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Does transparency pay? The impact of EITI on tax revenues in resource-rich developing countries.

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Abstract

This paper assesses the “treatment effect” of the Extractive Industries Transparency Initiative (EITI) membership on tax revenues through two main channels. The first (direct) works through an equitable and transparent resource tax regime. The second is the indirect effect EITI has on non-resource revenue once transparency enhances accountability and resource allocation to productive expenditures. Based on a sample of 83 resource-rich developing countries (44 EITI and 39 non-EITI) for the period from 1995 to 2017, we use propensity score matching (PSM) methods developed in the treatment effect literature to address the self-selection bias associated with EITI membership (the dates of countries’ commitment, candidacy, and compliance). Results show that EITI commitment and/or candidates have significant and positive effects on tax revenue collection, compared to non-EITI (on average 1.06 to 1.20 percentage points), and the EITI compliance generates a considerable surplus of tax revenues (on average 1.09 to 1.13 percentage points of GDP), compared to non-compliant (commitment and candidate). Besides, the magnitudes of the effects are greater and more significant if we include governance indicators. The results are robust, with a more significant increase in non-resource tax revenues and income tax. The paper reveals that EITI members have higher levels of tax revenue than non-members and that tax revenue is higher when countries are compliant with the initiative, even higher with quality of governance, and heterogeneous due to structural factors.

Keywords: Natural resources; Extractive industries; Governance; Transparency; Evaluation; Domestic revenue mobilization.

JEL Classification: C33; E62; O19; H2; Q32

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1 Introduction

The Addis Ababa Financing for Development conference and Sustainable Development Goals (SDGs) in mid-2015 highlighted a particular emphasis on domestic revenue mobilization (DRM). Development aid and public debt should be complementary. While most governments resource-rich developing countries have struggled to mobilize the substantial revenues from the sector due to a range of challenges, both external such as aggressive tax planning by Multinational Enterprises (MNEs) (*transfer pricing rules, distorted mineral valuations, excessive interest deductions, and treaty shopping*) and internal including weak enforcement of tax laws, overly generous tax incentives to attract foreign direct investment (FDI), ambiguous fiscal regimes (Knack, 2009), and misuse of public revenues (Robinson et al., 2006). International Monetary Fund Abbreviation (IMF) estimates that revenue losses from tax avoidance across all countries are 5% of corporate income tax (CIT) revenues, with a much more significant impact for developing countries, at least \$200 billion.

The pioneering research by Sachs and Warner (1995), and other works that have followed (Sachs and Warner, 2001; Van der Ploeg, 2011) suggest that the dependence on natural resources hurts the economic performance of the most resource-rich countries compared to the least resource-rich countries. This statement is generally known as the “resource curse.” On the one hand, this phenomenon refers to the adverse effects of natural resource wealth on the traditional sectors of an economy by appreciating its exchange rate (often called “Dutch Disease”). On the other hand, in resource-abundant countries, power tends to be centralized, leading regimes towards authoritarianism and making it difficult to establish democratic and transparent institutions. There is also talk of crowding out of non-resource tax revenues by resource revenues in several developing countries. (Bornhorst et al., 2009; Ndikumana and Abderrahim, 2010; Crivelli and Gupta, 2014; Mawejje, 2019). The high natural resource rents allow governments to reduce the burden of taxation on citizens to reduce the demand for democratic accountability (McGuirk, 2013). As a result, disparate literature has focused on the economics of natural resources to understand the “resource curse” phenomenon and turn natural resource wealth into a source of economic development. These include the definition and rents sharing¹, the macroeconomic effects of abundance and dependence on natural resources², and institutional impacts³.

The Extractive Industries Transparency Initiative (EITI), created in 2003 at the instigation of the NGO “Publish What You Pay,” aims to promote better governance of natural resources and to help address the challenges facing resource-rich countries relating to tax revenues collection. Nowadays, it is an initiative recognized as an international standard of good governance. Since then, 54 countries worldwide (including 24 African countries) have implemented the EITI standard. This standard requires extractive companies to publish all payments made in detail in the government’s accounts. Similarly, governments must publish all payments received from extractive companies (oil, gas, and mining). In other words, governments and companies disclose information on the main stages of the value chain: Multi-Stakeholder Group (MSG), Contracts and licenses, Exploration and production, Revenue collection, Social and economic spending, Outcomes and impact (EITI, 2016). In addition to revenue collection, the EITI Standard promotes transparency and accountability in allocating resource revenues

¹(Boadway and Keen, 2010; Charlet et al., 2013; Laporte and Rota-Graziosi, 2014)

²(Corden and Neary, 1982; Sachs and Warner, 1995; Gylfason et al., 1999; Gylfason, 2001; Tornell and Lane, 1999; Sachs and Warner, 2001; Gylfason and Zoega, 2006)

³(Alexeev and Conrad, 2011; Al-Kasim et al., 2013; de Medeiros Costa and dos Santos, 2013; Bhattacharyya and Hodler, 2010; Arezki and Brückner, 2011; Leite and Weidmann, 2002; Kolstad and Wiig, 2009; Norman, 2009; Saha and Gounder, 2013; Brunnschweiler, 2008; Bulte et al., 2005; Papyrakis et al., 2017; Amiri et al., 2019; Berman et al., 2017; Desai and Jarvis, 2012; Knutsen et al., 2017)

to public expenditure. Several international organizations (World Bank, International Monetary Fund, OECD) have endorsed the initiative and provide technical and financial support for implementing the EITI standard. Their objective is to enhance transparency for better domestic resource mobilization and promote inclusive economic growth and social development in developing countries (Liebenthal et al., 2005).

Generally, the EITI literature focused on the factors behind a country's joining the initiative (see Pitlik et al., 2010; Cockx and Francken, 2014; Öge, 2016; Kasekende et al., 2016; David-Barrett and Okamura, 2016; Lujala, 2018), the initiative impact on Gouvernance (Namely control of corruption, civil liberty and democracy) (see Ejiogu et al., 2019; Villar and Papyrakis, 2017; Rustad et al., 2017; Magno and Gatmaytan, 2017; Papyrakis et al., 2017; Sovacool et al., 2016; Sovacool and Andrews, 2015; Haufler, 2010), FDI flows (Sovacool and Andrews, 2015), and growth (Corrigan, 2014). A study close to ours is Mawejje (2019) which analyzes the link between natural rents and non-oil revenues using EITI membership as an interaction variable. This study focused on the linear regression model, therefore not taking into account the problem of self-selection rigorously. As well, Lujala (2018) argues that all impact evaluations of the EITI on resource governance and societal development need to correct for the selection biases in countries' decisions to commit to and implement the EITI standard. This paper aims to provide relevant answers to the following questions: Do EITI membership improves tax revenue mobilization after controlling for self-selection? Does the treatment effect vary with the status of EITI implementation (commitment, candidacy, and compliance)? Is there heterogeneity in the treatment effect of EITI depending on countries' structural characteristics?

Therefore, this paper aims to assess extractive industries' effects on tax revenue mobilization in developing countries. More specifically, we estimate the effect of EITI implementation on tax revenues compared to the situation of non-implementation. Our intuition is that EITI implementation would boost the quality of governance in resource-rich countries and improve tax revenue mobilization. We consider two main channels through which this effect occurs. The first channel is direct, and it works through an optimal and transparent resource tax regime; this could improve the government's share of rents (resource revenue). The second channel is the indirect effect that EITI has on non-resource revenues, as transparency enhances accountability and resource allocation to productive expenditures; this will have positive spillovers on government non-resource tax revenues. This study aligns with work on the effectiveness of the EITI in reducing the negative impacts of natural resources on economic development and the quality of governance (Corrigan, 2014, 2017), and in improving tax revenue mobilization (Mawejje, 2019).

This impact assessment is motivated not only by the challenges faced by resource-rich developing countries to generate adequate revenues for sustainable development finance but also the objective of rigorous evaluation of the EITI policy to reinforce the activities of its implementation. Our study contributes to the existing literature on several points. Firstly to the best of our knowledge, our paper is the first study taking into account rigorously this self-selection problem while investigating the impact of implementing the EITI on domestic revenue. We use the propensity score matching method of Leuven and Sianesi (2018), which allows us to consider the determinants that motivated countries to implement the EITI standard. Secondly, our analysis is more comprehensive because it considers the three main stages of the EITI implementation process: commitment, candidature, and compliance. Thirdly for our sensibility analysis, we consider the Total tax revenues as a dependent variable, and then, Non-resource Tax and income tax include taxes on income, profits, and capital gains. Fourthly we use a control function regression approach to analyze the heterogeneity of treatment effects on tax revenue mobilization

based on structural factors of countries. We consider country temporal and fixed effects, the sensitivity of compliance with standards, and the time elapsed since EITI implementation. The main results show that EITI implementation exerts a positive and significant effect on tax revenue mobilization.

In the following steps of the paper, Section 2 discusses the related literature, Section 3 presents data and highlights stylized facts, Section 4 describes the empirical strategy, Section 5 shows the main results, Section 6 explores the sources of heterogeneity in the treatment effects, and Section 7 concludes.

2 Literature review

2.1 *The macroeconomic effects of natural resources and tax revenue mobilization*

Natural resources have long been considered a strong pillar in the economic development process. The intuition is that countries rich in oil, gas, and minerals can generate significant revenues to improve their economic performance (see [Viner, 1952](#); [Rostow, 1961](#)). However, the resource bonus seems to be a curse rather than a blessing ([Auty, 1994](#); [Sachs and Warner, 1995](#)). Causes often cited to explain resource curse include Dutch disease, insufficient or inefficient investment (including human capital), lack of fiscal discipline, institutional decay, and macroeconomic instability (see [Gylfason, 2001](#); [Halland et al., 2015](#)).

In addition to other economic sectors, the tax capacity of resource-rich countries depends, on the one hand, on a fair tax regime for extractive industries that maximizes government revenue, and on the other hand, on the spillovers associated with the use of extractive resource revenues. Resource tax regimes can be quantitatively evaluated for their neutrality, revenue-raising potential, government risk (stability and timing of government revenue), effects on investor perceptions of risk, and their adaptability and progressivity ([Daniel and Goldsworthy, 2010](#)). The progressivity reassures investors and guarantees a "fair" share of rent to the government, and this means that a tax regime will yield a rising present value of government revenue as the pre-tax rate of return on a project increases ([Boadway and Keen, 2010](#)). The rent sharing between the transnational company and the host country depends not only on the government's bargaining power but also on company operations (accounting, financial behavior, transfer pricing, and dividend repatriation). Besides, tax competition between countries forces the implementation of incentives to attract capital; this is detrimental to tax revenues from traditional public economics and would require coordination or cooperation in tax matters between States. However, tax coordination is impossible under the assumption of a Nash equilibrium in the presence of tax competition (see, [Rota-Graziosi, 2019](#)).

Countries with enormous nonrenewable resources can reap substantial benefits from them, and many countries have done so. For example, industrialized countries such as Australia, Canada, and the United States have successfully transformed resource extraction into economic growth and development. Recently other resource-rich countries Botswana, Chile, Malaysia, and South Africa, have reached the highest income level ([Halland et al., 2015](#)). However, the reliance on resource revenue poses challenges to policymakers, and governments must play an essential role in how resource revenues are used. [Daniel et al. \(2013\)](#) indicates that with an effective fiscal policy, revenues from extractive industries would contribute significantly to finance productive spending. This condition the non-resource tax effort. Investments in immediately productive sectors would promote job creation and, consequently, expand the tax base and reduce resource dependence. According to [Knebelmann \(2017\)](#), the impact of oil revenue collection efforts on the taxation of the non-oil economy and/or investments in fiscal

capacity (tax administration capacity) could contribute to a synergy between these taxes. Conversely, a reduction in control and incentives of taxing non-oil economies because the resource revenue could lead to a crowding-out effect.

Several empirical analyses of the effect of natural resources on non-resource tax revenues have led to controversial results. [Bornhorst et al. \(2009\)](#) find that each additional percentage point of GDP in oil and gas revenues leads to a decline in non-oil and gas revenues of 0.23 percentage points across a sample of 30 oil countries over the period 1992-2005. [Crivelli and Gupta \(2014\)](#) find that there is a reduction in domestic non-resource tax revenues of about 0.3 percentage points for each additional percentage point of GDP in resource revenues. [Mohtadi et al. \(2016\)](#) show that for each additional percentage point of GDP in resource revenues, there is a reduction in taxes on individuals of about 0.2 percentage points. [Ossowski and Gonzáles \(2012\)](#) find that the resource revenues/GDP negatively impact the non-resource taxes/non-resource GDP on Latin American countries. [Thomas and Trevino \(2013\)](#) find that for every one percentage point increase in resource revenue as a proportion of GDP, non-resource revenue is lower by about 0.07 to 0.12 percent of GDP sub-Saharan Africa. When they use GDP excluding resources, their results are not significant. However, [Knebelmann \(2017\)](#)'s replicas from ICTD data show that the results are sensitive to the change in the denominator (GDP by GDP excluding oil). Non-resource taxes as a percentage of total GDP seem to be biased. According to [Crivelli and Gupta \(2014\)](#), "if resource revenue-to-GDP increases due to a sharp increase in resource production, non-resource revenue may appear depressed relative to GDP simply because of the increased income and the coefficient estimates may be biased downwards." In contrast, [Knebelmann \(2017\)](#) uses gross tax revenues, i. e. not related to GDP, for a sample of 31 countries. This study concludes that there is no crowding-out effect of oil revenues on non-oil revenues through tax channels.

Besides, some research indexes institutional quality as the solution to reverse the "resource curse" or enhance resource blessing in resource-rich countries (see [Collier and Hoeffler, 2005](#); [Lujala et al., 2005](#)). It is important to note that in resource-rich countries, the lower take up of non-resource taxes is correlated with higher levels of corruption in these countries, suggesting that weaker institutions affect non-resource revenue through incentives for tax evasion and/or overly generous tax incentives ([Crivelli and Gupta, 2014](#)). Also, natural resource abundance is the primary source of illicit financial flows ([Ndikumana and Boyce, 2003](#)). [Kolstad \(2009\)](#), and [Mavrotas et al. \(2011\)](#) show theoretically and empirical evidence that natural resources can be a blessing in countries with good institutions and a curse in bad institutions countries. [Grigorian and Davoodi \(2007\)](#) find in Romania that lower-country political risk is positively associated with the tax ratio. Similarly, [Bird et al. \(2014\)](#) find that governance indicators (corruption, voice, and accountability) significantly affect tax revenues. Using a sample of 46 SSA countries, [Botlhole et al. \(2012\)](#) provide evidence that natural resources are only detrimental to tax revenue mobilization in the absence of good institutions. On the other hand, [Eregba and Mesagan \(2016\)](#) showed that institutional quality enhanced per-capita income growth in African countries. This is thereby questioning institutional quality in these countries that would not reverse the resource curse.

To sum up, the issue of the political economy of natural resources requires private investment to discover and extract the resource, fiscal regimes to capture revenue, judicious spending and investment decisions, and policies to manage volatility and mitigate adverse impacts on the rest of the economy ([Venables, 2016](#)). Our analysis consists of highlighting the effects of EITI on the tax revenues, through the two channels mentioned above in particular, and by the spillover effects on the capacity of tax administration in general.

2.2 EITI Overview

Founded in 2002 under the initiative of "Publish What You Pay", an NGO, the EITI was formally launched in London in June 2003. It is a multi-stakeholder organization dedicated to promoting good management and governance of oil, gas, and mineral resources (EITI, 2016). The EITI standard has so far been applied in 54 countries (including 24 African countries). This standard requires extractive companies to publish all payments made in detail in government accounts, and governments are also required to publish all payments received from extractive companies, to curb corruption (Papyrakis et al., 2017). In other words, governments and companies disclose information on the main stages of the natural resource value chain, such as exploration activities, licenses and contracts, beneficial owners, production, revenue collection, and revenue use. Several international organizations (World Bank, International Monetary Fund, OECD) have endorsed the initiative and provide technical and financial support for implementing the EITI standard. Their objective is to enhance transparency for better domestic resource mobilization and promote inclusive growth and social development in developing countries (Liebenthal et al., 2005).

The EITI implementation process consists of three main steps: *Commitment, Candidate, and Compliance*. First, the government publicly commits to joining the EITI and implementing the EITI standard. Following the announcement of the commitment, government, companies, and civil society must jointly commit to establish both a national EITI secretariat and a multi-stakeholder group (MSG) to oversee the implementation process. The MSG requires the independent, active, and effective participation of all stakeholders. Thus, the MSG adopts a cost work plan in line with the reporting and validation deadlines of the EITI Board. This work plan sets out the country's objectives and priorities for implementing the EITI (EITI, 2016). This step takes time and allows the effects of accession to be examined before being accepted as a candidate country (Corrigan, 2014). Thus, this demonstrates the country's intention and implies its willingness to change transparency policies and accommodate the requirements of EITI membership.

After the requirements of Commitment Status, the government must submit a request to the EITI Board to become a candidate country. The country becomes an EITI Candidate if the Board considers that all conditions for membership have been met. To achieve Compliant status, a Candidate country must publish a first EITI Report within 18 months. It must also submit the final report for approval by the Board of Directors and approved by the MSG within two years and a half. Candidate countries that have not been able to comply with the requirements of the validation process and/or have not submitted their final validation report at deadline risk a suspension (Anwar and Kannan, 2012). The suspension can also intervene if the country lives in a context of political instability. This situation is the case for the Central African Republic in 2013 and Madagascar in 2011. After compliance, the country must submit a validation report every three years as requested by the Board. Non-compliance with the latter obligation may also result in the suspension of the concerned country. The phenomenon of the "resource curse" is one of the main reasons for the EITI creation. The pioneering work of Auty (1994) and Sachs and Warner (1995) showed that resource-rich countries (oil, gas, or mining) have below-average economic activity. These countries have a higher frequency of conflicts and suffer from poor governance (Humphreys, 2005; Collier, 2003). According to international organizations (World Bank, IMF, and other multilateral cooperatives), these adverse effects could be mitigated through greater transparency in the governance of extractive industries.

Indeed, the implementation of the EITI would allow countries to observe a better foreign direct

investment climate. This initiative would contribute to strengthening accountability and good governance and ensure more excellent economic and political stability. For companies, mitigating the political risks caused by opaque governance is a benefit for investments. Investments in the extractive sector are highly capital intensive, which requires a high degree of long-term stability to generate profits. Transparency of payments to governments allows companies to demonstrate their contribution to public finances. For civil society organizations, the benefits mainly concern the availability of information on governments' management of resource revenues, and this requires more responsibility in allocating income to social and economic expenditures (EITI, 2016).

However, the EITI still has several limitations. First, the fact that a country is an EITI Candidate or compliant country does not necessarily mean that its extractive sector is fully transparent or free of corruption. This situation indicates an effective process for monitoring and improving the disclosure of information (EITI, 2016). Also, international pressure for reform and the high implementation costs of international standards push some governments to so-called fictitious or facade compliance (Öge, 2017). Civil society organizations' participation in MSG in authoritarian countries satisfies this form of compliance. Global donor actors exert some form of external pressure for reforms in the management of extractive industries. They require strict compliance with good governance standards (Gillies, 2010; O'Neill et al., 2004). Since the EITI creation, it has been strongly supported by the World Bank, the IMF, and the G-20 as an instrument of transparency in developing countries. In this logic, countries are obliged to implement EITI in order to benefit from a better solvency of external financing (Simmons, 2001) and a good global reputation as FDI destinations (David-Barrett and Okamura, 2013; Henisz, 2002; Öge, 2017). These external incentives associated with the EITI require countries to formally accept civil society organizations as important stakeholders in managing extractive resources. However, in practice, these groups are often marginalized and silenced. Finally, it is important to note that at the inception of the EITI, the responsible use of resource revenues was not a concern in implementing the EITI, making it difficult to address corruption along the value chain.

2.3 How can EITI implementation improves tax revenue mobilization ?

The EITI literature focused on the factors behind a country's joining the initiative (see Pitlik et al., 2010; Cockx and Francken, 2014; Öge, 2016; Kasekende et al., 2016; David-Barrett and Okamura, 2016; Lujala, 2018), the initiative impact on Governance (Namely control of corruption, civil liberty and democracy) (see Ejiogu et al., 2019; Villar and Papyrakis, 2017; Rustad et al., 2017; Magno and Gatmaytan, 2017; Papyrakis et al., 2017; Sovacool et al., 2016; Sovacool and Andrews, 2015; Haufler, 2010), FDI flows (Sovacool and Andrews, 2015), and growth (Corrigan, 2014). A study close to ours is Mawejje (2019) which analyzes the link between natural rents and non-oil revenues using EITI membership as an interaction variable.

The national platforms of EITI for accountability improve reforms and governance and promote more excellent economic and political stability. The effects of EITI on tax revenues would be reflected in the strengthening of the resource tax regime and linkages with the non-resource economy. The first channel is direct, and it works through an optimal and transparent resource tax regime. The second channel is the indirect effect that EITI has on non-resource revenue once transparency enhances accountability and resource allocation to productive expenditures (for example, infrastructure and human development, to promote economic diversification). First, the EITI improves the transparency of the extractive business taxation system, improving the government's share of rents. It broadens access

to detailed information on extractive sector revenues in several countries and informs citizens about the amounts of payments made by companies. For example, in Chad, the national oil company discloses detailed information about Glencore's sale of oil. For each shipment of cargo, sales volumes, prices, sales amounts, public debt repayment, and the balance transferred to the treasury are presented in detail (EITI, 2018). For a long time, the identity of the beneficial owners of companies holding oil, gas, and mineral extraction rights has often been unknown. This lack of transparency in the governance of extractive industries fuels corruption, money laundering, tax evasion, and illicit financial flows, as evidenced by the Panamas Papers (Chohan, 2016). EITI requires disclosure of the absolute ownership of extractive companies (the holders of extraction rights), i.e., residence, parent company, and subsidiaries. This demonstrates that EITI leads to more efficient tax collection from companies in the extractive industries. The second channel is the indirect effect that EITI has on non-resource revenue once transparency enhances accountability and resource allocation to productive expenditures (for example, infrastructure and human development, to promote economic diversification). The transparency of the use of resource revenues to productive expending, which conditions the non-resource tax effort. This raises the complementary relationship between resource revenues and non-resource tax revenues. In general, citizens' transparency or access to information can reduce bureaucratic corruption by making acts of corruption riskier and promoting the selection of honest and efficient agents for the public service. According to the resource curse literature, appropriate institutions can prevent the adverse impact of natural resources. It is not immediately apparent that EITI transparency reform should be the priority. It is essential to consider other indicators of institutional quality, which are crucial to the effectiveness of tax revenues.

The question of the effects of EITI on tax revenues is still little empirically addressed in the existing literature. Only Maweje (2019) achieves to analyze a direct relationship between the EITI and non-oil tax revenues. The author considers 31 sub-Saharan African resource-rich countries over the period 2003-2015. The Fixed effects and dynamic panel models indicate a negative relationship between natural resource dependency and non-oil revenue mobilization. The effect becomes weakly positive by using the interaction between EITI membership and natural resource dependency (*Total rents in % GDP*). The author concludes that EITI membership partially improves tax revenues since the coefficient decreases with adding of control variables. With a panel of 186 countries over the period 1997-2014 and using the fixed-effect model, Corrigan (2017) shows that the EITI membership positively affects and significant economic development. However, the effect on the control of corruption is not significant. An ordinary least squares (OLS) analysis over the period 2005 to 2009 by Cockx and Francken (2014) finds no evidence for a positive effect of the EITI membership on public health spending.

However, there are several limitations to this empirical literature in particular and EITI policy in general. The regression method is no appropriate because a country's decision to implement the EITI standard is endogenous. This work considers EITI membership as the date on which the country publicly expresses its intention to implement the EITI standard. Demonstrating a country's intention to join the EITI implies a willingness to change transparency policies and comply with EITI requirements. By considering only this step, the analysis risks underestimating the impact of the EITI. Corrigan (2017) points out that this variable, as defined, does not take into account all policies or plans that aim to increase transparency and accountability in the governance of extractive industries. This suggests restraint in interpreting the results, as EITI implementation extends over several years. The specification with an interaction term indicates the heterogeneity of the effect of EITI via the level of dependence on natural resources between countries that are already EITI Members. The result does not compare

the effectiveness of non-resource tax revenues between EITI and non-EITI implementing countries. In other words, this result is much more reflective of the sensitivity in terms of extractive capacity and the value of natural resources between EITI members.

In addition to the limitations of empirical analysis, the EITI faces some challenges. Initially, EITI policy focuses only on revenues from extractive industries. Other aspects of the extractive value chain, such as these revenues allocating, are not considered. Nevertheless, resource-rich countries face many corruption problems that are mainly expenditure-based (Öge, 2017). Similarly, Robinson et al. (2006) suggest that responsible use of public resources is the way to avoid the "resource curse." Thus, the introduction of EITI seems a little late in the logic of real impact because corruption is already present at the contracting and procurement stages. As membership of the EITI is voluntary for countries and companies, countries and companies can express their intention to join the initiative and whether or not to follow up on it. This depends on the opportunity cost of complying with the standards. For example, highly corrupt governments may be interested in not promoting transparency in the extractive industries (Öge, 2017). For such governments, restrictions on access to international financial markets and development support could effectively increase their compliance costs. Also, there is a risk that supporters of the government regime may populate the multi-stakeholder group. This reduces the exposure of bad practices in EITI implementation. Members of multi-stakeholder groups also need to be able to process and act on the information conveyed.

On the other hand, we use a more appropriate methodology to assess the impact of EITI membership on tax revenues. Indeed, we consider two main stages (commitment status and candidate country status) of EITI implementation to measure EITI adherence. Besides, we consider the heterogeneity of effect (ATT) related to Compliance with EITI standards. The primary variable of interest is EITI Candidate country status. With this variable, we can ensure more transparency in the governance of the extractive industries, as it meets the first five (05) requirements of EITI implementation. We use the propensity score matching (PSM) method, which considers the impact of the main factors that motivate countries to join EITI. The PSM assesses the impact of EITI membership on tax revenue mobilization for a given country compared to what it would have been like to remain a non-EITI member. In other words, this method gives the average effect of EITI membership on tax revenue mobilization. We also analyze the heterogeneity of the effect across countries related to macroeconomic variables, institutional quality, and the time elapsed since EITI membership.

3 Dataset and Stylized facts

3.1 Dataset

The empirical analysis is conducted on an unbalanced panel of 83 resource-rich developing countries for the period from 1995-2017. The choice of this large panel is based on the dependence on extractive resources and the availability of tax revenue data. Extractive-dependent countries are defined as countries that depend on minerals for at least 25% of their tangible exports (Haglund, 2011). The panel is unbalanced because of missing observations. The sample includes 44 countries that have implemented the EITI standard at different accession dates (*called EITI members, or EITI member, or EITI countries, or treatment group*) and 39 non-EITI members (*control group*). Of these 44 EITI committed countries, all have achieved Candidate status, and only 25 have achieved Compliance status as of the specific dates (see Appendices A12 for the data sources & definitions of the different variables, and A13 for the

list of countries & their different stages of EITI implementation).

We use Government Revenue Dataset (GRD) developed by the International Centre for Tax and Development (Prichard et al., 2014; McNabb, 2017). It is a complete source of cross-country data available and extensively used in the studies surrounding the effects of tax policy on development. In particular, total tax revenues (% GDP) is our main dependent variable (*Log Tax_revenue-to-GDP*)⁴. It represents the sum of the sub-components of taxes excluding social security contributions, which are levied for the benefit of social welfare institutions. This coverage of tax revenues data is better because it is specific to taxes and consistent across countries. We test transmission channels using Non-resource tax revenues and Total income taxes, including taxes on the natural resource sector, to robust our results. Non-resource tax (*Log Non-Res.Tax-to-GDP*) calculated as total tax revenues excluding social security contributions and resource taxes (oil, gas, and mining). Total taxes on income, Profits, and Capital Gains (*Log Income_Tax-to-GDP*) represent the sum of corporate and personal income taxes (CIT + PIT).

The variable of interest is a dummy of *EITI implementation*, and it is constituted through the information available on the EITI website (EITI, 2016). The *EITI* dummy takes the value 1 to start from the year of takes the value 1 for the years that the country is an EITI member and 0 for the years that the country is not an EITI member according to the stage of implementing the EITI standard. Indeed, Candidate status is necessarily the first step for an EITI implementing country. For a more comprehensive analysis, in this study, the interest variable is measured in three chronological levels through three main stages of EITI standard implementation, namely *Commitment*, *Candidate*, and *Compliance*. We also use it as a dependent variable for the initial probit estimation of the Propensity Score for the set of explanatory variables suspected to be endogenous to EITI membership. Propensity score estimates include the group of countries such as EITI members and control group (non-EITI member). In particular, the control group for commitment and candidate status includes non-ITIE countries, and the control group for compliant countries is formed only by EITI commitment or candidate⁵ countries that have not yet obtained compliant status.

The control variables are composed mainly of structural and institutional indicators, and their choice is justified in subsection 4.2. The propensity score matching method suggests that the control factors are correlated simultaneously with the interest variable and the dependent variable. Otherwise, these factors are likely to explain both the choice to implement EITI and tax revenues for a given country. Based on existing literature, we monitor the endogeneity of the following factors: the total rents of extractive industries (oil, gas, mineral), GDP per capita, Financial development, Inflation, Commodity prices, Trade openness, Net official development assistance per capita (AID), Foreign direct investment (FDI), Industry value-added, Coal rents, Forest rents, Human development index (HDI), Index of institutional quality (control of corruption, government effectiveness, the rule of law), Regulatory quality, Voice and accountability. It is not possible to control for unobserved factors that may affect the likelihood of joining the EITI. However, the control variables allow us to take into account some of the known sources of bias. These data come mainly from the datasets of World Development Indicators (WDI), International Monetary Fund (IMF), and The World Governance Indicators (WGI).

⁴The standard deviations of certain variables in the two groups of countries are pretty disparate (see Table A11 for the descriptive statistics). We, therefore, consider their logarithms in our econometric regressions. For example, we use the variables total tax revenues and non-resource tax revenues in logarithms

⁵It is essential to note that all the EITI Candidate countries are a priori committed, but the reverse is not always the case.

3.2 Stylized facts

Governments of resource-rich countries receive revenues from taxing extractive companies, royalties, and economic rent-sharing arrangements. The mustache box diagram in fig.1 visualizes the distribution of tax revenues in EITI members before and after commitment. It can be seen that for each type of tax revenue, the range is higher for EITI member periods. The same is true for the median tax revenues, i.e., the amount that divides the distribution of tax revenues into two equal shares for EITI member periods is higher than the non-EITI period. However, we can see from the mustache box diagram in figure 2 that the median of the tax revenues distribution increases with the stages of EITI implementation (Non-EITI, commitment, candidate, and compliance). Unlike the mustache box diagrams, Figure 3 considers the period before the commitment to implement EITI and countries that are not yet EITI Members. This figure shows the relationship between natural resource dependency (sum of oil, mining, and gas rents) and non-resource tax revenues. We find that the mobilization of non-resource tax revenues is a decreasing function of natural resource dependency. However, the slope of the adjustment line is less steep in EITI members than in non-EITI members. This reflects the more responsible use of revenues under the EITI standard. We explain this by creating linkages with the rest of the economy, such as job creation and the allocation of revenues to productive expenditures that generate other non-resource tax revenues. The implementation of EITI, therefore, helps to mitigate the crowding out of non-resource tax revenues. In other words, the negative effect of extractive resource dependence on non-resource fiscal revenues is mitigated for EITI members. At the end of our statistical analysis, countries would mobilize more revenue by implementing EITI and more by achieving compliance status. Before concluding these results, we conduct an econometric verification because the stylized representation of economic variables does not take into account specific endogenous factors. Likewise, the periods before and after EITI are not necessarily comparable. In the following, we begin an analysis using propensity score matching on two more comparable groups.

Figure 1: Distribution of various taxes before and after EITI implementation

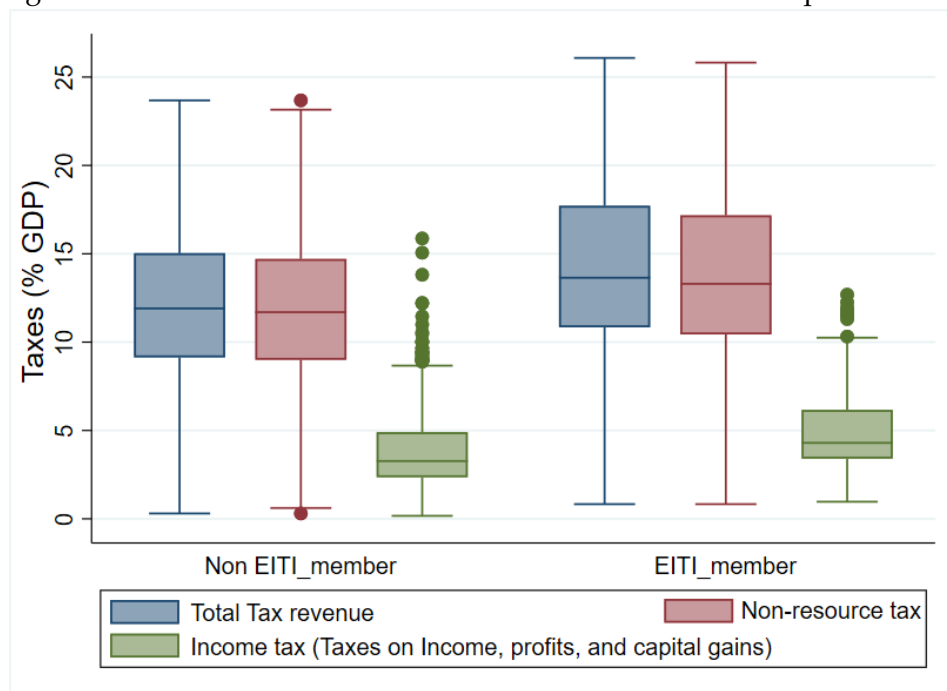


Figure 2: Distribution of total tax revenues according to EITI implementing stage

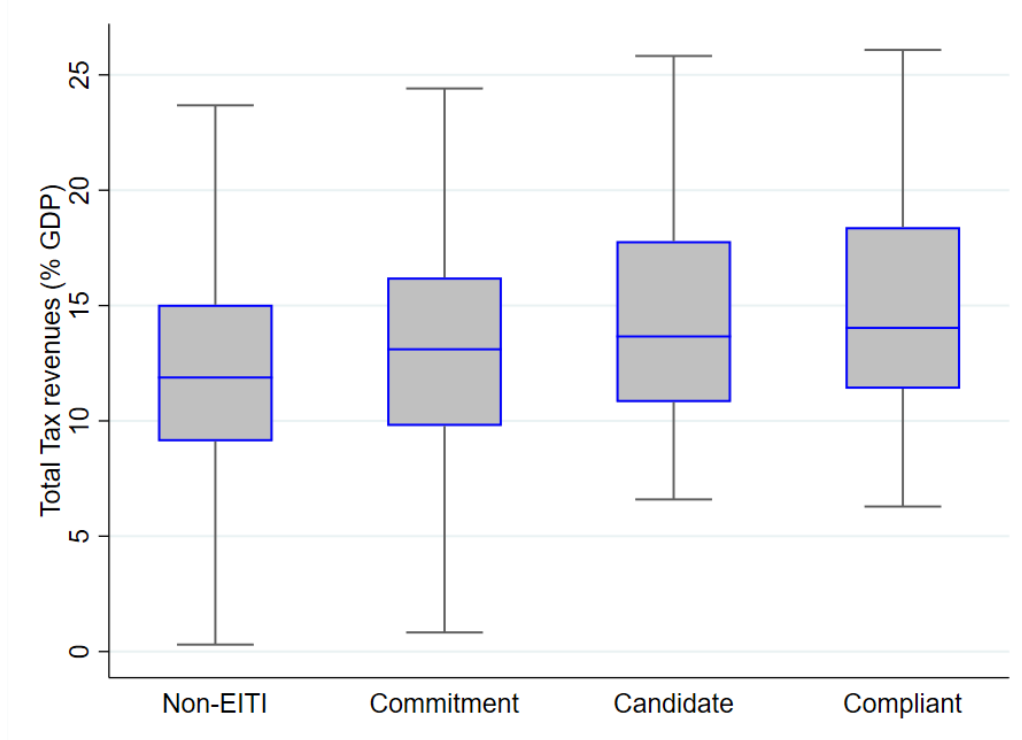
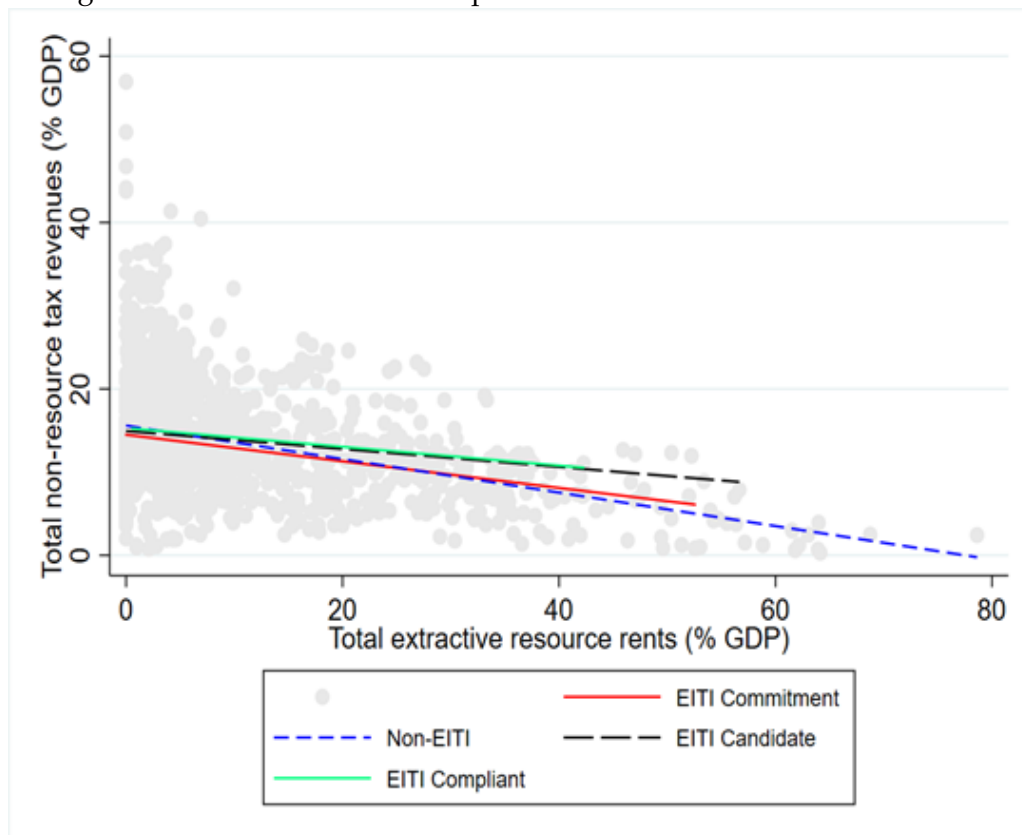


Figure 3: Extractive resources dependence and non-resource tax revenues



4 Empirical strategy

Our objective is to evaluate the treatment effect of EITI implementation on tax revenue mobilization and considering the selection bias. The treatment is the EITI implementation for a given country over a given period. We refer to EITI members as the treated group and non-EITI members as the control group. The equation of the estimated average treatment effect on the treated (ATT) is expressed as follows:

$$ATT = E[(Y_{it}^1 - Y_{it}^0) | EITI_{it} = 1] = E[Y_{it}^1 | EITI_{it} = 1] - E[Y_{it}^0 | EITI_{it} = 1] \quad (1)$$

where $EITI$ is the dummy (independent variable) corresponding to the EITI implementation and Y is the domestic tax revenues. $Y_{it}^0 | EITI_{it} = 1$ is the value of tax revenue mobilization at time t that would have been observed if an EITI members i had not implemented the EITI and $Y_{it}^1 | EITI_{it} = 1$ the outcome value actually observed in the same country. Equation (1) tells us that a simple comparison between the value of tax revenue mobilization observed in the treatment group and the value of tax revenue mobilization observed for the same countries if they had not implemented the EITI would give an unbiased estimate of ATT. However, the main difficulty in estimating the ATT is that the second term on the right-hand side ($E[Y_{it}^0 | EITI_{it} = 1]$) is not observable. We cannot observe the value of tax revenues of an EITI member if it had not implemented the EITI standard. We face an identification problem, as is often the case with experimental studies.

A simple approach commonly used to address this difficulty and assessing the causal effect would consist of comparing tax revenues of the treated (EITI-counties) with those of the control group (non-EITI countries) having similar observed characteristics (Rubin, 1974). This means that the treated group would have had tax revenues similar to those in the control group in the absence of EITI. In that respect, the difference in outcome between the two groups can be attributed to the treatment effect. This approach is possible if and only if the decision of the country to implement EITI standards is random. It will raise selectivity bias problems if the decision to implement the EITI is not random. However, the decision to implement the EITI standards may be non-random, as choices to join or no may be correlated to a set of observable that also affects tax revenue mobilization. Then we will have the "selection on observables" problem, which can lead to an overestimation of the impact of EITI implementation on tax revenues. Traditional linear regression is an unreliable method in this case (for detailed discussions, see Dehejia and Wahba, 2002; Heckman et al., 1998). We use various propensity score matching (PSM) methods recently developed in the treatment literature to address the selection problem on observable⁶ (Rosenbaum and Rubin, 1983).

4.1 Matching on propensity scores

The PSM method consists of comparing EITI and non-EITI members having similar observed characteristics so that the difference in tax revenues values between the two groups of countries can be attributed to the effect of treatment. In other words, to determine treatment effects, it is essential that before the experimental treatment is implemented, the two groups (EITI and non-EITI members) are as comparable as possible.

The *first assumption* needed to apply the PSM method is the "conditional independence" ($Y^0, Y^1 \perp EITI | X$). It requires that conditionally to observable (X) unaffected by the treatment, the outcomes be

⁶The selectivity problem here is neither omitted variables nor a Heckman-type sample selection problem

independent of the *EITI implementation* dummy. Under this assumption, equation (1) can be rewritten as follows:

$$ATT = E[Y_{it}^1 | EITI_{it} = 1, X_{it}] - E[Y_{it}^0 | EITI_{it} = 0, X_{it}] \quad (2)$$

where we have replaced $E[Y_{it}^0 | EITI_{it} = 1]$ with $E[Y_{it}^0 | EITI_{it} = 0, X_{it}]$, which is observable. The PSM method would consist of matching processed units to control units with similar values of X . As the number of covariates in X increases, matching on X will be difficult to implement in practice. To overcome this large problem, we follow [Rosenbaum and Rubin \(1983\)](#) which proposes a possibility to match the treated units and control units on their propensity scores. The Propensity Score (PS) is the probability of implementing the EITI standard, conditional on the observable covariates (X), and can be estimated using simple probit or logit models.

$$p(X_{it}) = E[EITI_{it} | X_{it}] = Pr(EITI_{it} = 1 | X_{it}) \quad (3)$$

A *second assumption* needed to apply propensity score matching is the "common support," i.e., the existence of some comparable control units for each treated unit. This condition ensures that each EITI country, a counterfactual in the group of Non-EITI countries. Observations with the same PS have a positive probability of being treated or untreated: $0 < p(X_{it}) < 1$. This implies that the propensity score distribution is substantially equal in the two groups of countries.

Using PSM, the estimated ATT now can be as:

$$ATT = E[Y_{it}^1 | EITI_{it} = 1, p(X_{it})] - E[Y_{it}^0 | EITI_{it} = 0, p(X_{it})] \quad (4)$$

We consider here a variety of commonly matching algorithms to assess the effect of treatment because the difference in matching criterion (see Section 5.3 and 5.4).

4.2 Expected effects of independent variables

[Lujala \(2018\)](#) argues that it is crucial to examine what factors influence a country's decision to join and implement the Standard, to understand whether and how adherence to the EITI Standard can affect resource governance and development. We estimate the PS using a probit model with the binary variable *EITI* as the dependent variable. The aim is to measure the correlation of the control variables with the probability of implementing the EITI standard. Based on existing literature, our primary selection equation consists of three categories of structural factors that can influence both EITI implementation and tax revenue mobilization: internal motivation, internal capacity, and external pressure, such as development agencies and organizations (see [Lujala, 2018](#)).

Internal motivation. We assume that countries with a relatively higher level of dependence on the extractive sector are more likely than countries with a lower dependence rate to implement the EITI to prevent the curse and attract more FDI. Along the same lines, [Öge \(2016\)](#) argues that acceptance of the EITI by leaders of resource-rich countries was to consolidate their international prestige as enthusiastic reformers, which would allow them to both maintain and attract foreign investment. Through cross-country and interrupted time series analyses, the author reveals that EITI members not only have higher levels of FDI than non-members but see their FDI levels increase once countries join the initiative. The World Bank justifies the EITI's creation with the "paradox of abundance". We expect that *Extractive*

rents (similarly for coal rents and forest rents) will positively affect the likelihood of implementing the EITI, as indicated in the literature (see [Pitlik et al., 2010](#); [Öge, 2016](#); [Kasekende et al., 2016](#); [David-Barrett and Okamura, 2016](#); [Lujala, 2018](#)). All of these studies also find that developing countries are likely to implement the EITI Standard faster than richer countries. In addition to benefiting more from the EITI, these countries may face external pressures for the reason of receiving international assistance. [Lujala \(2018\)](#) using both GDP per capita and the squared of GDP per capita, provide evidence of a curvilinear correlation between the two variables with the EITI implementation decision for a given country. In our specific case, which consists only of developing countries, we expect a positive impact of *GDP per capita* on the likelihood of implementing the EITI. This is also valid for the *Human Development Index (HDI)*. In most developing countries, the industrial exploitation of natural resources is generally carried out by multinational companies ([Manyika et al., 2013](#)). The governments of these countries not equipped with adequate technology for resource exploitation should adopt incentive policies to attract foreign direct investment (FDI). Following the evidence of [David-Barrett and Okamura \(2016\)](#), and [Lujala \(2018\)](#) we assume that a higher level of *FDI flows* is positively associated with the likelihood of implementing the EITI. The resource-rich countries receive even more FDI after becoming EITI members ([Öge, 2016](#)).

Internal capacity. Most resource-rich countries are still in a primary insertion into international trade. The World Bank calls on these countries to comply with EITI standards to attract FDI in the extractive sector to increase their exports. We, therefore, expect a negative relationship between the high level of past *Trade openness* and the likelihood of EITI implementation. [Pitlik et al. \(2010\)](#) don't find a significant effect. Although the industry remains embryonic in most developing countries, it proves to be an important source of tax revenues. It includes value added in mining, manufacturing, construction, electricity, water, and gas. We assume that countries with relatively high *Industrial value added* will be less interested in implementing the EITI standard. About the quality of institutions, countries with a good performance in *control of corruption*, *Government effectiveness* and enforcement of *Rules of laws* will be less interested in implementing the EITI compared to others. Countries that are more corrupt than others are more likely to start the EITI process ([Lujala, 2018](#)). The countries with high corruption and high dependence on extractive rents are less likely to implement the EITI quickly ([David-Barrett and Okamura, 2016](#)). Other studies suggest that the corruption in the EITI members may decrease in implementing periods ([Papyrakis et al., 2017](#); [Villar and Papyrakis, 2017](#)). However, Regulatory quality and Voice & Accountability, which refer much more to democracy, could motivate countries to join EITI. Governments that respect civil rights may tend to adopt progressive norms. At the same time, the social society can exert greater pressure on the government to implement the EITI standard ([Lujala, 2018](#)). In authoritarian regimes, NGOs will not have some freedom to voice their concerns in this process and act as whistle-blowers ([Öge, 2017](#)).

External pressure. dependence on development agencies and international organizations can influence a country's likelihood of implementing the EITI ([Lujala and Rustad, 2012](#); [Sovacool and Andrews, 2015](#)). We assume that countries which receive high levels of incoming development assistance are likely to implement the EITI Standard faster than others, as [David-Barrett and Okamura \(2016\)](#); [Lujala \(2018\)](#). These countries need some guarantee of transparency to continue to receive aid. The Natural Resources Governance Institute (NRGI) indicates that nowadays, resource-rich countries tend to turn away from multilateral loans at the detriment of private sources of finance. We capture the effects of macroeconomic fluctuations through the *Inflation rate*, *Commodity Prices*, and *Financial develop-*

ment index. We expect a negative relationship between the high level of past *Inflation rate, and Financial development index* and the likelihood of EITI implementation, and positive effect for *Commodity prices*.

5 Baseline results

The estimation process of the average treatment effect of EITI implementation on the tax revenue mobilization is done in two steps. The first consists of estimating the propensity scores with a binary outcome model (probit model in our case), while the second consists of matching treated (EITI members) and untreated (Non-EITI members) observations to estimate the average treatment effect on the treated (ATT).

5.1 *The estimation of propensity scores*

Table 1 reports the probit estimates of propensity scores on the full sample, which includes only developing resource-rich countries, based on starting dates of EITI implementation (respectively to the date of commitment, date of the candidate, and date of compliance). Recall that EITI implementation is a binary variable. It takes the value one during the period that a given country implement EITI and 0 otherwise. Most of the coefficients are significant and have the expected signs for EITI commitment. Almost all explanatory variables are also significant for EITI candidates and EITI compliance. Total extractive rents, GDP per capita, commodity prices, AID, FDI, coal rents, forest rents, HDI, regulatory quality, and voice and Accountability are positively correlated with EITI implementation. However, financial development, industry value-added, institutional composite index, control of corruption, government effectiveness, and the rule of law are negatively associated with the likelihood of EITI implementation. The overall significance of the regression is reasonable, with a pseudo R2 of about 20%. After estimating the propensity score for the sample, it is important to ensure that for each EITI member, there are at least one non-EITI members that have the same propensity score.

Table 1: Probit estimates of the propensity score

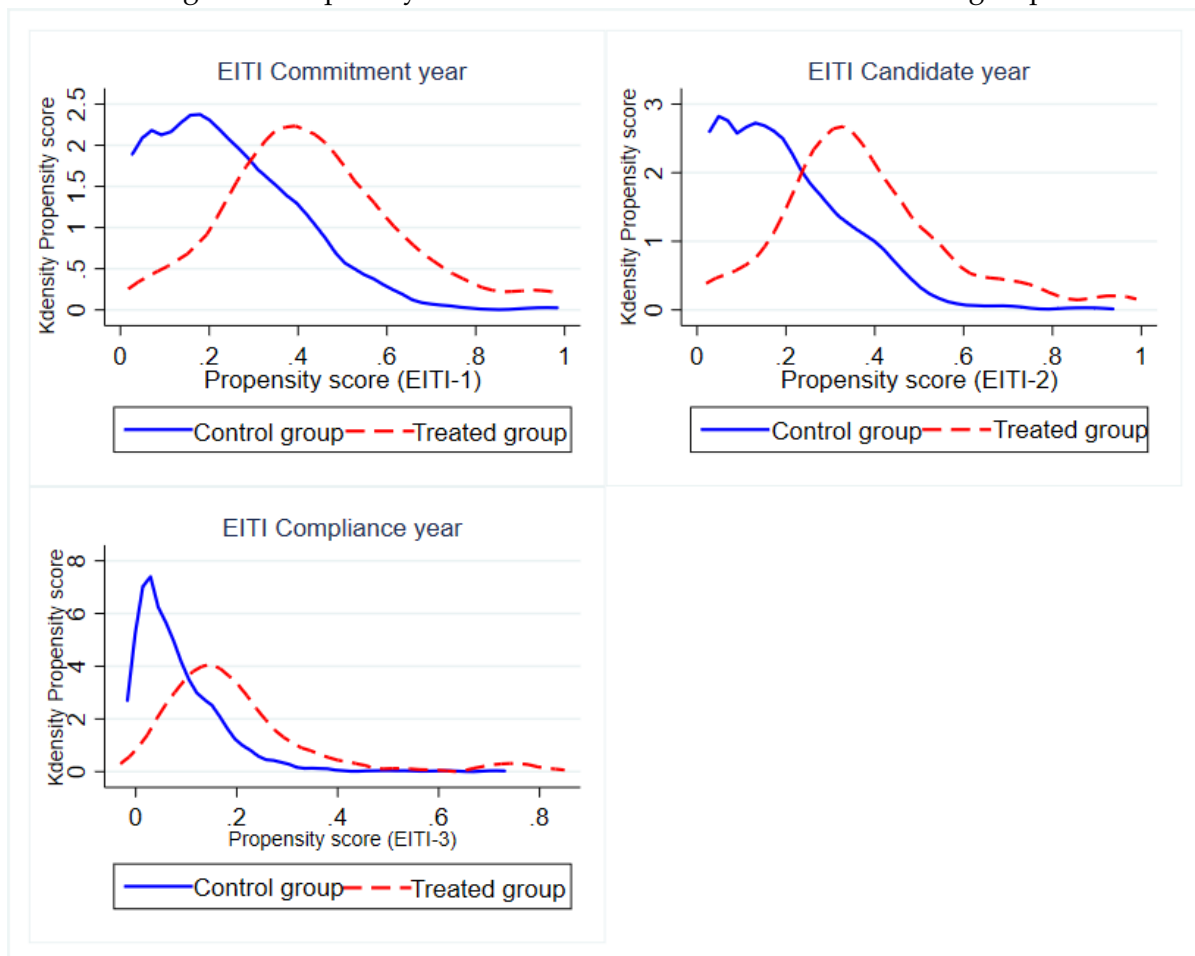
	EITI commitment						EITI Candidate						EITI Compliance					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Total extract. rents	0.045** (0.006)	0.048** (0.006)	0.045** (0.006)	0.057** (0.006)	0.047** (0.006)	0.067** (0.007)	0.045** (0.006)	0.048** (0.006)	0.043** (0.007)	0.055** (0.007)	0.047** (0.006)	0.064** (0.007)	0.038** (0.008)	0.039** (0.008)	0.037** (0.008)	0.049** (0.008)	0.040** (0.008)	0.050** (0.008)
LOG.GDP/CAPITA	0.045** (0.016)	0.042** (0.016)	0.050** (0.016)	0.053** (0.017)	0.045** (0.016)	0.079** (0.018)	0.049** (0.017)	0.048** (0.017)	0.053** (0.017)	0.056** (0.017)	0.049** (0.017)	0.080** (0.019)	0.045** (0.022)	0.043** (0.022)	0.047** (0.022)	0.056** (0.023)	0.046** (0.022)	0.077** (0.024)
Financial Dev.	-2.499** (0.591)	-2.764** (0.581)	-2.454** (0.594)	-3.530** (0.574)	-2.649** (0.586)	-4.147** (0.580)	-2.608** (0.625)	-2.929** (0.614)	-2.405** (0.628)	-3.512** (0.608)	-2.764** (0.618)	-4.112** (0.613)	-3.309** (0.838)	-3.355** (0.827)	-3.191** (0.844)	-4.202** (0.842)	-3.488** (0.828)	-4.368** (0.826)
Inflation	-0.015** (0.004)	-0.015** (0.004)	-0.013** (0.004)	-0.012** (0.004)	-0.015** (0.004)	-0.011** (0.004)	-0.026** (0.005)	-0.026** (0.005)	-0.025** (0.005)	-0.023** (0.005)	-0.026** (0.005)	-0.023** (0.005)	-0.036** (0.007)	-0.036** (0.007)	-0.035** (0.007)	-0.034** (0.007)	-0.036** (0.007)	-0.034** (0.007)
Commodity prices	0.048** (0.009)	0.048** (0.009)	0.046** (0.009)	0.043** (0.008)	0.049** (0.009)	0.040** (0.008)	0.056** (0.010)	0.054** (0.010)	0.054** (0.010)	0.050** (0.009)	0.056** (0.010)	0.046** (0.009)	0.025** (0.011)	0.025** (0.011)	0.024** (0.011)	0.021** (0.010)	0.024** (0.011)	0.015 (0.011)
Openess (Trade)	-0.002* (0.001)	-0.003* (0.001)	-0.003* (0.001)	-0.003* (0.001)	-0.002* (0.001)	-0.004** (0.001)	-0.004** (0.002)	-0.005** (0.002)	-0.004** (0.002)	-0.005** (0.002)	-0.004** (0.002)	-0.006** (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.003 (0.002)	-0.002 (0.002)	-0.004* (0.002)
LOG.AID	0.411** (0.046)	0.400** (0.046)	0.401** (0.045)	0.381** (0.045)	0.418** (0.047)	0.411** (0.046)	0.385** (0.048)	0.375** (0.047)	0.380** (0.047)	0.361** (0.047)	0.390** (0.048)	0.386** (0.048)	0.465** (0.067)	0.466** (0.067)	0.463** (0.067)	0.464** (0.069)	0.463** (0.067)	0.472** (0.070)
FDI	0.025** (0.008)	0.024** (0.008)	0.025** (0.008)	0.022** (0.008)	0.025** (0.008)	0.027** (0.008)	0.031** (0.008)	0.030** (0.008)	0.032** (0.008)	0.029** (0.008)	0.032** (0.008)	0.033** (0.008)	0.003 (0.008)	0.003 (0.007)	0.003 (0.007)	0.001 (0.008)	0.003 (0.007)	0.004 (0.007)
Industry V.A	-0.026** (0.006)	-0.026** (0.006)	-0.026** (0.006)	-0.030** (0.006)	-0.027** (0.006)	-0.035** (0.006)	-0.024** (0.006)	-0.024** (0.006)	-0.023** (0.006)	-0.027** (0.006)	-0.024** (0.006)	-0.031** (0.006)	-0.018** (0.007)	-0.018** (0.007)	-0.018** (0.007)	-0.019** (0.007)	-0.019** (0.007)	-0.023** (0.007)
Coal rents	0.153** (0.061)	0.146** (0.061)	0.149** (0.062)	0.142** (0.060)	0.162** (0.061)	0.087 (0.059)	0.137** (0.057)	0.133** (0.056)	0.133** (0.058)	0.129** (0.056)	0.144** (0.057)	0.082 (0.054)	0.149** (0.044)	0.148** (0.044)	0.146** (0.044)	0.141** (0.044)	0.150** (0.044)	0.107** (0.043)
Forest rents	0.053** (0.012)	0.057** (0.012)	0.051** (0.012)	0.064** (0.013)	0.052** (0.012)	0.059** (0.013)	0.042** (0.013)	0.047** (0.013)	0.039** (0.013)	0.053** (0.013)	0.042** (0.013)	0.049** (0.013)	0.028** (0.016)	0.030** (0.016)	0.025 (0.016)	0.042** (0.017)	0.029* (0.016)	0.033* (0.017)
HDI	4.024** (0.552)	3.897** (0.547)	4.222** (0.556)	3.820** (0.538)	3.890** (0.549)	4.053** (0.546)	4.032** (0.581)	3.907** (0.575)	4.312** (0.591)	3.846** (0.569)	3.906** (0.577)	4.057** (0.576)	3.543** (0.745)	3.493** (0.743)	3.676** (0.756)	3.291** (0.743)	3.488** (0.741)	3.764** (0.752)
Index Governance.(e)	-0.331** (0.071)	-0.428** (0.111)	-0.523** (0.121)	0.202** (0.100)	-0.492** (0.108)	0.545** (0.076)	-0.291** (0.075)	-0.304** (0.116)	-0.578** (0.129)	0.166 (0.106)	-0.410** (0.114)	0.504** (0.079)	-0.129 (0.095)	-0.211 (0.148)	-0.276* (0.163)	0.461** (0.146)	-0.096 (0.145)	0.521** (0.108)
Cntrl of Corruption(e)																		
Gov. Effectiveness(e)																		
Regulatory Quality(e)																		
Rule of Law(e)																		
Voice and Account.(e)																		
Constant	-15.886** (1.447)	-15.376** (1.418)	-15.586** (1.422)	-13.983** (1.364)	-15.964** (1.458)	-14.330** (1.378)	-16.112** (1.559)	-15.486** (1.525)	-16.172** (1.549)	-14.414** (1.486)	-16.074** (1.564)	-14.492** (1.493)	-14.697** (1.957)	-14.716** (1.959)	-14.719** (1.943)	-13.791** (1.901)	-14.425** (1.942)	-13.669** (1.928)
N.Obs.	1221	1221	1221	1221	1221	1221	1221	1221	1221	1221	1221	1221	1221	1221	1221	1221	1221	1221
Pseudo R2	0.208	0.203	0.206	0.196	0.207	0.230	0.207	0.201	0.211	0.197	0.205	0.228	0.177	0.177	0.178	0.188	0.175	0.207

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01. Dependent variable: EITI=1 if a country is IIE and 0 otherwise. (e) = Estimate

5.2 Common support of Propensity Score

According to Heckman et al. (1999), the common support is an area of overlap of treated and untreated individuals on the set of propensity score values. It ensures that for each of the treated individuals, there is at least one individual in the control group with simulated observed characteristics (Bryson et al., 2002). The two main techniques for determining common support are the comparison of minima and maxima between the two groups of individuals (Dehejia and Wahba, 1999) and comparison of trimming distributions (Smith and Todd, 2005). The first is to retain all treated and untreated individuals, except those with no counterfactual. The propensity score of the latter is lower than the minimum (respectively higher than the maximum) score of the individuals in the control group. A disadvantage of this method is that observations within limits will be discarded even if they are close to the limits. We use the second method, which estimates the density of the distribution in the two groups (trimming). We exclude the untreated individuals for whom the proportion of potential counterfactual is lower, i.e., the treated individuals with a propensity score very close to the propensity score of the untreated individuals under consideration. Figure 4 shows a fictitious situation in which the propensity score distribution supports the treatment group and the control group largely overlap, which is a good case for allowing matches. This indicates the existence of common support between EITI members and non-EITI members and verifies the second assumption to apply propensity score matching.

Figure 4: Propensity score distributions of treated and controls groups



5.3 Results from matching of basic model

We use four PSM algorithms commonly used in the literature to match each EITI member with non-EITI members given the closeness of their propensity scores⁷. Table 2 reports the results from matching concerning Total tax revenues, presented by the ATT (Average Treatment effect Treated). Recall that the treatment here consists of implementing the EITI. Considering that the treatment starts from the date of the country's commitment or candidacy, the control group includes only non-ITIE countries. However, considering the treatment starting from the date of the country's compliance to EITI standard, the control group is formed only by EITI commitment and/or candidate countries that have not yet obtained compliant status.

The first three columns show the results of n-Nearest neighbors matching (n-NNM), with $n = 1, 2, 3$ (LaLonde, 1986). This technique is subject to the risk of inaccurate matching when the nearest neighbor is numerically distant. The following three columns show the results of r-Radius matching (r-RM), which matches a treated unit to the control units with estimated propensity scores falling within a radius (or caliper) of length r (we consider a small radius $r=0.005$, a medium radius $r=0.01$, and a large radius $r=0.05$). In other words, each EITI member is associated only with a non-EITI member whose propensity score falls within a predefined neighborhood to that of EITI member country (Dehejia and Wahba, 2002). This approach has an advantage because it uses only the number of matching units available within a predefined radius. A possible drawback is that it is difficult to know a priori the reasonable radius. We also consider Kernel matching (KM), where a treated unit (EITI members) is matched to a weighted average of all control units (non-EITI members). All non-EITI members are used but weighted by their propensity score closeness to EITI members. Moreover, all control units contribute to the weights, so the variance is then reduced. The further the control unit is from the treated unit, the lower the weight (Dehejia and Wahba, 2002). Finally, we consider the regression-adjusted local linear matching (LLRM) in the last column. This method developed by (Heckman et al., 1998) is similar to kernel matching but includes a linear term in the weighting function instead of kernel. Each of these types of methods has advantages and disadvantages. A contrast between the most straightforward method (Nearest neighbors matching) and the most complex (Kernel matching) reflects the classic dilemma between bias and variance. In practice, it is recommended to test the sensitivity of the results according to the method used. We follow Dehejia and Wahba (2002) and compute standard errors by bootstrapping because the matching estimator has no analytical variance.

Table 2 indicates that the estimated ATT remains positive and statistically significant for all the matching algorithms. Regardless of the stage considered (commitment, candidate, or compliance) or the date of implementation of the EITI, we can notice a significant improvement in the estimated ATT. Our main results are twofold.

First, EITI committed and candidate countries are more effective than non-EITI countries in tax revenue mobilization. According to our estimations, EITI members increases total tax revenues by an average value ranging between $e^{0.0619}$ to $e^{0.178}$ (1.06 to 1.20) percentage points⁸ compared to non-EITI members. Assuming that EITI implementation starts from the commitment date or the candidacy date, it turns out that the treatment effects on total tax revenues are slightly identical. This could be explained

⁷While matching EITI members with non-EITI members, we limit the analyses to "common support." This restriction allows us to exclude treated countries whose propensity score is above the maximum or below the minimum of non-treaties. This is a sine qua non condition to avoid structural confusion bias when estimating treatment effects with the propensity score. (Dehejia and Wahba, 1999; Lucotte, 2012)

⁸Note that the values of tax revenues are considered in logarithm

by the fact that the duration is quite short (2 years on average) between the countries commitment date and their Candidacy date. On the other hand, the improvement of the treatment effect is pronounced between these two stages if we consider them independently, i.e., at their respective periods (see Table A1 and Fig. 5 for fixed effects regression using the function control approach). Nevertheless, the analysis of the stylized facts suggested that the median tax revenues are slightly higher for a country at the candidate stage than at the commitment stage.

Second, compliance with the EITI standard allows for additional tax revenues compared to the commitment and candidate status. This, because the ATT estimates using EITI compliance as the treatment variable, included in the control group, only those that are implementing the EITI but are not yet compliant (i.e., committed and/or candidate countries). In this case, EITI compliance as a treatment variable estimates the additional revenue that EITI committed and/or Candidate countries would receive if they were Compliant. According to our estimations, EITI compliance increases total tax revenues by an average value ranging between $e^{0.0844}$ to $e^{0.122}$ (1.09 to 1.13) *percentage points* compared to non-compliant members (EITI committed and/or candidate countries).

Our results support the theoretical arguments presented in Section 2.3 and confirm stylized facts (Section 3.2) that EITI implementation has encouraged the governments of developing countries to improve tax revenue collection. We also control for the sensitivity of some indicators of governance quality by adding an index calculated by the principal component analysis, then individually. There is a clear improvement to the estimated ATT for all the governance indicators relating to commitment and EITI candidate status but mixed for compliance status. This could be explained by the fact that almost all non-compliant EITI countries have made significant and satisfactory progress and have, therefore, good institutions. In other words, the institutional governance of the two groups seems quite similar.

In addition to the graphic evidence of common support (Fig.4), we also check the quality of the matching through the other three main diagnostic tests. First, the pseudo-R2 shows that our control variables significantly explain the probability of implementing the EITI, given that its values after matching are 'fairly low' (see for instance Sianesi, 2004; Caliendo and Kopeinig, 2008). Second, the diagnostic test based on the standardized bias evaluates the balancing score (see for instance Sianesi, 2004; Caliendo and Kopeinig, 2008; Lechner, 2001). According to Rosenbaum and Rubin (1985), the p-value associated with the standardized bias should be above the critical value of 10%. The results satisfy the conditional independence assumption. This indicates no significant difference between "EITI" and "non-EITI" observable characteristics within the selected common support. Third, the Rosenbaum bounds sensitivity test shows whether there are unobserved variables that simultaneously affect the treatment (EITI adherence) and the outcome variable (tax revenues) (Rosenbaum, 2002). The results suggest that there is no hidden bias⁹. As a result, the matching estimators are robust. Our results are robust to using an alternative measure of tax revenues (Non-resource tax and Income tax) and the different stages of EITI implementation.

⁹In order not to clutter the tables, we do not display the diagnostic tests of the control of governance indicators, but it should be noted that the results of the diagnostic tests are even better with the introduction of these indicators.

Table 2: Matching estimates of treatment effect on the tax revenues

<i>Treatment: EITI Commitment date (EITI_1)</i>			Dependent variable: Log Total Tax.revenue (% GDP)					
	n-Nearest neighbors matching			r-Radius matching			Kernel	local linear
	n=1	n=2	n=3	r=0.005	r=0.01	r=0.05	matching	matching
[1] ATT without GI	0.148** (0.0620)	0.0952* (0.0560)	0.0970* (0.0496)	0.0619* (0.0341)	0.0645* (0.0371)	0.106*** (0.0351)	0.104*** (0.0368)	0.0940** (0.0425)
N. Total Obs.	1311	1311	1311	1311	1311	1311	1311	1311
N. Treated/Controls Obs.	330/991	330/991	330/991	330/991	330/991	330/991	330/991	330/991
Pseudo R2	0.009	0.006	0.007	0.005	0.007	0.008	0.007	0.009
Standardized bias (p-value)	0.676	0.882	0.817	0.940	0.862	0.758	0.785	0.676
Rosenbaum sensitivity	1.2	1.2	1.3	1.2	1.2	1.4	1.4	1.4
[2] Index of Governance	0.119* (0.0639)	0.115** (0.0550)	0.102* (0.0552)	0.0559 (0.0389)	0.0759** (0.0383)	0.141*** (0.0391)	0.147*** (0.0380)	0.154*** (0.0444)
[3] Corruption(e)	0.167*** (0.0604)	0.146*** (0.0529)	0.158*** (0.0479)	0.102*** (0.0376)	0.0858** (0.0353)	0.131*** (0.0361)	0.135*** (0.0358)	0.131*** (0.0425)
[4] Gov. Effectiveness(e)	0.142** (0.0714)	0.115* (0.0608)	0.121** (0.0585)	0.0770** (0.0386)	0.0844** (0.0379)	0.155*** (0.0437)	0.166*** (0.0420)	0.157*** (0.0519)
[5] Rule of Law(e)	0.135** (0.0629)	0.136** (0.0578)	0.135*** (0.0511)	0.0922** (0.0385)	0.0915** (0.0362)	0.127*** (0.0365)	0.126*** (0.0372)	0.134*** (0.0439)
<i>Treatment: EITI Candidate date (EITI_2)</i>			Dependent variable: Log Total Tax.revenue (% GDP)					
	n-Nearest neighbors matching			r-Radius matching			Kernel	local linear
	n=1	n=2	n=3	r=0.005	r=0.01	r=0.05	matching	matching
[1] ATT without GI.	0.0762 (0.0624)	0.0683 (0.0524)	0.0723 (0.0511)	0.0784** (0.0367)	0.100*** (0.0387)	0.105*** (0.0314)	0.107*** (0.0335)	0.0975*** (0.0372)
N. Total Obs.	1311	1311	1311	1311	1311	1311	1311	1311
N. Treated/Controls Obs.	256/1055	256/1055	256/1055	256/1055	256/1055	256/1055	256/1055	256/1055
Pseudo R2	0.011	0.010	0.009	0.004	0.001	0.006	0.005	0.011
Standardized bias (p-value)	0.694	0.728	0.825	0.991	1.000	0.995	0.964	0.694
Rosenbaum sensitivity	1	1	1.1	1.3	1.5	1.5	1.5	1.4
[2] Index of Governance	0.137** (0.0633)	0.120** (0.0600)	0.123** (0.0510)	0.103** (0.0405)	0.106*** (0.0399)	0.140*** (0.0373)	0.134*** (0.0388)	0.128*** (0.0404)
[3] Corruption(e)	0.162*** (0.0569)	0.127** (0.0528)	0.102** (0.0495)	0.0795** (0.0368)	0.0960*** (0.0365)	0.105*** (0.0361)	0.106*** (0.0344)	0.108*** (0.0372)
[4] Gov. Effectiveness(e)	0.118 (0.0760)	0.126* (0.0664)	0.178*** (0.0643)	0.101** (0.0393)	0.114*** (0.0380)	0.130*** (0.0414)	0.134*** (0.0455)	0.132*** (0.0481)
[5] Rule of Law(e)	0.0673 (0.0613)	0.0704 (0.0538)	0.0727 (0.0461)	0.0688* (0.0376)	0.0751** (0.0361)	0.106*** (0.0359)	0.109*** (0.0352)	0.104*** (0.0361)
<i>Treatment: EITI Compliance date (EITI_3)</i>			Dependent variable: Log Total Tax.revenue (% GDP)					
	n-Nearest neighbors matching			r-Radius matching			Kernel	local linear
	n=1	n=2	n=3	r=0.005	r=0.01	r=0.05	matching	matching
[1] ATT without GI.	0.0691 (0.0687)	0.0919 (0.0617)	0.103* (0.0544)	0.0945** (0.0437)	0.121*** (0.0386)	0.114*** (0.0359)	0.110*** (0.0356)	0.116*** (0.0372)
N. Total Obs.	743	743	743	743	743	743	743	743
N. Treated/Controls Obs.	91/652	91/652	91/652	91/652	91/652	91/652	91/652	91/652
Pseudo R2	0.025	0.014	0.011	0.007	0.009	0.008	0.007	0.025
Standardized bias (p-value)	0.808	0.972	0.987	0.999	0.996	0.997	0.998	0.808
Rosenbaum sensitivity	1	1.2	1.4	1.5	1.9	1.7	1.7	1.8
[2] Index of Governance	0.0331 (0.0711)	0.0822 (0.0667)	0.0667 (0.0572)	0.0883* (0.0475)	0.0809* (0.0439)	0.0940** (0.0398)	0.0943*** (0.0355)	0.107*** (0.0381)
[3] Corruption(e)	0.0763 (0.0693)	0.100 (0.0629)	0.107** (0.0508)	0.122*** (0.0462)	0.0906** (0.0430)	0.100*** (0.0350)	0.0971*** (0.0369)	0.107** (0.0416)
[4] Gov. Effectiveness(e)	0.123* (0.0712)	0.107* (0.0596)	0.0909 (0.0572)	0.0844* (0.0466)	0.113*** (0.0418)	0.0850** (0.0365)	0.0846** (0.0379)	0.0980*** (0.0349)
[5] Rule of Law(e)	0.0918 (0.0735)	0.0879 (0.0642)	0.0872 (0.0589)	0.112** (0.0490)	0.110*** (0.0404)	0.0975** (0.0394)	0.0949** (0.0406)	0.105*** (0.0407)

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Bootstrap replications = 500. GI= Governance Index

All the control variables estimating the propensity score are included beforehand, then we use Governance indicators estimate (e) one by one to test their specific influence on the outcome.

5.4 Robustness checks

We analyze the robustness of our empirical results in two ways. First, we check the sensitivity of two essential components of total tax revenues: the Non-resource tax-to-GDP ratio (excluding social contributions) and the Income tax-to-GDP ratio (including taxes on income, profits, and capital gains). The matching results are presented respectively in Tables 3 and Table 4. The results remain robust (with an increase in non-resource tax revenues and a more considerable increase in income tax) to the combination of control variables, our treatment variables, the matching algorithms, and the adding of the governance indicators. Specifically to non-resource tax revenues, We note that the estimated ATTs are highly sensitive to governance indicators. Our estimations in Table 3 (*EITI_1 & EITI_2*) demonstrate that compared to non-members, EITI members increase non resource tax revenues by an average value ranging between $e^{0.0819}$ to $e^{0.222}$ (1.085 to 1.25) percentage points. Table 3 (*EITI_3*) indicates that EITI compliant increases non-resource tax revenues by an average value ranging between $e^{0.100}$ to $e^{0.197}$ (1.105 to 1.22) percentage points compared to non-compliant members. Mawejje (2019) found that the coefficient on the interaction term between the EITI membership dummy variable and the natural resource dependency is positively and significantly associated with non-oil revenue mobilization but gets increasingly weaker with the addition of control variables. Our results confirm a significant and robust positive effect of EITI on the level of domestic tax revenue mobilization through a better-adapted methodology. This suggests that EITI implementation helps to mitigate the crowding out of non-resource tax revenues by resource revenues, thereby reducing resource dependence¹⁰. EITI, therefore, promotes complementary linkages between the extractive sector and other sectors in resource-rich economies.

Likewise, in Table 4 (*EITI_1 & EITI_2*) we notice that EITI members increase significantly income tax revenues by an average value ranging between $e^{0.112}$ to $e^{0.447}$ (1.13 to 1.56) percentage points compared to non-members. Table 4 (*EITI_3*) indicates that EITI compliant increase significantly income tax revenues by an average value ranging between $e^{0.124}$ to $e^{0.234}$ (1.132 to 1.26) percentage points compared to non-compliant members. On the one hand, we note that the estimated ATT coefficients are greater for income tax revenues than those for total tax revenues and non-resource tax revenues. This could be explained by the direct impact EITI on income tax revenues through more equitable and transparent tax regimes (mining, oil, and gas regimes). The estimated ATT coefficients are smaller for total tax revenues than for income and non-resource tax revenues separately, because of the negative relationship between resource dependence and non-resource tax revenues despite the EITI. This is consistent with Bornhorst et al. (2009), Ndikumana and Abderrahim (2010), Crivelli and Gupta (2014), and Mawejje (2019).

Second, to remove any doubt about whether the treatment effect improves with the main stages of EITI implementation, we undertake a fixed-effects estimation through the control function approach (equation 5), considering only the duration of each stage independently. We then include the estimated propensity score (*_pscore*) obtained after matching, taking into account all the control variables. The results are presented in Table A1 and graphically represented by Figure 5. The estimated coefficients on the propensity score are statistically significant at the 1% level, which is strong evidence for the presence of self-selection bias. This justifies a posteriori the use of the PSM method in the previous estimations of main results. The results reveal very significantly that EITI members have higher levels of tax revenue mobilization than non-members and the effects are more significant with the stage of EITI implementation. The treatment effect is more significant on income tax revenue than on non-resource

¹⁰The degree to which countries do—or do not—have access to alternative sources of income other than resource extraction, at some point in time (Brunnschweiler and Bulte, 2008)

tax revenue, which is also greater than on total tax revenue.

Table 3: Matching estimates of treatment effect on the Non_resource_tax_revenues

	<i>Treatment: EITI Commitment date (EITI.1)</i>			Dep. var.: Log Non_resource_tax_revenues (% GDP)				
	n-Nearest neighbors matching			r-Radius matching			Kernel	local linear
	n=1	n=2	n=3	r=0.005	r=0.01	r=0.05	matching	matching
[1] ATT without GI.	0.0125 (0.0655)	0.0214 (0.0642)	0.0345 (0.0576)	0.0383 (0.0428)	0.0373 (0.0420)	0.0961** (0.0413)	0.0907** (0.0428)	0.0819* (0.0446)
N. Total Obs.	1263	1263	1263	1263	1263	1263	1263	1263
N. Treated/Controls Obs.	277/986	277/986	277/986	277/986	277/986	277/986	277/986	277/986
Pseudo R2	0.013	0.013	0.010	0.003	0.008	0.006	0.006	0.013
Standardized bias (p-value)	0.423	0.436	0.684	0.995	0.851	0.918	0.910	0.423
Rosenbaum sensitivity	1	1.1	1.3	1.1	1.2	1.4	1.4	1.4
[2] Index of Governance	0.222*** (0.0687)	0.192*** (0.0650)	0.191*** (0.0533)	0.131*** (0.0431)	0.131*** (0.0419)	0.203*** (0.0402)	0.203*** (0.0407)	0.200*** (0.0468)
[3] Corruption(e)	0.197*** (0.0619)	0.172*** (0.0542)	0.165*** (0.0529)	0.117*** (0.0410)	0.131*** (0.0372)	0.166*** (0.0372)	0.168*** (0.0368)	0.166*** (0.0403)
[4] Gov. Effectiveness(e)	0.121 (0.0738)	0.131** (0.0627)	0.157** (0.0625)	0.0853** (0.0432)	0.121*** (0.0455)	0.174*** (0.0429)	0.178*** (0.0455)	0.187*** (0.0498)
[5] Rule of Law(e)	0.169** (0.0686)	0.169*** (0.0627)	0.165*** (0.0568)	0.108** (0.0429)	0.124*** (0.0402)	0.185*** (0.0418)	0.187*** (0.0408)	0.179*** (0.0483)
	<i>Treatment: EITI Candidate date (EITI.2)</i>			Dep. var.: Log Non_resource_tax_revenues (% GDP)				
	n-Nearest neighbors matching			r-Radius matching			Kernel	local linear
	n=1	n=2	n=3	r=0.005	r=0.01	r=0.05	matching	matching
[1] ATT without GI.	0.109 (0.0681)	0.104* (0.0599)	0.113** (0.0560)	0.0757* (0.0438)	0.0820* (0.0423)	0.108*** (0.0359)	0.107*** (0.0402)	0.107*** (0.0388)
N. Total Obs.	1263	1263	1263	1263	1263	1263	1263	1263
N. Treated/Controls Obs.	220/1043	220/1043	220/1043	220/1043	220/1043	220/1043	220/1043	220/1043
Pseudo R2	0.012	0.009	0.007	0.005	0.007	0.003	0.003	0.012
Standardized bias (p-value)	0.727	0.867	0.930	0.985	0.948	0.996	0.996	0.727
Rosenbaum sensitivity	1	1.2	1.3	1.2	1.2	1.5	1.5	1.6
[2] Index of Governance	0.147* (0.0756)	0.115* (0.0649)	0.127** (0.0625)	0.0947** (0.0467)	0.123*** (0.0470)	0.182*** (0.0415)	0.185*** (0.0439)	0.196*** (0.0430)
[3] Corruption(e)	0.126** (0.0597)	0.129** (0.0557)	0.145*** (0.0535)	0.101** (0.0413)	0.114*** (0.0388)	0.160*** (0.0368)	0.160*** (0.0358)	0.166*** (0.0368)
[4] Gov. Effectiveness(e)	0.176** (0.0861)	0.170** (0.0717)	0.148** (0.0675)	0.125*** (0.0481)	0.151*** (0.0488)	0.193*** (0.0469)	0.190*** (0.0500)	0.202*** (0.0518)
[5] Rule of Law(e)	0.178** (0.0726)	0.132** (0.0619)	0.158*** (0.0591)	0.125*** (0.0477)	0.150*** (0.0431)	0.179*** (0.0422)	0.173*** (0.0412)	0.169*** (0.0451)
	<i>Treatment: EITI Compliance date (EITI.3)</i>			Dep. var.: Log Non_resource_tax_revenues (% GDP)				
	n-Nearest neighbors matching			r-Radius matching			Kernel	local linear
	n=1	n=2	n=3	r=0.005	r=0.01	r=0.05	matching	matching
[1] ATT without GI.	0.175* (0.0903)	0.165** (0.0779)	0.144* (0.0741)	0.151*** (0.0554)	0.156*** (0.0548)	0.138*** (0.0478)	0.134*** (0.0464)	0.154*** (0.0497)
N. Total Obs.	664	664	664	664	664	664	664	664
N. Treated/Controls Obs.	68/597	68/597	68/597	68/597	68/597	68/597	68/597	68/597
Pseudo R2	0.043	0.026	0.016	0.006	0.006	0.005	0.005	0.043
Standardized bias (p-value)	0.615	0.899	0.981	1.000	1.000	1.000	1.000	0.615
Rosenbaum sensitivity	1.5	1.7	1.5	1.6	1.7	1.6	1.5	1.8
[2] Index of Governance	0.130 (0.0938)	0.146* (0.0880)	0.141* (0.0773)	0.101* (0.0607)	0.100* (0.0577)	0.155*** (0.0449)	0.155*** (0.0477)	0.162*** (0.0478)
[3] Corruption(e)	0.197** (0.0891)	0.158** (0.0799)	0.183** (0.0775)	0.186*** (0.0569)	0.150*** (0.0528)	0.136*** (0.0439)	0.139*** (0.0449)	0.156*** (0.0466)
[4] Gov. Effectiveness(e)	0.0800 (0.0951)	0.151* (0.0840)	0.131* (0.0758)	0.123* (0.0639)	0.124** (0.0545)	0.159*** (0.0458)	0.157*** (0.0443)	0.162*** (0.0501)
[5] Rule of Law(e)	0.190** (0.0938)	0.137* (0.0748)	0.123* (0.0745)	0.118** (0.0547)	0.140*** (0.0516)	0.130*** (0.0444)	0.133*** (0.0440)	0.154*** (0.0509)

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Bootstrap replications = 500. GI= Governance Indicators

All the control variables estimating the propensity score are included beforehand, then we use Governance Indicators estimate one by one to test their specific influence on the outcome.

Table 4: Matching estimates of treatment effect on the income tax revenues

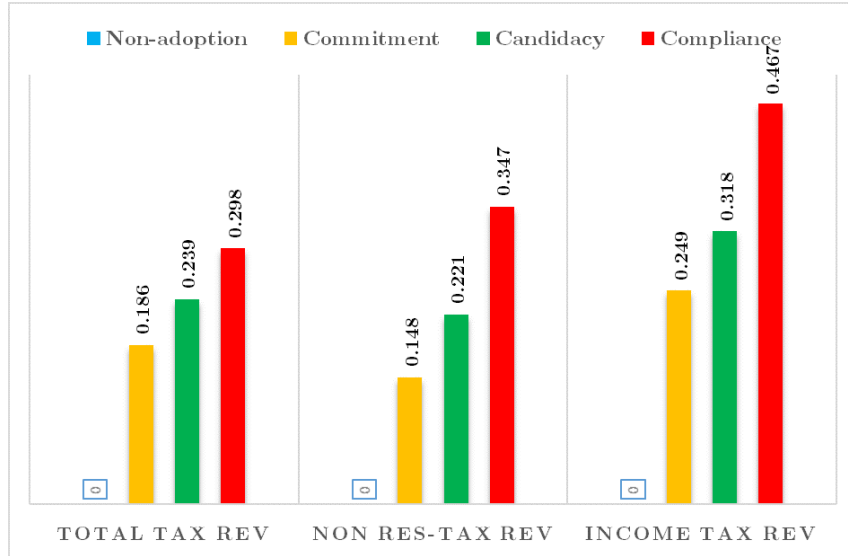
<i>Treatment: EITI Commitment date (EITI.1) Dep. var.: Log Income Tax (income, profits, and capital gains (% GDP))</i>								
	n-Nearest neighbors matching			r-Radius matching			Kernel	local linear
	n=1	n=2	n=3	r=0.005	r=0.01	r=0.05	matching	matching
[1] ATT without GI.	0.321*** (0.0996)	0.286*** (0.0888)	0.296*** (0.0822)	0.122** (0.0619)	0.141** (0.0651)	0.242*** (0.0651)	0.260*** (0.0687)	0.267*** (0.0723)
N. Total Obs.	1096	1096	1096	1096	1096	1096	1096	1096
N. Treated/Controls Obs.	229/867	229/867	229/867	229/867	229/867	229/867	229/867	229/867
Pseudo R2	0.047	0.074	0.012	0.007	0.005	0.009	0.012	0.047
Standardized bias (p-value)	0.001	0.000	0.670	0.960	0.989	0.861	0.696	0.001
Rosenbaum sensitivity	1.5	1.7	1.9	1.3	1.5	1.8	1.8	2
[2] Index of Governance	0.447*** (0.108)	0.393*** (0.100)	0.345*** (0.0881)	0.220*** (0.0624)	0.256*** (0.0597)	0.291*** (0.0692)	0.293*** (0.0700)	0.366*** (0.0836)
[3] Corruption(e)	0.373*** (0.104)	0.375*** (0.0906)	0.368*** (0.0819)	0.229*** (0.0632)	0.230*** (0.0593)	0.275*** (0.0631)	0.278*** (0.0631)	0.319*** (0.0765)
[4] Gov. Effectiveness(e)	0.227* (0.117)	0.295*** (0.103)	0.304*** (0.0969)	0.141** (0.0615)	0.182*** (0.0619)	0.324*** (0.0733)	0.329*** (0.0799)	0.393*** (0.0908)
[5] Rule of Law(e)	0.360*** (0.0965)	0.303*** (0.0882)	0.263*** (0.0850)	0.170*** (0.0592)	0.174*** (0.0570)	0.248*** (0.0610)	0.243*** (0.0639)	0.310*** (0.0744)
<i>Treatment: EITI Candidate date (EITI.2) Dep. var.: Log Income Tax (income, profits, and capital gains (% GDP))</i>								
	n-Nearest neighbors matching			r-Radius matching			Kernel	local linear
	n=1	n=2	n=3	r=0.005	r=0.01	r=0.05	matching	matching
[1] ATT without GI.	0.234** (0.104)	0.243** (0.0992)	0.229** (0.0906)	0.170** (0.0680)	0.167** (0.0706)	0.183*** (0.0642)	0.189*** (0.0664)	0.258*** (0.0759)
N. Total Obs.	1096	1096	1096	1096	1096	1096	1096	1096
N. Treated/Controls Obs.	177/919	177/919	177/919	177/919	177/919	177/919	177/919	177/919
Pseudo R2	0.023	0.094	0.020	0.008	0.009	0.007	0.007	0.023
Standardized bias (p-value)	0.377	0.000	0.514	0.976	0.958	0.980	0.981	0.377
Rosenbaum sensitivity	1.3	1.4	1.4	1.4	1.5	1.8	1.8	2
[2] Index of Governance	0.262** (0.107)	0.252** (0.100)	0.250*** (0.0890)	0.140** (0.0668)	0.168*** (0.0649)	0.246*** (0.0703)	0.248*** (0.0648)	0.240*** (0.0730)
[3] Corruption(e)	0.252** (0.108)	0.198** (0.0983)	0.188** (0.0910)	0.0642 (0.0658)	0.122* (0.0637)	0.223*** (0.0646)	0.224*** (0.0664)	0.220*** (0.0739)
[4] Gov. Effectiveness(e)	0.225* (0.120)	0.232** (0.107)	0.230** (0.0899)	0.171** (0.0692)	0.200*** (0.0633)	0.308*** (0.0764)	0.305*** (0.0828)	0.284*** (0.0871)
[5] Rule of Law(e)	0.258** (0.105)	0.241*** (0.0890)	0.219** (0.0894)	0.0721 (0.0672)	0.112* (0.0643)	0.228*** (0.0670)	0.227*** (0.0651)	0.226*** (0.0715)
<i>Treatment: EITI Compliance date (EITI.3) Dep. var.: Log Income Tax (income, profits, and capital gains (% GDP))</i>								
	n-Nearest neighbors matching			r-Radius matching			Kernel	local linear
	n=1	n=2	n=3	r=0.005	r=0.01	r=0.05	matching	matching
[1] ATT without GI.	0.211* (0.113)	0.186* (0.100)	0.169* (0.0909)	0.234*** (0.0805)	0.196*** (0.0700)	0.173*** (0.0601)	0.171*** (0.0570)	0.167*** (0.0548)
N. Total Obs.	596	596	596	596	596	596	596	596
N. Treated/Controls Obs.	72/524	72/524	72/524	72/524	72/524	72/524	72/524	72/524
Pseudo R2	0.092	0.170	0.054	0.060	0.027	0.017	0.019	0.092
Standardized bias (p-value)	0.062	0.001	0.419	0.391	0.893	0.973	0.965	0.062
Rosenbaum sensitivity	1.4	1.4	1.3	2.3	2.1	2.3	2.3	2.3
[2] Index of Governance	0.0673 (0.112)	0.165* (0.0963)	0.187** (0.0916)	0.210*** (0.0800)	0.178** (0.0731)	0.132** (0.0598)	0.132* (0.0690)	0.134** (0.0620)
[3] Corruption(e)	0.0958 (0.110)	0.0667 (0.0993)	0.0845 (0.0899)	0.149* (0.0785)	0.111 (0.0753)	0.129** (0.0611)	0.124** (0.0609)	0.136** (0.0612)
[4] Gov. Effectiveness(e)	0.115 (0.117)	0.152 (0.106)	0.157* (0.0912)	0.169** (0.0777)	0.148* (0.0756)	0.144** (0.0575)	0.141** (0.0630)	0.141** (0.0593)
[5] Rule of Law(0-100)	0.277** (0.110)	0.200* (0.103)	0.207** (0.0907)	0.203** (0.0826)	0.168** (0.0749)	0.133** (0.0630)	0.135** (0.0640)	0.138** (0.0574)

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Bootstrap replications = 500. GI= Governance Indicators

All the control variables estimating the propensity score are included beforehand, then we use Governance Indicators estimate one by one to test their specific influence on the outcome.

Figure 5: The evolution of the estimated fixed-effects coefficients of the stages of EITI implementation compared to non-EITI.



6 Exploring the heterogeneity in the treatment effects

Developing countries share many common characteristics, but structural factors such as economic and institutional contexts (Easterly, 2002) can magnify or mitigate the impact of EITI implementation on the tax revenues. We have shown through Propensity Scoring Matching that EITI Compliant countries perform better on tax revenues than non-compliant countries. We also examine whether the length of time that has elapsed since a country joined the EITI primarily affects tax revenues. Next, we test the influence of economic indicators in the ATT. Finally, we examine the impact of other institutional transparency indicators in the ATT. To assess the presence of potential sources heterogeneity in the ATT related to structural factors, we use a control function regression approach, following to Lin and Ye (2009) and Guerguil et al. (2017). The following OLS specification respecting the common support from matching allows exploring non-linearity in the ATT:

$$TAX_REV_{it} = \alpha + \beta EITI_{it} + \gamma Pscore_{it} + \phi X_{it} + \theta(EITI_{it} * X_{it}) + \mu_i + v_t + \varepsilon_{it} \quad (5)$$

TAX_REV_{it} refers to the tax revenues (or the tax structure); $EITI_{it}$ to the EITI dummy variable; $Pscore_{it}$ which stands for the Estimated Propensity Score through the probit model is included to correct for self-selection. The X_{it} vector includes the set of macroeconomic and institutional factors that could give rise to heterogeneity in the ATT; θ coefficient of the interactive term (between $EITI_{it}$ and X_{it}) characterizes the heterogeneity features of the treatment effect of EITI. μ_{it} and v_{it} refer to country fixed effects and time effects, respectively, while ε_{it} refers to stochastic disturbance term.

Tables A2, A3 and A4 below report the results of total tax revenues using EITI (commitment, Candidate and Compliant, respectively) as the treatment variable. Column (2) shows the results of a simple OLS linking EITI implementation and total tax revenues while accounting for the previously estimated $pscore_{it}$. The estimated β coefficient (including country fixed and random effects) is the average difference in tax revenues between countries having implemented EITI standards and those that have not. This coefficient is positive and significantly different from zero. The magnitudes are close to the ATTs from the matching algorithms in Table 2 above (0.096 for Commitment, 0.088 for Candidate, and 0.057

for Compliant). This shows that tax revenue growth is stronger in EITI members than in other resource-dependent countries. The time elapsed since EITI Commitment or Candidate (column 3) positively and significantly different from zero on tax revenues. We can confirm that the time elapsed since EITI Commitment and Candidate contribute to the heterogeneity of ATT between EITI members. The following columns show the heterogeneity of treatment effects related to a given structural factor.

In EITI Candidate countries, for example, the time elapsed since the country's application date, total rents, GDP per capita, financial development, trade openness, ODA, FDI, coal rents, forest rents, HDI, industrial value-added, governance quality index, influence positively or negatively and significantly the effect of the ATT, depending on the type of tax. Our findings suggest that developing countries could improve their tax revenues by applying EITI standards rigorously and, indeed, strengthening the quality of governance.

Similarly, trade openness improves the effect of treatment on the outcome (column 10). Extractive resources in developing countries are mainly for export. Although trade openness in developing countries is still low compared to developed countries, it influences the effect of EITI membership on tax revenues. High inflation reduces tax revenue mobilization, but its influence on the effect of treatment is insignificant (column 12). This may be explained by the low inflation disparity in developing countries.

7 Conclusion

The objective of this study was to assess the impact of EITI on the tax revenue mobilization from a panel of 83 developing countries over the period 1995-2017. The intuition was that EITI implementation would boost the quality of governance in resource-rich countries and thus improve tax revenue mobilization. Our empirical strategy focuses on the propensity score matching method and the control function approach. We highlight various matching methods, which allows us to control the self-selection of choice to implement EITI. We find that the ATT is positive and is robust to various matching methods. In other words, there is a significant difference between EITI members compared to non-EITI members in terms of tax revenue mobilization. All else being equal, EITI membership improves the tax revenues by around 1.06 to 1.20 percentage points for a given country. The matching of EITI compliant countries with EITI non-compliant countries (commitment and candidate stage) suggests that the compliance to EITI standards generates a considerable surplus of domestic tax revenues (around 1.09 to 1.13 percentage points of GDP). The magnitudes estimated ATTs are more significant if we include governance quality. Results are robust to non-resource and income tax revenues. In other words, EITI members are more effective than non-EITI members in mobilizing domestic revenues. Regarding heterogeneity in EITI Compliant countries, the time elapsed since the country's application date, trade openness, FDI, and forest rents positively and significantly influence the ATT effect of total tax revenues. Financial development, HDI, and governance quality index have a negative and significant influence on the ATT effect. Heterogeneity factors are more or less dependent on the stage of EITI implementation and the type of tax revenues. The stylized facts show that membership in the EITI mitigates the harmful effects of dependence on extractive resources.

In terms of policy implications of this study, resource-rich countries could improve their tax revenue mobilization by implementing EITI in light of the requirements. Most importantly, the implementation of EITI reduces dependence on resources and the "resource curse." Countries already implementing the EITI need to build good institutions. However, it is crucial to keep in mind that simply EITI implementation is not enough to guarantee transparency and better tax revenues. It must be accompanied

by a series of other measures, such as compliance and responsible use of revenues. Another suggestion for resource-rich countries beyond this study's scope would be the need for closer monitoring of international tax treaties and the relationship between EITI policy and fiscal transparency.

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APPENDIX

Table A1: Comparing of each EITI implementation step to non-EITI

	[Log.Total Tax rev.] [1]	[Log.Non-Resource Tax rev.] [2]	[Log.Income Tax rev.] [3]
_pscore	0.224*** (0.055)	0.180*** (0.059)	0.676*** (0.090)
0.EITI (Non-adoption)	0.000 (.)	0.000 (.)	0.000 (.)
1.EITI (Commitment)	0.186*** (0.029)	0.148*** (0.031)	0.249*** (0.045)
2.EITI (Candidacy)	0.239*** (0.020)	0.221*** (0.021)	0.318*** (0.035)
3.EITI (Compliance)	0.298*** (0.027)	0.347*** (0.032)	0.467*** (0.043)
Constant	2.492*** (0.014)	2.428*** (0.014)	1.193*** (0.021)
N	1311	1210	1085
F	82.532	65.380	90.962
Adjusted R-squared	0.162	0.134	0.212

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A2: Heterogeneity of the treatment effects (EITI.1) on outcome (Log Total tax_revenues (% GDP))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
EITI.1	0.151*** (0.021)	0.096*** (0.020)	0.058** (0.024)	0.093*** (0.022)	0.182*** (0.068)	0.251*** (0.035)	0.206 (0.370)	0.064* (0.037)	0.328 (0.307)	0.089*** (0.021)	0.084*** (0.021)	0.100*** (0.020)	0.017 (0.023)	0.269*** (0.069)	0.223*** (0.043)	0.024 (0.023)
p_score		0.108** (0.046)	0.086* (0.047)	0.021 (0.048)	0.157*** (0.045)	0.081* (0.047)	0.202*** (0.053)	0.100** (0.045)	0.039 (0.051)	0.101** (0.044)	0.060 (0.049)	0.083* (0.048)	0.160*** (0.047)	0.067 (0.047)	0.092** (0.045)	0.136*** (0.047)
Time1			0.011*** (0.004)													
Total.Extract.rents				0.008*** (0.001)												
EITI.1xTotal.Extract.rents				-0.002 (0.002)												
LOG.GDP/CAPITA					0.365*** (0.039)											
EITI.1xLOG.GDP/CAPITA					-0.008 (0.006)											
FINANCIAL DEV.						0.424** (0.188)										
EITI.1xFINANCIAL DEV.						-0.837*** (0.157)										
Commodity prices							-0.005*** (0.001)									
EITI.1xCommodity prices							-0.001 (0.004)									
OPENESS								0.002*** (0.000)								
EITI.1xOPENESS								0.000 (0.000)								
LOG.AID									0.041*** (0.012)							
EITI.1xLOG.AID									-0.011 (0.015)							
Inflation										-0.001*** (0.000)						
EITI.1xInflation										-0.000 (0.001)						
FDI											0.001 (0.002)					
EITI.1xFDI											0.002 (0.002)					
Coal.rents												0.028* (0.017)				
EITI.1xCoal.rents												-0.016 (0.016)				
Forest.rents													-0.030*** (0.003)			
EITI.1xForest.rents													0.014*** (0.003)			
HDI														1.490*** (0.396)		
EITI.1xHDI														-0.300** (0.117)		
Industry.VA															0.010*** (0.001)	
EITI.1xIndustry.VA															-0.005*** (0.001)	
Index Governance																0.114*** (0.019)
EITI.2xIndex Governance																-0.086*** (0.016)
Constant	1.585*** (0.066)	3.256*** (0.052)	3.260*** (0.052)	3.017*** (0.068)	-0.584 (0.411)	3.220*** (0.054)	3.657*** (0.119)	3.037*** (0.057)	2.476*** (0.239)	3.299*** (0.050)	3.258*** (0.052)	3.263*** (0.052)	3.296*** (0.050)	2.630*** (0.174)	2.713*** (0.084)	3.505*** (0.064)
N	1697	1111	1111	1111	1111	1111	1111	1111	1111	1110	1111	1111	1111	1111	1111	1111
F	78.671	75.627	75.002	77.039	81.333	76.291	75.051	80.734	74.855	82.265	74.708	74.275	81.453	75.813	79.310	79.449
Adjusted R-squared	0.826	0.861	0.861	0.866	0.872	0.864	0.862	0.871	0.862	0.873	0.862	0.861	0.872	0.864	0.869	0.869

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A3: Heterogeneity of the treatment effects (EITL2) on outcome (Tax revenues (% GDP))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
EITL2	0.134*** (0.022)	0.088*** (0.020)	0.055** (0.025)	0.090*** (0.023)	0.120* (0.068)	0.234*** (0.035)	0.036 (0.432)	0.015 (0.040)	0.467 (0.321)	0.081*** (0.022)	0.078*** (0.021)	0.092*** (0.020)	0.005 (0.023)	0.238*** (0.070)	0.148*** (0.043)	-0.105*** (0.035)
_p.score		0.147*** (0.049)	0.134*** (0.049)	0.068 (0.050)	0.190*** (0.047)	0.129*** (0.049)	0.253*** (0.056)	0.155*** (0.048)	0.087 (0.053)	0.132*** (0.047)	0.089 (0.054)	0.123** (0.051)	0.177*** (0.049)	0.111** (0.049)	0.135*** (0.048)	0.173*** (0.048)
Time2			0.010** (0.005)													
Total.extract.rents				0.008*** (0.001)												
EITL2xTotal.extract.rents				-0.003** (0.002)												
LOG.GDP/CAPITA					0.351*** (0.039)											
EITL2xLOG.GDP/CAPITA					-0.004 (0.006)											
FINANCIAL DEV.						0.384** (0.186)										
EITL2xFINANCIAL DEV.						-0.813*** (0.162)										
Commodity prices							-0.006*** (0.001)									
EITL2xCommodity prices							0.000 (0.004)									
OPENESS								0.002*** (0.000)								
EITL2xOPENESS								0.001* (0.000)								
LOG.AID									0.039*** (0.011)							
EITL2xLOG.AID									-0.018 (0.016)							
Inflation										-0.001*** (0.000)						
EITL2xInflation										0.000 (0.001)						
FDI											0.001 (0.001)					
EITL2xFDI											0.002 (0.002)					
Coal.rents												0.024 (0.016)				
EITL2xCoal.rents												-0.014 (0.015)				
Forest.rents													-0.026*** (0.003)			
EITL2xForest.rents													0.014*** (0.003)			
HDI														1.371*** (0.396)		
EITL2xHDI														-0.267** (0.119)		
Industry_VA															0.009*** (0.001)	
EITL2xIndustry_VA															-0.003** (0.001)	
Index Governance																0.118*** (0.019)
EITL2xIndex Governance																-0.152*** (0.024)
Constant	1.585*** (0.066)	3.256*** (0.052)	3.267*** (0.052)	3.017*** (0.068)	-0.584 (0.411)	3.220*** (0.054)	3.657*** (0.119)	3.037*** (0.057)	2.476*** (0.239)	3.299*** (0.050)	3.258*** (0.052)	3.263*** (0.052)	3.296*** (0.050)	2.630*** (0.174)	2.713*** (0.084)	3.505*** (0.064)
N	1697	1111	1111	1111	1111	1111	1111	1111	1111	1110	1111	1111	1111	1111	1111	1111
F	78.671	75.627	75.475	77.039	81.333	76.291	75.051	80.734	74.855	82.265	74.708	74.275	81.453	75.813	79.310	79.449
Adjusted R-squared	0.826	0.861	0.862	0.866	0.872	0.864	0.862	0.871	0.862	0.873	0.862	0.861	0.872	0.864	0.869	0.869

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The F-test refers to the global significance test (1 %) of the interaction term and the variable X.

Table A4: Heterogeneity of the treatment effects (EITL3) on outcome (Tax revenues (% GDP))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
EITL3	0.095***	0.057**	0.031	0.003	0.084	0.205***	-1.223	-0.191***	0.159	0.058**	0.006	0.057**	-0.073**	0.285***	0.005	-0.056
	(0.031)	(0.026)	(0.044)	(0.037)	(0.111)	(0.050)	(0.855)	(0.065)	(0.549)	(0.028)	(0.029)	(0.026)	(0.034)	(0.106)	(0.060)	(0.050)
pscore		0.441***	0.445***	0.287***	0.492***	0.453***	0.528***	0.411***	0.350***	0.386***	0.330***	0.446***	0.467***	0.395***	0.446***	0.493***
		(0.090)	(0.090)	(0.092)	(0.087)	(0.092)	(0.096)	(0.087)	(0.101)	(0.088)	(0.093)	(0.105)	(0.088)	(0.090)	(0.089)	(0.090)
Time3			0.008													
			(0.011)													
Total.extractrentGDP				0.006***												
				(0.001)												
EITL3xTotal.extractrentGDP				0.004												
				(0.003)												
LGDPCAPITA					0.353***											
					(0.039)											
EITL3xLGDPCAPITA					-0.004											
					(0.009)											
FD						0.305										
						(0.188)										
EITL3xFD						-0.933***										
						(0.268)										
xm_gdpf							-0.004***									
							(0.001)									
EITL3xxm_gdpf							0.013									
							(0.008)									
OPENESS_Trade								0.002***								
								(0.000)								
EITL3xOPENESS_Trade								0.003***								
								(0.001)								
LAIID									0.023**							
									(0.011)							
EITL3xLAIID									-0.005							
									(0.027)							
Inflation										-0.001***						
										(0.000)						
EITL3xInflation										-0.000						
										(0.002)						
FDI											0.002*					
											(0.001)					
EITL3xFDI											0.007***					
											(0.002)					
Coal_rents												-0.000				
												(0.011)				
EITL3xCoal_rents												-0.001				
												(0.010)				
Forest_rents													-0.027***			
													(0.003)			
EITL3xForest_rents													0.026***			
													(0.005)			
HDI														1.284***		
														(0.402)		
EITL3xHDI														-0.435**		
														(0.184)		
Industry_VA															0.008***	
															(0.001)	
EITL3xIndustry_VA															0.002	
															(0.002)	
Index Governance																0.109***
																(0.019)
EITL3xIndex Governance																-0.093**
																(0.036)
_cons	1.632***	3.226***	3.226***	3.043***	-0.483	3.196***	3.587***	3.017***	2.779***	3.272***	3.227***	3.226***	3.271***	2.684***	2.817***	3.458***
	(0.067)	(0.052)	(0.052)	(0.060)	(0.411)	(0.054)	(0.113)	(0.056)	(0.222)	(0.050)	(0.051)	(0.052)	(0.050)	(0.177)	(0.077)	(0.064)
N	1697	1111	1111	1111	1111	1111	1111	1111	1111	1110	1111	1111	1111	1111	1111	1111
F	76.162	75.392	74.551	76.755	80.538	74.696	74.945	80.933	74.001	81.799	75.212	73.644	81.264	74.972	78.191	76.901
Adjusted R-squared	0.822	0.860	0.860	0.865	0.871	0.862	0.862	0.871	0.861	0.873	0.863	0.860	0.872	0.862	0.867	0.865

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Table A5: Heterogeneity of the treatment effects (EITL1) on outcome (LOG.Non-Resource tax)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
EITL1	0.104*** (0.023)	0.077*** (0.021)	0.027 (0.025)	0.062*** (0.023)	0.151** (0.072)	0.227*** (0.037)	0.247 (0.348)	0.030 (0.038)	-0.208 (0.311)	0.074*** (0.021)	0.074*** (0.022)	0.079*** (0.021)	-0.004 (0.023)	0.263*** (0.074)	0.045 (0.044)	0.238*** (0.037)	0.274*** (0.035)	0.271*** (0.036)
Pscore		-0.128*** (0.047)	-0.156*** (0.047)	-0.136*** (0.050)	-0.099** (0.046)	-0.179*** (0.048)	0.037 (0.054)	-0.126*** (0.045)	-0.223*** (0.051)	-0.135*** (0.044)	-0.189*** (0.048)	-0.149*** (0.047)	-0.116** (0.048)	-0.173*** (0.048)	-0.125*** (0.047)	-0.122*** (0.047)	-0.178*** (0.048)	-0.145*** (0.046)
Time1			0.014*** (0.004)															
Total_extract_rents				-0.001 (0.001)														
EITL1xTotal_extract_rents				0.002 (0.002)														
LOGGDP/CAPITA					0.215*** (0.039)													
EITL1xLOGGDP/CAPITA					-0.007 (0.006)													
FINANCIAL DEV.						0.050 (0.185)												
EITL1xFINANCIAL DEV.						-0.798*** (0.161)												
Commodity prices.							-0.007*** (0.001)											
EITL1xCommodity prices.							-0.002 (0.003)											
OPENESS.								0.002*** (0.000)										
EITL1xOPENESS.								0.001 (0.000)										
LOG_AID									0.041*** (0.012)									
EITL1xLOG_AID									0.015 (0.016)									
Inflation										-0.001*** (0.000)								
EITL1xInflation										-0.001 (0.001)								
FDI											0.006*** (0.001)							
EITL1xFDI											-0.001 (0.002)							
Coal_rents												0.046*** (0.017)						
EITL1xCoal_rents												-0.010 (0.022)						
Forest_rents													-0.024*** (0.003)					
EITL1xForest_rents													0.016*** (0.003)					
HDI														1.501*** (0.391)				
EITL1xHDI														-0.315** (0.123)				
Industry_VA															0.003** (0.001)			
EITL1xIndustry_VA															0.001 (0.002)			
Control of Corruption (0-100)																0.004*** (0.001)		
EITL1xControl of Corruption (0-100)																-0.006*** (0.001)		
Gov. Effectiveness (0-100)																	0.003*** (0.001)	
EITL1xGov. Effectiveness (0-100)																	-0.006*** (0.001)	
Rule of Law (Estimate)																		0.003*** (0.001)
EITL1x Rule of Law (Estimate)																		-0.007*** (0.001)
.Constant	1.679*** (0.057)	1.727*** (0.049)	1.738*** (0.049)	1.745*** (0.066)	-0.542 (0.413)	1.726*** (0.052)	2.294*** (0.107)	1.529*** (0.055)	0.943*** (0.238)	1.773*** (0.047)	1.726*** (0.049)	1.736*** (0.049)	1.760*** (0.048)	1.097*** (0.171)	1.589*** (0.083)	1.702*** (0.049)	1.690*** (0.049)	1.706*** (0.049)
N	1621	1069	1069	1069	1069	1069	1069	1069	1069	1068	1069	1069	1069	1069	1069	1069	1069	1069
F	81.016	100.217	100.431	98.109	101.364	100.692	101.899	105.749	99.909	112.926	101.899	98.782	105.976	100.574	98.819	102.641	104.013	103.093
Adjusted R-squared	0.834	0.894	0.895	0.894	0.897	0.897	0.898	0.901	0.896	0.907	0.898	0.895	0.901	0.897	0.895	0.898	0.900	0.899

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

The F-test refers to the global significance test (1 %) of the interaction term and the variable X.

Table A6: Heterogeneity of the treatment effects (EITI_2) on outcome (LOG.Non-Resource tax)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
EITI_2	0.095*** (0.024)	0.079*** (0.021)	0.024 (0.027)	0.058** (0.024)	0.095 (0.073)	0.245*** (0.037)	0.124 (0.409)	-0.036 (0.042)	0.075 (0.328)	0.075*** (0.022)	0.073*** (0.021)	0.080*** (0.021)	-0.007 (0.024)	0.298*** (0.074)	0.031 (0.043)	0.222*** (0.036)	0.256*** (0.035)	0.261*** (0.036)
Pscore		-0.087* (0.049)	-0.110** (0.050)	-0.083 (0.052)	-0.059 (0.049)	-0.134*** (0.050)	0.100* (0.057)	-0.075 (0.049)	-0.158*** (0.053)	-0.104** (0.047)	-0.189*** (0.053)	-0.108** (0.050)	-0.093* (0.050)	-0.133*** (0.050)	-0.082* (0.050)	-0.071 (0.049)	-0.116** (0.050)	-0.094* (0.049)
Time2			0.016*** (0.005)															
Total_extract_rents				-0.001 (0.001)														
EITI_2xTotal_extract_rents				0.003* (0.002)														
LOGGDP/CAPITA					0.211*** (0.039)													
EITI_2xLOGGDP/CAPITA					-0.002 (0.006)													
FINANCIAL DEV.						0.071 (0.183)												
EITI_2xFINANCIAL DEV.						-0.909*** (0.167)												
Commodity prices.							-0.008*** (0.001)											
EITI_2xCommodity prices.							-0.001 (0.004)											
OPENESS.								0.002*** (0.000)										
EITI_2xOPENESS.								0.001*** (0.000)										
LOG_AID									0.039*** (0.011)									
EITI_2xLOG_AID									0.001 (0.016)									
Inflation										-0.001*** (0.000)								
EITI_2xInflation										-0.000 (0.002)								
FDI											0.006*** (0.001)							
EITI_2xFDI											-0.001 (0.002)							
Coal_rents												0.040** (0.016)						
EITI_2xCoal_rents												0.001 (0.024)						
Forest_rents													-0.022*** (0.003)					
EITI_2xForest_rents													0.017*** (0.003)					
HDI														1.385*** (0.390)				
EITI_2xHDI														-0.381*** (0.124)				
Industry_VA															0.002* (0.001)			
EITI_2xIndustry_VA															0.002 (0.001)			
Control of Corruption (0-100)																0.004*** (0.001)		
EITI_2xControl of Corruption (0-100)																-0.005*** (0.001)		
Gov. Effectiveness (0-100)																	0.003*** (0.001)	
EITI_2xGov. Effectiveness (0-100)																	-0.006*** (0.001)	
Rule of Law (Estimate)																		0.003*** (0.001)
EITI_2x Rule of Law (Estimate)																		-0.007*** (0.001)
.Constant	1.673*** (0.057)	1.719*** (0.049)	1.726*** (0.049)	1.764*** (0.064)	-0.509 (0.414)	1.713*** (0.051)	2.361*** (0.107)	1.528*** (0.055)	0.975*** (0.225)	1.766*** (0.046)	1.716*** (0.048)	1.726*** (0.049)	1.747*** (0.048)	1.135*** (0.171)	1.600*** (0.081)	1.692*** (0.049)	1.677*** (0.049)	1.694*** (0.049)
N	1621	1069	1069	1069	1069	1069	1069	1069	1069	1068	1069	1069	1069	1069	1069	1069	1069	1069
F	80.669	100.020	100.015	98.073	100.931	101.019	102.708	105.371	99.111	112.679	101.709	98.468	105.528	100.438	98.563	102.053	103.236	102.649
Adjusted R-squared	0.834	0.894	0.895	0.894	0.897	0.897	0.899	0.901	0.895	0.907	0.898	0.895	0.901	0.896	0.895	0.898	0.899	0.898

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

The F-test refers to the global significance test (1 %) of the interaction term and the variable X.

Table A7: Heterogeneity of the treatment effects (EITL3) on the outcome (LOG.Non-Resource tax)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
EITL3	0.056	0.042	0.052	-0.032	-0.275*	0.201***	-0.083	-0.272***	0.059	0.052	-0.052	0.015	-0.108**	0.380***	0.033	0.186***	0.209***	0.249***
	(0.036)	(0.035)	(0.057)	(0.048)	(0.147)	(0.066)	(0.863)	(0.080)	(0.630)	(0.037)	(0.042)	(0.036)	(0.045)	(0.123)	(0.067)	(0.061)	(0.060)	(0.061)
Pscore		-0.037	-0.036	-0.130	-0.031	-0.096	0.279**	-0.047	-0.361***	-0.113	-0.049	-0.051	-0.110	-0.109	-0.094	-0.033	-0.045	-0.037
		(0.104)	(0.104)	(0.119)	(0.097)	(0.104)	(0.110)	(0.098)	(0.122)	(0.094)	(0.101)	(0.103)	(0.099)	(0.103)	(0.101)	(0.102)	(0.103)	(0.101)
Time3			-0.004															
			(0.016)															
Total_extract_rents				0.003*														
				(0.002)														
EITL3xTotal_extract_rents				0.008**														
				(0.003)														
LOGGDP/CAPITA					0.444***													
					(0.053)													
EITL3xLOGGDP/CAPITA					0.025**													
					(0.012)													
FINANCIAL DEV.						-0.447												
						(0.314)												
EITL3xFINANCIAL DEV.						-1.109***												
						(0.391)												
Commodity prices.							-0.013***											
							(0.002)											
EITL3xCommodity prices.							0.001											
							(0.009)											
OPENESS.								0.002***										
								(0.000)										
EITL3xOPENESS.								0.003***										
								(0.001)										
LOG_AID									0.081***									
									(0.016)									
EITL3xLOG_AID									-0.001									
									(0.031)									
Inflation										-0.001***								
										(0.000)								
EITL3xInflation										-0.004								
										(0.004)								
FDI											0.003***							
											(0.001)							
EITL3xFDI											0.011***							
											(0.003)							
Coal_rents												0.002						
												(0.024)						
EITL3xCoal_rents												0.122***						
												(0.044)						
Forest_rents													-0.025**					
													(0.004)					
EITL3xForest_rents													0.029***					
													(0.006)					
HDI														2.362***				
														(0.691)				
EITL3xHDI														-0.689***				
														(0.215)				
Industry_VA															0.009***			
															(0.001)			
EITL3xIndustry_VA															0.000			
															(0.002)			
Control of Corruption (0-100)																0.004***		
																(0.001)		
EITL3xControl of Corruption (0-100)																-0.006***		
																(0.002)		
Gov. Effectiveness (0-100)																	0.003***	
																	(0.001)	
EITL3xGov. Effectiveness (0-100)																	-0.007***	
																	(0.002)	
Rule of Law (Estimate)																		0.005***
																		(0.001)
EITL3x Rule of Law (Estimate)																		-0.008***
																		(0.002)
.Constant	2.552***	2.665***	2.664***	2.692***	-2.908***	2.754***	3.922***	2.525***	1.133***	2.689***	2.654***	2.673***	2.735***	1.156**	2.471***	2.541***	2.580***	2.508***
	(0.055)	(0.057)	(0.057)	(0.057)	(0.670)	(0.073)	(0.183)	(0.058)	(0.314)	(0.051)	(0.055)	(0.057)	(0.054)	(0.457)	(0.062)	(0.066)	(0.075)	(0.074)
N	813	557	557	557	557	557	557	557	557	556	557	557	557	557	557	557	557	557
F	66.282	45.485	44.630	44.782	51.381	45.218	49.288	50.440	46.406	56.335	46.711	44.952	50.506	46.342	48.526	46.241	45.645	46.895
Adjusted R-squared	0.835	0.823	0.822	0.825	0.845	0.827	0.839	0.842	0.831	0.857	0.831	0.826	0.842	0.830	0.837	0.830	0.828	0.832

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

The F-test refers to the global significance test (1 %) of the interaction term and the variable X.

Table A8: Heterogeneity of the treatment effects (EITI_1) on outcome (Log.Income-profits-capital tax (% GDP))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
EITI_1	0.189*** (0.035)	0.062** (0.030)	0.007 (0.036)	0.083** (0.035)	0.516*** (0.116)	0.252*** (0.055)	-0.384 (0.627)	0.007 (0.058)	-2.098*** (0.466)	0.046 (0.033)	0.020 (0.032)	0.066** (0.031)	-0.039 (0.035)	0.366*** (0.107)	0.221*** (0.083)	0.188*** (0.060)	0.216*** (0.058)	0.223*** (0.059)
Pscore		0.311*** (0.075)	0.279*** (0.085)	0.254*** (0.074)	0.313*** (0.076)	0.278*** (0.083)	0.366*** (0.074)	0.286*** (0.080)	0.204** (0.075)	0.270*** (0.081)	0.175** (0.079)	0.283*** (0.075)	0.275*** (0.076)	0.224*** (0.076)	0.259*** (0.075)	0.351*** (0.075)	0.278*** (0.078)	0.332*** (0.074)
Time1			0.016*** (0.006)															
Total_extract_rents				0.006** (0.003)														
EITI_1xTotal_extract_rents				-0.005 (0.003)														
LOGGDP/CAPITA					0.223*** (0.068)													
EITI_1xLOGGDP/CAPITA					-0.039*** (0.010)													
FINANCIAL DEV.						0.586** (0.267)												
EITI_1xFINANCIAL DEV.						-0.997*** (0.246)												
Commodity prices.							-0.004* (0.002)											
EITI_1xCommodity prices.							0.004 (0.006)											
OPENESS.								0.003*** (0.000)										
EITI_1xOPENESS.								0.001 (0.001)										
LOG_AID									0.005 (0.019)									
EITI_1xLOG_AID									0.108*** (0.023)									
Inflation										-0.000*** (0.000)								
EITI_1xInflation										0.001 (0.002)								
FDI											-0.002 (0.002)							
EITI_1xFDI											0.009*** (0.003)							
Coal_rents												0.026 (0.025)						
EITI_1xCoal_rents												-0.016 (0.023)						
Forest_rents													-0.021*** (0.006)					
EITI_1xForest_rents													0.021*** (0.004)					
HDI														1.864*** (0.570)				
EITI_1xHDI														-0.519*** (0.179)				
Industry_VA															0.007*** (0.002)			
EITI_1xIndustry_VA															-0.006** (0.003)			
Control of Corruption (0-100)																0.005*** (0.001)		
EITI_1xControl of Corruption (0-100)																-0.004** (0.002)		
Gov. Effectiveness (0-100)																	0.003** (0.001)	
EITI_1xGov. Effectiveness (0-100)																	-0.005*** (0.002)	
Rule of Law (Estimate)																		0.004*** (0.001)
EITI_1x Rule of Law (Estimate)																		-0.005*** (0.002)
.Constant	-0.096 (0.100)	0.420*** (0.102)	0.420*** (0.102)	0.195 (0.146)	-1.915*** (0.715)	0.367*** (0.105)	0.712*** (0.198)	0.147 (0.111)	0.333 (0.400)	0.480*** (0.102)	0.439*** (0.102)	0.424*** (0.103)	0.467*** (0.101)	-0.306 (0.245)	0.015 (0.171)	0.373*** (0.102)	0.394*** (0.102)	0.391*** (0.102)
N	1447	910	910	910	910	910	910	910	910	909	910	910	910	910	910	910	910	910
F	42.739	62.129	62.027	61.002	62.707	62.126	60.889	64.079	62.912	62.156	62.628	60.742	63.729	62.452	61.415	62.555	61.780	62.228
Adjusted R-squared	0.743	0.855	0.857	0.856	0.859	0.858	0.856	0.862	0.860	0.858	0.859	0.855	0.861	0.859	0.857	0.859	0.858	0.858

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

The F-test refers to the global significance test (1 %) of the interaction term and the variable X.

Table A9: Heterogeneity of the treatment effects (EITI_2) on outcome (Log.Income-profits-capital tax (% GDP))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
EITL2	0.188*** (0.038)	0.077** (0.031)	-0.000 (0.041)	0.105*** (0.037)	0.514*** (0.119)	0.325*** (0.058)	-0.963 (0.812)	-0.031 (0.067)	-1.961*** (0.495)	0.054 (0.036)	0.040 (0.033)	0.084*** (0.032)	-0.033 (0.036)	0.495*** (0.112)	0.222*** (0.083)	0.187*** (0.062)	0.234*** (0.060)	0.242*** (0.061)
Pscore		0.346*** (0.077)	0.325*** (0.085)	0.308*** (0.076)	0.341*** (0.077)	0.301*** (0.086)	0.405*** (0.077)	0.340*** (0.081)	0.259*** (0.077)	0.297*** (0.077)	0.189** (0.089)	0.327*** (0.082)	0.264*** (0.077)	0.248*** (0.078)	0.295*** (0.078)	0.377*** (0.077)	0.311*** (0.079)	0.356*** (0.076)
Time2			0.022*** (0.007)															
Total_extract_rents				0.005** (0.003)														
EITL2xTotal_extract_rents				-0.006* (0.003)														
LOGGDP/CAPITA					0.209*** (0.067)													
EITL2xLOGGDP/CAPITA					-0.038*** (0.010)													
FINANCIAL DEV.						0.645** (0.262)												
EITL2xFINANCIAL DEV.						-1.308*** (0.258)												
Commodity prices.							-0.005* (0.002)											
EITL2xCommodity prices.							0.010 (0.008)											
OPENESS.								0.003*** (0.000)										
EITL2xOPENESS.								0.001 (0.001)										
LOG_AID									0.019 (0.018)									
EITL2xLOG_AID									0.102*** (0.025)									
Inflation										-0.000*** (0.000)								
EITL2xInflation										0.003 (0.002)								
FDI											-0.002 (0.002)							
EITL2xFDI											0.008*** (0.003)							
Coal_rents												0.045* (0.024)						
EITL2xCoal_rents												-0.038* (0.022)						
Forest_rents													-0.017*** (0.006)					
EITL2xForest_rents													0.025*** (0.005)					
HDI														1.710*** (0.563)				
EITL2xHDI														-0.721*** (0.186)				
Industry_VA															0.006*** (0.002)			
EITL2xIndustry_VA															-0.006* (0.003)			
Control of Corruption (0-100)																0.005*** (0.001)		
EITL2xControl of Corruption (0-100)																-0.004** (0.002)		
Gov. Effectiveness (0-100)																	0.003** (0.001)	
EITL2xGov. Effectiveness (0-100)																	-0.005*** (0.002)	
Rule of Law (Estimate)																		0.004*** (0.001)
EITL2x Rule of Law (Estimate)																		-0.005*** (0.002)
.Constant	-0.097 (0.100)	0.425*** (0.102)	0.425*** (0.101)	0.236* (0.139)	-1.768** (0.712)	0.361*** (0.104)	0.759*** (0.199)	0.138 (0.109)	0.040 (0.377)	0.483*** (0.102)	0.437*** (0.102)	0.430*** (0.102)	0.460*** (0.101)	-0.246 (0.243)	0.070 (0.166)	0.383*** (0.101)	0.399*** (0.102)	0.397*** (0.101)
N	1447	910	910	910	910	910	910	910	910	909	910	910	910	910	910	910	910	910
F	42.555	62.794	62.772	61.659	63.154	63.595	61.731	65.040	63.222	62.930	62.684	61.558	64.570	63.553	61.970	62.969	62.386	62.801
Adjusted R-squared	0.742	0.857	0.858	0.857	0.860	0.861	0.857	0.864	0.860	0.860	0.859	0.857	0.863	0.861	0.858	0.860	0.859	0.860

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

The F-test refers to the global significance test (1 %) of the interaction term and the variable X.

Table A10: Heterogeneity of the treatment effects (EITI_3) on outcome (Log.Income-profits-capital tax (% GDP))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
EITI_3	0.101*	0.097**	0.150**	0.290***	0.918***	0.514***	-0.547	0.012	-5.414***	0.061	0.024	0.124***	-0.134***	0.966***	0.515***	0.243***	0.323***	0.372***
	(0.052)	(0.044)	(0.067)	(0.064)	(0.161)	(0.075)	(1.440)	(0.098)	(0.739)	(0.050)	(0.049)	(0.045)	(0.051)	(0.148)	(0.112)	(0.081)	(0.082)	(0.083)
Pscore		0.795***	0.784***	1.018***	0.818***	0.711***	0.893***	0.710***	0.435***	0.678***	0.597***	0.793***	0.685***	0.683***	0.716***	0.782***	0.713***	0.795***
		(0.141)	(0.141)	(0.177)	(0.137)	(0.135)	(0.155)	(0.137)	(0.152)	(0.141)	(0.142)	(0.156)	(0.133)	(0.138)	(0.142)	(0.141)	(0.141)	(0.138)
Time3			-0.018															
			(0.017)															
Total_extract_rents				-0.002														
				(0.003)														
EITI_3xTotal_extract_rents				-0.022***														
				(0.005)														
LOGGDP/CAPITA					0.167													
					(0.105)													
EITI_3xLOGGDP/CAPITA					-0.071***													
					(0.013)													
FINANCIAL DEV.						0.968**												
						(0.440)												
EITI_3xFINANCIAL DEV.						-2.564***												
						(0.388)												
Commodity prices.							-0.006*											
							(0.004)											
EITI_3xCommodity prices.							0.006											
							(0.014)											
OPENESS.								0.003***										
								(0.000)										
EITI_3xOPENESS.								0.001										
								(0.001)										
LOG_AID									0.065***									
									(0.022)									
EITI_3xLOG_AID									0.272***									
									(0.036)									
Inflation										-0.000***								
										(0.000)								
EITI_3xInflation										0.005								
										(0.003)								
FDI											0.004**							
											(0.002)							
EITI_3xFDI											0.009***							
											(0.003)							
Coal_rents												0.040**						
												(0.016)						
EITI_3xCoal_rents												-0.049***						
												(0.015)						
Forest_rents													-0.009					
													(0.006)					
EITI_3xForest_rents													0.054***					
													(0.007)					
HDI														1.571*				
														(0.886)				
EITI_3xHDI														-1.572***				
														(0.247)				
Industry_VA															0.007**			
															(0.003)			
EITI_3xIndustry_VA															-0.017***			
															(0.004)			
Control of Corruption (0-100)																0.001		
																(0.001)		
EITI_3xControl of Corruption (0-100)																-0.005**		
																(0.002)		
Gov. Effectiveness (0-100)																	-0.002	
																	(0.002)	
EITI_3xGov. Effectiveness (0-100)																	-0.007***	
																	(0.002)	
Rule of Law (Estimate)																		0.002
																		(0.002)
EITI_3x Rule of Law (Estimate)																		-0.009***
																		(0.002)
.Constant	-0.084	0.737***	0.735***	0.669***	-1.344	0.614***	1.373***	0.546***	-0.415	0.765***	0.747***	0.739***	0.820***	-0.203	0.578***	0.702***	0.872***	0.680***
	(0.094)	(0.074)	(0.074)	(0.077)	(1.314)	(0.099)	(0.376)	(0.078)	(0.432)	(0.073)	(0.073)	(0.075)	(0.072)	(0.583)	(0.097)	(0.089)	(0.105)	(0.101)
N	735	487	487	487	487	487	487	487	487	486	487	487	487	487	487	487	487	487
F	37.682	38.396	37.749	38.781	40.155	41.551	37.248	41.098	43.986	38.746	39.538	38.047	43.365	41.492	38.730	37.437	38.233	38.539
Adjusted R-squared	0.756	0.812	0.812	0.818	0.824	0.829	0.812	0.827	0.837	0.819	0.821	0.816	0.835	0.829	0.818	0.813	0.816	0.818

Standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

The F-test refers to the global significance test (1 %) of the interaction term and the variable X.

Table A11: Descriptive statistics

Variable	Total of Sample					Group of treated					Group of controls				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Total_tax_revenue	1,697	15.097	7.428	0.301	56.916	913	13.012	4.704	0.301	26.082	784	17.525	9.097	1.193	56.916
non-resource_tax	1,621	13.859	6.957	0.301	56.916	813	12.549	4.804	0.301	25.819	808	15.176	8.395	0.846	56.916
Income tax	1,449	5.044	3.083	0.000	24.074	735	4.298	2.459	0.166	15.867	714	5.811	3.453	0.000	24.074
EITI.1	1,909	0.219	0.414	0.000	1.000	1,012	0.414	0.493	0.000	1.000	897	0.000	0.000	0.000	0.000
Total_rents	1,849	8.516	12.452	0.000	78.623	969	7.377	11.354	0.000	74.033	880	9.771	13.454	0.000	78.623
L.GDPCAPITA	1,872	11.109	2.719	5.453	18.304	989	11.533	2.579	5.453	17.439	883	10.633	2.794	5.899	18.304
Financial Dev.	1,817	0.191	0.123	0.000	0.679	966	0.159	0.091	0.000	0.418	851	0.226	0.143	0.002	0.679
Inflation	1,867	19.873	141.080	-36.565	4800.532	985	15.980	90.314	-36.565	2630.123	882	24.220	181.688	-31.566	4800.532
Commodity prices	1,870	98.001	10.130	44.630	125.776	1,007	99.288	8.649	44.630	122.847	863	96.499	11.446	45.423	125.776
Trade Openness	1,754	75.577	37.119	0.021	311.354	920	74.322	37.210	0.021	311.354	834	76.961	36.991	14.772	220.407
L.ODA	1,817	19.607	1.289	9.903	23.924	992	19.839	1.195	9.903	23.924	825	19.328	1.343	12.346	23.135
FDI	1,821	4.221	8.295	-37.155	161.824	973	4.274	7.790	-37.155	103.337	848	4.160	8.843	-8.589	161.824
Industry_Value Added	1,799	29.115	13.150	2.073	87.797	951	26.997	12.379	3.243	85.659	848	31.490	13.583	2.073	87.797
Coal_rents	1,840	0.232	1.059	0.000	25.316	965	0.257	1.344	0.000	25.316	875	0.205	0.607	0.000	7.850
Forest_rents	1,859	3.337	5.044	0.000	36.068	975	4.515	5.683	0.000	36.068	884	2.038	3.834	0.000	31.963
HDI	1,796	0.572	0.137	0.228	0.832	966	0.537	0.136	0.235	0.832	830	0.612	0.127	0.228	0.822
Governance Index	1,574	-1.106	0.918	-3.312	1.585	833	-1.292	0.730	-3.312	0.181	741	-0.898	1.053	-3.135	1.585
Control of corruption	1,574	-0.630	0.554	-1.826	1.568	833	-0.739	0.409	-1.723	0.478	741	-0.508	0.660	-1.826	1.568
Gov. Effectiveness	1,574	-0.594	0.570	-2.232	1.267	833	-0.708	0.491	-2.232	0.376	741	-0.466	0.623	-1.915	1.267
Regulatory Quality	1,574	-0.608	0.626	-2.344	1.053	833	-0.602	0.544	-2.344	0.615	741	-0.615	0.707	-2.274	1.053
Rule of Law	1,577	-0.692	0.561	-2.255	0.731	836	-0.791	0.468	-2.130	0.292	741	-0.582	0.633	-2.255	0.731
Voice and accountability	1,577	-0.595	0.724	-2.233	0.976	836	-0.467	0.621	-2.233	0.606	741	-0.740	0.801	-2.124	0.976

Table A12: Definitions and Data Sources

Indicateurs	Définitions	Sources
Rentes totales (% du PIB)	The sum of oil, mining and gas rents, including the extractive industries. They correspond to the difference between the value of gross production at world prices and the total cost of production (specifically for each type of rent).	World Development Indicators. https://databank.worldbank.org/
Coal rents (% of GDP)	Coal rents are the difference between the value of both hard and soft coal production at world prices and their total costs of production.	
Forest rents (% of GDP)	Forest rents are roundwood harvest times the product of average prices and a region-specific rental rate.	
Inflation, GDP deflator (% annual)	It is measured by the annual growth rate of the implicit deflator (ratio of GDP in current local currency to GDP in constant local currency) of GDP and indicates the rate of price change in the economy as a whole.	
Trade openness (% of GDP)	It is the sum of exports and imports of goods and services relative to GDP.	
Net Official Development Assistance (ODA) received per capita (US\$)	It includes loan disbursements with a grant element of at least 25% (calculated using a discount rate of 10%) and grants paid by official bodies (current US \$).	
GDP per capita (\$ US)	GDP per capita is the gross domestic product divided by the population at mid-year. (\$ US constants 2010).	
Foreign Direct Investment (% GDP)	These are the net inflows of investments to acquire a sustainable management interest. It is the difference between new investment inflows and disinvestment divided by GDP.	
Industry value added (% of GDP)	It comprises value added in mining, manufacturing, construction, electricity, water, and gas.	
Voice and Accountability (VA)	capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	Kaufmann et al. (2011). Worldwide Governance Indicators: . Estimate of governance in standard normal units ranging from approximately -2.5 (weak) to 2.5 (strong) governance performance; . Percentile rank among all countries, ranging from 0 (lowest) to 100 (highest) rank. www.govindicators.org
Government Effectiveness (GE)	"capturing perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies."	
Control of Corruption (CC)	"capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests."	
Rule of Law (RL)	"capturing perceptions of the extent to which agents have confidence in and abide by the rules of society and in particular the quality of contract enforcement, property rights, the police , and the courts, as well as the likelihood of crime and violence."	
Regulatory Quality (RQ)	capturing perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	
Financial Development Index	The dataset contains nine indices that summarize how developed financial institutions and financial markets are in terms of their depth, access, and efficiency.	International Monetary Fund https://data.imf.org/
Commodity Terms of Trade	Commodity-price fluctuations on countries that both export and import primary commodities, using a country-specific measure of the commodity terms of trade	Gruss and Kebhaj (2019) International Monetary Fund https://data.imf.org/
Total tax revenues (% GDP)	It is the sum of the sub-components of tax revenues, i.e. stamp duties and taxes on the one hand, and upstream profits from extractive resource (oil, gas, and mining), royalties and revenue from rentsharing agreements paid to the consolidated fund on the other hand, and excluding social contributions.	ICTD Government Revenue Dataset www.ictd.ac/dataset/grd
Human Development Index (HDI)	The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living.	UNITED NATIONS DEVELOPMENT PROGRAMME http://hdr.undp.org/en/data

Table A13: List of EITI members (Group of treated), the original event dates, and status in February 2018, and Non-EITI members (Group of control)

	EITI members	Commitment	MSG	Candidate	First Report	Valid. Report	Compliant	Suspended	Status Feb. 2018	Non-EITI members
1	Afghanistan	march-09	oct-09	Feb-10	Aug-12	Feb-13		Jan-19 -	Candidate	Algeria
2	Albania	jan-09	march-09	May-09	march-11	Aug-11	May-13		Compliant	Angola
3	Argentina	Dec-17	Dec-18	march-19					Committed	Azerbaijan
4	Armenia	Jan-17		March-17					Candidate	Belarus
5	Burkina Faso	June-07	Dec-08	May-09	Apr-11	sept-11	Feb-13		Compliant	Belize
6	Cameroon	Feb-05	May-05	sept-07	oct-06	july-10	oct-13		Compliant	Bhutan
7	Central African Republic	sept-07	July-08	nov-08	Feb-09	nov-10	march-11	April-13 -	Suspended	Bosnia and Herzegovina
8	Chad	sept-07	Feb-10	Apr-10	oct-12	May-13	oct-14		Compliant	Botswana
9	Colombia	May-13	Feb-14	oct-14					Candidate	Brazil
10	Côte d'Ivoire	May-07	Feb-08	May-08	jan-10	nov-10	May-13		Compliant	Bulgaria
11	Ethiopia	july-09	june-09	march-14	May-15				Candidate	Cuba
12	Ghana	May-03	jan-05	sept-07	sept-07	june-10	oct-10		Compliant	Ecuador
13	Guatemala	june-10	May-12	march-11	Apr-13	nov-13	march-14	feb - may-15	Compliant	Egypt
14	Guinea	march-05	Apr-05	sept-07	july-07	Aug-12	july-14	jan-nov-11	Compliant	Equatorial Guinea
15	Guyana	May-10	Apr-10	oct-17					Candidate	Gabon
16	Honduras	nov-12	Dec-12	May-13	May-15				Candidate	Gambia
17	Indonesia	Dec-08	june-10	oct-10	May-13	july-13	oct-14	feb - Dec-15	Compliant	Georgia
18	Iraq	march-09	Aug-10	Feb-10	nov-11	Aug-12	Dec-12		Compliant	Guinea-Bissau
19	Kazakhstan	june-05	Apr-05	sept-07	nov-07	Aug-10	oct-13		Compliant	India
20	Kyrgyzstan	Apr-04	june-08	sept-07	nov-09	Apr-10	march-11		Compliant	Iran
21	Liberia	May-07	Apr-07	sept-08	jan-09	july-09			Candidate	Jordan
22	Madagascar	march-07	jan-08	Feb-08	May-11	sept-11		Oct-12 - jan-14	Candidate	Lao PDR
23	Malawi	june-14	march-15	oct-15					Candidate	Lesotho
24	Mali	Aug-06	june-07	sept-07	nov-09	sept-10	Aug-11		Compliant	Libya
25	Mauritania	oct-05	Dec-06	sept-07	Feb-07	sept-10	Feb-12	march - may-13	Compliant	Malaysia
26	Mexico	jan-15	nov-17	oct-18	Dec-19				Candidate	Morocco
27	Mongolia	march-06	jan-06	sept-07	Dec-07	Feb-10	oct-10		Compliant	Namibia
28	Mozambique	May-08	Apr-09	May-09	jan-11	May-11	oct-12		Compliant	Niger
29	Myanmar	Dec-12	jan-14	july-14	Dec-15				Candidate	Russian Federation
30	Nigeria	nov-03	Dec-03	sept-07	oct-06	june-10	march-11		Compliant	Rwanda
31	Papua New Guinea	Apr-13	nov-13	march-14	Feb-16				Candidate	South Africa
32	Peru	Apr-05	May-06	sept-07	oct-09	sept-10	Feb-12		Compliant	Sudan
33	Philippines	july-12	jan-13	May-13	Dec-14				Candidate	Syrian Arab Republic
34	Republic of the Congo	june-04	sept-06	sept-07	Aug-08	sept-10	Feb-13		Compliant	Tunisia
35	Sao Tome and Principe	Dec-05	Dec-07	Feb-08	july-14	june-16		feb - march-10	Candidate	Uzbekistan
36	Senegal	Feb-12	Feb-13	oct-13	Dec-15				Candidate	Venezuela
37	Sierra Leone	May-06	june-07	Feb-08	Feb-10	july-10	Apr-14		Compliant	Vietnam
38	Suriname	feb-16	nov-17	Apr-18				feb-19 -	Committed	Yemen
39	Tajikistan	Aug-12	Aug-12	Feb-13	oct-15				Candidate	Zimbabwe
40	Tanzania	nov-08	Feb-09	nov-09	jan-11	May-11	Dec-12	Nov - Dec-15	Compliant	
41	Timor-Leste	Apr-07	Apr-07	Feb-08	oct-09	march-10	july-10	march - june-17	Compliant	
42	Togo	Dec-09	Apr-10	oct-10	Feb-12	Apr-13	May-13		Compliant	
43	Ukraine	oct-09	oct-09	oct-13	nov-15				Candidate	
44	Zambia	july-08	july-08	May-09	jan-11	May-11	sept-12		Compliant	