An assessment of the Extractive Industries Transparency Initiative (EITI) using the Bayesian Corruption Indicator

Paul FENTON VILLAR [a]

School of International Development, University of East Anglia, Norwich, NR4 7TJ, UK

[a] *Corresponding author: P.Fenton-Villar@uea.ac.uk*

Abstract

Advocated across the international community for more than 15 years, the Extractive Industries Transparency Initiative (EITI) is now widely recognised as a hallmark anti-corruption scheme in the extractive sector. This study presents an assessment of the relationship between EITI membership and countries' progress in tackling corruption. It provides the first study looking at this issue using a 'state of the art' indicator called the Bayesian Corruption Indicator (BCI). It also introduces an innovative estimation strategy combining Entropy Balancing with a Difference-in-Difference framework to address the baseline inequalities that exist between member and non-member countries. Contrary to the findings of many leading studies, this analysis finds corruption scores have improved significantly among EITI member countries. In particular, the evidence is strongest when we examine a sub-group of EITI members designated fully compliant with the initiative's transparency standards.

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1. INTRODUCTION

Advocated across the international community for more than 15 years, the Extractive Industries Transparency Initiative (EITI) has become widely recognised as a hallmark anti-corruption scheme in the extractive sector. While the Organization for Economic Co-operation and Development (OECD) identifies the extractive industries as the world's most corrupt economic sector, it's conceived the EITI will help to alleviate the sectors' corruption problems by unveiling financial and contractual discrepancies in public agreements and enhancing public accountability (Rustad et al., 2017 and Van Alstine, 2017).[1] In practice, the EITI requires its member countries to abide by financial and contractual disclosure standards and maintain a public feedback mechanism in the form of a national multi-stakeholder group comprising of private, public, and civil society representatives.[2] The EITI also uses audits to verify members' compliance with its disclosure standards and ensure these requirements are upheld properly (Sovacool et al., 2016).[3]

55 countries have currently publicly committed to implementing the EITI's standards and the initiative has contributed to the disclosure of more than $3 trillion (US) of public revenues from the extractive industries worldwide (EITI, 2020). Some suggest these commitments may have helped members to attract foreign aid and investment (Lujala, 2018). However, discontent has grown among many in the sector as questions have continued to arise about the EITI's ability to induce meaningful changes among its members. While some critics point towards issues concerning the EITI's implementation (such as members incomplete and insufficient reporting of information) (Öge, 2016), a review by Rustad et al. (2017) adds to the growing disillusionment surrounding the initiative. The review identifies a broad range of

[1] See OECD Foreign Bribery Report: An Analysis of the Crime of Bribery of Foreign Public Officials. Available online: https://www.oecd.org/corruption/oecd-foreign-bribery-report-9789264226616-en.htm
[2] Details of the various disclosure requirements are provided here: https://eiti.org/document/standard
[3] Following validation of their compliance, countries are required to re-validate their compliance periodically, at least every 3 years. Further details of the joining and verification process are available here: https://eiti.org/join-EITI.

studies offering mixed conclusions as to whether a relationship exists between EITI membership and countries' progress in tackling corruption.

Bickham (2009) argues that the ultimate test of the EITI must be whether it has stimulated the systemic effects expected at its inception and whether this has contributed to improvements in EITI countries' levels of corruption. Nonetheless, little attention has been paid to the methodologies applied in this literature to measure countries' progress. In particular, these studies often examine changes in corruption indicators (such as the World Governance Indicators Control of Corruption Index) that are more indicative than consistent in their measurement of corruption over time. Such issues may confound the results of existing studies as the corruption scores in one year are not necessarily comparable to the next year. Also, studies that draw comparisons between countries' outcomes often neglect the endogeneity issues caused by countries' self-selection into the initiative.

Reflecting on these limitations, this study provides a re-assessment of the relationship between the EITI and countries' progress in tackling corruption using a 'state of the art' indicator called the Bayesian Corruption Indicator (BCI). Compared to other common corruption indicators, this measure benefits from characteristics such as improved comparability over time and reduced demands to impute data during its construction. Meanwhile, to address the endogeneity issues caused by self-selection, this study combines an Entropy Balancing approach with a Difference-in-Difference framework. This approach compares changes in EITI members corruption scores to an adjusted (weighted) control group of non-EITI countries. The weights are created such that they minimise the difference in baseline characteristics between members and non-member countries. The approach draws on research showing that minimising the baseline differences between compared samples may significantly decrease an observational estimators bias (Glazerman et al., 2003; and Jaciw, 2016).

Contrary to the findings of many leading studies, this study shows corruption scores among EITI member countries have improved significantly relative to non-member countries after adjusting for the differences in their baseline characteristics. In particular, this evidence is strongest among countries considered compliant with the initiative's international standards. The results of this cross-country assessment of the EITI offers important insights into suggestive empirical regularities concerning changes in corruption outcomes across the globe. While a degree of cynicism (or at least scepticism) has built up in recent years around the EITI, this study paints a more optimistic picture of the progress made by its members. Nevertheless, even though its members do appear to be making promising progress, it is clear that even the initiative's most ardent supporters would not claim it is a silver bullet. Critics raise important issues about the implementation of the EITI and recent changes to the EITI's standards (for example, increasing the scope of its standards and its compliance verification process) have only just begun to address them.

This paper continues in Section 2 with a more in-depth review summarising the key theories, debates, and empirical evidence concerning the EITI and corruption. Section 3 then provides details of this study's methodology. This includes a description of the data and estimation strategy it uses. Section 4 presents the results of the analysis. Finally, Section 5 further discusses the study's findings and provides the study's concluding remarks concerning policy and future research.

2. THE EITI AND CORRUPTION: LITERATURE REVIEW

The EITI has become a widely recognised policy instrument to help combat corruption in the extractives sector. However, since its inception, its implementation has also been controversial and subject to a polarised debate. This section provides a brief overview of some of the key arguments underlying the debates concerning the EITI. It starts with a summary of policy arguments underpinning the EITI's inception and then describes some of the key criticisms the

initiative has faced through its implementation. Following this, it examines some of the existing empirical evidence on the relationship between the EITI and corruption.

2.1 Shining a light on corruption: Arguments underpinning the EITI

The policy arguments underlying the EITI's creation generally portray the initiative as a multi-pronged and complex intervention. The EITI is not thought of as subscribing to one single channel or mechanism delivering change in the extractive industries. Rather, its approach considers that tackling corruption may require systematic changes supported by several simultaneous mechanisms combining transparency, deliberation, demand/capacity-building, and support for the policy environment. However, the first of these mechanisms concerning information and transparency has most clearly defined the growth of the EITI as an anti-corruption policy. Here it is conceived that increased disclosure in the extractives sector will enable better identification of corrupt activity. This relates to the idea that transparency may help to detect and reduce public malfeasance through its "sunshine effect" (Wilson, 2014). An example of this is described by McDevitt (2017) who highlights company and government reporting to the EITI uncovered nearly $10 billion (US) of missing tax and royalty payments in Nigeria.

The second route through which it is thought the initiative may help to tackle corruption is through its effect on accountability and deliberation in the sector. The EITI's proponents argue that the initiative dilutes information asymmetry and thus may help to empower citizens to hold public officials accountable for the incidence of financial discrepancies (Van Alstine, 2017). This may also help to alter the balance of incentives (i.e. it may increase the risks) associated with officials using their position for private gains. While some suggest this improved accountability may deter illicit acts of corruption or embezzlement from occurring in the first place (Gillies and Heuty, 2011), it is also thought the EITI's multi-stakeholder groups provide another way through which the initiative can contribute to improving

accountability too. These groups intend to create a legitimate space for civil society to participate in the management of the extractive sector.

A third way the EITI may contribute to helping build stronger institutions and combatting corruption is through its capacity-building role. For example, more than 1000 targeted participants from multi-stakeholder groups, national secretariats, government, civil society, industry, parliament, state-owned enterprises and national audit institutions participated in EITI peer learning and capacity building schemes in 2016 alone (EITI, 2020). This is function is considered important for developing an understanding of the information created by the EITI and to stimulate demand for better practices for managing the extractive activity. Building on this point, Bickham (2015) describes the "viral" (or systemic) effects it is also expected the EITI may have on the broader governance of natural resources. This considers the initiative may act as an 'entry point' or stimulant for broader reforms (Fenton Villar, 2021). Bebbington et al. (2017) offer similar insights highlighting the influence of the initiative on the policy environment. They find the politics concerning transparency in the extractive sector has been more stable and less susceptible to political U-turns due to changes in the national political landscape among EITI members. Numerous examples also exist indicating the noticeable spill-over effects the EITI has had on its members' legislative and governing environments. For instance, Reinfeldt (2018) highlights some of the EITI's achievements supporting broader economic and institutional reforms helping to combat corruption in Ukraine.

2.2 Is the EITI sufficient?

However, the EITI has not grown without criticism. Embodied by theories of 'mock compliance', critics often argue the EITI enables governments to appease the international community by mimicking compliance with global norms without inducing meaningful changes (Öge, 2016). This could also reflect countries' historically slow progression to reaching compliance. Lujala (2018) reports it has taken countries, on average, 17 months to become

formal candidates (to join the formal process of applying to join the initiative) after making a public commitment to implement the EITI's transparency standards, and a further four years to progress their implementation to fully comply with them. Here it is suggested some countries may simply intend to remain associated with the EITI without inducing the desired changes. This is an issue that, in part, motivated major updates to the EITI compliance validation system in 2016. This included introducing a more disaggregated validation system with specific timeframes that members must adhere to. Failure to comply with these timeframes can result in a country becoming delisted (or expelled) from the initiative.

Beyond this, the Institute for Multi-Stakeholder Initiative Integrity has criticised the EITI because governments are allowed to select the members that constitute the national multi-stakeholder group. This freedom may enable governments to simply appoint favourable representatives to this group and circumvent the initiative's intended accountability mechanism.[4] Maconachie et al. (2015) further argue that even where meaningful representation exists, it may not be reasonable to consider that civil society's inclusion in decision making is meaningful. For example, in some cases, civil society representatives have been invited to stakeholder meetings too late to be able to influence the agenda of those meetings. Also, while many governments appear willing to partially increase their levels of disclosure, recommendations from the initiative's audits have not necessarily materialised in action despite serious irregularities being noted in some instances. This relates to critics warnings about the initiatives limited legal mandate in many implementing countries (Kasekende et al., 2016).

Further concerns are also voiced about the shortcomings of the EITI's relatively limited focus or scope (Vadlamannati and Soysa, 2016). The initiative's disclosure standards historically focused very narrowly on the resource revenues received by governments and not

[4] E.g. see the comments from the Institute for Multi-Stakeholder Initiative Integrity on the EITI at http://www.msi-integrity.org/assessing-eiti-msg-governance/

the deployment (or expenditure) of revenues or other contractual factors. Reflecting on this issue, the EITI has continued to modify and expand its standards. For example, updates have expanded the EITI's standards remit since 2016 to include issues such as the disclosure of the distribution of revenues, environmental payments, and beneficial ownership information. Nevertheless, despite the widened remit of its disclosure standards, the appeal of the initiative to ordinary citizens remains a contentious issue. McDevitt (2017) describes that the technical nature of the disclosed information may render it incomprehensible to the public. This also explains the growing concerns that the EITI is failing to engage and empower local populations.

2.3 The EITI and Corruption: Existing Evidence

From the arguments summarised above, it is clear that some scholars emphasise the potential positive aspects of EITI membership while others remain more sceptical. A review of existing evidence shows that the empirical literature on the EITI and corruption also offers no clear indication of the progress made in tackling corruption among EITI members. Evidence provides mixed conclusions about the direction and significance of changes to corruption outcomes (Rustad et al., 2017). However, limited discussion exists about the various approaches adopted to examine this complex intervention. This is particularly important in this context given that many existing studies offer new and competing evidence based on methodological debates.

For instance, studies using time-series based approaches have rarely offered positive conclusions concerning the effects of the EITI (e.g. see Öge, 2016). These approaches often examine graphical trends in corruption outcomes or use a single group interrupted time-series analysis. Yet, both of these methods impose stringent assumptions about changes in corruption scores in the absence of the EITI. They assume corruption scores would not have changed had members not joined the initiative or that they would change at a linear rate (a rate often inferred from as few as one or two years of outcome data). Furthermore, like other research discussed

in this review, these time-series studies also use common corruption indicators, such as the World Governance Indicators Control of Corruption Index (CCI) and Transparency International's Corruption Perceptions Index (CPI). It is well known that such measures often lack a degree of comparability over time. For example, the World Bank cautions against comparing the CCI's scores across different years because the scale changes annually.[5] This issue may confound any inferences drawn from an analysis doing so. Öge (2016) justifies that in the absence of alternative indicators such indicators remain insightful. Nevertheless, this point highlights a broader underlying limitation evident in this evidence.

Some evidence also exists using a 'counterfactual' based approach; using a control group of non-EITI countries to determine changes in corruption outcomes that would occur in the absence of the EITI. For example, Ölcer (2009) compares EITI members CCI scores for 2007 to non-EITI countries scores. According to his analysis, perceptions indicate the incidence of corruption is, on average, higher in EITI countries compared to non-EITI countries. However, Pitlik et al., (2010) and Lujala (2018) highlight that countries' decision to join the initiative is not random. This raises concerns of an endogeneity problem caused by selection bias (i.e. this is effectively like comparing apples with oranges). One method used to address this issue of selection bias includes controlling for variables correlated with countries' EITI membership in a regression specification (see Papyrakis et al., 2017). Nevertheless, a discussion by Kasekende et al. (2016) emphasises that this approach remains biased if unobserved variables jointly determine both the outcome variable (i.e. corruption) and the selection process (i.e. the decision to join and progress with EITI).

[5] This also reflects that the parameters underlying the model creating the indicators common units are re-estimated each year with different sources provided different parameters. The common units enable cross-country comparisons when countries do not appear in overlapping sources of data informing the indiactor (see Standaert (2015) for further information).

To purge any potential confounding correlation between these factors, Kasekende et al. (2016) adopted a two-stage treatment effects model to analyse the effects of the EITI. However, numerous practical limitations also exist in this application. One example is that the year countries have joined the EITI varies. While they try to estimate the likelihood of a country joining the EITI over time, the two-step econometric estimator they employ does not allow variables to simultaneously determine the outcome variable and EITI membership status. This represents a problem because the reasons why a country may join the EITI (e.g. to improve aid commitments or FDI) may also be factors that EITI membership enhances (Lujala, 2018). They circumvent this issue by including lagged values (from before the inception of the EITI) for a selection of variables. Beyond the subjectivity of some of their decision to lag (or not lag) particular variables, this also risks introducing a dynamic form of panel bias to this estimator design for static econometric models (as the authors also note).[6]

Other strategies for dealing with this problem include using a Synthetic Control Method (SCM). At an individual country-level, Fenton Villar and Papyrakis (2017) show perceptions of corruption improved in Zambia following its commitment to the EITI. López-Cazar et al. (2021) further replicated Fenton Villar and Papyrakis' (2017) SCM approach showing that, while corruption scores did not improve in Colombia, Guatemala, Honduras or Peru following their commitment to the EITI, they did improve marginally in Trinidad and Tobago. However, a broader challenge of the Synthetic Control Method approach exists in creating well behaved synthetic comparisons for each member of the EITI to replicate the analysis across the globe.

Alternatively, Sovacool et al. (2016) also introduced an approach that defines a group of EITI countries that joined the initiative any time before 2014 and a 'control group' that did not join the EITI before this date. Measuring corruption using the CCI, the study then compares

[6] E.g. Kasekende et al. (2016) choose not to lag the GDP per capita variable. However, other analysts argue a plausible relationship exists between the EITI and GDP (see Corrigan 2014).

the average differences in changes in corruption scores between the EITI's inception in 2002 and 2014. Overall, they find joining the EITI has not been associated with statistically significant changes in corruption. The key drawback of such a strategy is that it may provide a conservative estimate of the true effect of the EITI if the initiative's effects grow with time. This conservatism grows innately with the degree of late adopters in the defined group of EITI countries.[7]

3. METHODOLOGY

Reflecting on the existing limitations of studies in this existing literature, this study examines the progress made by EITI countries in improving corruption indicators using a contemporary indicator known as the Bayesian Corruption Indicator (BCI). Consistent with Sovacool et al. (2016), this study also creates a comparative analysis comparing changes in EITI members corruption scores to changes in non-EITI country scores. To address the endogeneity issues caused by self-selection, it also explores combining an Entropy Balancing approach with a Difference-in-Difference framework to minimise the difference in baseline characteristics between members and non-member countries. This section continues by describing the details of the variables and then provides further information on the estimation strategy.

3.1 Data

In this study, we examine the relationship between the EITI and changes in countries corruption outcomes using the BCI developed by Standaert (2015). The BCI is a composite index of the perceived overall level of public corruption. It combines information from 17 international surveys and 110 different survey questions covering perceptions of corruption. The values of

[7] In other words, including countries with only limited histories with the EITI may dilute the estimated effect where the effect of the initiative increases with the maturity of its implementation. The effects in members with short histories may not have been given time to fully unfold and this explains why the effect estimate may also become a conservative or diluted estimate of the true effect. The greater the number of countries included in the EITI sample that consist of short EITI histories, the larger this problem becomes.

the BCI variable range between 0 and 100 (with higher values given to countries perceived to have a higher level of corruption).

Due to insufficient quality data on the actual level of corruption, this corruption measure leans on well-established arguments that perceptions provide valuable insights into the incidence of corruption (Charron, 2016).[8] Of course, perceptions may still deviate to some degree from actual levels of corruption. However, perceptions of corruption are also important outcomes in their own right in this context. Perceptions are considered an important factor from a development perspective because they also directly matter for many outcomes (Kaufmann et al. 2006). For example, some highlight citizens perceptions of these issues have further exacerbated local conflicts in many contexts and increased demand for consumption (Collier, 2017). Perception outcomes may also capture instances where societal improvements occur due to a reduction in misconceptions about corruption; which may have previously been prevalent due to the lack of clear information. This last point reflects many members' motivation to join the EITI. Zambia's public officials, for instance, expressed a desire to join the EITI to address misconceptions about corruption and restore public confidence in the government (Fenton Villar, 2020).[9] It is ambiguous whether we should expect actual- or perception-based corruption measures will be more responsive to the EITI but this poses an interesting issue future research might seek to examine further (data permitting).

Ideally, we would also have a corruption measure focused on the extractive industries but such international measures do not currently exist. The application of the BCI here is based

[8] The hidden nature of corruption, direct and comparable measures across countries are hard to come by or inherently flawed. Even if cases of corruption do become known, this might not occur for many years after the incident and the true details of the case (the magnitude of corruption or whether the incident even occurred) is often highly controversial. Since corruption usually leaves no paper trail, perceptions of corruption are sometimes the best, and the only, information we have (Kaufmann et al. 2006).

[9] For example, we might expect perception measures could be more responsive to the EITI because they also capture changes arising from reduced misconceptions. However, it is also unclear the degree that perceptions respond to actual changes in corruption. It may be that the EITI deters illicit acts of corruption or embezzlement, as discussed above, but in ways that go unnoticed. Furthermore, historic accounts of corruption may leave a lasting impression on perceptions making them difficult to change.

on the understanding that changes in corruption in extractive industries are also likely to affect cross-sector indicators (even if the extractives sector does not entirely determine the score and it will likely create a conservative estimate of the true effect). It is worth noting that the selection of this type of cross-sector measure is consistent with the type of measures used in existing EITI studies. This creates an interesting exercise that examines whether the use of this new indicator draws similar conclusions to commonly used indicators.

To further justify why this measure makes a particularly interesting indicator compared with other corruption indicators already featuring in the EITI literature (such as the CCI and CPI), it is important to understand the relative methodological strengths of the BCI. The BCI keeps the scaling of its index and its model parameters estimating its index constant across time, for instance. This enables it to provide a greater deal of comparability between estimated corruption scores over time than these other alternative indicators. Also, even though the BCI draws information from multiple sources of information (in fact it is the same sources as the CCI), the BCI's aggregation approach averts the need for additional data manipulations during the computation of the indicator (such as imputation and sub-level aggregation).

The interested reader may see Standaert (2015) for a detailed description of the composition of the BCI and an empirical review comparing it with other available corruption indicators mentioned in this text. Some of the key findings from the text show that the between-correlations (the correlation between the mean values for each country) between the BCI and other comparable international corruption indicators are generally very high (above 0.9). The within-correlations (between the demeaned values) are, however, much lower (below 0.5). This means that, while the choice of indicator might not have a large effect on the results in a cross-sectional study, the differences between indicators may be significant in a study using time-series or panel data (such as this study). These potentially important differences help to

motivate the interest in this study in re-examining the relationship between the EITI and changes in corruption scores using the methodologically more robust BCI measure.

This analysis measures changes in corruption scores between 2002 (the year before the first set of public commitments made to the EITI by participating countries) and 2016 (the year of a major overhaul in the EITI's standards).[10] The period examined is largely recognised as the initiatives inception period before a significant change in the scope of EITI's standard and the way members progress has was measured (discussed above). As noted in the conclusions below, future research might consider the implications and experiences of members transitioning to the new standards when more data for the BCI is made available and sufficient time has lapsed for their effects to have convincingly transpired.

This study focuses on changes in corruption outcomes of developing countries identified by their eligibility for Official Development Assistance (ODA). This reflects that the motivations of the limited sample of developed economies, such as the U.K., Norway, and Germany, for joining the EITI have been intrinsically different from developing countries (to which the initiative originally targeted). For example, the U.K. joined the initiative primarily because of the role that its Department for International Development had in brokering the EITI's inception and Norway joined because the EITI Secretariat is in Oslo and also due to the country's leadership role in the industry. Similarly, Germany is a major consumer of raw materials and aid donor among developed economies, and so the country's membership was intended to reflect its role as a 'role model' to aspiring nations. Hence, it largely represents a

[10] This study examines changes until 2016 for two reasons. The first is the availability of the BCI data and the second is that the EITI went into a period of restructuring in late 2016 (changing some of its standards and some fundamental methods of assessing/validating country compliance). The EITI's institutional changes create a discontinuity in the implementation of the EITI and it is too soon to effectively assess these changes as their implementation is often drawn out over 3 to 4-year cycles (which is largely determined by the length of time between each members validation assessment). Here we must also consider the long-term perspective of the initiative and the pace of institutional change. It may take some considerable time for these changes to unfold and become fully operational.

notional commitment (e.g. to 'lead by example'), as opposed to a domestic development one per se (Short, 2014 and von Klencke, 2016).[11]

Member countries participating in the EITI go through different stages. The first stage is for the government of the participating country to publicly announce its *commitment* to the EITI. After this, it needs to develop a work plan that sets concrete objectives (regarding ways to improve transparency in the extractive sector) and establish a multi-stakeholder group together with companies and civil society. Once these steps have been carried out, the country moves to the second stage by formally applying to the initiative to become a *candidate* country. Candidate countries are then required to work towards fulfilling the initiatives various standards (requiring full and timely disclosure of financial and contractual information stipulated in its transparency standards, a continuous and effective functioning multi-stakeholder group, and so forth). The EITI uses audits to assess when countries reach the third stage. In the third stage, countries are validated that they are *compliant* with the EITI's standards (Papyrakis et al. 2017).

To verify members' compliance with its standards and ensure the requirements are upheld properly, the initiatives international secretariat's validation team reviews information provided by each member according to its standards. Here the onus is on the country multistakeholder group and supporting national bodies to provide evidence of compliance with the standard. After reviewing the information provided by each country, the secretariat's validation team will offer the multi-stakeholder group the opportunity to discuss preliminary findings at a teleconference and may also undertake targeted virtual stakeholder consultations,

[11] It was also considered whether it would be appropriate to conduct an analysis also using developed economies. The issue in doing so is that including more developed economies expands the control group and adds only a few countries to the EITI intervention group. Those that are added to the EITI intervention group are generally outliers in this sample of developed economies (as also highlighted in many respects in text), and so it is questionable whether adding a large group of control countries that do not necessarily represent the additional treatment countries credibly contributes to this comparison. Rather, we focus on the group of countries which the EITI largely targeted during the study period and was originally intended for at its inception.

consult the international secretariat's country team or draw on external experts to seek further information at this stage. In exceptional cases, especially if there are severe concerns related to stakeholder engagement, the Validation team may visit the country to undertake in-person consultations and seek further information. The EITI board in the international secretariat make the final assessment determining the compliance status of each country based on the evidence and recommendations from the validations committee and other appointed external experts.[12]

In this analysis, a binary variable represents a country's EITI status. This equals 1 if a country has made a public commitment to the EITI, and 0 otherwise. Data for countries' histories concerning the EITI derives from the online EITI country index (EITI, 2020).[13] This analysis also examines the difference in changes of perceptions of corruption among a subgroup of those countries that have complied with the intended intervention (i.e. among just countries that are verified compliant EITI members). The binary variable used for the subgroup analysis equals 1 if country i is verified an EITI compliant member country, and 0 if country i did not commit to the EITI before 2016. Non-compliant EITI committed countries are not included in the sub-group analysis (i.e. this compares compliant and non-committed countries only). The analysis does not conduct a subgroup analysis comparing members that reach candidate status to non-member countries because very few members in the sample period did not graduate to candidate status (see Appendix 1). Some further analysis does, however, consider interacting these EITI variables with the length of time each country has been as a committed or compliant member. Appendix 1 lists information on the sample of 78 countries included in the analysis and their EITI status. This includes a sample of 33 countries committed

[12] See further information on the EITI validation process here: https://eiti.org/overview-of-validation.
[13] See https://eiti.org/countries for information on EITI country membership.

to the EITI which have sufficient data available for the analysis. 21 of which were verified compliant with the EITI standard by 2016.[14]

For data pre-processing purposes described below, the data compiled for this analysis also includes information on country characteristics related to both the corruption outcome and the EITI self-selection process. Variable selection is informed by relevant studies by Pitlik (2010) and Lujala (2018) who examine factors correlated with EITI membership. This includes variables for GDP per capita, as well as the relative economic size of natural resource rents, trade, FDI, and aid to GDP. Other variables include state polity, the incidence of conflict, the freedom of the press, and a measure of each country's pre-EITI corruption score (measured by the BCI). Note a broader literature also justifies that the inclusion of pre-intervention outcomes can improve the efficacy of observational estimators (see Jaciw, 2016 and Fenton Villar and Waddington, 2019). Finally, this list of variables includes the interaction between corruption scores and the economic importance of resource-rents. This reflects the discussion by Lujala (2018) that countries with high rents and corruption may be intrinsically less likely to join the EITI. Appendix 2 further provides detailed definitions and information on each of the variables included in this analysis and Appendix 3 presents a table of descriptive statistics.

3.2 Identification Strategy

This analysis starts by adopting a difference-in-difference approach, which is analogous to the approach by Sovacool et al. (2016). A difference-in-difference approach calculates the average effect by simply taking the differences in the observed changes in outcomes between countries in the EITI intervention group and those not in the EITI intervention group (a control group). The purpose of the control group is that measures what would have happened to beneficiaries

[14] The sample consist of countries from across the globe. This includes 13 (5, 2) countries from South and East Asia and the Pacific, 8 (3, 3) from Europe & Central Asia, 21 (7, 2) from Latin America & Caribbean, 36 (18, 14) from the Middle East and Africa. Note the number of EITI committed and compliant countries are in parenthesis.

in the absence of the intervention, thereby controlling for secular trends in the outcome variable.

To formally outline this estimator using a common language to express observations potential outcomes, here we further define some basic notation. We denote the EITI intervention variable using a simpler term D, where d $\in \{0,1\}$. EITI countries remain represented by the value 1 (as described above). T defines a variable representing two time periods, where t $\in \{0,1\}$. Period zero indicates the intervention baseline year, 2002, and period one denotes the year 2016. Also, X is a matrix of J exogenous pre-intervention characteristics from t_0 such that X_{ij} then denotes the value of the jth characteristic for country i and X_i= $[X_{i1}, \dots, X_{ij}]$. With this basic notation, we may index observations potential outcomes by the potential states of the intervention variable; where Y_t^d denotes the outcome that would be realized for a specific value of d in period t.

Using the potential outcomes notation defined above, the difference-in-difference estimator's average effect is formally described by the notation $\mathrm{E}[Y_{t+1}^1 - Y_{t0}^1 \mid D = 1)] - \mathrm{E}[Y_{t+1}^0 - Y_{t0}^0 \mid D = 1)$. In a regression framework, the difference-in-difference approach using panel data is equivalent to estimating the following equation:

$$\Delta Y_i = \alpha + \beta D_i + \varepsilon_i. \qquad \text{(i)}$$

Where ΔY represents the change in the corruption outcome variable between 2002 and 2016 for country i. D is the binary EITI variable described above. The parameter α estimates the time-trend (i.e. the average change in corruption outcomes) observed among control countries. β is the estimated average difference in changes in corruption scores between EITI members and the control group. Finally, ε is the error term.

This estimator infers a common trend which assumes that in absence of the EITI intervention the difference between treatment and control groups outcomes would remain the same over time (i.e. that $\Delta Y_t^d \perp D_t \mid D = 0$, where $\mathrm{E}[Y_{t+1}^0 - Y_{t0}^0 \mid D = 1) = \mathrm{E}[Y_{t+1}^0 - Y_{t0}^0 \mid D = 0]$). It is important to note that this does not mean that there is no trend in the outcome variable in the counterfactual state (just that the trend is analogous across the treatment and control groups). It also does not mean that it requires that the level of the outcome variable for the two groups be the same in the pre-treatment era. However, empirical assessments support that minimising the baseline differences in compared sample characteristics can help to improve the efficacy and reduce the bias associated with observational difference-in-difference estimators (see Glazerman et al., 2003; Jaciw, 2016). In other words, this indicates comparing groups that are observationally similar at baseline can increase the plausibility of the common trends assumption.

To do justice to the portion of the methodological literature that supports using data pre-processing approaches to minimise the baseline differences between compared sample characteristics, this analysis also considers adjusting the simple difference-in-difference framework using Hainmueller's (2012) method of Entropy Balancing.[15] The Entropy Balancing approach involves creating an adjusted control group of non-EITI countries using a re-weighting procedure that minimises the baseline inequalities between member and non-member countries characteristics.[16] More formally, here the counterfactual outcome is denoted

[15] The *Stata* package -ebalance- creates the weights using the *entropy balancing* method described in Hainmueller (2012).

[16] To estimate the weights the balancing scheme searches for the set of unit weights (ω_i) taking the loss function $\min_{\omega_i} H(\omega) = \sum_{i|D=0} h(\omega_i) = \sum_{i|D=0} \omega_i \, log\,(\frac{\omega_i}{q_i})$ subject to; i) the balance constraint $\sum_{\{i|D=0} \omega_i c_{ri}(X_i) = m_r$ with m_r representing the EITI intervention groups first moment for covariate X_i, ii) the normalizing constraint $\sum_{1|D=o} \omega_i = 1$, and iii) the non-negativity constraint $\omega_i \geq 0$ for all i such that D=0. This is provided that Q is the base weight $[q_i, \dots, q_{n_0}]^T$, where $q_i = \frac{1}{n_0}$ and n_0 is the number of potential control observations, and $c_{ri}(X_{ij}) = (X_{ij} - \mu_j)^r$ with mean μ_j.

$\mathrm{E}[\widehat{Y_t^0|\mathrm{D}=1}] = \frac{\sum_{\{i|D=0} Y_i \omega_i}{\sum_{\{i|D=0} \omega_i}$. The outcome variable in the Difference-Difference regression framework described above is simply adjusted using the procedures estimated weights (ω):

$$\Delta Y_i \omega_i = \alpha + \beta D_i + \varepsilon_i. \quad \text{(ii)}$$

Hainmueller (2012) discusses in greater detail the similarities and advantages of Entropy Balancing compared with alternative pre-processing approaches available, such as the better-known propensity score matching method. In particular, they highlight the practical advantages caused by its approach directly measuring the balance of covariates (as opposed to, say, a propensity score). This approach prevents the need for the researcher to manually iterate between modelling the propensity score and checking whether pre-specified covariates are stochastically balanced and also ensures pre-specified covariates are balanced (which indirectly matching on propensity scores does not guarantee).[17] Through simulations and empirical evidence from within-study comparisons, they also highlight Entropy Balancing's appealing finite sample properties and both demonstrate the estimator's efficacy (ability to mitigate bias) relative to other common matching techniques. The efficacy of the Entropy Balancing estimator has also recently been confirmed in further empirical testing provided by Matschinger et al. (2020) and Wang (2020).

4. RESULTS

We now examine the results of this analysis. First, Panel A in Table 1 compares the baseline characteristics (from 2002) of the group of EITI committed countries to the control group of non-EITI committed countries. The comparison shows the characteristics of the EITI and non-

[17] Hainmueller's (2012) discussion describes the practical limitations and the inadequacies of alternative approaches based on propensity score theory (also known as the propensity score paradox - see King and Nielsen, 2019). Our own experiences resemble this common practical problem explained by the propensity score paradox. We were unable to find a comparable – "well balanced" – control group using propensity score matching. The approach improves the balance between EITI and control countries for some covariates and decreases balance for others (which can counteract bias reduction). As further explained by Hainmueller (2012), Entropy Balancing provides a key methodological contribution in addressing this issue by focusing on directly providing covariate balance.

EITI countries are statistically similar in some respects, but also considerably different in others. For example, while the standardised mean differences (SMD's) are very small for covariates related to countries' polity (-0.035), FDI (-0.07), and press freedom (-0.058), SMD's for factors such as log GDP (0.810), aid (-0.815), and corruption (-0.749) are particularly large and statistically significant. Panel B in Table 1 provides details of this comparison limited to a sub-group of EITI countries who progressed to reach compliant status during the study period. We see the same pattern also exists here; log GDP, aid, and countries corruption scores remain significantly different in EITI compliant countries compared to non-EITI committed countries.

A degree of selection bias between these groups at baseline is not necessarily an issue given that a difference-in-difference estimator may intrinsically account for this type of bias where the assumption of common trends holds. However, as noted in the description of our identification strategy, increasing the similarity of observed groups may help to improve the plausibility of this estimator. The column headed 'Adjusted Control' (Adj. Control) in Table 1 provides the results of re-weighting the control group using the Entropy Balancing procedure. The comparison shows the Entropy Balancing procedure works well in creating an alternative control group that is observationally comparable to the EITI committed group at baseline. The adjusted control group's SMD's are negligible across the included covariates, and this is also the case when performing the same re-weighting procedure to balance the control group with the group of EITI compliant countries (see Panel B). Hence, we continue further reflecting on the findings inferred from both unadjusted and adjusted control groups (as well as examine the common trends assumptions below).

However, before doing so, it is also interesting to note some of the differences between countries that have progressed to compliant status during this period in our sample. Comparing the means in panels A and B of Table 1, we see that compliant EITI countries are more aid-dependent and less democratic than the average EITI committed country. We also find, on

average, compliant countries derive from countries with lower incomes but where foreign investment appears relatively more important. Finally, albeit the values are somewhat similar, the perceived levels of the incidence of corruption, the relative economic importance of natural resource rents, and their interaction are also higher in compliant countries. These findings are in line with the expectation and previous evidence (see Lujala, 2018) that the countries who are hypothesised might benefit the most from implementing the EITI are also the ones most likely to progress with its implementation. This implies a simple comparison of the size of the average relative change in corruption scores between EITI committed and the sub-group of EITI compliant countries may not be directly attributable to countries' progression in the EITI.

Further attempts to address this issue using the Entropy Balancing technique to minimise the baseline inequalities between EITI committed and EITI compliant countries were, though, unsuccessful. This reflects a known limitation of this re-weighting procedure, which is that it may not converge to a balanced solution. The universe of countries here is very small (only 12 EITI committed countries in the sample may serve as a control for the group of compliant EITI members). This may explain why limited overlap exists between these two samples. The analysis, therefore, continues reporting and discussing the differences between the results of EITI committed countries, and a sub-group of compliant members, to each group's respective adjusted control group of non-EITI countries. However, it should be cautioned that this only provides intuitive evidence of the difference in the effects between committed and fully compliant with the EITI. As noted above, it is not clear the difference in effects can be attributed to countries' progression with the implementation of the EITI.

Table 2 presents the analysis examining the changes in corruption scores according to the BCI. The changes reported are scaled using the pooled standard deviation of the level of corruption in the baseline year (2002). When using an unadjusted control group (the one not using Entropy Balancing), the results in Panel A in Table 2 show that between 2002 and 2016

the difference in changes in corruption scores between EITI committed and non-EITI countries were small. Here, while the coefficient labelled change (Chg) shows perceptions of corruption improved (i.e. scores decreased) by 0.070 standard deviations in non-EITI countries during this period, the difference-in-difference (DiD) coefficient shows the average decrease in corruption scores was only slightly larger (0.025 standard deviations) in EITI committed countries relative to non-EITI countries. Limiting the analysis to the sub-group of EITI compliant countries, in Panel B in Table 2 the estimates show similar but slightly larger improvements in EITI countries. The difference-in-difference estimate indicates the change in corruption scores were 0.128 standard deviations lower in EITI compliant countries relative to non-EITI countries. However, in neither instance are the difference-in-difference coefficients statistically significant.

In contrast to the estimates from the unadjusted control group, looking at the estimates from the adjusted control group obtained from the Entropy Balancing procedure we find the relative improvements in perceptions of corruption measured by the BCI are statistically significant. The results show that, after adjusting for the baseline differences in country characteristics, the average change in corruption scores between 2002 and 2016 was 0.347 standard deviations lower in EITI committed countries relative to non-EITI countries. This estimate is significant at a 5% confidence level. The results also indicate improvements in perceptions of corruption were slightly better in the sub-group of EITI compliant countries. The estimates show the average change in corruption scores were approximately 0.391 standard deviations lower in EITI compliant countries relative to the adjusted control group. In this instance, the difference-in-difference coefficient is significant at a 1% confidence level.

Much like it is not simple to comprehend the practical meaning of a point change in the underlying BCI index, comprehending the magnitude of the size of this change reported in

standard deviations is not very simple either. However, one benefit of examining the results measured in standard deviations is that this figure can be easily transformed (or converted) into an intuitive and well-known improvement index based on Cohen's U3 index (Cohen, 1988).[18] Concerning the results reported above, an effect size decreasing the average corruption score by 0.347 (0.391) standard deviations in the treatment group indicates that 64% (65%) of the treatment group score lower than the mean score in the control group. In other words, it corresponds to a 14% (15%) relative improvement. This does not appear to be a transformative improvement but it still appears to indicate a marked improvement which is by no means meagre.

Estimations using both the unadjusted and adjusted control group infer perceptions of the incidence of corruption have improved in EITI countries. The discrepancy concerning the significance of these findings does raise a point for concern though. One explanation for the difference in these findings might be that the pre-treatment differences in the unadjusted control group are creating non-parallel outcome dynamics (which would bias the difference-in-difference estimator). To examine this issue further, here we assess the validity of the common trends assumption associated with the difference-in-difference estimator using an '*In-time Placebo Test'*. This placebo test re-applies the same analysis to outcomes before countries were exposed to the EITI intervention. It is expected that before the inception of the EITI, the estimated difference in the changes in corruption between the control group and EITI group should not be larger than what we might expect to occur by chance. Empirical analysis has

[18] This transformation simulates two perfectly overlapping standard normal curves (one for the treatment group and one for the control group) to illustrate the magnitude of the estimated effect. The approach involves comparing the proportion of area under the normal curve given the standard deviation shift in means inferred by the estimated effect, and interpreting this in terms of percentiles. For example, if there was no effect, the 0 standard deviation difference between the means of the treatment and control group indicates 50% of members in the treatment group would score higher than the mean of the control group (and 50% of members in the treatment group would score lower than the control group mean).

shown this type of test a useful method for detecting poor-performing observational estimators which are more susceptible to bias (Glazerman et al., 2003).

In this application, we examine a placebo test for the period 1997 to 2002. This covers the period where BCI data for the full sample of included treatment and control countries is available. The results of this robustness test are presented alongside the main estimates in Table 2. They indicate that changes in corruption were significantly different between EITI committed countries and the unadjusted control group even before the EITI's inception. The DiD coefficient shows that, in the period between 1997 and 2002, changes in corruption scores were 0.038 standard deviations higher in EITI committed countries relative to non-EITI countries. This difference is significant at the 1% confidence level. Similarly, focusing on the analysis for the sub-group of EITI compliant countries in Panel B in Table 2, we see that changes in corruption outcomes were also significantly higher (approximately 0.037 standard deviations) in EITI compliant countries before its inception. Again, this finding is also significant at the 1% confidence level. This undermines the plausibility of the difference-in-difference estimator's assumptions for the results using the unadjusted control group. The placebo test results using the adjusted control group, on the other hand, show the DiD coefficients in the pre-EITI period are not significant. This, therefore, increases our confidence in the main findings using the adjusted control group; that the perceptions of corruption have improved significantly (and corruption scores decreased) in EITI countries relative to non-EITI countries.

To further examine the robustness of the results from the estimator using Entropy Balancing, another type of test considers a natural extension of Rosenbaum's sensitivity analysis (a test that is widely used for matched observational studies) (see Rosenbaum, 2002). Adapted by Soriano et al. (2021) for the Entropy Balancing approach, this test assesses the degree that the estimates would change due to 'hidden bias' caused by unobserved confounding

variables. The test's results provide a critical value of 2.45 for the estimates using the EITI committed country sample and 2.65 for the model using the sub-sample of EITI compliant countries. In other words, these unobserved factors would need to more than double the likelihood of being an EITI country to overturn the main findings. This test cannot rule out that some degree of unobserved confounding exists in the current estimates. However, these test results do indicate that the reported estimates are reasonably insensitive to this potential type of bias based on common thresholds used to interpret the test's critical value.[19]

Some further analysis also considered examining whether progress among EITI members is related to countries characterises. This included, for instance, interacting the EITI variable with the length of time each country has been as a committed or compliant member, as well as other baseline characteristics (such as natural resource rent dependence, aid dependence, and the level of corruption). The coefficients of the interaction terms testing such effects were consistently small and statistically insignificant.[20] This may suggest that changes in corruption outcomes are relatively abrupt rather than gradually growing over time (similar to the trajectory of the effects reported by Fenton Villar and Papyrakis, 2017 in Zambia). However, one issue here is that the time variable may be a poor indicator of the maturity of the initiative. The discussion above highlighted that several countries were seen to be 'dragging their heels' with the implementation of the EITI's standards. Some countries progressed very slowly despite having been members for several years while others adapted to the standards very quickly. This suggests a more accurate representation of maturity may well simply be each member's EITI status (as seen in the results above).

[19] For example, Duvendack and Palmer-Jones (2012) suggest the critical values should exceed between 1.5 and 2 if the estimates are reasonably invulnerable to this 'hidden bias'.
[20] The estimates are omitted for brevity. Results are available from the author.

Finally, additional results available in Appendix 4 compare these findings to those using three corruption indicators more conventionally adopted in the cross-country literature on the EITI and corruption. This includes examining the estimated outcomes using the Political Risk Services (PRS) Group corruption indicator, the World Governance Indicators Control of Corruption Index (CCI) and Transparency International's Corruption Perception Index (CPI) (Appendix 2 reports further variable descriptions).[21] As discussed previously, the additional results from these indicators should be interpreted with a degree of caution. The CCI and CPI indicators inherently host limitations concerning their measurement of corruption over time and the PRS indicator creates annual scores only using a single set of 'experts' subjective opinions and offers little transparency about the consistency in their measurement. Also, in two instances the Entropy Balancing procedure did not converge to a consistent weighting solution. This explains why the adjusted control results are not reported for the PRS indicator when using the sample of all committed EITI countries or the CPI for the sub-sample of EITI compliant countries.

From these additional results, we generally see that the estimates obtained from these alternative corruption indicators are largely aligned with those using the more contemporary BCI outcome variable. In particular, the difference-in-difference (DiD) estimates are negative for both the adjusted and unadjusted control groups.[22] However, the lack of correspondence concerning the statistical significance of the results also highlights the headline conclusions drawn from existing flagship EITI studies using these alternative indicators (such as Sovacool et al., 2016 in World Development) may be sensitive to the type of EITI member and the

[21] The signs on the coefficients for Chg and DID are inverted reflecting that the scales for these indices point in the opposite direction to BCI's. Hence, a positive coefficient in Appenidx 4 continues to indicate a higher incidence of corruption and a negative coefficient that the perceived incidence of corruption is lower.

[22] An exception exists when using the PRS indicator with the unadjusted control group but the positive coefficients are not statistically significant at conventional levels and the coefficient turns negative when using the adjusted control group (albeit also insignificant).

corruption measure used, as well as the estimator applied. For example, if we examine the results of the CCI indicator in Appendix 4 using the unadjusted control group, we see the results show the relative changes in corruption scores among EITI members have only been significant among the sub-sample of compliant countries (indicating conclusions are temperamental depending on the definition of EITI member type, as also recently shown by Sovacool, 2020). These results also contrast with the results from the more robust BCI indicator (which is based on the same sources of information as the CCI). The results from estimates using the BCI and the unadjusted control group indicate the changes have not been significant in the EITI compliant group. This emphasises the corruption indicator used is also be an important factor determining the conclusions of existing studies.

5. Conclusion

The advent of the EITI has been a major step forward towards generating a more transparent extractive sector in countries across the globe. However, interest in the initiative in recent years has stimulated a vigorous debate questioning its sufficiency to tackle the sector's corruption problem. While its proponents highlight the potential benefits of the EITI to the governance of the extractives sector, critics often draw attention to the common limitations surrounding its implementation. The question, therefore, remains whether its members have witnessed any improvements in their scores from international assessments of the prevalence of corruption. This study uses a state of the art corruption indicator, called the Bayesian Corruption Indicator (BCI), combined with an estimation strategy using a difference-in-difference (DiD) model and an Entropy Balancing technique to address the measurement and self-selection issues prevalent in existing studies on the progress of EITI members. It finds, on average, corruption scores have improved significantly in EITI countries compared to non-EITI countries after adjusting for baseline differences between these groups of countries characteristics.

Further analysis also looks at the relationship between the EITI and corruption among a sub-group of members compliant with the international standards. The results provide even stronger evidence of the relationship between EITI membership and improvements in corruption outcomes. However, a limitation of this study remains that it is unable to generalise whether changes have occurred more strongly during a particular stage of implementation (e.g. when countries are joining the initiative or after they become compliant). This is largely due to the differences in the 'expected potential benefits' profile of compliant members. It may be those countries that have already progressed with the initiative stand to benefit the most from its implementation. If this is the case, these countries may naturally have benefited more from commitment to the EITI than the slow and late adopters. Nevertheless, reflecting that on average more corrupt and resource-dependent countries with lower incomes have been likely to progress with the implementation of the initiative (the type of country the intervention was most keenly intended for at the EITI's inception), it is intuitively encouraging to see from these findings that progress has been strongest (even if the results are only slightly stronger) among the sub-group of compliant members.

Concerning the policy implications of this research, this evidence does not advocate the EITI as the policy panacea that will lead to the eradication of corruption in the extractive industries. It is clear from discussions on its implementation that the initiative must continue to strengthen its standards and increase its stringency and local outreach to ensure it remains relevant (particularly as its membership continues to mature). Nonetheless, this evidence supports the positive role that the EITI may contribute in helping to develop the policy environment, infrastructure, and capacity required to stimulate better governance of the extractive industries. As highlighted by Van Alstine (2017), the initiative may use transparency as a necessary 'entry point' to help build a better mutual understanding between stakeholders and stimulate changes in public governance and management. With this in mind, the recent

package of changes to further support the EITI's standards and verification process remains relatively fresh, and so their full implications may take some time to transpire. Considering the implications of transitioning to new standards on EITI members experiences may pose an interesting line for future research. Furthermore, examining how institutional changes to the EITI's standard have caused differences in early and late adopters' experiences with its uptake and implementation also offers another interesting avenue for future research.[23]

Cross-country assessments of the EITI, such as this study, offer important insights into suggestive empirical regularities involving changes in corruption outcomes among members across the globe. Nevertheless, as this study also highlights, methodological challenges and limitations inevitably exist with this approach. Further research might consider exploring sub-national variations in citizens' interactions with public officials and the EITI as an alternative approach for identifying the distribution of the EITI's effects. Consideration should also be given to research understanding how different modes of information provision and stakeholder deliberation may help to maximise the benefits of increased transparency.

A final point for discussion concerns whether this type of mechanism is relevant or could be expanded to other sectors. This has been a lively and interesting issue even among stakeholders in the EITI itself. For instance, in Ghana, extensive work has taken place over the past 10 years to try to incorporate natural resource-based industries beyond the mining sector into the remit of its EITI scheme. This included a bill put to its parliament in 2012 to expand the scope of the EITI to cover other sectors such as the forestry and fishery sectors. Expanding the EITI's scope to the forestry sector has also been a prominent issue in other countries, such as Tanzania.[24] This highlights that the EITI's model does indeed appear highly relevant to other

[23] Considering the effects of the EITI's transition to new standards should consider the long-term perspective of the initiative and the pace of institutional change. The evaluations of this initial phase are occurring after more than 15 years since the EITI's inception and patience is needed for understanding the effects of these changes as it is important to allow events to properly unfold.
[24] See https://eiti.org/document/tanzania-scoping-study-on-forestry-sector

sectors too. Important factors that typically distinguish the EITI from many other (often local) transparency schemes include that its mechanism is based on a set of internationally developed technical standards and that it has a validation process run by an independent international secretariat (which also provides leadership through capacity building and training activities). Other related topics drawing considerable advocacy towards the need to improve transparency concern land deals and land registration.[25] Whether an EITI type multistakeholder initiative with an international validation and membership scheme could help to support efforts on such issues warrants further research.

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[25] E.g. see related discussions by Deborah Horan (2013) on Devex at: https://www.devex.com/news/how-to-ensure-transparency-in-land-deals-81859.

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7. TABLES

Table 1. Summary of country characteristics in 2002.

	Panel A: EITI Countries				
	EITI Mean	**Control Mean**	**Pooled SD**	**Control SMD**	**Adj. Control SMD**
Log GDP	8.025	8.816	0.977	0.810***	0.000
Natural Res.	6.007	4.629	9.400	-0.147	0.000
Aid	7.527	2.748	5.862	-0.815***	0.000
FDI	3.214	2.916	4.287	-0.070	0.000
Trade	69.290	71.788	36.188	0.069	0.000
Polity	3.182	2.978	5.856	-0.035	0.000
Conflict	8.198	8.563	1.762	0.207	0.000
Press Freedom	52.120	53.240	19.360	0.058	0.000
Corruption	58.960	51.240	10.312	-0.749***	-0.001
Corrupt*Nat.Res	357.700	225.700	523.089	-0.252	0.000
Observations	33	45	78	78	78
	Panel B: EITI Compliant Countries				
Log GDP	7.884	8.816	0.981	0.951***	0.000
Natural Res.	6.372	4.629	9.393	-0.186	0.000
Aid	9.216	2.748	6.139	-1.054***	-0.001
FDI	3.855	2.916	4.587	-0.205	-0.001
Trade	65.170	71.788	32.891	0.201	0.000
Polity	2.333	2.978	5.987	0.108	0.000
Conflict	8.312	8.563	1.735	0.145	-0.001
Press Freedom	55.900	53.240	19.033	-0.140	0.001
Corruption	59.110	51.240	10.871	-0.724***	-0.001
Corrupt*Nat.Res	383.400	225.700	517.800	-0.305	0.000
Observations	21	45	66	66	66

Notes: SD = Standard Deviation. SMD = Standardised Mean Difference. SMD is calculated by dividing the difference between treatment and control group mean values by the pooled standard deviation. Superscripts ***, **, ***** correspond to a 10%, 5% and 1% level of significance from a t-test with robust standard errors.

Table 2. Changes in Bayesian Corruption Indicator Score.

		Panel A: EITI Countries			
		Control		Adj. Control	
Study period	**Obs.**	**Chg**	**DiD**	**Chg**	**DiD**
1997-2002	78	0.014	0.038***	0.066**	-0.014
		(0.009)	(0.011)	(0.026)	(0.026)
2002-2016	78	-0.070	-0.025	0.252*	-0.347**
		(0.073)	(0.110)	(0.145)	(0.166)
		Panel B: EITI Compliant Countries			
1997-2002	66	0.014	0.037***	0.069**	-0.018
		(0.009)	(0.011)	(0.029)	(0.029)
2002-2016	66	-0.070	-0.128	0.193	-0.391***
		(0.073)	(0.118)	(0.163)	(0.187)

Notes: Chg provides the change in the corruption scores in the control group measured in standard deviations (i.e. it is the parameter α in the difference-in-difference regression equation in Section 3.2). DiD reports the corresponding difference-in-differences between the EITI and control group (i.e. it corresponds to the β coefficient in the difference-in-difference regression equation in Section 3.2). The results are estimated using OLS regressions. Control refers to the estimates using the unweighted control group and Adj. Control the estimates using the weighted control group; weights are derived from the entropy balancing approach described above. Obs. is the number of countries included in the analysis. Superscripts *, **, *** correspond to a 10%, 5% and 1% level of significance. Robust standard errors are reported in parenthesis ().