ability of a country to attract investment.

will expect a return on its investment. As a result, it may revise its mining code to make it progressive, with slightly higher tax rates. If the State increases its investment, it will demand a higher share of rents in order to get a return on its investment.

Table 3.4: Baseline results

	Dependent variable: AETR of Low-grade mine							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Infrastructure index	0.006***	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDP per capita (log)			0.062*	0.064**	0.061*	0.054	0.032	0.029
			(0.033)	(0.032)	(0.035)	(0.035)	(0.037)	(0.038)
EITI				0.040***	0.041***	0.045***	0.044***	0.044***
				(0.011)	(0.011)	(0.012)	(0.012)	(0.012)
Foreign Direct Investment (log)					0.004	0.005	0.004	0.004
					(0.004)	(0.004)	(0.004)	(0.004)
Trade Openness (log)						-0.030*	-0.023	-0.024
						(0.018)	(0.018)	(0.018)
Foreign Aid (log)							-0.016*	-0.016*
							(0.009)	(0.009)
Inflation								-0.000
								(0.000)
Constant	0.352***	0.376***	-0.053	-0.066	-0.050	0.121	0.280	0.303
	(0.010)	(0.016)	(0.230)	(0.225)	(0.239)	(0.259)	(0.274)	(0.280)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	291	291	291	291	282	282	282	282
R-squared	0.255	0.280	0.290	0.325	0.329	0.337	0.344	0.345
Number of id	22	22	22	22	22	22	22	22

Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Some of our control variables are not significant, in particular GDP per capita, foreign direct investment (FDI), trade oppenness, and inflation. However, our binary variable of Extractive Industry Transparency Initiative is positively and significant associated with AETR at 1% level of significance. This means that the adoption of EITI standards leads to a sharing of rents in favor of the State. Indeed, when there is greater transparency in managing the rents from natural resources, especially gold, some of the informal payments made with corruption are "reintegrated" into the less corrupt formal circuit (Villar and Papyrakis, 2017; Papyrakis et al., 2019; Villar, 2022), thus increasing State's rents. This result is in line with the work of Okada and Shinkuma (2022), who find that there is a positive relationship between the EITI and mineral rents. Foreign aid is negatively and significantly correlated with AETR at 10% level of significance. This means that an increase in aid leads to a decrease in the government's share of mining rents. Indeed, a country may have an incentive to collect less mining rents if it receives enough aid. As a result, the volatility of mining rents may be on the rise. Similar results have been found by authors such as Benedek et al. (2014) and Minh Ha et al. (2022) who find that foreign aid discourages domestic resource mobilization.

3.4.2 Endogeneity concerns

Here we discuss the endogeneity that can be observed in the relationship between infrastructure quality and AETR. Endogeneity exists in the infrastructure quality when we know that certain structural factors are captured by the random component in our regressions. This is likely due to reverse causality between infrastructure and AETR, or the presence of certain unobserved variables that may affect both the infrastructure quality and the AETR. If a country's government chooses to have high or low tax rates, this may be influenced by the country's infrastructure quality. At the same time, tax policy choices can affect the quality of infrastructure. Reverse causality is therefore an issue. A high infrastructure quality can be a source of increased revenues for mining companies, as they are often attracted by existing infrastructure. Infrastructure investment is also a function of government revenue. The AETR therefore affects the infrastructure development.

We use three approaches to address these endogeneity issues. First, we run our equation (1) with lagged independent variables. Column (1) of Table 3.5 reports the results. The positive relationship between infrastructure quality and AETR remains significant. Second, we use instrumental variable for infrastructure quality. Based on previous work by El Ghoul et al. (2011); Kim et al. (2014) and Wan et al. (2022), we use average infrastructure index of other countries belonging in the same income group (middle-income and low-income) as the instrumental variable. Column (2) of Table 3.5 reports the results. It is clear that the p-value for the underidentification test is less than 0.005, rejecting the null hypothesis of underidentification. In addition, the F-statistic is above the critical value of the Stock-Yogo weak ID test (for 10-15% relative IV bias tolerance). This eliminates the concern that the instrument is weakly correlated with the endogenous regressors (Stock et al., 2002; Stock and Yogo, 2005). The null hypothesis that the coefficient of the one-year lagged infrastructure index is zero and that overidentification restrictions are valid is rejected by the weak instrument-robust Anderson and Rubin (1950). The 0.000 value of the Sargan statistic indicates that the equation is exactly identified. The joint null hypothesis that the instrument does not correlate with the error term was not rejected, indicating that the over-identification constraint holds. As shown at the end of the column (2) of Table 3.5, the first stage regression indicates a significant correlation between the observed infrastructure index and its instrument, and a positive relationship between the infrastructure index and AETR. Third, we use the generalized method of moments (GMM) system approach developed by Arellano and Bover (1995) and Blundell and Bond (1998) to account for inverse causality and lag term of dependent variable[17]. Several validity tests are used. The p-value of AR (1) is well below 0.05, and the p-value of AR (2) is insignificant, indicating that there are no overidentification problems in the model. In addition, the p-value of the Hansen test is also insignificant, further confirming

[17]We believe that AETR of year t can be ifluenced by AETR of year t-1.

Table 3.5: Endogeneity concerns

	Dependent variable: Low-grade mine		
	(1)	(2)	(3)
Infrastructure index	0.0036***	0.0137***	0.0019**
	(0.001)	(0.005)	(0.001)
GDP per capita (log)	0.0016	0.0448	-0.0466**
	(0.004)	(0.043)	(0.020)
EITI	0.0497	0.0443***	0.0220
	(0.038)	(0.013)	(0.014)
Foreign Direct Investment (log)	-0.0166	0.0021	0.0089*
	(0.018)	(0.005)	(0.005)
Trade Openness (log)	-0.0107	-0.0160	0.0042
	(0.009)	(0.021)	(0.022)
Foreign Aid (log)	0.0420***	-0.0172	-0.0257**
	(0.012)	(0.011)	(0.010)
Inflation	0.0001	0.0001	-0.0003***
	(0.000)	(0.000)	(0.000)
L.AETR1			0.5695***
			(0.080)
Constant	0.1176		0.4935***
	(0.282)		(0.160)
Country FE	Yes	Yes	
Time FE	Yes	Yes	
Observations	270	282	261
Number of id	22	22	22
R-squared	0.335	0.087	
Instruments			13
Hansen test			0.900
Arellano-Bond test for AR(1)			0.012
Arellano-Bond test for AR(2)			0.282
P-value for underidentification test		0.000	
Weak-ID test (Cragg-Donald Wald F-statistic)		17.494	
AR Weak-ID-robust F (p value)		0.001	
AR Weak-ID-robust χ^2 (p value)		0.000	
Sargan Statistic (p value)		0.000	
First-stage results for AIDI		0.619***	
		(0.148)	

Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. In the first column (1), all variables are lagged by one year.

the validity of our instruments. The results shown in Column (3) of Table 3.5 depict that infrastructure quality is still positively correlated with AETR at the 5% significance level. Hence, our baseline finding is robust after addressing potential endogeneity bias.

We now subject these basic results to a series of sensitivity analyses. First, what infrastructure matters?

3.4.3 Investigating the type of infrastructure

In our previous regressions, we used a measure of infrastructure quality that is a composite of four components (electricity index, transport index, ICT index and WSS index). Now, we evaluate the individual effect of each component on AETR in the Table 3.6.

Table 3.6: Types of infrastructure

	Dependent variable: AETR of Low-grade mine				
	(1)	(2)	(3)	(4)	(5)
Infrastructure index	0.004***				
	(0.001)				
Transport index		0.003*			
		(0.002)			
Electricity index			0.005		
			(0.003)		
ICT index				0.000	
				(0.001)	
WSS index					0.000
					(0.001)
GDP per capita (log)	0.029	0.023	0.025	0.024	0.025
	(0.038)	(0.038)	(0.038)	(0.038)	(0.039)
EITI	0.044***	0.045***	0.042***	0.044***	0.043***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Foreign Direct Investment (log)	0.004	0.005	0.004	0.005	0.005
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Trade Openness (log)	-0.024	-0.023	-0.026	-0.026	-0.027
	(0.018)	(0.019)	(0.018)	(0.018)	(0.019)
Foreign Aid (log)	-0.016*	-0.015	-0.016	-0.016*	-0.016*
	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)
Inflation	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.303	0.360	0.346	0.386	0.379
	(0.280)	(0.284)	(0.285)	(0.285)	(0.291)
Country FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	282	282	282	282	282
R-squared	0.345	0.321	0.320	0.314	0.313
Number of id	22	22	22	22	22

Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

From column (1) to (5), we have the results of infrastructure index, transport index,

electricity index, ICT index and WWS index as variables of interest. Our dependent variable is AETR of low-grade mine. Only transport index is positive and significant like infrastructure index. This means that the transportation effect dominates. This positive effect can be explained by the fact that for transporting minerals from mining sites to processing facilities and markets, transportation infrastructure such as roads and railways is essential. Improvements in transportation infrastructures facilitate access to mining sites, reduce mining costs (Ando and Kimura, 2013) and improve the efficiency of mining operations. However, what about the sensitivity of our results to the institutional setting?

3.4.4 Sensitivity to additional variables

Our goal here is to test the sensitivity of our results to the regime durability and institution variables. Table 3.7 presents the results of these additional variables. We consider our final specification from the baseline results (column 1), where we add regime durability (column 2) and institutional quality (column 3).

Our previous results still hold. Regime durability and institutional quality both have a positive impact on the government's share of rents. For the purpose of seeing what institution even matter, we split our institution quality variable into its components, namely control of corruption, bureaucracy, and law and order. Columns (4), (5) and (6) report respectively the results by adding control of corruption, bureaucracy and law and order to our final specification. Only corruption is positively and significantly associated with AETR. Therefore, the effect of institutions on AETR is more influenced by corruption than by bureaucracy and law and order.

The significance of the coefficients associated with infrastructure quality in columns (2) and (3) has not changed. However, these coefficients are all smaller than the coefficient associated with infrastructure quality in column (1). In other words, adding regime durability and institutional quality to our final specification in a different way reduces the coefficient associated with infrastructure quality. This may indicate the mediating role that these variables may play in the relationship between infrastructure quality and AETR.

3.4.5 Mediating effects of institutions and political regime

Table 3.8 shows the results of our regressions. In the first, we assume that infrastructure quality can affect the stability and longevity of a political regime, and then affect the AETR. In a second, we also assume that infrastructure quality can effect the institutional quality toward corruption and then on the AETR.

Column (2) shows that the coefficient (0.3774) associated with the infrastructure quality and regime durability is positive and significant at the 1% level. This means that

Table 3.7: Sensitivity to additional variables

	Dependent variable: AETR of Low-grade mine					
	(1)	(2)	(3)	(4)	(5)	(6)
Infrastructure index	0.0036***	0.0029***	0.0033***	0.0032***	0.0037***	0.0039***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDP per capita (log)	0.0291	0.0180	0.0502	0.0475	0.0831**	0.0811**
	(0.038)	(0.038)	(0.042)	(0.044)	(0.039)	(0.038)
EITI	0.0438***	0.0344***	0.0564***	0.0560***	0.0515***	0.0509***
	(0.012)	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)
Foreign Direct Investment (log)	0.0042	0.0009	0.0034	0.0036	0.0042	0.0042
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)
Trade Openness (log)	-0.0239	-0.0170	-0.0246	-0.0268	-0.0274	-0.0208
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.019)
Foreign Aid (log)	-0.0165*	-0.0199**	-0.0168*	-0.0172*	-0.0141	-0.0140
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Inflation	-0.0001	-0.0000	-0.0000	-0.0000	-0.0000	0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Regime Durability		0.0017***				
		(0.001)				
Institution			0.0111*			
			(0.006)			
Control of Corruption				0.0110*		
				(0.007)		
Bureaucracy Quality					-0.0034	
					(0.023)	
Law and Order						0.0301
						(0.021)
Constant	0.3028	0.3550	0.1032	0.1733	-0.0588	-0.1581
	(0.280)	(0.283)	(0.298)	(0.319)	(0.298)	(0.290)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	282	263	247	247	247	247
R-squared	0.345	0.347	0.398	0.396	0.387	0.393
Number of id	22	22	19	19	19	19

Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Table 3.8: Mediating effects of regime durability and institutions

	A	**B**	**C**	**D**	**A**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Infrastructure index	0.0036***	0.3774***	0.0179*	0.0306***	0.0029***	0.0033***	0.0032***
	(0.001)	(0.099)	(0.010)	(0.001)	(0.009)	(0.001)	(0.001)
Regime Durability					0.0017***		
					(0.001)		
Institution						0.0111*	
						(0.006)	
Control of Corruption							0.0110*
							(0.007)
Constant	0.3028	-24.4201	-14.3587***	-19.6250***	0.3550	0.1032	0.1733
	(0.280)	(27.912)	(2.976)	(2.658)	(0.283)	(0.298)	(0.319)
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	282	295	274	274	263	247	247
R-squared	0.345	0.153	0.257	0.296	0.347	0.398	0.396
Number of id	22	22	19	19	22	19	19

Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1
A denotes that the dependent variable is the AETR of the low grade mine.
B denotes that the dependent variable is regime durability.
C denotes that the dependent variable is institutional quality.
D denotes that the dependent variable is control of corruption.

an increase in the infrastructure quality leads to regime stability over time. Developed countries have higher infrastructure development indexes and therefore more sustainable regimes than the developing countries in our sample. It should be noted that public dissatisfaction with politicians' governance can be one of the reasons for regime change. In the African context, infrastructure development may lead to a sense of popular satisfaction with the regime in power. This may make them less inclined to change regimes. The results in column (5) show that infrastructure quality and regime durability are all positively related to AETR, and that the addition of the regime durability variable in the initial model (column 1) decreased the coefficient on the infrastructure quality by 0.0007 (0.0029 - 0.0036 = - 0.0007). This confirms the significance of the partial mediating effect of regime durability on the AETR. The direct effect of the infrastructure quality on the AETR is 0.0029 and the indirect effect is 0.0006 (0.3774*0.0017). These results suggest that the infrastructure quality can indirectly increase AETR through regime durability, on which it has a positive effect. One explanation is that stable political institutions are one of the characteristics of a highly sustainable political system. Thus, in an environment with stable institutions, it would be easier to implement certain policies and/or enforce the law, especially the mining code that regulates ore extraction. All of this could increase government's rents. What's more, given that most mining companies are foreign, a stable political regime can be a source of attraction for these companies, as the country risk is lower (Amedanou and Laporte, 2024). This could lead companies to accept a more

favorable rent distribution for the State.

The results in column (3) show that our institutional variable is positively associated with infrastructure development index. Since a higher value of this variable means that institutional quality is strong, these results imply that strong institutional quality tends to lower the infrastructure development index. The results in column (6) confirm the partial mediating effect that institution can play in the relationship between AETR and the infrastructure quality. The direct effect of the infrastructure index on the AETR is 0.0033 and the indirect effect is 0.0002. Considering that our institutional variable is driven by control of corruption, the results (columns (4) and (7)) are the same when institutional quality is replaced by control of corruption. There are several ways to explain the positive effect of infrastructure quality on corruption (column (4)). First, infrastructure quality is associated with regular audits and evaluations. This reduces opportunities for corruption by increasing the accountability of project actors. Second, rigorous management with technical skills is required to achieve high-quality infrastructure. This not only strengthens the capacity of public institutions, but it also reduces some corrupt practices. To finish, high-quality infrastructure will encourage and facilitate citizen monitoring. This will make it possible to strengthen the control of corruption at all levels. All this makes it possible to increase State's share of mining rents, as shown by the results in column (7).

3.5 Robustness checks

In this section we examine whether the results remain unchanged depending on the grade of the mine. Remember that the AETR calculation is based on three 'representative' mines: low-, medium- and high-grade mines. In our baseline estimations we use AETR of low-grade mine as dependent variable. We test the sensitivity of the results by considering medium- and high-grade mines AETRs. The results are respectively in Tables 3.9 and 3.10. They are similar to the baseline results. Column (8) of each table shows that our basic results remain unchanged. This means that the infrastructure development index has a positive impact on the AETR regardless of the grade of the mine. In other words, our findings are not driven by the choice of the mine grade. The significance level of the infrastructure development index effect decreases as the mine grade increases.

Table 3.9: Robustness: Medium-grade mine

	Dependent variable: AETR of Medium-grade mine							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Infrastructure index	0.005***	0.002**	0.003**	0.003**	0.003**	0.002**	0.003**	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDP per capita (log)			0.016	0.018	0.012	0.005	-0.013	-0.016
			(0.037)	(0.036)	(0.038)	(0.038)	(0.041)	(0.041)
EITI				0.041***	0.041***	0.045***	0.044***	0.043***
				(0.012)	(0.013)	(0.013)	(0.013)	(0.013)
Foreign Direct Investment (log)					0.004	0.005	0.004	0.004
					(0.005)	(0.005)	(0.005)	(0.005)
Trade Openness (log)						-0.030	-0.025	-0.027
						(0.019)	(0.020)	(0.020)
Foreign Aid (log)							-0.012	-0.013
							(0.010)	(0.010)
Inflation								-0.000
								(0.000)
Constant	0.334***	0.363***	0.254	0.241	0.277	0.452	0.573*	0.607*
	(0.011)	(0.017)	(0.253)	(0.248)	(0.263)	(0.285)	(0.303)	(0.309)
Country FE	Yes	Yes	Yes	Yes	282	Yes	Yes	Yes
Time FE	No	Yes	Yes	Yes	282	Yes	Yes	Yes
Observations	291	291	291	291	282	282	282	282
R-squared	0.170	0.209	0.209	0.242	0.246	0.254	0.258	0.259
Number of id	22	22	22	22	22	22	22	22

Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Table 3.10: Robustness: High-grade mine

	Dependent variable: AETR of High-grade mine							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Infrastructure index	0.004***	0.002*	0.002*	0.002*	0.002*	0.002*	0.002*	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDP per capita (log)			-0.008	-0.006	-0.014	-0.022	-0.037	-0.041
			(0.040)	(0.040)	(0.042)	(0.042)	(0.045)	(0.046)
EITI				0.043***	0.043***	0.048***	0.047***	0.046***
				(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Foreign Direct Investment (log)					0.004	0.005	0.004	0.004
					(0.005)	(0.005)	(0.005)	(0.005)
Trade Openness (log)						-0.033	-0.029	-0.030
						(0.021)	(0.022)	(0.022)
Foreign Aid (log)							-0.010	-0.012
							(0.011)	(0.012)
Inflation								-0.000
								(0.000)
Constant	0.321***	0.351***	0.410	0.397	0.444	0.635**	0.740**	0.780**
	(0.012)	(0.019)	(0.279)	(0.274)	(0.290)	(0.314)	(0.334)	(0.341)
Country FE	Yes	Yes	Yes	Yes	282	Yes	Yes	Yes
Time FE	No	Yes	Yes	Yes	282	Yes	Yes	Yes
Observations	291	291	291	291	282	282	282	282
R-squared	0.121	0.164	0.164	0.197	0.202	0.210	0.212	0.214
Number of id	22	22	22	22	22	22	22	22

Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

3.6 Conclusion

Our study examines the relationship between the Average Effective Tax Rate (AETR), defined as the share of gold rents accruing to the government at a given gold price, and the quality of infrastructure in gold-producing countries. We use the African Development Bank's African Infrastructure Development Index (AIDI) as a measure of infrastructure quality. We work on a sample of 22 gold-producing countries in Africa, as defined by the FERDI database, over the period 2005-2020, using fixed-effect model. We use regime durability and institutions to assess the mediating role that these variables may play in the relationship between the infrastructure development index and the AETR.

We found the following results: (i) A positive association between government's share of rents and infrastructure development index. The better the infrastructure in the gold-producing country, the greater the reduction in risk, which increases the part of government's rents. (ii) The transport infrastructure index have a positive effect on the part of government's rents. In other words, when the quality of transport infrastructure improves, mining companies accept a more favourable share of rents for the State. Electricity or power and water and sanitation infrastructure indexes do not affect AETR. (iii) The mediating effects of regime durability and institutions are confirmed. Before exerting their effects on the AETR, infrastructures go through regime durability and institutions. The infrastructure development index has a positive effect on regime durability and institutional quality, which in turn affect the rent-sharing in favour of the State, in the same order.

In terms of policy implications, gold-producing countries in Africa need to invest more in infrastructure. Better infrastructure (and hence an ambitious investment policy) can change the risk-sharing between investors and the State, thus creating room for developing a tax system that is more favourable to the State in terms of rent-sharing. For example by making mining regimes progressive with higher tax rates. These countries are also urged to consolidate the stock of public capital so that all private investment is beneficial. This investment should be directed more towards transport infrastructure, which affects the distribution of rents.

Appendix B

Table 3.B1: Robustness: Types of infrastructure with Medium-grade mine

	Dependent variable: AETR of Medium-grade mine				
	(1)	(2)	(3)	(4)	(5)
Infrastructure index	0.002**				
	(0.001)				
Transport index		0.002			
		(0.002)			
Electricity index			0.005		
			(0.004)		
ICT index				-0.000	
				(0.001)	
WSS index					-0.001
					(0.001)
GDP per capita (log)	-0.016	-0.020	-0.018	-0.020	-0.023
	(0.041)	(0.042)	(0.042)	(0.042)	(0.042)
EITI	0.043***	0.044***	0.042***	0.043***	0.044***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Foreign Direct Investment (log)	0.004	0.005	0.004	0.005	0.005
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Trade Openness (log)	-0.027	-0.025	-0.028	-0.029	-0.027
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Foreign Aid (log)	-0.013	-0.012	-0.013	-0.013	-0.013
	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)
Inflation	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.607*	0.645**	0.627**	0.671**	0.702**
	(0.309)	(0.310)	(0.311)	(0.311)	(0.317)
Country FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	282	282	282	282	282
R-squared	0.259	0.249	0.250	0.245	0.246
Number of id	22	22	22	22	22

Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Table 3.B2: Robustness: Types of infrastructure with High-grade mine

	Dependent variable: AETR of High-grade mine				
	(1)	(2)	(3)	(4)	(5)
Infrastructure index	0.002*				
	(0.001)				
Transport index		0.002			
		(0.002)			
Electricity index			0.005		
			(0.004)		
ICT index				-0.001	
				(0.001)	
WSS index					-0.001
					(0.001)
GDP per capita (log)	-0.041	-0.045	-0.043	-0.045	-0.049
	(0.046)	(0.046)	(0.046)	(0.046)	(0.046)
EITI	0.046***	0.047***	0.045***	0.046***	0.048***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Foreign Direct Investment (log)	0.004	0.005	0.004	0.005	0.004
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Trade Openness (log)	-0.030	-0.029	-0.031	-0.033	-0.028
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Foreign Aid (log)	-0.012	-0.011	-0.011	-0.011	-0.012
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Inflation	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
					(0.001)
Constant	0.780**	0.809**	0.793**	0.838**	0.897**
	(0.341)	(0.341)	(0.342)	(0.341)	(0.348)
Country FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	282	282	282	282	282
R-squared	0.214	0.208	0.209	0.206	0.207
Number of id	22	22	22	22	22

Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Table 3.B3: Sensitivity to additional variables with Medium-grade mine

	Dependent variable: AETR of Medium-grade mine					
	(1)	(2)	(3)	(4)	(5)	(6)
Infrastructure index	0.0024**	0.0020*	0.0028***	0.0028***	0.0032***	0.0033***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDP per capita (log)	-0.0162	-0.0109	0.0411	0.0396	0.0717*	0.0691*
	(0.041)	(0.040)	(0.039)	(0.041)	(0.037)	(0.036)
EITI	0.0434***	0.0327***	0.0510***	0.0505***	0.0467***	0.0460***
	(0.013)	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)
Foreign Direct Investment (log)	0.0044	0.0006	0.0027	0.0029	0.0034	0.0035
	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Trade Openness (log)	-0.0266	-0.0192	-0.0253	-0.0273	-0.0279	-0.0215
	(0.020)	(0.019)	(0.017)	(0.017)	(0.017)	(0.017)
Foreign Aid (log)	-0.0131	-0.0158	-0.0151*	-0.0153*	-0.0125	-0.0125
	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)
Inflation	-0.0001	-0.0001	-0.0000	-0.0000	-0.0000	0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Regime Durability		0.0018***				
		(0.001)				
Institution			0.0101*			
			(0.006)			
Control of Corruption				0.0097		
				(0.006)		
Bureaucracy Quality					-0.0012	
					(0.022)	
Law and Order						0.0287
						(0.020)
Constant	0.6074*	0.5394*	0.1509	0.2084	-0.0035	-0.0905
	(0.309)	(0.295)	(0.279)	(0.299)	(0.278)	(0.272)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	282	263	247	247	247	247
R-squared	0.259	0.271	0.350	0.347	0.339	0.346
Number of id	22	22	19	19	19	19

Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Table 3.B4: Sensitivity to additional variables with High-grade mine

	Dependent variable: AETR of High-grade mine					
	(1)	(2)	(3)	(4)	(5)	(6)
Infrastructure index	0.0021*	0.0017	0.0029***	0.0028***	0.0032***	0.0034***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDP per capita (log)	-0.0410	-0.0266	0.0404	0.0403	0.0682*	0.0654*
	(0.046)	(0.042)	(0.039)	(0.040)	(0.036)	(0.035)
EITI	0.0462***	0.0345***	0.0511***	0.0504***	0.0471***	0.0464***
	(0.014)	(0.013)	(0.011)	(0.011)	(0.011)	(0.011)
Foreign Direct Investment (log)	0.0043	0.0004	0.0021	0.0023	0.0028	0.0028
	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Trade Openness (log)	-0.0303	-0.0227	-0.0282*	-0.0301*	-0.0306*	-0.0239
	(0.022)	(0.020)	(0.017)	(0.016)	(0.017)	(0.017)
Foreign Aid (log)	-0.0117	-0.0140	-0.0144*	-0.0145*	-0.0120	-0.0121
	(0.012)	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)
Inflation	-0.0001	-0.0001	-0.0000	-0.0000	-0.0000	0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Regime Durability		0.0019***				
		(0.001)				
Institution			0.0092*			
			(0.005)			
Control of Corruption				0.0085		
				(0.006)		
Bureaucracy Quality					-0.0012	
					(0.021)	
Law and Order						0.0299
						(0.019)
Constant	0.7796**	0.6460**	0.1545	0.1986	0.0150	-0.0757
	(0.341)	(0.316)	(0.273)	(0.293)	(0.273)	(0.266)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	282	263	247	247	247	247
R-squared	0.214	0.227	0.319	0.316	0.310	0.318
Number of id	22	22	19	19	19	19

Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

Table 3.B5: Endogeneity concerns with Medium-grade mine

	Dependent variable: AETR of Medium-grade mine		
	(1)	(2)	(3)
Infrastructure index	0.0026**	0.0102**	0.0014*
	(0.001)	(0.005)	(0.001)
GDP per capita (log)	0.0018	-0.0041	-0.0385**
	(0.005)	(0.044)	(0.016)
EITI	0.0074	0.0438***	0.0148*
	(0.042)	(0.013)	(0.009)
Foreign Direct Investment (log)	-0.0213	0.0027	0.0074*
	(0.020)	(0.005)	(0.004)
Trade Openness (log)	-0.0063	-0.0204	0.0024
	(0.010)	(0.021)	(0.016)
Foreign Aid (log)	0.0436***	-0.0137	-0.0216**
	(0.013)	(0.011)	(0.008)
Inflation	0.0000	0.0000	-0.0002***
	(0.000)	(0.000)	(0.000)
L.AETR2			0.6550***
			(0.064)
Constant	0.4065		0.4003***
	(0.310)		(0.130)
Country FE	Yes	Yes	
Time FE	Yes	Yes	
Observations	270	282	261
Number of id	22	22	22
R-squared	0.253	0.117	
Instruments			13
Hansen test			0.864
Arellano-Bond test for AR(1)			0.107
Arellano-Bond test for AR(2)			0.682
P-value for underidentification test		0.000	
Weak-ID test (Cragg-Donald Wald F statistic)		17.494	
AR Weak-ID-robust F (p value)		0.021	
AR Weak-ID-robust χ^2 (p value)		0.015	
Sargan Statistic (p value)		0.000	
First-stage results for AIDI		0.619***	
		(0.148)	

Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. In the first column (1), all variables are lagged by one year.

Table 3.B6: Endogeneity concerns whith High-grade mine

	Dependent variable: AETR of High-grade mine		
	(1)	(2)	(3)
Infrastructure index	0.0022*	0.0093*	0.0011
	(0.001)	(0.005)	(0.001)
GDP per capita (log)	0.0018	-0.0299	-0.0288*
	(0.005)	(0.047)	(0.015)
EITI	-0.0164	0.0466***	0.0127*
	(0.046)	(0.014)	(0.007)
Foreign Direct Investment (log)	-0.0249	0.0028	0.0056*
	(0.022)	(0.006)	(0.003)
Trade Openness (log)	-0.0042	-0.0246	0.0018
	(0.011)	(0.023)	(0.013)
Foreign Aid (log)	0.0460***	-0.0122	-0.0159**
	(0.014)	(0.012)	(0.007)
Inflation	0.0000	0.0000	-0.0002***
	(0.000)	(0.000)	(0.000)
L.AETR3			0.7362***
			(0.071)
Constant	0.5706*		0.2935**
	(0.343)		(0.121)
Country FE	Yes	Yes	
Time FE	Yes	Yes	
Observations	270	282	261
Number of id	22	22	22
R-squared	0.335	0.087	
Instruments			13
Hansen test			0.670
Arellano-Bond test for AR(1)			0.162
Arellano-Bond test for AR(2)			0.844
P-value for underidentification test		0.000	
Weak-ID test (Cragg-Donald Wald F statistic)		17.494	
AR Weak-ID-robust F (p value)		0.056	
AR Weak-ID-robust χ^2 (p value)		0.045	
Sargan Statistic (p value)		0.000	
First-stage results for AIDI		0.619***	
		(0.148)	

Standard errors are in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1. In the first column (1), all variables are lagged by one year.

Table 3.B7: African countries with gold production

Country	2017	2018	2019	2020	2021	2022
Algeria	137	286	70	58	71	138
Angola (*)	-	-	23	59	35	80
Benin (*)	5	5	5	5	5	5
Botswana	913	1105	942	851	650	426
Burkina Faso (*)	46436	52898	51500	62470	66931	60000
Burundi	1742	1898	1599	863	893	900
Cameroon (*)	713	478	341	450	450	175
Central African Republic	118	142	359	401	858	1507
Congo (*)	150	150	150	150	150	150
Congo, Democratic Republic (*)	37100	43800	43000	40000	42000	38000
Côte d'Ivoire (*)	25395	24488	32568	38523	39779	47600
Egypt	16941	14694	14946	14069	12919	13716
Equatorial Guinea	200	200	200	200	200	200
Eritrea	2700	3768	2443	3019	2200	3300
Eswatini (Swaziland)	-	12	6	1	-	-
Ethiopia	4704	2570	3180	3320	9190	8680
Gabon (*)	600	83	107	371	967	1063
Ghana (*)	133303	149216	143940	125884	88013	108115
Guinea (*)	46847	25086	2752	91802	100958	84713
Kenya (*)	503	5472	5395	5150	5292	5564
Liberia	6071	7289	5068	4396	7860	11718
Madagascar (*)	2833	3000	2100	1500	-	-
Mali (*)	51500	61000	63000	65000	69400	72200
Mauritania (*)	9096	9235	13554	14125	6302	17539
Morocco	220	386	221	143	147	167
Mozambique	166	507	430	488	764	1264
Namibia	7469	6632	6526	6254	7103	6992
Niger (*)	914	6207	5224	2361	4010	2601
Nigeria (*)	19000	18000	9000	5000	3000	12000
Rwanda	8800	18100	11400	11532	6341	9470
Senegal (*)	11700	14900	16100	14600	18800	16200
Sierra Leone (*)	142	464	75	14	92	150
South Africa (*)	136833	117150	105185	95789	105019	88883
South Sudan	200	200	200	200	200	200
Sudan	107300	93600	55400	35700	49700	41800
Tanzania (*)	43489	39304	48408	55508	59638	56943
Togo	20000	10000	10000	10000	10000	3600
Uganda	4	12	10	7	7	7
Zambia (*)	4373	4044	4522	3994	3987	3108
Zimbabwe (*)	23929	35054	29429	20873	31477	37225

Source: Critical Minerals Center. (*) Gold-producing countries (except Chad) according to the FERDI database (including Chad).

Chapter 4

Elections and Average Effective Tax Rate in Mining Rent in Africa: Evidence from Spatial Regression

[1]

[1]This chapter is a joint work with Mahamady Ouédraogo.

4.1 Introduction

Africa is endowed with abundant natural resources. The continent accounts for 30% of the world's mineral reserves[2] including gold, bauxite, diamonds, cobalt, copper, iron and others. According to the World Bank, 26 out of the 48 countries in Sub-Saharan Africa are classified as "resource-rich" based on the International Monetary Fund (IMF) definition (Cust and Zeufack, 2023). Gold is mined in forty of fifty-four countries on the continent according to the latest British Geological Survey (BGS) report (Idoine et al., 2023). With rising global demand for transition minerals driven by the energy transition and the potential for new resource discoveries, Africa's natural wealth offers an opportunity to mobilize domestic revenue for financing sustainable development (Bernstein, 2012; Trench et al., 2024). In fact, the 2015 Addis Ababa Conference on Development in Ethiopia emphasized the role of natural resource taxation on domestic revenue mobilization in Africa.

Yet, the taxation of the mining sector remains challenging (Ossowski and Gonzáles, 2012; Thomas and Trevino, 2013; Crivelli and Gupta, 2014). African countries collect, on average, only about 40% of the revenue they could potentially gain from natural resources (Cust and Zeufack, 2023). Since the mid-2000s, the growing demand for gold has driven an increase in gold prices. However, this price surge stands in contrast to the relatively low government revenues from mining and the limited benefits experienced by local communities. Still, the mining sector generate substantial rent[3] that can be fully taxed without causing economic distortions and without affecting investor choice, hence its potential to contribute to revenue mobilization (Charlet et al., 2013). Taxing 100% of rent is economically neutral according to optimal rent taxation theory, as it does not alter the investment decision and production trajectory (Boadway and Keen, 2010).

Often pushed by the civil society, many African governments have been revising their mining codes in recent years. The goal is to better capture the mining rent and invest for local communities. Yet, advocating for a better sharing of mining revenues faces two major challenges. First, States compete with each other to attract mining investment. Some regional institutions such as the Economic Community of West Africa States (ECOWAS) and West African Economic and Monetary Union (WAEMU) have been pushing for harmonization of the mining codes to limit inter-States tax competition and the so called "race toward the bottom" (Zodrow and Mieszkowski, 1986; Wilson, 1986). In 2009, ECOWAS adopted a Directive C/DIR.3/5/09 for Harmonization of Guiding Principles and Policies in the Mining Sector[4]. On June 16th 2023, WAEMU revised its 2003' mining

[2]Notwithstanding the fact that a large part of the mineral reserves of the African continent is still unexplored.

[3]Rent is shared between investors and the State. Cottarelli (2012) defines the rent as "the amount by which revenues exceed all production costs, including those of discovery and development, as well as the normal return on capital".

[4]See itie-bf.bf/harmonisation for more information.

code (Regulation No. 02/2023/CM/UEMOA)[5]. In the same vein, several countries have even "constitutionalized" their mining law to assert and/or strengthen their sovereignty over natural resources. For example, article 25-1 of the Senegalese constitution states that "Natural resources belong to the people. They are used to improve their living conditions. The development and management of natural resources must be transparent and in a way that generates economic growth, promotes the well-being of the general population and is environmentally sustainable". Such effort can contribute to a "race to the top" in mining taxation in Africa. However, tax competition remains prevalent across Africa. For instance, Burkina Faso and Mali revised their mining codes in 2015 and 2012 respectively, granting tax holidays to mining companies at the research phase. In any case, there has been a mimetic behavior in the revision of mining codes across Africa over recent years.

Second, mining lobbies, particularly active during election periods, are capable of influencing reforms by funding the electoral campaigns of some politicians in exchange for tax reforms in their favor (Buchanan, 2008). Mining policy can also be subject to unrealistic electoral promise from politician which contribute to the electoral manipulation of the tax system. The literature on political budget cycles support that electoral cycles may influence tax policies (Nordhaus, 1975; Brollo and Nannicini, 2012). In such context, how does elections affect mining taxation in Africa? This chapter aims to analyze the impact of elections on the average effective tax rate (AETR) of the mining rents while considering the spatial interactions arising from tax competition or mimetic behavior in mining rent taxation in Africa.

In recent years, several studies have explored the sharing of mining rents in Africa, thanks to the data collection efforts by Laporte et al. (2015). Laporte et al. (2015) established the first comprehensive legal and fiscal database on the tax regimes governing industrial gold mining covering African countries. The database details, on a country-by-country basis, the taxes, duties, and levies (including rates, bases, and exemptions) applicable during both the exploration and exploitation phases of gold mining projects. The dataset provides a measure of the AETR for low-, medium- and high-grade mines. Relying on this dataset, several studies examines the trends, the structure and determine the government share of the rent measured by the AETR. Bouterige et al. (2019) analyze the evolution of mining taxation in Africa. They shows that Chad, Democratic Republic of Congo, Kenya, Senegal and Tanzania are the countries that have experienced a significant increase in the AETR over the period 2016-2018. These countries made reforms on their mining codes over the same period. Charlet et al. (2019) undertake a comparative analysis of the AETR between the WAEMU Zone and the other African countries. They find heterogeneous application of taxes and customs regime in the WAEMU. Moving beyond these descriptive analysis, Amedanou and Laporte (2024) study the effect of country risk on AETR. They find that country risk is associated with lower AETR. Their findings

[5]See itie-bf.bf/reglement for more information.

corroborate those by Adebayo et al. (2021) who combined micro data on gold mining projects around the world over 2015 to 2017 with a macroeconomic variables to study the determinants of the AETR. They define their AETR as "the ratio of total payments to the government from a mining project (including taxes, fees, and royalties) relative to the mining company's pre-tax net revenue from the same project". Unlike Adebayo et al. (2021), Amedanou and Laporte (2024) find a non linear relationship between country risk and AETR. Laporte et al. (2022) study the tax design trough the two components of AETR: *production-based tax* and *profit-based tax*. They showed that "tax design depends essentially on the evolution of world prices and not on institutional variables." In the same vein, Sanou (2024) find that access to the sea is positively correlated with *production-based taxes* rather than *profit-based taxes*.

We depart from the previous studies in two ways. First, despite the potential spatial correlation in mining rent taxation design, non of the previous studies consider the spillover effects of AETR. There are several compelling reasons to believe that AETRs may be correlated across countries. The first and most obvious reason is tax competition. Countries often lower their tax rates in response to the actions of their neighbors. As Keen and Konrad (2013) aptly note, "Like it or not, national tax policymakers are involved in a game with one another." The second reason follows logically from the first. To counteract the downward pressure of tax competition, countries may choose to coordinate rather than compete. In this context, transparency and the exchange of best practices among neighboring countries can drive convergence in mining tax policies. When one country achieves success with a particular tax structure for a specific resource, others in the region may adopt a similar approach. A third reason lies in historical legacies. Colonial history has left a significant imprint on legal and fiscal systems. Former colonies often inherit legal frameworks from their colonizers, which can lead to spatial correlations in tax policies. In our sample, 13 out of the 20 countries are former French colonies (see Appendix 4.6). Finally, shared geological formations can also influence tax structures. Countries within regions rich in similar mineral resources are likely to adopt comparable mining tax policies tailored to the characteristics of those resources. Laporte et al. (2015), in their descriptive analysis, underscore a convergence in average effective tax rates, which have been rising across most countries since 2010. However, they also highlight a divergence in fiscal regimes between anglophone and francophone countries, reflecting different historical and institutional trajectories.

Second, we study the effect of elections on the AETR in Africa. Mining taxation can be subject to electoral manipulations. On the one hand, certain interest groups within the mining sector may provide financial support for electoral campaigns in exchange for promises of tax policies favorable to their interests. On the other hand, to appeal to the median voter, candidates may pledge tax reforms aimed at increasing domestic revenue. Building on the electoral budget cycles literature (Nordhaus, 1975), we test this

assumption by investigating the effect of elections on the AETR of the mining sector in Africa. An extensive literature support the idea that taxation, like public spending follows an electoral cycles (Vandernoot et al., 2019; Ehrhart, 2013; Foremny and Riedel, 2014).

The chapter uses a Spatial Durbin Model (SDM) to account for the spatial spillovers in tax policies on a sample of 20 gold-producing countries over the period 2000-20. We find three key results: First, mining AETR exhibits spatial spillovers across countries in our sample. Second, accordance with our assumption, presidential elections negatively affect the AETR. The effects on neighboring countries are positive, implying positive externalities on neighboring countries. Third, the negative effect of elections is conditional on the level of democracy, transparency and quality of institutions. In democratic countries, the effect of elections on the AETR is positive. Transparency, in particular Extractive Industry Transparency Initiative (EITI) membership, and the quality of institutions attenuated the negative effect of elections. Finally, the type of institutions matters. Institutions that matter for improving the government's share of rents are corruption control, government effectiveness, and voice and accountability. Indeed, good governance of the mining sector implies informed citizens who hold their rulers to account, as well as the control of corruption. In addition, the administrative capacity of government is important for the sharing of rents.

The rest of the paper is organized as follows. Section 4.2 reviews the literature. Section 4.3 presents the data and empirical strategy. Section 4.4 presents and discusses the estimation results. In section 4.5, we perform the robustness checks. Section 4.6 presents some concluding remarks and policy implications.

4.2 Literature review

The chapter builds on the literature on political budget cycles and political economy of natural resource taxation literature. The literature on political budget cycles[6] studies how political motives specifically reelection concerns affect fiscal policy (tax revenue, spending and the deficit) (De Haan and Klomp, 2013). "A political budget cycle is a periodic fluctuation in a government's fiscal policies, which is induced by the cyclicality of elections" (Shi and Svensson, 2006). Hence political budget cycles literature covers studies on the effects of elections on tax policies, government spending and the deficit. In this chapter we focus on the taxation aspects if political budget cycles.[7]

The literature on political budget cycles follows three approaches: the partisan approach, the adverse selection type model, and the moral hazard approach to political bud-

[6]The political budget cycles used to be part of political business cycles literature which study the effects of elections on broad economic outcomes such as GDP growth, unemployment. The first model of political business cycles is formalized by Nordhaus (1975).

[7]For broader view of the literature we refer the reader to Dubois (2016) and Mandon and Cazals (2019).

get cycles. The partisan approach analyzes the implications of elections "when different political parties have different ideological and economic preferences" (Shi and Svensson, 2006). In the case of taxation for example, left-wing party would prefer taxation on wealth rather than taxation on income or consumption borne by low and medium classes. Right-wing party, in contrast, would be reluctant to wealth taxation. Consequently, a left wing party would be supportive of greater taxation of the mining rent compared to a right wing party. Hibbs Jr (1977) is the first to apply the partisan approach to political business cycles. Based on 12 West European and North American nations data, Hibbs Jr (1977) observe "a low unemployment-high inflation configuration in nations regularly governed by the left and a high unemployment-low inflation pattern in political systems dominated by center and rightist parties". However, as Shi and Svensson (2006) point out, the partisan approach is less relevant for developing countries because the ideological cleavage is less market compared to developed countries.

The adverse selection model assume that political candidates have a certain competence level only known by him or herself but not by the voters. Rogoff and Sibert (1988) argue that electoral cycles in taxes, government spending, and money growth can be modeled as an equilibrium signaling process driven by temporary information asymmetries. Voters wanting to elect the most competent politician but do not have information on their competence form their expectation based on observable policy outcomes. Incumbents would signal their competence by investing in physical and observable projects (Rogoff, 1990). In many resources rich countries this lead to "white elephants investment" (Robinson and Torvik, 2005).

The moral hazard approach to political budget cycles consider that political cycles are the result of a moral hazard problem between the government and voters (Persson and Tabellini, 2002; Shi and Svensson, 2002). In the run-up to the elections, the government tends to adopt expansionist policies to stimulate economic activity and curb unemployment. The new generation of political budget cycles models incorporate information asymmetries between government and citizens on budget statistics (Shi and Svensson, 2006) or tolerance of informal activities run-up to the elections (Imami et al., 2022). In any case, the objective of the incumbent is to use fiscal and non-fiscal policies to get re-elected.

Both adverse selection and moral hazard approaches to political budget cycles are related to information asymmetry between politician and voters. Several empirical studies find that information asymmetry, the maturity of democracy and the quality of institutions matter for the relationship between election and tax policy (Brender, 2003; Brender and Drazen, 2005; Shi and Svensson, 2006; Alt and Lassen, 2006). Brender and Drazen (2005) argue that the political budget cycle disappears when considering only matured democracies.

The political economy argument of natural resource taxation examines how political

motives affect resource taxation. A large share of this literature studies the effect of resource revenue on non-resource revenue. It argue that to avoid accountability government prefer resource revenue to non-resource revenue. Natural resource revenue crowd-out non-resource revenue (Thomas and Trevino, 2013; Crivelli and Gupta, 2014; Mawejje, 2019). Little attention is paid to the sharing of natural resources rents between private investors and governments partly due to the lack of data. Thanks to the recent efforts by Laporte et al. (2015) to build a dataset on mining rent-sharing, a bourgeoning literature is emerging[8]. Taking into account fiscal instruments and other out-of-pocket expenses, Laporte et al. (2015) show a convergence of AETRs between English-speaking and French-speaking countries from 2010 onward.

Using this database set up by Laporte et al. (2015), Charlet et al. (2019) analyze the AETR and discuss the differences between the WAEMU zone and other countries in the African sub-region. They find that the tax and customs regime applied to extractive industries in the zone is heterogeneous. Laporte et al. (2022) study the fiscal design of gold-producing countries in Africa. They show that the fiscal design of the State's share of rents depends essentially on world prices and not on the institutional framework, let alone technical assistance. Amedanou and Laporte (2024) complements the study by Adebayo et al. (2021), that use a *de facto* measure of AETR. They then assess the impact of country risk on *de jure* AETR using pooled Ordinary Last Squares (OLS) regression with Driscoll-Kraay's methods. They find that country risk has a nonlinear impact on AETR. Their results provide an empirical support for Adebayo et al. (2021) theoretical model prediction, which stipulates a positive relationship between AETR and country risk must. Differentiating between the share of *production-based taxes* and the share of *profit-based taxes* in AETR, Sanou (2024) found that access to the sea is positively correlated with *production-based taxes* rather than *profit-based taxes*.

The previous literature on mining rent-sharing overlook the effect of elections on AETR. However, the political budget cycles literature provides arguments to support the idea that mining taxation can be subject to electoral manipulations. First, incumbents may increase the government's share of mining rents to appeal to the median voter. Similarly, challengers might promise higher taxes on the mining sector as a way to fund public services. For instance, in Senegal, the challenger pledged to renegotiate petroleum contracts signed by the incumbent, Macky Sall, illustrating how resource governance can become a focal point in election campaigns. Second, politicians may face pressure from powerful lobbying groups that are willing to fund their campaigns in exchange for tax exemptions or holidays. A notable example is the Bolloré Group's involvement in funding elections in Togo and Guinea, reportedly in return for favorable concessions[9].

[8]This database is on behalf of the Foundation for Studies and Research on International Development. It can be accessed via the following link: https://fiscalite-miniere.ferdi.fr/

[9]See https://france3-regions.francetvinfo.fr for more information.

4.3 Methodology

4.3.1 Data

Our data cover 20 African countries over the period 2000 to 2020. The choice of the sample and the period is constrained by the data coverage on our dependent variable, the AETR of the mining rents. The original dataset covers 22 gold producers in Africa. Benin and Angola are not included in our sample because their data cover a short time period. Also, only gold rent is used because we do not have data on the government share of rents for other minerals. The countries of our sample represent 83.2% of total gold produced in Africa (the data on gold production are from Idoine et al. (2024)).

Measuring AETR in mining sector

To assess the effect of elections on the share of gold mining rent that goes to the State, we use AETR of low-grade mine as our dependent variable in a sample of 20 gold-producing countries[10] over the period 2000-2020. This variable comes from the FERDI database set up by Laporte et al. (2015). We prefer this dataset over the one used by Adebayo et al. (2021) because its cross-sectional nature prevents an assessment of the effect of elections on the AETR. Based on economic assumptions, Laporte et al. (2015) have identified 3 types of mine for the calculation of AETR: (i) the low-grade mine, operating mainly as an open-pit with an ore grade of 1.8g/t; (ii) the medium-grade mine, also operating as an open-pit with an ore grade of 3.0g/t; and (iii) the high-grade mine, with an ore grade of between 4.0g/t (open-pit) and 5.5g/t (underground). Table 4.1 presents these economic assumptions.

Table 4.1: Economic assumptions for the three types of mine

	Law-grade, open-pit	Medium-grade, open-pit	High-grade, open-pit and underground
Life cycle	13 years	13 years	13 years
Area	150 km2	150 km2	150 km2
Stripping ratio	1/9	1/9	1/9
Mineral grade	1.8g/t	3.0g/t	4.0g/t(open-pit); 5.5g/t(underground)
Recovery rate	86%	88%	88%(open-pit); 95%(underground)
Initial investment	USD 190 million	USD 150 million	USD 290 million
Length of investment	2 years	2 years	2 years
Renewable investment	USD 18 million	USD 13.5 million	USD 22.5 million
Extraction costs	USD 2.5/t of waste rock mined	USD 2.8/t of waste rock mined	USD 3/t of waste rock mined
Processing costs	USD 15/t of mineral processed	USD 20/t of mineral processed	USD 22/t of mineral processed
Administrative costs	USD 3.5 million/year from year 3	USD 4 million/year from year 3	USD 5.1 million/year from year 3
Refining and sales costs	USD 5/oz	USD 5/oz	USD 5/oz

Source: Laporte et al. (2019)

The model used to calculate the AETR is a discounted cash flow model (DCF) whose logic is close to that of the Fiscal Analysis of Resource Industries (FARI) Model developed

[10]These countries are : Burkina Faso; Côte d'Ivoire; Cameroon; Democratic Republic of Congo; Republic of Congo; Gabon; Ghana; Guinea; Kenya; Madagascar; Mali; Mauritania; Niger; Nigeria; Senegal; Sierra Leone; Chad; Tanzania; South Africa; Zimbabwe.

by the International Monetary Fund (Luca and Puyo, 2016). It is the ratio of discounted government revenues from a mining project to the net cash flow before taxes of the same project. In other words, the AETR represents the share of the mining rent captured by the State on a mining project, provided that the discount rate is high enough to reflect the opportunity cost of capital (Laporte et al., 2015). It is based on national legislation and economic data available on the Foundation for Studies and Research on International Development (FERDI).

Otto (1998, 2006) identified two types of tax levies: (i) in rem taxes or *production-based taxes* and (ii) in personam taxes or *profit-based taxes*. Among the tax instruments used to calculate the AETR, annual ground fees, fixed fees, mining royalties, withholding taxes on interest and turnover minimum tax constitute *production-based taxes*, while withholding taxes on dividends, corporate income tax, and the payment of dividends to the State constitute *profit-based taxes*. Other tax instruments that may affect the AETR have not been considered since the information needed to calculate their value is not available. These include fuel and petroleum product taxes, value added tax (VAT) credits not reimbursed by the tax authorities to operating companies, and customs duties levied on imports of capital goods. It is important to note that the model considers the specificities of each country's legislation with respect to each tax instrument. As mining reforms have progressed, the scope for special agreements to operate within the general framework of common law and mining codes has narrowed (Laporte and Diallo, 2022). The model assumes that the company operating the mine benefits from a stability clause[11] guaranteeing the maintenance of the tax regime over the life of the project (on average over 13 years). Thus, in a given country and a given year, the AETRs obtained reflect the distribution of rents defined by the legislation in force.

Data are extracted based on the annual average gold price[12]. Medium- and high-grade mines AETR's are used for the robustness of our results.

Figure 4.1 shows the average share of gold rents accruing to the State in the countries in our sample. The higher the grade of the mine, the lower the State's share of rents. The low-grade mine is the most profitable for the State in terms of rent-sharing. With low-grade mine AETR's, Figure 4.2 shows that Niger is the country with the highest AETR, followed by Guinea and Cameroon. However, the lowest AETRs are attributed to Nigeria, Zimbabwe and South Africa.

Figure 4.3 is a spatial display of the AETR of low-grade mine across countries. As can be seen, there is a potential spatial correlation in the AETR of the various gold-producing

[11]The guarantee period covered by the stability clause stability clause is usually the duration of the validity of the mining permit (South Africa, Tanzania, Burkina Faso, Côte d'Ivoire and Mali), but it can also be longer it may also be longer (Mauritania and Senegal) or be counted in years (Ghana).

[12]For example, in 2020, when the average gold price was around 1770.25 U.S. dollars per oz, we consider 1800 U.S. dollars per oz to extract the data. The database does not have data for the year in which the average price is below 1,000 U.S. dollars. We therefore consider 1000 U.S. dollars per oz as the average price if the average price is less than 1,000 U.S. dollars per oz.

Figure 4.1: Average effective tax rate according to mine grade

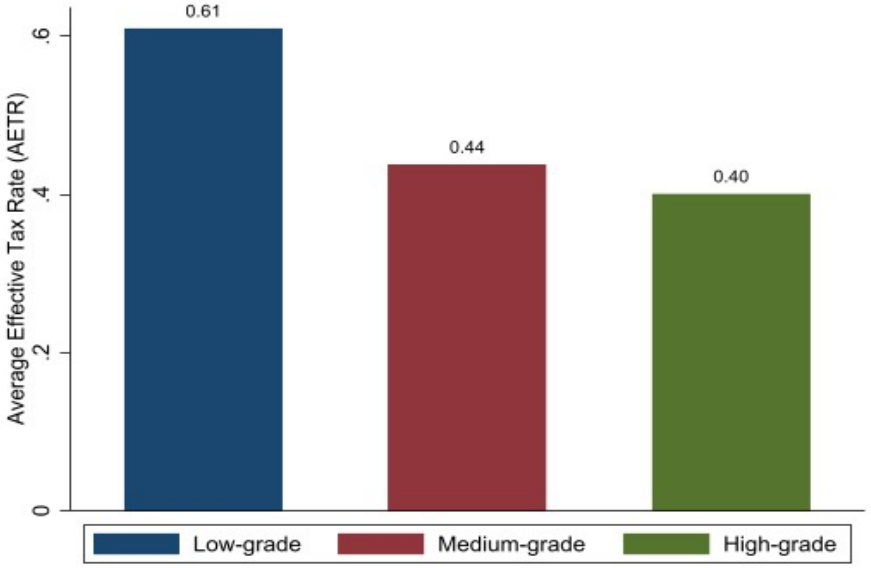
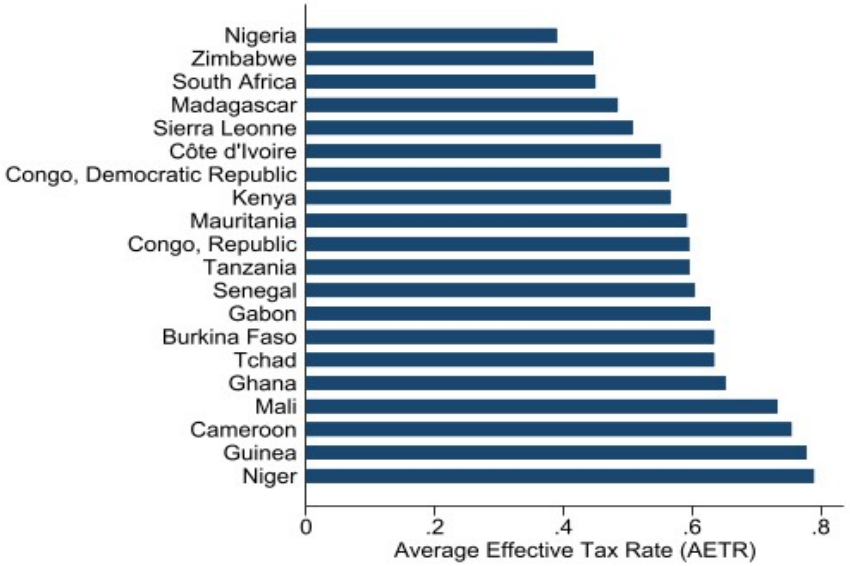
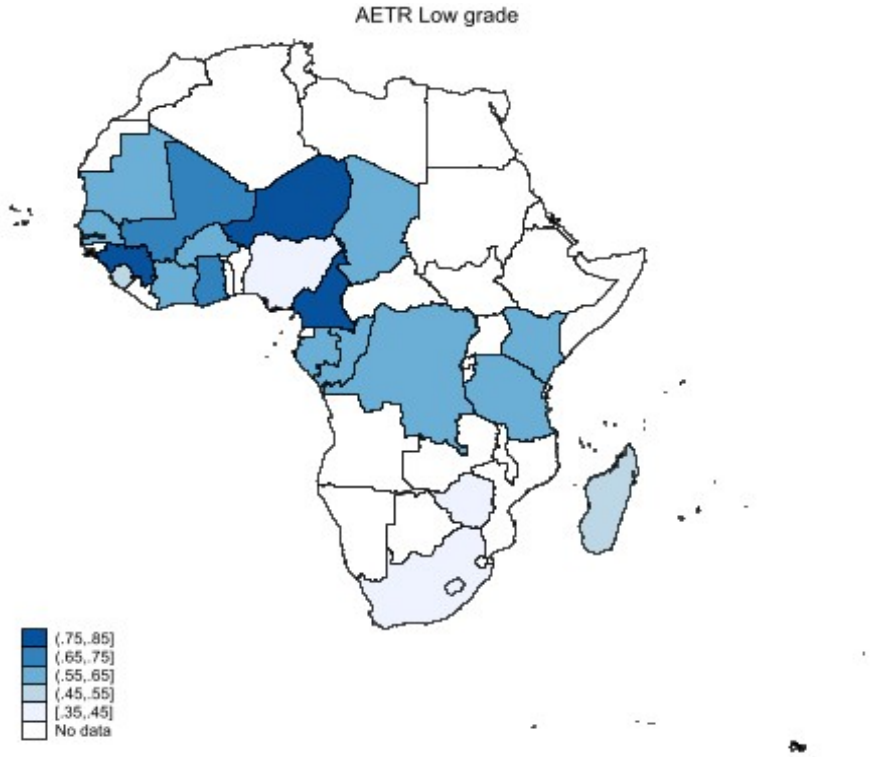


Figure 4.2: Average effective tax rate across countries



countries in Africa, regardless of mine grade (Figure 4.C1 in the appendix for medium- and high-grade mines spatial display).

Figure 4.3: Spatial display of Average effective tax rate across countries

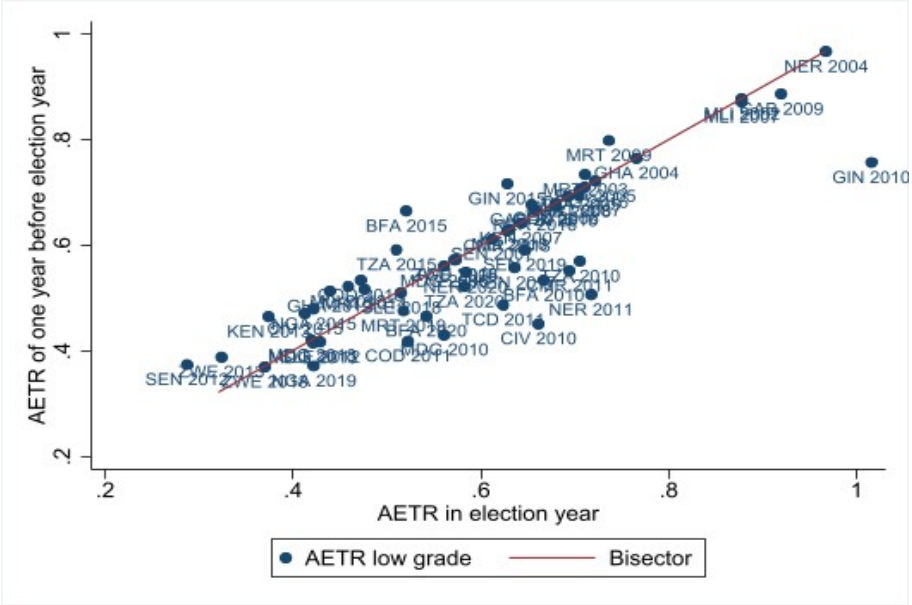


Measuring elections

Our election variable which is the interest variable, is based on suggestions made by Franzese Jr (2000). It takes into account the month in which elections take place during an election year. Considering M as the election month, our election variable takes the value [(12-M)/12] in a pre-election year and [M/12] in an election year. All other years are set to zero (0). The advantage of this approach is that it minimizes measurement error (Klomp and de Haan, 2016) when compared with use of a dummy variable (1 in an election year and 0 otherwise), which is typical of this type of study. Data are extracted from the Database of Political Institutions 2020 (DPI2020) set up by Cruz et al. (2021). Depending on whether it is a presidential or legislative election, the election variable is constructed in the same way. Figure 2.2 is a graphical representation of AETR in presidential election year as a function of AETR of one year before election year. Points to the left or above the bisector represent countries in which the AETR of one year before election year is higher than AETR in election year. Conversely, points to the left or below the bisector are countries in which AETR in election year is higher than AETR of one year before election. Bisecting points mean that there has been no variation in AETR during the period. The density of points below the bisector is higher. This suggests a

negative relationship between presidential elections and AETR.

Figure 4.4: AETR before election and election year



Other control variables

We build on the existing literature on rent sharing by identifying some macroeconomic and institutional variables such as GDP per capita, agricultural value added, Foreign Direct Investment (FDI), trade openness, foreign aid, inflation, control of corruption, government effectiveness, rule of law, regulatory quality, political stability, voice and accountability, EITI membership and democracy (Isham et al., 2005; Mehlum et al., 2006b; Haufler, 2010; Laporte et al., 2022; Amedanou and Laporte, 2024; Sanou, 2024).

To measure the level of development of the countries in our sample, we use **GDP per capita** (constant 2015 U.S. dollars) as a proxy. This variable is defined as the ratio between gross domestic product (GDP) and mid-year population. Data are extracted form Worldwide Development Indicators (WDI) from the World Bank. It is inserted in the model with its natural logarithm.

Foreign aid (% GNI) or net official development assistance (ODA) refers to loan disbursements on concessional terms (net of principal repayments) and grants provided by official agencies of Development Assistance Committee (DAC) members, by non-DAC countries and multilateral institutions to support development and welfare in DAC-ODA recipient countries and territories. Data are extracted form Worldwide Development Indicators (WDI) from the World Bank and inserted in the model with its natural logarithm.

Trade openness is the sum of exports and imports of goods and services measured as a share of gross domestic product (GDP). A country is said to be introverted when its trade openness values are low. Conversely, the country will be qualified as extroverted

when these values are high. If the data comes from the Worldwide Development Indicators (WDI) from the World Bank, it is entered into our regressions with its natural logarithm.

Foreign Direct Investment (FDI) is the sum of short-term capital and long-term capital as shown in the balance of payments. it is entered into our regressions with its natural logarithm and provided from the Worldwide Development Indicators (WDI) from the World Bank.

Inflation, our measure of the change in the general price level in the economy as a whole, is extracted from the Worldwide Development Indicators (WDI) from the World Bank. This variable is measured by the annual growth rate of the implicit GDP deflator, which is the ratio of GDP in current local currency to GDP in constant local currency. In fact, the fiscal design of the average effective tax rate, defined as the share of the gold mining rent accruing to the State, depends essentially on the evolution of world gold prices (Laporte et al., 2022).

The **Extractive Industries Transparency Initiative** (EITI) variable refers to the country's adoption or membership of the EITI. The promotion of transparent and responsible management of natural resources is the main objective of the EITI. In other words, the EITI is recognized as a leading anti-corruption program promoting transparency, accountability and good governance of public revenues from oil, gas and mining. In fact, in developing resource-rich countries, Haufler (2010) presents the promotion of global transparency as a solution to the poor governance experienced almost daily in the extractive sector. The EITI variable is a dummy variable which takes 1 the year in which the country adheres to the initiative and 0 otherwise. It is constructed on the basis of information received from the official EITI website[13].

To construct our **institutional quality** variable, we used a Principal Component Analysis (PCA). The variables used for the PCA are control of corruption, government effectiveness, rule of law, voice and accountability, regulatory quality and political stability and voice and accountability, all taken from the World Governance Indicators (WGI) database by the World Bank (Kaufmann et al., 2011). It is very important to take account of the institutions involved in the sharing of rents in the mining sector. Tax administrations in countries with poor institutions are notorious for their inefficiency in collecting taxes (Isham et al., 2005; Mehlum et al., 2006b).

Our **democracy** variable measures the level of democracy in the country. It ranges from -10 to 10. A country with a high value (+10) of this variable means that it is highly democratic. Conversely, a low value (-10) indicates an autocratic regime. It comes from the Center for Systemic Peace database set up by Marshall and Gurr (2020).

Table 4.2 presents the descriptive statistics for our different variables. Due to missing data from AETR, we lose some of our observations. Among all three types of mine, the low-grade mine has the highest average share of gold rents accruing to the State (0.61),

[13]It can be accessed via the following link: https://eiti.org/countries

followed by the medium- (0.44) and high-grade (0.40) mines. The standard deviation and the coefficient of dispersion around the average are respectively 0.17 and 27% for the low-grade mine, 0.08 and 19% for the medium-grade mine and 0.09 and 21% for the high-grade mine. This means that there is a slightly wide dispersion around the average of AETRs due to the high heterogeneity of the countries in the panel.

Table 4.2: Descriptive statistics

	(1)	(2)	(3)	(4)	(5)
	Obs	Mean	Std, dev,	Min	Max
AETR Low-grade	323	0.616	0.166	0.273	1.111
AETR Medium-grade	323	0.438	0.084	0.244	0.760
AETR High-grade	323	0.400	0.087	0.229	0.869
Presidential Election	400	0.176	0.310	0.000	1.000
Legislative Election	400	0.194	0.317	0.000	1.000
GDP per capita	400	1606.009	1704.625	322.440	7611.836
Foreign Aid	400	6.787	6.350	-0.188	62.187
Foreign Direct Investment	400	3.846	5.732	-11.197	46.275
Trade Openness	400	62.887	23.429	20.723	156.862
Inflation	400	15.453	132.431	-21.165	2630.123
Control of Corruption	380	-0.785	0.462	-1.541	0.550
Government Effectiveness	380	-0.836	0.465	-1.841	0.646
Political Stability	380	-0.769	0.742	-2.474	0.640
Regulatory Quality	380	-0.691	0.525	-2.202	0.820
Rule of Law	380	-0.813	0.521	-1.870	0.181
Voice and Accountability	380	-0.565	0.605	-1.734	0.746
Democracy	380	2.518	4.499	-6.000	9.000
EITI	400	0.445	0.498	0.000	1.000

Source: Authors.

4.3.2 Empirical strategy

The Spatial Model

Previous works on AETR of mining sector ignore its potential spatial autocorrelation. However, there are several reasons to think that AETR may be correlated across countries. The first and the obvious one is tax competition. Countries may lower their tax rate in response to their neighbors' behavior. As Keen and Konrad (2013) point out: "Like it or not, national tax policy makers are involved in a game with one another." The second reason is consequential to the first one. To restrict downward pressures on tax, countries may decide to coordinate instead of competing against each other. In this regards, transparency and best practices between neighboring countries can lead to a convergence in mining tax policies. If a country sees success with a particular tax structure for a specific resource, others in the region might adopt a similar approach. For instance, ECOWAS adopted its mining directive since 2009[14] and WAEMU has a mining code adopted in 2003 and revised in 2023[15]. The third reason is historical legacy. Colonial history can play a role. Former colonies might inherit similar legal system from their colonizers, leading to a spatial correlation across countries. Thirteen of the 20 countries of the sample are former French colonies (see the list of countries in appendix 4.6). Fourth, regions with similar geological formations are more likely to have the same types of minerals. Countries within such regions might implement similar mining tax structures based on the shared characteristics of the resources being extracted.

Regarding these reasons, we resort to a spatial model. Our goal is to assess the effect of elections on the AETR of mining rents while considering the potential spatial spillovers. Spatial econometrics provides several options for estimating spatial model. The spatial autoregressive model (SAR), the spatial error model (SEM), the spatial Durbin model (SDM) and the spatial autocorrelation model (SAC) among others. According to LeSage and Pace (2009) and Elhorst et al. (2014), the SDM is more convenient than both SAR and SEM model, hence we favor SDM in our empirical analysis. The SDM contain the SAR and the SEM, and provides a general starting point for spatial econometric analysis (LeSage and Pace, 2009). The SDM includes among the regressors the spatial lags for the explanatory variables and the dependent variable. It uses the marginal effects of the explanatory variables based on the SAR model in the nearby countries. However, we check the robustness of the results using alternative specifications. Following LeSage and Pace (2009), we construct the baseline regression model as follows:

$$AETR_{it} = \rho WAETR_{it} + \beta_1 Elect_{it} + \beta_2 WElect_{it} + \beta_X X_{it} + \lambda WX_{it} + \alpha_i + \varepsilon_{it} \quad (4.1)$$

[14] See itie-bf.bf/harmonisation for more information.
[15] See itie-bf.bf/reglement for more information.

where:

$AETR_{it}$ is the dependent variable for country i at year t. ρ is the spatial auto-regressive coefficient for the dependent variable. W is the spatial weights matrix, reflecting the spatial structure among the units. $Elect_{it}$ is our variable of interest, e.g., elections, for country i at year t. X_{it} is a vector of control variables for country i at year t. β_1 is the coefficient for the variable of interest. β_X represents the direct effect coefficients for the control variables. λ represents the coefficients for the spatial lag of the control variables, capturing the indirect effects of neighboring units' characteristics. α_i represents the fixed effects for country i, capturing unobserved heterogeneity across countries that does not vary over time. ε_{it} is the error term for unit i at time t.

Equation 4.1 is estimated by using Quasi Maximum Likelihood (QML) estimator. In a spatial setting, an explanatory variable change in a particular unit affects not only that unit but also its neighbors (LeSage and Pace, 2009). These effects are often referred to as contextual effects.

Spatial weights matrix

The selection of the spatial weighting is important in SDM since the model introduces the spatial lag terms using the spatial weights matrix in order to capture the spatial correlation of variables (LeSage and Pace, 2009; Chen et al., 2022). For the theoretical reasons behind the spatial model, we use contiguity weighting matrix in our baseline estimations. Our contiguity matrix Wij is defined as follow:

$$W_{ij} = \begin{cases} 1 & \text{if countries } i \text{ and } j \text{ are contiguous,} \\ 0 & \text{otherwise.} \end{cases}$$

However, for robustness purpose we will consider inverse distance matrix to check the sensitivity of our result to the choice of the weighting matrix. The inverse distance matrix mitigates the fact that not all neighbors are in the sample. The inverse distance matrix Mij is defined as follow:

$$M_{ij} = \begin{cases} \frac{1}{d_{ij}} & \text{if } i \neq j, \\ 0 & \text{if } i = j. \end{cases}$$

Here, d_{ij} represents the distance between countries i and j, and M_{ij} is set to 0 for all $i = j$ to avoid division by zero, assuming the distance from a country to itself is not relevant or is considered infinite.

4.4 Results and discussions

4.4.1 Baseline results

Table 4.3 presents our baseline results[16]. Our dependent variable is the average effective tax rate (AETR) of mining for low-grade scenario. We start by estimating a naïve equation (column 1) where we only include our variable of interest, the presidential election in our spatial autoregressive (SAR) model. The result show that the coefficient of the spatial lag is positive and significant at 1% threshold. It suggests that there is a spatial correlation in the AETR. In other words, countries with neighboring locations that have high levels of AETR are also likely to have high levels of AETR themselves. The direct effect of election is negative and significant while the indirect effect is positive and significant. In column 2, we challenge the naïve equation by including macroeconomic variables: GDP per capita, foreign aid (Official Development Aid), trade openness, foreign direct investment (FDI) in log terms and inflation. The direct effect of presidential election is still negative and significant at 1% threshold while the indirect effect is positive and significant at 1% threshold as well. From column (3) to (5), we respectively add the EITI membership, democracy index, and institutional quality. Our favorite specification is column (5) where we have all of our control variables included.

We find that presidential election exerts negative effect on AETR; the effect is strongly significant. This negative effect might operate through three mechanisms. First, elections can lead to policy shifts. The taxation of the mining sector is highly political in Africa (Bourgouin, 2011). As the election approach, the government may prioritize social programs or environmental concerns over maximizing mining revenue. This could result in lower taxes or royalties on mining companies, reducing the government's share of rents. Second, elections engender regulatory uncertainty. The lead-up to elections and potential changes in leadership can create uncertainty around regulations in the mining sector. Companies might delay investments or production, leading to lower overall mining activity and government revenue. The last mechanism is mining rents for votes. Politicians might prioritize short-term political gains by offering concessions to mining companies in exchange for campaign contributions or support from powerful mining lobbies. The neighboring effect of elections is positive and strongly significant. The coefficient is four time bigger than the coefficient of the direct effect in absolute term. Elections have positive spillovers effects on neighboring countries. Elections are major political risk in Africa (Cazals and Léon, 2023) where pre and post electoral war, instability and violence are common (Beaulieu, 2014; Flores and Nooruddin, 2012; Lars-Erik and Skrede, 2013; Collier and Vicente, 2012; Wahman and Goldring, 2020). As the elections in a given country approach the neighboring countries may benefit from the perceived risk on investment in

[16]The number of observations in the regressions is higher than the minimum because of the weighting matrix.

the mining sector in this country.

Most of the control variables are significant with the expected signs. For the direct effect, GDP per capita and trade openness are associated with less AETR. Less developed countries have less capacity to design tax policy. Also, countries openness to trade can mean less trade barriers, and hence lower level of taxation. Foreign aid, foreign direct investment and inflation are not significant determinant of AETR in the mining sector in Africa. As expected, EITI membership increase the AETR in the mining sector. EITI promotes good governance and transparency in the mining sector globally. The direct effect of democracy is not significant. Institutional quality is a composite index of all the six variables of world governance indicators namely voice and accountability, rule of law, political stability and absence of violence, government effectiveness, control of corruption and regulatory quality. Good institutional quality is positively associated with AETR. For the neighboring effects, the coefficient of GDP per capita positive but not significant. Foreign aid, trade openness and foreign direct investment exert negative spillover effects on the AETR in the mining sector. These three variables may signal competitive advantage for the receiving countries compared to the neighboring counterparts. Similarly, the EITI membership has negative and significant effect. EITI membership may constitute a comparative advantage; which favors the acceding country to the detriment of its neighbors. Democracy and institutional quality do not have neighboring effect. To justify the relevance of the choice of the spatial model we present results of a fixed effects model in Table 4.C5 in Appendix which ignores spatial interdependencies. The results show that the elections are not significant; a conclusion that would have been misleading given the results of the spatial model.

Table 4.4 presents the same specification as in Table 4.3 with legislative elections. The results show that legislative elections have neither direct nor indirect effects on the AETR. The control variables display similar results as the baseline results in Table 4.3. This result is not surprising for several reasons.

First, the legislative branch plays a major decision-making role in parliamentary systems. In contrast, in presidential systems, power is largely concentrated in the hands of the president. In our sample, only South Africa has a parliamentary system, while the other countries follow a presidential regime. In these systems, the concentration of decision-making power in the president's hands explains why presidential elections attract more attention than legislative elections. Consequently, lobbying activities in favor of a mining code favorable to investors are often more intense during presidential elections than during legislative ones. Similarly, the tendency to use mining legislation as a campaign tool is particularly high. In a similar study on the relationship between elections and taxation, Ehrhart (2013) analyzes presidential elections in presidential systems and legislative elections in parliamentary systems.

Second, the distribution of power in Africa is often so centralized that a change in

president is far more likely to significantly influence taxation than a legislative election, whose impact generally remains marginal. For this reason, We will focus on presidential elections in the remaining analyses. We now submit these baseline findings to a series of sensitivity analyses. First, is the effect of presidential elections conditional to the level of democracy, the EITI membership and the quality of institutions?

Table 4.3: Baseline results: Presidential elections

Dependent variable:	(1)		(2)		(3)		(4)		(5)	
AETR (Low-grade)	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx
Presidential election	-0.0335***	0.114***	-0.0316***	0.126***	-0.0298***	0.123***	-0.0333***	0.117***	-0.0271***	0.129***
	(0.0105)	(0.0230)	(0.00962)	(0.0209)	(0.00956)	(0.0208)	(0.00969)	(0.0211)	(0.0101)	(0.0223)
GDP per capita (log)			0.0157	0.0752	-0.0150	0.116	-0.0449	0.0957	-0.0830*	0.0240
			(0.0380)	(0.0660)	(0.0398)	(0.0846)	(0.0414)	(0.0849)	(0.0456)	(0.0923)
Foreign Aid (log)			-0.0160	-0.0545**	-0.00979	-0.0673**	-0.00508	-0.0778***	-0.00286	-0.0741**
			(0.0110)	(0.0260)	(0.0111)	(0.0266)	(0.0113)	(0.0274)	(0.0121)	(0.0300)
Trade Openness (log)			-0.0508***	-0.191***	-0.0609***	-0.178***	-0.0573***	-0.174***	-0.0688***	-0.220***
			(0.0173)	(0.0393)	(0.0177)	(0.0421)	(0.0175)	(0.0421)	(0.0192)	(0.0475)
Foreign Direct Investment (log)			6.00e-05	-0.0241***	0.000475	-0.0248***	-0.000813	-0.0236***	-0.00145	-0.0278***
			(0.00306)	(0.00682)	(0.00304)	(0.00676)	(0.00307)	(0.00683)	(0.00315)	(0.00719)
Inflation			-1.46e-05	6.63e-06	7.01e-06	0.000198	-3.99e-05	0.000156	-2.07e-05	4.82e-05
			(0.000100)	(0.000304)	(9.97e-05)	(0.000310)	(0.000103)	(0.000303)	(0.000102)	(0.000299)
AETR low-grade		0.724***		0.539***		0.545***		0.542***		0.481***
		(0.0382)		(0.0498)		(0.0495)		(0.0506)		(0.0606)
EITI					0.0408**	-0.0465*	0.0451***	-0.0925***	0.0500***	-0.0602*
					(0.0163)	(0.0273)	(0.0158)	(0.0287)	(0.0167)	(0.0333)
Democracy							0.00293	0.0146***	-9.62e-06	0.00852
							(0.00189)	(0.00534)	(0.00218)	(0.00659)
Institutional Quality									0.0435***	0.0589
									(0.0135)	(0.0377)
Constant	0.0414***		0.0335***		0.0331***		0.0334***		0.0339***	
	(0.00159)		(0.00123)		(0.00122)		(0.00127)		(0.00132)	
Observations	380	380	400	400	400	400	380	380	360	360
Number of groups	20	20	20	20	20	20	20	20	20	20
Log Likelihood	611.8	611.8	739.9	739.9	743.2	743.2	701.7	701.7	659.6	659.6
Chi-squared	424.7	424.7	518.5	518.5	536.2	536.2	531.5	531.5	523.8	523.8
Chi-squared-pvalue	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.4: Baseline results: Legislative elections

Dependent variable:	(1)		(2)		(3)		(4)		(5)	
AETR (Low-grade)	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx
Legislative election	-0.0294***	-0.0114	-0.00836	0.00233	-0.00798	-0.00298	-0.00859	-0.0119	-0.00539	-0.00442
	(0.00991)	(0.0244)	(0.00989)	(0.0260)	(0.00983)	(0.0263)	(0.0100)	(0.0267)	(0.0103)	(0.0276)
GDP per capita (log)			0.0255	0.0722	-0.0123	0.105	-0.0519	0.0782	-0.0851*	0.0305
			(0.0403)	(0.0707)	(0.0422)	(0.0923)	(0.0439)	(0.0926)	(0.0484)	(0.0999)
Foreign Aid (log)			-0.0126	-0.0566**	-0.00530	-0.0708**	-0.00195	-0.0785***	0.00187	-0.0839***
			(0.0116)	(0.0276)	(0.0117)	(0.0281)	(0.0119)	(0.0290)	(0.0128)	(0.0318)
Trade Openness (log)			-0.0478***	-0.195***	-0.0603***	-0.181***	-0.0562***	-0.174***	-0.0610***	-0.213***
			(0.0183)	(0.0434)	(0.0186)	(0.0453)	(0.0185)	(0.0454)	(0.0202)	(0.0512)
Foreign Direct Investment (log)			-0.000703	-0.0207***	-0.000111	-0.0219***	-0.00146	-0.0215***	-0.00180	-0.0236***
			(0.00327)	(0.00736)	(0.00324)	(0.00730)	(0.00328)	(0.00737)	(0.00336)	(0.00768)
Inflation			3.01e-05	-0.000319	5.63e-05	-8.51e-05	-1.30e-05	-8.59e-05	1.05e-05	-0.000152
			(0.000106)	(0.000320)	(0.000105)	(0.000326)	(0.000109)	(0.000320)	(0.000108)	(0.000316)
AETR low-grade		0.718***		0.542***		0.550***		0.542***		0.516***
		(0.0391)		(0.0501)		(0.0497)		(0.0511)		(0.0580)
EITI					0.0496***	-0.0497*	0.0547***	-0.0995***	0.0567***	-0.0787**
					(0.0172)	(0.0291)	(0.0168)	(0.0305)	(0.0178)	(0.0348)
Democracy							0.00406**	0.0161***	0.00157	0.0138**
							(0.00200)	(0.00560)	(0.00228)	(0.00675)
Institutional Quality									0.0423***	0.0196
									(0.0141)	(0.0381)
Constant	0.0429***		0.0354***		0.0350***		0.0353***		0.0359***	
	(0.00165)		(0.00131)		(0.00129)		(0.00134)		(0.00140)	
Observations	380	380	400	400	400	400	380	380	360	360
Number of groups	20	20	20	20	20	20	20	20	20	20
Log Likelihood	599.4	599.4	718.2	718.2	722.5	722.5	682	682	639.5	639.5
Chi-squared	369.2	369.2	420.7	420.7	441.2	441.2	437.8	437.8	432	432
Chi-squared-pvalue	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.4.2 Conditional effects of elections

Our goal here is to assess whether democracy, good institutions and transparency mitigate the adverse effect of elections on AETR. Table 4.5 presents the results of the conditional effect of presidential elections. We consider our last specification from the baseline results where we add a multiplicative term between elections and democracy (column 1), EITI membership (column 2), and institutional quality (column 3). We report the direct and indirect effect (Wx) for each specification. Our previous results still hold. AETR has spillover effects on neighboring countries. Elections exert direct negative effect on AETR, while the indirect effect is positive.

The coefficient associated with the interaction between elections and democracy is positive and strongly significant. This means that elections do not exert a negative effect on AETR when countries are democratic. In fact, the effect is even positive and significant even though the size of the coefficient is small. Democracy mitigates the political risk paused by elections in the sample countries. Countries should strengthen their democratic systems to dampen the political risks posed by elections. In columns (2) and (3), we replicate the same exercise with EITI membership and the quality of institutions respectively. Just like democracy, EITI membership and institutional quality contribute to mitigate the negative effect of elections. However, what institutions even matter?

4.4.3 Investigating the type of institutions

In the previous regressions, we use a composite index of the quality of institutions applying principal component analysis method for the six indicators (voice and accountability, rule of law, political stability and absence of violence, government effectiveness, control of corruption and regulatory quality). Now, we explore the specificity of each institution in Table 4.6. Our previous results hold. The results show that the institutions that matter foster government's AETR are control of corruption, government effectiveness and voice and accountability.

Table 4.5: Conditional effects of presidential elections

Dependent variable:	(1)		(2)		(3)	
AETR (Low-grade)	Direct	Wx	Direct	Wx	Direct	Wx
Presidential election	-0.0518***	0.124***	-0.0737***	0.127***	-0.0269***	0.127***
	(0.0131)	(0.0220)	(0.0233)	(0.0222)	(0.0100)	(0.0223)
GDP per capita (log)	-0.0713	-0.0209	-0.0861*	0.00662	-0.0721	-0.00315
	(0.0451)	(0.0922)	(0.0453)	(0.0919)	(0.0458)	(0.0932)
Foreign Aid (log)	-0.00345	-0.0851***	-0.00444	-0.0821***	-0.00236	-0.0757**
	(0.0120)	(0.0298)	(0.0121)	(0.0300)	(0.0121)	(0.0299)
Trade Openness (log)	-0.0668***	-0.214***	-0.0694***	-0.229***	-0.0690***	-0.214***
	(0.0189)	(0.0467)	(0.0191)	(0.0474)	(0.0191)	(0.0473)
Foreign Direct Investment (log)	-0.00132	-0.0284***	-0.00141	-0.0273***	-0.00142	-0.0287***
	(0.00310)	(0.00708)	(0.00313)	(0.00714)	(0.00314)	(0.00717)
Inflation	-1.12e-05	6.74e-05	1.26e-05	-2.92e-06	-2.36e-05	5.05e-05
	(0.000101)	(0.000295)	(0.000103)	(0.000298)	(0.000102)	(0.000298)
AETR low-grade		0.510***		0.481***		0.493***
		(0.0599)		(0.0604)		(0.0604)
EITI	0.0505***	-0.0576*	0.0354**	-0.0547*	0.0517***	-0.0556*
	(0.0164)	(0.0328)	(0.0178)	(0.0331)	(0.0166)	(0.0332)
Democracy	-0.00132	0.0103	8.08e-05	0.00935	-0.000177	0.00790
	(0.00219)	(0.00651)	(0.00216)	(0.00655)	(0.00217)	(0.00656)
Institutional Quality	0.0429***	0.0458	0.0455***	0.0565	0.0409***	0.0583
	(0.0133)	(0.0373)	(0.0134)	(0.0375)	(0.0135)	(0.0375)
ElectionXDemocracy	0.00682***					
	(0.00238)					
ElectionXEITI			0.0572**			
			(0.0258)			
ElectionXInstitution					0.0172*	
					(0.0104)	
Constant	0.0334***		0.0337***		0.0338***	
	(0.00131)		(0.00131)		(0.00132)	
Observations	360	360	360	360	360	360
Number of countries	20	20	20	20	20	20
Log Likelihood	663.6	663.6	662.1	662.1	661	661
Chi-squared	550.2	550.2	536.5	536.5	533	533
Chi-squared-pvalue	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.6: The type of institutions

Dependent variable:	(1)		(2)		(3)		(4)		(5)		(6)	
AETR (Low-grade)	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx
Presidential election	-0.0308***	0.113***	-0.0331***	0.118***	-0.0340***	0.118***	-0.0345***	0.116***	-0.0330***	0.117***	-0.0271***	0.129***
	(0.00991)	(0.0216)	(0.00983)	(0.0214)	(0.00989)	(0.0216)	(0.00991)	(0.0216)	(0.00991)	(0.0217)	(0.0101)	(0.0223)
GDP per capita (log)	-0.0721	-0.00559	-0.0634	0.0421	-0.0408	0.112	-0.0283	0.135	-0.0531	0.0917	-0.0830*	0.0240
	(0.0459)	(0.101)	(0.0449)	(0.0948)	(0.0451)	(0.0934)	(0.0460)	(0.0923)	(0.0476)	(0.0900)	(0.0456)	(0.0923)
Foreign Aid (log)	-0.00608	-0.0756***	-0.00302	-0.0717**	-0.00429	-0.0702**	-0.00440	-0.0797***	-0.00186	-0.0836***	-0.00286	-0.0741**
	(0.0120)	(0.0289)	(0.0119)	(0.0295)	(0.0121)	(0.0304)	(0.0121)	(0.0291)	(0.0124)	(0.0296)	(0.0121)	(0.0300)
Trade Openness (log)	-0.0592***	-0.197***	-0.0592***	-0.194***	-0.0660***	-0.166***	-0.0540***	-0.136***	-0.0570***	-0.177***	-0.0688***	-0.220***
	(0.0198)	(0.0454)	(0.0190)	(0.0449)	(0.0189)	(0.0459)	(0.0200)	(0.0503)	(0.0193)	(0.0450)	(0.0192)	(0.0475)
Foreign Direct Investment (log)	0.000217	-0.0238***	-0.00107	-0.0240***	-0.000498	-0.0246***	-0.000850	-0.0245***	-0.000757	-0.0229***	-0.00145	-0.0278***
	(0.00315)	(0.00699)	(0.00313)	(0.00709)	(0.00315)	(0.00708)	(0.00319)	(0.00701)	(0.00315)	(0.00708)	(0.00315)	(0.00719)
Inflation	-3.50e-05	0.000130	1.05e-05	0.000300	-1.93e-05	0.000206	-1.29e-05	0.000272	-1.24e-05	0.000174	-2.07e-05	4.82e-05
	(0.000103)	(0.000298)	(0.000102)	(0.000298)	(0.000102)	(0.000301)	(0.000103)	(0.000301)	(0.000103)	(0.000301)	(0.000102)	(0.000299)
EITI	0.0627***	-0.0805***	0.0702***	-0.0869***	0.0527***	-0.0933***	0.0477***	-0.109***	0.0521***	-0.0990***	0.0500***	-0.0602*
	(0.0174)	(0.0309)	(0.0181)	(0.0325)	(0.0167)	(0.0329)	(0.0168)	(0.0306)	(0.0168)	(0.0322)	(0.0167)	(0.0333)
Democracy	0.00252	0.0135**	0.00280	0.0136**	0.00312	0.0127**	0.00303	0.0135**	0.00241	0.0155***	-9.62e-06	0.00852
	(0.00200)	(0.00557)	(0.00199)	(0.00551)	(0.00202)	(0.00591)	(0.00201)	(0.00575)	(0.00208)	(0.00596)	(0.00218)	(0.00659)
AETR low-grade		0.507***		0.541***		0.544***		0.533***		0.545***		0.481***
		(0.0579)		(0.0524)		(0.0527)		(0.0528)		(0.0524)		(0.0606)
Control of Corruption	0.0665***	0.0886										
	(0.0239)	(0.0748)										
Government Effectiveness			0.0747***	0.0578								
			(0.0274)	(0.0888)								
Political Stability					-0.0104	0.0206						
					(0.00898)	(0.0241)						
Regulatory Quality							-0.0243	-0.0929				
							(0.0210)	(0.0792)				
Rule of Law									0.0212	-0.0172		
									(0.0224)	(0.0696)		
Voice and Accountability											0.0720***	0.0976
											(0.0223)	(0.0625)
Constant	0.0340***		0.0339***		0.0341***		0.0341***		0.0342***		0.0339***	
	(0.00133)		(0.00132)		(0.00133)		(0.00133)		(0.00133)		(0.00132)	
Observations	360	360	360	360	360	360	360	360	360	360	360	360
Number of countries	20	20	20	20	20	20	20	20	20	20	20	20
Log Likelihood	658	658	657.8	657.8	655.2	655.2	655.4	655.4	654.8	654.8	659.6	659.6
pseudo-R-squared	0.157	0.157	0.147	0.147	0.103	0.103	0.214	0.214	0.123	0.123	0.157	0.157
Chi-squared	520.2	520.2	526.8	526.8	513.7	513.7	512.5	512.5	511.8	511.8	523.8	523.8
Chi-squared-pvalue	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.5 Robustness checks

4.5.1 Sensitivity to the weighting matrix

While implementing spatial regressions, the common treat is the sensitivity of the results to the spatial weighting matrix. Our spatial weighting matrix being a contiguity matrix in the baseline results, we test the sensitivity of the results by using an inverse distance weighting matrix. Table 4.7 presents the results. They are similar to the baseline results. The spatial lag is positive and strongly significant which justify the choice of a spatial specification. The direct effect of presidential elections remains negative and significant while the indirect effect is positive and significant. The signs and significance of the control variables are similar to the previous results. Our findings are not driven by the choice of the spatial weighting matrix.

4.5.2 Sensitivity to mining grade

The calculation of the AETR is based on assumption on mining grade. In our baseline estimations we use AETR of low-grade mine. We relax this assumption by considering medium- and high-grade mines. The results are respectively in Tables 4.8 and 4.9. The results remain the same. Elections have negative effect on the AETR and a positive effect on neighboring countries. The spatial spillovers of medium- and high-grade mines are however low compared to low-grade mine.

Table 4.7: Robustness: Inverse distance matrix

Dependent variable:	(1)		(2)		(3)		(4)		(5)	
AETR (Low-grade)	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx
Presidential election	-0.0270***	0.0929***	-0.0309***	0.121***	-0.0293***	0.124***	-0.0322***	0.0911***	-0.0217**	0.179***
	(0.00968)	(0.0299)	(0.00899)	(0.0320)	(0.00892)	(0.0324)	(0.00907)	(0.0352)	(0.00968)	(0.0419)
GDP per capita (log)			-0.0219	-0.00111	-0.0292	0.00690	-0.0304	-0.183	-0.0702	-0.252*
			(0.0388)	(0.0964)	(0.0389)	(0.128)	(0.0391)	(0.149)	(0.0440)	(0.153)
Foreign Aid (log)			-0.0237**	-0.0643	-0.0191**	-0.0986*	-0.0131	-0.167***	-0.0204**	-0.161***
			(0.00948)	(0.0458)	(0.00955)	(0.0517)	(0.00969)	(0.0570)	(0.0102)	(0.0589)
Trade Openness (log)			-0.00856	-0.271***	-0.0144	-0.239***	-0.0146	-0.222***	-0.0384**	-0.248***
			(0.0168)	(0.0523)	(0.0173)	(0.0747)	(0.0172)	(0.0750)	(0.0191)	(0.0825)
Foreign Direct Investment (log)			-0.00129	-0.0149*	-6.84e-05	-0.0169*	-0.000724	-0.0179**	-0.00322	-0.0364***
			(0.00288)	(0.00876)	(0.00300)	(0.00871)	(0.00304)	(0.00877)	(0.00314)	(0.00997)
Inflation			-1.25e-06	-0.000684	2.84e-05	-0.000677	4.36e-05	0.000189	-2.05e-05	-0.000483
			(9.04e-05)	(0.000555)	(9.10e-05)	(0.000618)	(9.28e-05)	(0.000703)	(9.23e-05)	(0.000722)
AETR low-grade		0.801***		0.562***		0.572***		0.532***		0.318***
		(0.0325)		(0.0582)		(0.0576)		(0.0638)		(0.0919)
EITI					0.0404**	-0.0611	0.0419***	-0.160***	0.0615***	-0.0800
					(0.0159)	(0.0545)	(0.0162)	(0.0617)	(0.0171)	(0.0678)
Democracy							0.00394*	0.0385***	5.66e-05	-0.00669
							(0.00216)	(0.0145)	(0.00256)	(0.0187)
Institutional Quality									0.0155	0.248***
									(0.0129)	(0.0600)
Constant	0.0384***		0.0314***		0.0311***		0.0314***		0.0318***	
	(0.00146)		(0.00115)		(0.00114)		(0.00118)		(0.00122)	
Observations	380	380	400	400	400	400	380	380	360	360
Number of groups	20	20	20	20	20	20	20	20	20	20
Log Likelihood	644.9	644.9	769.3	769.3	773	773	729.3	729.3	688.9	688.9
Chi-squared	680.8	680.8	655.7	655.7	678.9	678.9	659	659	657.6	657.6
Chi-squared-pvalue	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.8: Robustness: Medium-grade mine

Dependent variable: AETR (Medium-grade)	(1)		(2)		(3)		(4)		(5)	
	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx
Presidential election	-0.0184**	0.0680***	-0.0158**	0.0857***	-0.0131**	0.0861***	-0.0126**	0.0857***	-0.0129**	0.0823***
	(0.00796)	(0.0172)	(0.00637)	(0.0137)	(0.00623)	(0.0134)	(0.00620)	(0.0133)	(0.00638)	(0.0139)
GDP per capita (log)			-0.0280	0.140***	-0.0411	0.281***	-0.0420	0.298***	-0.0492*	0.315***
			(0.0250)	(0.0427)	(0.0258)	(0.0549)	(0.0263)	(0.0540)	(0.0288)	(0.0590)
Foreign Aid (log)			-0.0179**	-0.00275	-0.0130*	-0.0222	-0.00801	-0.0235	-0.00440	-0.0326*
			(0.00720)	(0.0171)	(0.00718)	(0.0172)	(0.00716)	(0.0173)	(0.00766)	(0.0190)
Trade Openness (log)			-0.0270**	-0.0981***	-0.0315***	-0.0575**	-0.0371***	-0.0583**	-0.0362***	-0.0590**
			(0.0113)	(0.0248)	(0.0113)	(0.0261)	(0.0110)	(0.0256)	(0.0119)	(0.0276)
Foreign Direct Investment (log)			-0.000907	-0.0196***	-0.000386	-0.0199***	-0.000871	-0.0189***	-0.000474	-0.0179***
			(0.00203)	(0.00448)	(0.00198)	(0.00437)	(0.00195)	(0.00432)	(0.00200)	(0.00450)
Inflation			-2.58e-05	0.000324	-2.26e-05	0.000455**	-4.64e-05	0.000471**	-1.58e-05	0.000436**
			(6.58e-05)	(0.000200)	(6.44e-05)	(0.000200)	(6.53e-05)	(0.000192)	(6.44e-05)	(0.000189)
AETR medium-grade		0.247***		0.00480		-0.0257		-0.0336		0.000762
		(0.0710)		(0.0769)		(0.0775)		(0.0795)		(0.0846)
EITI					0.0242**	-0.0802***	0.0369***	-0.0973***	0.0383***	-0.103***
					(0.0106)	(0.0177)	(0.0101)	(0.0181)	(0.0106)	(0.0208)
Democracy							0.000987	0.00175	0.000271	0.00448
							(0.00120)	(0.00335)	(0.00137)	(0.00413)
Institutional Quality									0.0131	-0.0323
									(0.00826)	(0.0219)
Constant	0.0314***		0.0220***		0.0214***		0.0211***		0.0214***	
	(0.00117)		(0.000798)		(0.000777)		(0.000786)		(0.000821)	
Observations	380	380	400	400	400	400	380	380	360	360
Number of groups	20	20	20	20	20	20	20	20	20	20
Log Likelihood	733.3	733.3	911.3	911.3	921.4	921.4	878.3	878.3	824.4	824.4
Chi-squared	32.84	32.84	140.6	140.6	169	169	202.5	202.5	205.8	205.8
Chi-squared-pvalue	3.48e-07	3.48e-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.9: Robustness: High-grade mine

Dependent variable: AETR (High-grade)	(1)		(2)		(3)		(4)		(5)	
	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx
Presidential election	-0.0193**	0.0576***	-0.0182**	0.0831***	-0.0155**	0.0835***	-0.0139*	0.0849***	-0.0160**	0.0753***
	(0.00898)	(0.0194)	(0.00723)	(0.0155)	(0.00709)	(0.0152)	(0.00710)	(0.0152)	(0.00718)	(0.0156)
GDP per capita (log)			-0.0421	0.147***	-0.0529*	0.302***	-0.0460	0.335***	-0.0378	0.420***
			(0.0285)	(0.0481)	(0.0296)	(0.0617)	(0.0303)	(0.0611)	(0.0331)	(0.0672)
Foreign Aid (log)			-0.0157*	0.0211	-0.0109	0.000866	-0.00570	0.00507	-0.000987	-0.0158
			(0.00821)	(0.0195)	(0.00821)	(0.0197)	(0.00822)	(0.0199)	(0.00871)	(0.0216)
Trade Openness (log)			-0.0150	-0.0461*	-0.0183	0.000739	-0.0277**	-0.00518	-0.0216	0.00744
			(0.0128)	(0.0274)	(0.0129)	(0.0294)	(0.0127)	(0.0288)	(0.0135)	(0.0304)
Foreign Direct Investment (log)			-0.000686	-0.0207***	-0.000126	-0.0209***	-0.000448	-0.0197***	0.000292	-0.0160***
			(0.00231)	(0.00510)	(0.00226)	(0.00499)	(0.00224)	(0.00496)	(0.00227)	(0.00511)
Inflation			-3.55e-05	0.000425*	-3.44e-05	0.000552**	-5.24e-05	0.000604***	-1.46e-05	0.000590***
			(7.50e-05)	(0.000228)	(7.36e-05)	(0.000229)	(7.50e-05)	(0.000220)	(7.33e-05)	(0.000215)
AETR high-grade		0.0417		-0.0854		-0.115		-0.123		-0.104
		(0.0811)		(0.0828)		(0.0833)		(0.0857)		(0.0886)
EITI					0.0224*	-0.0859***	0.0391***	-0.0930***	0.0380***	-0.126***
					(0.0121)	(0.0202)	(0.0116)	(0.0207)	(0.0121)	(0.0237)
Democracy							0.000565	-0.00222	0.00109	0.00684
							(0.00138)	(0.00384)	(0.00155)	(0.00468)
Institutional Quality									-0.00236	-0.0887***
									(0.00950)	(0.0242)
Constant	0.0355***		0.0251***		0.0245***		0.0242***		0.0244***	
	(0.00132)		(0.000910)		(0.000889)		(0.000905)		(0.000936)	
Observations	380	380	400	400	400	400	380	380	360	360
Number of groups	20	20	20	20	20	20	20	20	20	20
Log Likelihood	690.7	690.7	861.3	861.3	870.1	870.1	827.8	827.8	779.8	779.8
Chi-squared	13.23	13.23	70.45	70.45	91.98	91.98	116.5	116.5	130.8	130.8
Chi-squared-pvalue	0.00416	0.00416	6.64e-10	6.64e-10	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.6 Conclusion

Mining resources often become a topic of debate during elections in Africa. However, empirical studies on the link between mining resources and rent distribution remain scant. This chapter addresses this gap by investigating the effect of elections on the average effective tax rate (AETR) of the mining sector, defined as the share of gold rents accruing to the State at a given gold price, in Africa.

We rely on a sample of 20 gold-producing countries in Africa using the FERDI database over the period 2000-2020 (Laporte et al., 2015; Laporte and de Quatrebarbes, 2015; Laporte et al., 2022). To take into account the potential spillover effects of the taxation of mining rents, we use a Spatial Durbin Model approach (LeSage and Pace, 2009).

The results are threefold: (i) mining taxation exhibit spatial spillovers across countries in the sample. (ii) Presidential elections negatively affect the AETR. However, the effects on neighboring countries are positive, implying positive externalities on neighboring countries. This result is only observed for presidential elections, but not legislative ones. (iii) We find that the negative impact of elections is conditional on the level of democracy, transparency and quality of institutions. In democratic countries, the effect of elections on the AETR is positive. Transparency, in particular membership of the EITI, and the quality of institutions attenuated the negative effect of elections. Institutions that matter for improving the government's share of rents are corruption control, government efficiency and voice and accountability. Indeed, good governance of the mining sector implies informed citizens who hold their rulers to account, as well as the control of corruption. In addition, the administrative capacity of government is important for the sharing of rents.

Regulatory bodies must pay special attention to mining regulation during election periods in Africa. The chapter stresses the need to account for the spillover effects in work on the sharing of mining rents.

Appendix C

Country list: Burkina Faso; Cameroon; Democratic Republic of Congo; Republic of Congo; Côte d'Ivoire; Gabon; Ghana; Guinea; Kenya; Madagascar; Mali; Mauritania; Niger; Nigeria; Senegal; Sierra Leonne; South Africa; Tanzania; Chad and Zimbabwe.

Table 4.C1: Conditional effect with inverse distance matrix

Dependent variable:	(1)		(2)		(3)	
AETR (Low-grade)	Direct	Wx	Direct	Wx	Direct	Wx
Presidential election	-0.0406***	0.192***	-0.0475**	0.180***	-0.0214**	0.183***
	(0.0122)	(0.0418)	(0.0217)	(0.0419)	(0.00969)	(0.0424)
GDP per capita (log)	-0.0655	-0.271*	-0.0722	-0.267*	-0.0675	-0.257*
	(0.0436)	(0.152)	(0.0439)	(0.153)	(0.0442)	(0.153)
Foreign Aid (log)	-0.0220**	-0.165***	-0.0218**	-0.170***	-0.0204**	-0.159***
	(0.0101)	(0.0584)	(0.0102)	(0.0591)	(0.0102)	(0.0589)
Trade Openness (log)	-0.0391**	-0.237***	-0.0393**	-0.247***	-0.0390**	-0.246***
	(0.0189)	(0.0818)	(0.0191)	(0.0823)	(0.0191)	(0.0824)
Foreign Direct Investment (log)	-0.00328	-0.0387***	-0.00321	-0.0367***	-0.00329	-0.0368***
	(0.00311)	(0.00992)	(0.00313)	(0.00995)	(0.00314)	(0.00999)
Inflation	-2.84e-05	-0.000459	-7.21e-06	-0.000596	-2.47e-05	-0.000481
	(9.15e-05)	(0.000715)	(9.26e-05)	(0.000725)	(9.25e-05)	(0.000722)
EITI	0.0616***	-0.0766	0.0531***	-0.0765	0.0623***	-0.0758
	(0.0170)	(0.0672)	(0.0182)	(0.0677)	(0.0172)	(0.0681)
Democracy	-0.00122	-0.00646	-0.000173	-0.00808	-4.59e-05	-0.00754
	(0.00259)	(0.0185)	(0.00256)	(0.0187)	(0.00257)	(0.0187)
Institutional Quality	0.0162	0.242***	0.0170	0.253***	0.0149	0.248***
	(0.0128)	(0.0595)	(0.0129)	(0.0601)	(0.0129)	(0.0600)
AETR low-grade		0.326***		0.313***		0.317***
		(0.0910)		(0.0920)		(0.0918)
ElectionXDemocracy	0.00558**					
	(0.00222)					
ElectionXEITI			0.0324			
			(0.0244)			
ElectionXInstitution					0.00607	
					(0.00976)	
Constant	0.0315***		0.0317***		0.0317***	
	(0.00121)		(0.00122)		(0.00122)	
Observations	360	360	360	360	360	360
Number of countries	20	20	20	20	20	20
Log Likelihood	692	692	689.8	689.8	689.1	689.1
pseudo-R-squared	0.0858	0.0858	0.0857	0.0857	0.0857	0.0857
Chi-squared	676.7	676.7	662.5	662.5	658.7	658.7
Chi-squared-pvalue	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

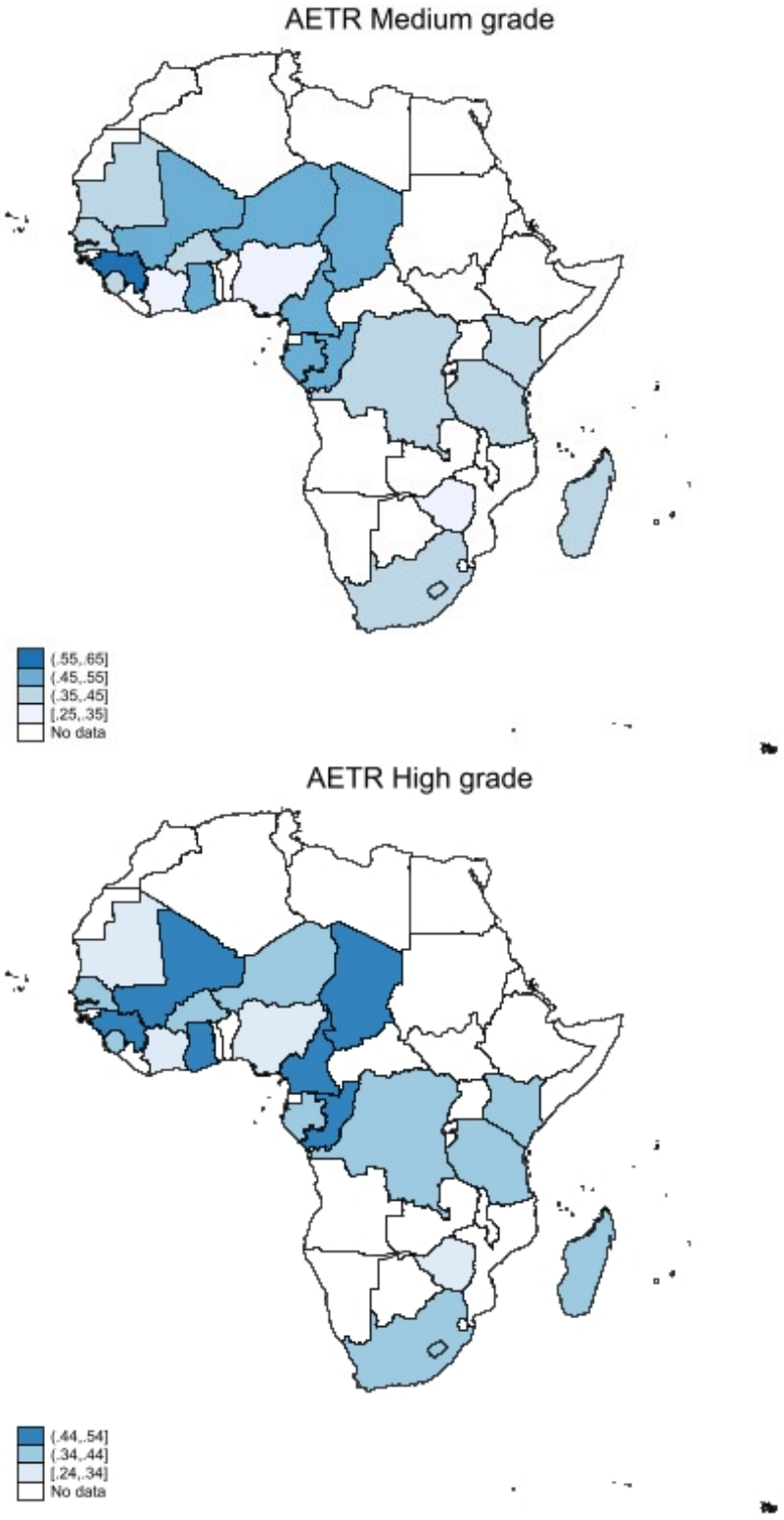


Figure 4.C1: Spatial display of Average effective tax rate

Table 4.C2: Type of institutions with inverse distance matrix

Dependent variable:	(1)		(2)		(3)		(4)		(5)		(6)	
AETR (Low-grade)	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx
Presidential election	-0.0287***	0.0800**	-0.0301***	0.0993***	-0.0328***	0.0866**	-0.0329***	0.0800**	-0.0307***	0.0901**	-0.0217**	0.179***
	(0.00917)	(0.0349)	(0.00925)	(0.0355)	(0.00914)	(0.0350)	(0.00927)	(0.0358)	(0.00929)	(0.0356)	(0.00968)	(0.0419)
GDP per capita (log)	-0.0779*	-0.401**	-0.0677	-0.403**	-0.0332	-0.0348	-0.0565	-0.292*	-0.0736	-0.380**	-0.0702	-0.252*
	(0.0428)	(0.162)	(0.0425)	(0.160)	(0.0419)	(0.158)	(0.0454)	(0.162)	(0.0449)	(0.165)	(0.0440)	(0.153)
Foreign Aid (log)	-0.0152	-0.179***	-0.0111	-0.150**	-0.0216**	-0.127**	-0.0127	-0.154**	-0.0190*	-0.185***	-0.0204**	-0.161***
	(0.00991)	(0.0587)	(0.00995)	(0.0592)	(0.0102)	(0.0591)	(0.0101)	(0.0604)	(0.0104)	(0.0604)	(0.0102)	(0.0589)
Trade Openness (log)	-0.00593	-0.317***	-0.0158	-0.313***	-0.0451**	-0.314***	-0.0241	-0.355***	-0.0116	-0.231***	-0.0384**	-0.248***
	(0.0190)	(0.0819)	(0.0184)	(0.0819)	(0.0198)	(0.0897)	(0.0200)	(0.112)	(0.0190)	(0.0822)	(0.0191)	(0.0825)
Foreign Direct Investment (log)	-0.00102	-0.0196**	-0.00206	-0.0189**	-0.000130	-0.0179**	-0.000506	-0.0130	-0.000920	-0.0205**	-0.00322	-0.0364***
	(0.00306)	(0.00900)	(0.00307)	(0.00896)	(0.00307)	(0.00888)	(0.00319)	(0.00959)	(0.00311)	(0.00909)	(0.00314)	(0.00997)
Inflation	6.28e-05	0.000158	9.15e-05	0.000238	4.71e-05	0.000872	5.48e-05	0.000429	6.23e-05	0.000314	-2.05e-05	-0.000483
	(9.11e-05)	(0.000720)	(9.15e-05)	(0.000699)	(9.10e-05)	(0.000704)	(9.20e-05)	(0.000695)	(9.15e-05)	(0.000701)	(9.23e-05)	(0.000722)
EITI	0.0617***	-0.123*	0.0761***	-0.0886	0.0601***	-0.0976	0.0525***	-0.142**	0.0625***	-0.115*	0.0615***	-0.0800
	(0.0171)	(0.0649)	(0.0180)	(0.0692)	(0.0172)	(0.0683)	(0.0173)	(0.0666)	(0.0178)	(0.0673)	(0.0171)	(0.0678)
Democracy	0.00388*	0.0428***	0.00449**	0.0391***	0.00336	0.0193	0.00484**	0.0468***	0.00210	0.0240	5.66e-05	-0.00669
	(0.00221)	(0.0149)	(0.00222)	(0.0149)	(0.00229)	(0.0160)	(0.00227)	(0.0153)	(0.00241)	(0.0167)	(0.00256)	(0.0187)
AETR low-grade		0.444***		0.453***		0.475***		0.522***		0.464***		0.318***
		(0.0780)		(0.0747)		(0.0725)		(0.0669)		(0.0744)		(0.0919)
Control of Corruption	0.0940***	0.106										
	(0.0207)	(0.104)										
Government Effectiveness			0.0984***	0.333**								
			(0.0243)	(0.156)								
Political Stability					-0.0152*	0.184***						
					(0.00819)	(0.0508)						
Regulatory Quality							0.0295	0.181				
							(0.0227)	(0.141)				
Rule of Law									0.0513**	0.337**		
									(0.0227)	(0.144)		
Voice and Accountability											0.0256	0.411***
											(0.0213)	(0.0994)
Constant	0.0315***		0.0316***		0.0316***		0.0322***		0.0320***		0.0318***	
	(0.00121)		(0.00122)		(0.00122)		(0.00124)		(0.00124)		(0.00122)	
Observations	360	360	360	360	360	360	360	360	360	360	360	360
Number of countries	20	20	20	20	20	20	20	20	20	20	20	20
Log Likelihood	690.3	690.3	688.6	688.6	687.9	687.9	681.1	681.1	683.6	683.6	688.9	688.9
pseudo-R-squared	0.0876	0.0876	0.0875	0.0875	0.0825	0.0825	0.0873	0.0873	0.0877	0.0877	0.0861	0.0861
Chi-squared	675.5	675.5	666.5	666.5	665	665	632.1	632.1	638.2	638.2	657.6	657.6
Chi-squared-pvalue	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.C3: Type of institutions with medium-grade mine

Dependent variable:	(1)		(2)		(3)		(4)		(5)		(6)	
AETR (Medium-grade)	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx
Presidential election	-0.0104*	0.0828***	-0.0133**	0.0853***	-0.0128**	0.0868***	-0.0134**	0.0845***	-0.0125**	0.0866***	-0.0129**	0.0823***
	(0.00626)	(0.0134)	(0.00627)	(0.0135)	(0.00633)	(0.0136)	(0.00629)	(0.0135)	(0.00634)	(0.0137)	(0.00638)	(0.0139)
GDP per capita (log)	-0.0588**	0.215***	-0.0382	0.336***	-0.0342	0.288***	-0.0238	0.346***	-0.0394	0.306***	-0.0492*	0.315***
	(0.0284)	(0.0626)	(0.0285)	(0.0607)	(0.0286)	(0.0588)	(0.0291)	(0.0582)	(0.0302)	(0.0573)	(0.0288)	(0.0590)
Foreign Aid (log)	-0.00940	-0.0185	-0.00707	-0.0295	-0.00683	-0.0245	-0.00791	-0.0241	-0.00625	-0.0246	-0.00440	-0.0326*
	(0.00748)	(0.0180)	(0.00752)	(0.0186)	(0.00762)	(0.0192)	(0.00755)	(0.0182)	(0.00781)	(0.0187)	(0.00766)	(0.0190)
Trade Openness (log)	-0.0381***	-0.0739***	-0.0330***	-0.0623**	-0.0407***	-0.0514*	-0.0301**	-0.0221	-0.0389***	-0.0627**	-0.0362***	-0.0590**
	(0.0122)	(0.0271)	(0.0119)	(0.0271)	(0.0119)	(0.0276)	(0.0125)	(0.0309)	(0.0122)	(0.0274)	(0.0119)	(0.0276)
Foreign Direct Investment (log)	-9.39e-05	-0.0190***	-0.00105	-0.0166***	-0.000590	-0.0185***	-0.00122	-0.0195***	-0.000780	-0.0184***	-0.000474	-0.0179***
	(0.00197)	(0.00435)	(0.00198)	(0.00446)	(0.00200)	(0.00447)	(0.00201)	(0.00439)	(0.00200)	(0.00448)	(0.00200)	(0.00450)
Inflation	-4.44e-05	0.000419**	-1.47e-05	0.000458**	-4.05e-05	0.000440**	-1.98e-05	0.000548***	-2.83e-05	0.000458**	-1.58e-05	0.000436**
	(6.41e-05)	(0.000185)	(6.42e-05)	(0.000188)	(6.46e-05)	(0.000190)	(6.42e-05)	(0.000188)	(6.47e-05)	(0.000190)	(6.44e-05)	(0.000189)
EITI	0.0491***	-0.0814***	0.0426***	-0.115***	0.0409***	-0.106***	0.0367***	-0.108***	0.0402***	-0.101***	0.0383***	-0.103***
	(0.0108)	(0.0193)	(0.0116)	(0.0205)	(0.0107)	(0.0208)	(0.0107)	(0.0191)	(0.0107)	(0.0203)	(0.0106)	(0.0208)
Democracy	0.000379	-0.000154	0.000947	0.00146	0.00106	0.00186	0.000915	-0.000605	0.000690	0.00223	0.000271	0.00448
	(0.00125)	(0.00346)	(0.00126)	(0.00345)	(0.00128)	(0.00371)	(0.00126)	(0.00359)	(0.00132)	(0.00375)	(0.00137)	(0.00413)
AETR medium-grade		-0.0999		-0.0134		-0.0389		-0.0596		-0.0318		0.000762
		(0.0891)		(0.0821)		(0.0821)		(0.0824)		(0.0830)		(0.0846)
Control of Corruption	0.0529***	0.0812*										
	(0.0147)	(0.0465)										
Government Effectiveness			0.0195	-0.119**								
			(0.0173)	(0.0555)								
Political Stability					-0.00750	-0.00755						
					(0.00564)	(0.0151)						
Regulatory Quality							-0.0143	-0.112**				
							(0.0132)	(0.0494)				
Rule of Law									0.00470	-0.0210		
									(0.0141)	(0.0441)		
Voice and Accountability											0.0217	-0.0534
											(0.0137)	(0.0363)
Constant	0.0212***		0.0213***		0.0215***		0.0214***		0.0216***		0.0214***	
	(0.000812)		(0.000818)		(0.000826)		(0.000821)		(0.000827)		(0.000821)	
Observations	360	360	360	360	360	360	360	360	360	360	360	360
Number of countries	20	20	20	20	20	20	20	20	20	20	20	20
Log Likelihood	828.2	828.2	825.8	825.8	822.6	822.6	824.7	824.7	821.9	821.9	824.4	824.4
pseudo-R-squared	0.215	0.215	0.201	0.201	0.198	0.198	0.198	0.198	0.200	0.200	0.200	0.200
Chi-squared	218.6	218.6	210.3	210.3	200.2	200.2	206.8	206.8	197.9	197.9	205.8	205.8
Chi-squared-pvalue	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.C4: Type of institutions with high-grade mine

Dependent variable:	(1)		(2)		(3)		(4)		(5)		(6)	
AETR (High-grade)	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx
Presidential election	-0.0127*	0.0823***	-0.0144**	0.0846***	-0.0136*	0.0859***	-0.0146**	0.0837***	-0.0138*	0.0858***	-0.0160**	0.0753***
	(0.00724)	(0.0156)	(0.00715)	(0.0153)	(0.00721)	(0.0155)	(0.00725)	(0.0156)	(0.00728)	(0.0157)	(0.00718)	(0.0156)
GDP per capita (log)	-0.0561*	0.281***	-0.0294	0.428***	-0.0328	0.293***	-0.0320	0.369***	-0.0425	0.340***	-0.0378	0.420***
	(0.0332)	(0.0730)	(0.0328)	(0.0689)	(0.0330)	(0.0659)	(0.0338)	(0.0659)	(0.0349)	(0.0650)	(0.0331)	(0.0672)
Foreign Aid (log)	-0.00664	0.00779	-0.00525	-0.00985	-0.00355	-0.00565	-0.00564	0.00408	-0.00420	0.00313	-0.000987	-0.0158
	(0.00871)	(0.0211)	(0.00861)	(0.0213)	(0.00873)	(0.0220)	(0.00874)	(0.0212)	(0.00899)	(0.0217)	(0.00871)	(0.0216)
Trade Openness (log)	-0.0267*	-0.0168	-0.0212	-0.000787	-0.0287**	0.00827	-0.0224	0.0243	-0.0296**	-0.00910	-0.0216	0.00744
	(0.0141)	(0.0311)	(0.0136)	(0.0304)	(0.0136)	(0.0309)	(0.0145)	(0.0353)	(0.0140)	(0.0310)	(0.0135)	(0.0304)
Foreign Direct Investment (log)	0.000223	-0.0195***	-0.000675	-0.0160***	-0.000115	-0.0181***	-0.000654	-0.0201***	-0.000321	-0.0192***	0.000292	-0.0160***
	(0.00230)	(0.00507)	(0.00227)	(0.00510)	(0.00229)	(0.00511)	(0.00232)	(0.00508)	(0.00231)	(0.00515)	(0.00227)	(0.00511)
Inflation	-4.33e-05	0.000540**	-3.07e-05	0.000494**	-6.00e-05	0.000491**	-3.06e-05	0.000631***	-3.70e-05	0.000557**	-1.46e-05	0.000590***
	(7.47e-05)	(0.000216)	(7.35e-05)	(0.000215)	(7.40e-05)	(0.000218)	(7.43e-05)	(0.000218)	(7.46e-05)	(0.000219)	(7.33e-05)	(0.000215)
EITI	0.0479***	-0.0824***	0.0340**	-0.126***	0.0422***	-0.116***	0.0395***	-0.100***	0.0419***	-0.0959***	0.0380***	-0.126***
	(0.0126)	(0.0225)	(0.0133)	(0.0234)	(0.0122)	(0.0238)	(0.0123)	(0.0220)	(0.0124)	(0.0234)	(0.0121)	(0.0237)
Democracy	6.08e-05	-0.00340	0.000608	-0.00171	0.000806	-0.000158	0.000456	-0.00422	0.000281	-0.00170	0.00109	0.00684
	(0.00146)	(0.00405)	(0.00144)	(0.00395)	(0.00146)	(0.00425)	(0.00146)	(0.00416)	(0.00152)	(0.00433)	(0.00155)	(0.00468)
AETR high-grade		-0.135		-0.132		-0.150*		-0.133		-0.119		-0.104
		(0.0918)		(0.0886)		(0.0888)		(0.0886)		(0.0891)		(0.0886)
Control of Corruption	0.0389**	0.0334										
	(0.0170)	(0.0517)										
Government Effectiveness			-0.0122	-0.220***								
			(0.0200)	(0.0635)								
Political Stability					-0.0100	-0.0322*						
					(0.00647)	(0.0174)						
Regulatory Quality							-0.00977	-0.0900				
							(0.0152)	(0.0570)				
Rule of Law									0.00323	-0.0224		
									(0.0163)	(0.0506)		
Voice and Accountability											-0.00391	-0.147***
											(0.0157)	(0.0400)
Constant	0.0247***		0.0244***		0.0246***		0.0248***		0.0249***		0.0244***	
	(0.000948)		(0.000938)		(0.000947)		(0.000951)		(0.000954)		(0.000936)	
Observations	360	360	360	360	360	360	360	360	360	360	360	360
Number of countries	20	20	20	20	20	20	20	20	20	20	20	20
Log Likelihood	775.7	775.7	779.2	779.2	776	776	774.5	774.5	773.3	773.3	779.8	779.8
pseudo-R-squared	0.121	0.121	0.120	0.120	0.119	0.119	0.117	0.117	0.118	0.118	0.119	0.119
Chi-squared	119.8	119.8	129.3	129.3	120.5	120.5	116.6	116.6	113.2	113.2	130.8	130.8
Chi-squared-pvalue	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.C5: Simple panel fixed effects regression

	Dependent variable: AETR (Low-grade)				
	(1)	(2)	(3)	(4)	(5)
Presidential election	-0.00916	0.00343	0.00193	-0.00911	-0.00486
	(0.0240)	(0.0208)	(0.0201)	(0.0203)	(0.0204)
GDP per capita (log)		-0.557***	-0.399***	-0.319***	-0.372***
		(0.0636)	(0.0705)	(0.0833)	(0.0866)
Foreign Aid (log)		-0.0280	-0.0368**	-0.0211	-0.0266
		(0.0172)	(0.0167)	(0.0178)	(0.0180)
Trade Openness (log)		-0.154***	-0.104***	-0.150***	-0.137***
		(0.0355)	(0.0361)	(0.0388)	(0.0396)
Foreign Direct Investment (log)		-0.0132*	-0.0122*	-0.0127*	-0.0114
		(0.00730)	(0.00706)	(0.00728)	(0.00732)
Inflation		-0.000308	-0.000406	-0.000308	-0.000362
		(0.000353)	(0.000342)	(0.000434)	(0.000434)
EITI			-0.0947***	-0.0838***	-0.0810***
			(0.0206)	(0.0212)	(0.0214)
Democracy				-0.00738**	-0.0125***
				(0.00367)	(0.00409)
Institutional Quality					0.0690**
					(0.0267)
Constant	0.612***	5.176***	3.932***	3.559***	3.892***
	(0.00828)	(0.481)	(0.538)	(0.616)	(0.636)
Observations	335	322	322	294	288
R-squared	0.000	0.289	0.337	0.343	0.347
Number of countries	20	20	20	20	20

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4.C6: Global and Local Moran's I Test for Spatial Autocorrelation

Distance metric: Simplified Vincenty formula (unit: miles)

Panel A. Global Moran's I						
Variable	Obs.	Moran's I	$E(I)$	$SE(I)$	$Z(I)$	p-value
AETR Low-grade	335	0.36281	-0.00299	0.01904	19.20839	0.0001

Panel B. Local Moran's I				
Cluster Type	Observed	$p < 0.10$	$p < 0.05$	$p < 0.01$
High–High	90	44	43	42
High–Low	68	0	0	0
Low–High	55	9	5	3
Low–Low	122	50	47	38

Notes: This table presents results from the Global and Local Moran's I tests using spatial weights based on distance calculated via a simplified Vincenty formula (in miles). The Global Moran's I measures overall spatial autocorrelation in the variable `AETR`. The Local Moran's I identifies the number of statistically significant spatial clusters (high-high, high-low, etc.) at various significance levels. The null hypothesis for both tests is spatial randomness.

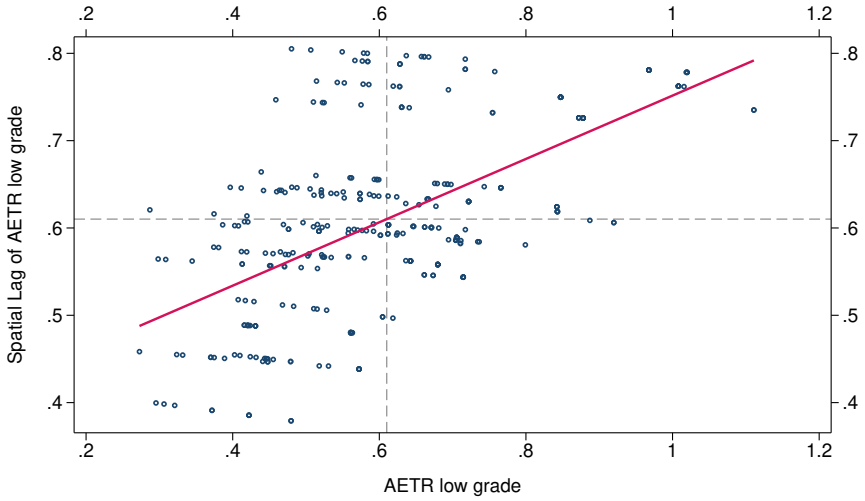


Figure 4.C2: Spatial autocorrelation

Table 4.C7: Baseline with time trend

Dependent variable: AETR (Low-grade)	(1)		(2)		(3)		(4)		(5)	
	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx
Presidential election	-0.0333***	0.115***	-0.0336***	0.123***	-0.0319***	0.122***	-0.0348***	0.116***	-0.0289***	0.130***
	(0.0104)	(0.0228)	(0.00961)	(0.0208)	(0.00957)	(0.0207)	(0.00971)	(0.0211)	(0.0101)	(0.0222)
GDP per capita (log)			-0.0213	0.0225	-0.0462	0.114	-0.0647	0.0960	-0.123**	0.00547
			(0.0420)	(0.0705)	(0.0428)	(0.0842)	(0.0432)	(0.0846)	(0.0484)	(0.0920)
Foreign Aid (log)			-0.0142	-0.0524**	-0.00871	-0.0686***	-0.00303	-0.0809***	0.000411	-0.0785***
			(0.0109)	(0.0259)	(0.0111)	(0.0265)	(0.0114)	(0.0274)	(0.0121)	(0.0299)
Trade Openness (log)			-0.0484***	-0.184***	-0.0542***	-0.152***	-0.0520***	-0.154***	-0.0612***	-0.193***
			(0.0172)	(0.0392)	(0.0179)	(0.0439)	(0.0178)	(0.0439)	(0.0194)	(0.0485)
Foreign Direct Investment (log)			-0.000661	-0.0254***	-0.000243	-0.0260***	-0.00139	-0.0243***	-0.00251	-0.0300***
			(0.00306)	(0.00681)	(0.00305)	(0.00676)	(0.00309)	(0.00683)	(0.00317)	(0.00720)
Inflation			-6.97e-06	7.07e-05	3.87e-06	0.000227	-3.05e-05	0.000162	-1.06e-05	2.99e-05
			(9.96e-05)	(0.000304)	(9.93e-05)	(0.000309)	(0.000103)	(0.000302)	(0.000102)	(0.000298)
AETR low-grade		0.702***		0.543***		0.544***		0.540***		0.467***
		(0.0397)		(0.0496)		(0.0494)		(0.0506)		(0.0611)
EITI					0.0294*	-0.0656**	0.0356**	-0.108***	0.0340*	-0.0800**
					(0.0172)	(0.0289)	(0.0170)	(0.0304)	(0.0179)	(0.0341)
Democracy							0.00223	0.0148***	-0.00141	0.00773
							(0.00194)	(0.00533)	(0.00224)	(0.00655)
Institutional Quality									0.0495***	0.0729*
									(0.0137)	(0.0381)
Constant	0.0411***		0.0333***		0.0330***		0.0333***		0.0337***	
	(0.00158)		(0.00123)		(0.00122)		(0.00126)		(0.00131)	
Observations	380	380	400	400	400	400	380	380	360	360
Number of groups	20	20	20	20	20	20	20	20	20	20
Log Likelihood	616.7	616.7	741.9	741.9	745.1	745.1	702.8	702.8	662.4	662.4
pseudo-R-squared	0.150	0.150	0.166	0.166	0.167	0.167	0.168	0.168	0.165	0.165
Chi-squared-pvalue	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.C8: Baseline with Regional Economic Community as weighting matrix

Dependent variable: AETR (low-grade)	(1)		(2)		(3)		(4)		(5)	
	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx	Direct	Wx
Presidential election	-0.0237**	0.123***	-0.0312***	0.145***	-0.0290***	0.146***	-0.0301***	0.139***	-0.0214**	0.194***
	(0.0112)	(0.0344)	(0.0104)	(0.0354)	(0.0104)	(0.0352)	(0.0106)	(0.0367)	(0.0108)	(0.0380)
GDP per capita (log)			-0.0165	0.128	-0.0341	-0.00500	-0.0256	0.00905	-0.0713	-0.385**
			(0.0481)	(0.0955)	(0.0483)	(0.117)	(0.0487)	(0.135)	(0.0545)	(0.151)
Foreign Aid (log)			-0.0223**	-0.0302	-0.0114	0.0289	-0.00874	0.0182	-0.0185	-0.0341
			(0.0108)	(0.0505)	(0.0115)	(0.0556)	(0.0119)	(0.0622)	(0.0120)	(0.0590)
Trade Openness (log)			-0.0612***	-0.311***	-0.0781***	-0.427***	-0.0723***	-0.348***	-0.0743***	-0.352***
			(0.0187)	(0.0708)	(0.0196)	(0.0935)	(0.0202)	(0.103)	(0.0208)	(0.102)
Foreign Direct Investment (log)			0.00171	-0.0115	0.000960	-0.0174	0.000316	-0.0209	-0.000870	-0.0433***
			(0.00336)	(0.0118)	(0.00338)	(0.0119)	(0.00346)	(0.0128)	(0.00346)	(0.0135)
Inflation			-0.000179*	-0.000370	-0.000148	-0.000307	-0.000152	-0.000161	-0.000193*	-0.000833**
			(0.000105)	(0.000393)	(0.000106)	(0.000391)	(0.000107)	(0.000409)	(0.000105)	(0.000416)
AETR low-grade		0.775***		0.504***		0.458***		0.474***		0.295***
		(0.0402)		(0.0769)		(0.0837)		(0.0851)		(0.106)
EITI					0.0315**	0.0850*	0.0295*	0.0246	0.0457***	0.0690
					(0.0161)	(0.0510)	(0.0166)	(0.0653)	(0.0170)	(0.0538)
Democracy							0.00228	0.00929		
							(0.00249)	(0.0152)		
Institutional Quality									0.0158	0.214***
									(0.0137)	(0.0509)
Constant	0.0442***		0.0361***		0.0358***		0.0365***		0.0362***	
	(0.00169)		(0.00132)		(0.00131)		(0.00138)		(0.00135)	
Observations	380	380	400	400	400	400	380	380	380	380
Number of groups	20	20	20	20	20	20	20	20	20	20
Log Likelihood	593.9	593.9	717.6	717.6	721.6	721.6	675.8	675.8	682.5	682.5
pseudo-R-squared	0.0103	0.0103	0.00169	0.00169	0.00337	0.00337	0.00379	0.00379	0.00293	0.00293
Chi-squared	405.3	405.3	401.7	401.7	413	413	390.7	390.7	418	418
Chi-squared-pvalue	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Chapter 5

Conclusion générale

5.1 Résumé et principaux points à retenir

Le partage de la rente minière est un sujet largement débattu dans la littérature sur le développement. Bien que les chercheurs et les décideurs politiques y prêtent une attention particulière, certains aspects restent à éclaircir. Premièrement, depuis la conférence internationale sur le développement à Addis-Abeba, la mobilisation des ressources internes est apparue comme un pilier du développement pour tout pays. Ainsi, la plupart des études sur le partage de la rente minière se concentrent sur l'optimisation de la part de l'État, qui peut représenter une source importante de resources pour les pays africains.Si cette mobilisation est essentielle, le rôle des orientations idéologiques des gouvernements ne peut être ignoré : les choix politiques des dirigeants - qu'ils soient de gauche ou de droite - influencent directement la redistribution et la part de la rente revenant à l'État. Deuxièmement, dans un contexte où la plupart des entreprises extractives opérant sur le continent africain sont d'origine étrangère, le risque pays apporte une nouvelle dimension à la littérature sur le partage de la rente minière. Les contraintes structurelles liées aux infrastructures peuvent être perçues comme un risque pour l'investissement initial destiné à l'exploitation de la ressource minière. Enfin, en Afrique, les élections sont marquées par des crises postélectorales et des comportements de recherche de rente. Outre le mimétisme que peuvent adopter les États dans les instruments de taxation de la rente minière, ces élections ont des conséquences sur le partage de la rente minière. Cette thèse contribue à ces trois domaines de la littérature. Elle est organisée en trois chapitres.

Le chapitre 2 évalue l'impact de l'idéologie politique des gouvernements sur les réformes minières dans les 54 pays africains, sur la période 2000-2020. En utilisant une stratégie empirique en deux étapes, nous estimons d'abord la probabilité de réforme à travers un modèle probit basé sur les changements dans l'idéologie gouvernementale. Ensuite, nous appliquons une méthode de différence-en-différences échelonnées (staggered DiD) pour évaluer l'impact de ces réformes sur la part des rentes extractives captée par l'État. Les résultats montrent que, même si les changements idéologiques ne modifient pas nécessairement la probabilité d'adoption de réformes fiscales ou juridiques, ils conditionnent en revanche fortement leurs effets. Les gouvernements de gauche tendent à augmenter la part de la rente captée par l'État, en promouvant une redistribution plus équitable, tandis que les gouvernements de droite sont associés à une diminution de cette part, dans une logique plus favorable à l'investissement privé. Ce résultat remet en question l'idée selon laquelle les réformes minières seraient essentiellement techniques ou neutres politiquement. Ainsi, il invite à reconsidérer la prétendue neutralité des réformes minières et à reconnaître le rôle actif des orientations idéologiques dans la définition des politiques publiques extractives.

Le chapitre 3 évalue la relation entre le partage de la rente minière de l'or et les contraintes structurelles liées aux infrastructures à l'aide du modèle à effets fixes sur un échantillon de 22 pays producteurs d'or en Afrique entre 2005 et 2020. Nous nous appuyons sur les données de la Banque africaine de développement, notamment l'indice de développement des infrastructures en Afrique (AIDI), avec ses différentes composantes de qualité infrastructurelle, ainsi que le taux effectif moyen d'imposition (TEMI) de la base de données sur la fiscalité minière de la FERDI. Les résultats montrent que l'indice de développement des infrastructures en Afrique a un effet positif sur la part de la rente qui revient à l'État, ce qui est compatible avec l'idée qu'une meilleure qualité des infrastructures abaisse le risque pays et modifie les conditions de partage de la rente. Un examen approfondi des composantes de l'indice de qualité des infrastructures en Afrique montre que l'effet positif des infrastructures de transport est le plus important. De plus, il apparaît que la durabilité du régime et la qualité des institutions jouent des rôles médiateurs dans la relation entre le TEMI et la qualité des infrastructures de développement. Ces éléments suggèrent que l'amélioration des capacités infrastructurelles et institutionnelles constitue un levier important pour renforcer l'efficacité et la stabilité des dispositifs fiscaux appliqués au secteur extractif.

Le chapitre 4 évalue l'effet des élections sur le partage de la rente minière de l'or. L'étude, qui s'appuie sur un modèle spatial de Durbin (MDS), porte sur un échantillon de 20 pays producteurs d'or en Afrique, sur la période 2000-2020. Nos résultats montrent que les élections présidentielles ont un impact négatif sur le TEMI, illustrant des logiques de manipulation fiscale en contexte électoral. Cependant, les élections législatives n'ont pas d'impact sur le TEMI. De plus, l'effet négatif des élections présidentielles n'est pas universel : dans les pays disposant d'un niveau élevé de démocratie, d'une forte transparence, ou d'institutions performantes, l'impact négatif des élections est atténué, voire inversé. En outre, l'approche spatiale adoptée dans ce chapitre a mis en évidence des effets de voisinage significatifs, soulignant que les politiques fiscales minières ne s'élaborent pas en vase clos, mais dans un environnement régional où les décisions des uns influencent les choix des autres.

5.2 Limites et perspectives pour la recherche future

La présente thèse trace les pistes d'un programme de recherche basé sur certains résultats et limites identifiés. Une première limite réside dans le périmètre géographique de l'analyse. Le travail s'est concentré sur les pays africains producteurs de ressources, notamment d'or. Si ce choix se justifie par les enjeux spécifiques que représente le secteur extractif sur le continent, il limite la possibilité de généraliser les résultats à d'autres contextes institutionnels. Une extension future du travail aux pays développés produc-

teurs d'or offrirait un terrain de comparaison particulièrement fécond. En effet, l'une des caractéristiques majeures des administrations fiscales des pays développés est leur plus grande capacité à mobiliser les recettes fiscales, notamment à travers des dispositifs plus complexes et plus rigoureux de collecte de l'impôt. Dès lors, la manière dont la rente est captée, redistribuée, voire utilisée comme levier d'attractivité, peut différer sensiblement de celle des pays en développement. Des études comparatives entre ces deux groupes de pays permettraient ainsi de mieux comprendre la diversité des stratégies fiscales extractives à l'échelle mondiale, tout en mettant en lumière les trajectoires institutionnelles qui favorisent un partage plus équilibré de la rente.

Une autre limite importante concerne la structure des données mobilisées. Les indicateurs utilisés dans cette thèse, tels que le taux effectif moyen d'imposition (TEMI), les indices d'infrastructure ou les variables institutionnelles, sont construits à partir de sources secondaires disponibles à l'échelle nationale. Bien que solides, ces données restent agrégées et ne permettent pas d'appréhender les variations intra-nationales ni les dynamiques propres aux régions minières. À ce titre, des approches plus localisées, ou fondées sur des données microéconomiques (entreprises, sites miniers, contrats), permettraient d'affiner les diagnostics.

Par ailleurs, la thèse a mis en évidence que la qualité des infrastructures, notamment de transport, est un facteur déterminant dans la capacité des États à capter la rente minière. Cette qualité infrastructurelle constitue également un élément majeur du risque pays pour les investisseurs étrangers, qui dominent largement le secteur extractif africain. Ce lien entre infrastructures et perception du risque mérite d'être approfondi, notamment en croisant les données économiques avec des indicateurs de climat des affaires, de stabilité juridique ou de sécurité physique.

Dans cette optique, un prolongement naturel du travail consisterait à s'intéresser à la nature des contrats miniers conclus entre les États et les entreprises. Ces contrats encadrent juridiquement l'exploration et l'exploitation des ressources naturelles, et prennent des formes variées : concessions, accords de service, coentreprises ou encore contrats de partage de production. Ce dernier type de contrat, historiquement plus courant dans le secteur pétrolier, tend à se développer dans le secteur minier. L'analyse des déterminants du choix contractuel (contraintes budgétaires, niveau de risque géologique, stratégie politique) ainsi que de son efficacité en termes de rentabilité pour l'État pourrait faire l'objet de recherches spécifiques. Cela permettrait de mieux comprendre si certains types de contrats sont plus favorables à une meilleure captation de la rente par les pays producteurs.

Enfin, sur le plan méthodologique, bien que cette thèse ait mobilisé quelques outils

économétriques (modèles à effets fixes, modèles de différences-en-différences, modèles spatiaux), elle reste ancrée dans une approche quantitative. Or, la compréhension fine des rapports de pouvoir, des stratégies d'acteurs ou des pratiques informelles dans la gouvernance des ressources exige également des approches qualitatives ou mixtes. Des études de terrain, des analyses de discours ou des entretiens avec les parties prenantes pourraient compléter utilement les analyses statistiques, en fournissant une lecture plus contextuelle et nuancée des dynamiques observées. Une approche pluridisciplinaire intégrant science politique, économie et sociologie serait particulièrement pertinente dans cette optique.

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