A ‘Crypto Tax Assessment Index (C-TAI)’ for Oil and Gas Industry

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Highlights

- In addition to conventional taxes, host countries impose “crypto tax” to maximize tax take, ensure production efficiency and sustainable development.
- Multinationals look beyond the glary conventional taxes while deciding investment locations
- However, a robust and valid index for these “crypto tax” is yet to be constructed
- Crypto Tax Assessment Index(C-TAI) is constructed and validated through empirical analyses
- The Index can be utilized by policymakers, oil and gas companies and researchers

Abstract

In addition to conventional taxes, host oil and gas producing countries impose a “crypto tax”, including sustainability-related taxes similar to environmental taxes and social sphere development costs. These taxes aim to maximize government taxes which are collected to ensure operational efficiency and sustainable development. In contrast, multinational oil companies look beyond conventional taxes by performing a thorough assessment of “crypto tax” while deciding investment locations. Extractive industry taxation literature is limited in offering a scrupulous index. In particular, how a robust index is constructed and tested for these quasi-taxes. Therefore, the issues surrounding the construction and testing of Crypto Tax Assessment Index (C-TAI) underpins the relevance and motivations of this study. Specifically, this study aims to examine the construction and testing of a C-TAI in guiding policymakers and investors concerning crypto taxes. A properly constructed Index would enable governments to undertake environmental and sustainability assessment, knowing that the index suited their particular petroleum fiscal policy. The Malaysian marginal oil field sector was established to test internal and external validities and model fit indices of the C-TAI through surveying the opinions of experts in this field. Taking these views and opinions into consideration, in constructing an appropriate C-TAI, researchers can use the index address possible questions relating to the effects of crypto taxes on individual oil and gas projects or the overall petroleum sector of a country. For instance, how useful the

constructed C-TAI could be in the examination the effect of crypto taxes on the profitability of a mature basin? How does the constructed C-TAI could be used in relation to the effect of crypto taxes on the profitability of marginal oil fields and the investment climate of a frontier petroleum basin? In answering these questions, it is anticipated that a properly constructed and robust C-TAI would help to guide policymakers and investors in understanding the importance of a C-TAI for crypto taxes, including sustainable developments.

Keywords; *crypto tax assessment index, crypto charges, crypto impositions, crypto obligations*

1. Introduction

Investments in oil and gas exploration and production mostly involve a contractual relationship between a host government and an international oil and gas company (OGC). Such contracts govern the relationship between the host government and the company, and are bounded by a fiscal system that regulates the financial issues between the parties. These contracts can vary in type and structure (see Abdo, 2008); however, the taxation structure they contain is underpinned by certain types of mineral resources governance (see Abdo, 2014). Although the interests of the contractual parties are furnished in their investment attractiveness, their objectives are different and can be conflicting. On one hand, host governments make several impositions beyond conventional taxes to maximize benefits from their sovereign national resources as well as to ensure operational efficiency, sustainable development and possibly cleaner production through the reduction for carbon emissions and gas flaring in the production processes as well as addressing the environmental degradation concerns of the host community. On the other hand, OGCs try to bring costs down by avoiding rather than evading taxes to maximize profitability but at the same time, in order to enhance their legitimacy, maintain both of their corporate sustainability and corporate social responsibilities (CSR). Host governments use their taxation systems in an interventionist approach to influence investment behavior in their oil and gas resources and to target different types of the operating companies' profit, for example the economic rent (see Abdo, 2009 & 2010) and also ensure industrial sustainability by addressing

environmental and social concerns of the host producing communities. One of the impositions that have been made by the host government is 'crypto taxes'. Crypto taxes are forms of impositions and obligations made against OGCs not directly on its oil and gas operation, rather based on its presence in the country (Johnston, 1994a). These additional impositions compel investors to pay additional charges even in loss-making years (McPhail et al., 2009). If this becomes so stringent, such impositions may make a country's petroleum sector less attractive to investors and will likely encourage OGCs to look for more competing destinations with less stiff crypto effects. Adversely, if the crypto taxes are left uncharged the sustainability of the industry could be at stake. Hence, the need for trade-off, which implies that desirability for an index as a guiding tool.

Why is 'Crypto Taxes Assessment Index (C-TAI) desirable? OGCs would need a C-TAI to assess impacts of crypto taxes on the company's overall profit and decide investment locations. Likewise, host governments would equally need C-TAI to assess the impact of crypto taxes on overall marginal tax take, operational efficiency and possibly cleaner production for sustainable development of the oil and gas industry which is achievable through reduction of carbon emissions and curtailing the degradation of environment resulting from oil and gas production. However, such index is not currently available. In fact, methodological literature has been stuffed with several attempts for scale development with few focuses on index construction. Almost twenty years have passed since Diamantopoulos and Winklhofer (2001) outlined the relevant processes for index construction, yet so few attempts were made on constructing desirable indices that could benefit policymakers, operators and researchers. The only effort identified from the oil and gas perspective was that of Taylor et al. (2012) who constructed a

reserve disclosure index (RDI) in an attempt to measure its determinants, however, such effort does not followed the robustness checks disclosed here is constructing C-TAI, but rather regressed the RDI with corporate governance variables.

To understand crypto taxes, Johnston (2003) defined crypto taxes as payment obligations by an investor company to a host country but without appearing in a government take (GT) calculation and not recoverable either. This is mostly made through an imposition of sustainability-related taxes such as environmental taxes and social sphere development cost that can be used to curtail the adverse environmental negativities in the producing communities alongside other impositions for revenue maximization by the host government. Johnston (2003) further explains that they are the price of doing business and they vary among countries. Crypto taxes are indirect taxes through which governments collect additional revenue through levies, imposition of duties and other financial obligations (Iledare, 2014) and have been seen as additional impositions and obligations made on OGCs by the host countries (Abdulkarim, 2009). Many quasi impositions have been reported in the literature such as government participation, technology transfer compulsions, skill training and employment to host communities and environmental obligations (McPhail et al., 2009). From the examples given by McPhail et al., (2009) it is clear that crypto taxes could relate to sustainability-related taxes through social element of sustainability via sustainable development related education through technology transfer, skill training and internship-related employment to host communities. It also includes environmental element of sustainability through obligations meant to encourage companies to devise environmentally friendly innovations (see Aldieri, Carlucci, Vinci, & Yigitcanlar, 2019) to adhere to sustainability measures and mitigate climate impacts through reduction in gas flaring and

emission of fossil fuels to ensure cleaner oil and gas production (Bai, Ochuodho & Yang, 2019). Crypto taxes also include economic element of sustainability through levies, duties and other financial obligations (Iledare, 2014); domestic market obligation, security fees, custom duties, hostile audits, unclear regulations, government participation (Abdulkarim, 2009), VAT, import duty, capital gain tax, property taxes, surface rent tax, stamp duty, license/lease/data fees for prospecting/exploration/extraction, local taxes applied to water and road use, and withholding tax on investments (Johnston, 2003), which will enable government to earn additional revenue from the oil and production without being loose to the social and environmental concerns. Therefore, they have roles in ensuring corporate social responsibilities on one side and include sustainable development indicators and measures on the other. Whilst several '*crypto taxes*' exist in the literature, a valid, robust and fitted index that comprehends the entire available indicators is missing. Therefore, this study attempts to construct such index "C-TAI" which is to be used by policymakers, investors and researchers.

In order to maximize their tax take and ensure sustainability in the industry, host governments often impose a number of '*crypto taxes*' beyond the conventional others. However, as opined by McPhail et al. (2009), excessive tax impositions have consequences for investment decisions of OGCs, while refusal to impose them for attracting investors could pose much concern to sustainability of the industry in terms of economic, social and environmental issues as discussed earlier. Hence, this implied the need for an index to checkmate these taxes to achieve tradeoff between the attracting investors and achieving industrial sustainability. Crypto-tax instruments are usually disposed of to increase the host government indirect tax take; thus, they tend to lower the field's profitability in economic terms (Johnston, 1994b; Iledare, 2014). For example, OGCs

may not be able to deduct CSR related expenditure (McPhail, *et al.*, 2009) where such crypto taxes such as import duty are not allowed as deductions in arriving at tax liability, thus, they could be seen as an additional tax burden; and may limit companies' voluntary contributions towards other social and societal aspects such as skill training and employment to host communities. In contrast, refusal to impose crypto taxes could affect sustainability of oil and gas industry in terms of economic benefit to the government as well as social and environmental concerns of the host communities. By implication, C-TAI could be a tool for both investment locations decisions and industrial sustainability.

C-TAI has potential contribution to theory and practice. Theoretically, C-TAI will expand discussions within the resource rent literature as it highlights the relevance of crypto tax in oil and gas investment decisions. Extant literature is limited to conventional resource rent taxation which is mostly associated with fields' viability in terms of reservoir productivity and an investor closure decisions (Arnason, 2002), thereby neglecting crypto tax which are key in pre-invest and sustainable development decisions that involves skill training and technology transfer to the host communities as well as curtailing environmental damages. To this end, the C-TAI contributes towards wider understanding, explanation and application of Resource Rent Theory (Wessel, 1967). Moreover, C-TAI will be opened for application by researchers in a number of ways for the examination of its effects on the petroleum sector investment climate and profitability, therefore the index contributes towards taxation, policy, investment and sustainable development research.. In practice, C-TAI can be a catalog that can guide policymakers of host governments and OGCs. For policymakers C-TAI offers guidance to assess stiffness or otherwise of the crypto taxes existing in their fiscal regime so as to identify the scope for improvement in attracting

sustainable investment from among OGCs. For OGCs, C-TAI will be a measure for assessing the potential effects of crypto taxes on return on investment from among mutually competing investment locations and their potentials towards maintaining their CSR activities.

The main objective of this study is to construct a C-TAI for investment decisions and sustainability in an oil and gas industry. In achieving this objective, the steps recommended by Diamantopoulos and Winklhofer (2001) and Zyl and Puth (2015) for index construction were followed. Zyl and Puth (2015) identified three steps following the syntheses of works of Spector (1992), Jensen et al., (2002) and Babbie (2011). The steps involve items selection, combining the items into an index, and, finally, validating the index through empirical analyses. These steps are consistent with those identified by Diamantopoulos and Winklhofer (2001); content specification, indicator specification, indicator collinearity and external validity. These steps are discussed next in detail.

2.0 Methods

In this section, the process followed in selecting the items for the index construction and combining the items into the index is discussed. The section also discussed the research design for conducting the empirical analysis for the index validation.

2.1 Items selection

Selecting items that are potential components of the index requires understanding of the conceptual domains of the index that those items are expected to measure. The index needs to be defined for better understanding of its expected measures. Following the definition of crypto taxes, the domain of these taxes can be defined as being additional charges, impositions and

obligations beyond the conventional petroleum income taxes. Table 1 presents examples of crypto taxes as depicted by the literature.

[TABLE 1 HERE]

In identifying these items, we used numbers of approaches. Johnston (1994) seems to be the first to have discussed '*crypto-taxes*', when he mentioned the concept but does not discuss much of items that involve the proposed index. However, Johnston (2003) discusses some forms of '*crypto-taxes*'. In order to uncover more items that governments use as crypto taxes, the authors searched the database of the Center for Energy, Petroleum, Mineral Law and Policy (CEPMLP) of University of Dundee, United Kingdom¹; the database published a journal titled CEPMLP Annual Review. At the time of this search, 16 volumes comprising over 400 issues of the journal were published from 1997 to 2012. Keywords such as 'crypto tax (es)' and 'quasi tax (es)' were used to search for the concept, however, few articles such as that of Menezes (2005) and Abdulkarim (2009) mentioned a number of these taxes using names such as '*indirect taxes*' or '*indirect expropriation*'. Additionally, the database of Aberdeen Centre for Research in Energy Economics and Finance (ACREEF), University of Aberdeen was also consulted under the theme '*North Sea Study Occasional Paper*' which published about 143 occasional papers from 1975 to 2018, with many contributions by the renowned energy economist and director of the centre, Professor Alex Kemp, since 1976. However, most of the quasi-tax issues discussed (such as Supplementary Charge (SC) and Investment Allowances (IA)) relate to production-based taxes which were directly linked to reservoir productivity rather than crypto-based taxes. Other crypto

¹ Established in 1977, CEPMLP as a specialist postgraduate institution of University of Dundee is a global voice of energy law and policy which has been educating and training business leaders for over 40 years in energy, natural resources and sustainability studies through LLM, M.Sc. and PhD degrees. It can be visited via its website at <https://www.dundee.ac.uk/cepmlp/>

issues discussed such as economics of infrastructure cost sharing, mothballing and re-use of facilities as well as government subsidies (Kemp & Stephen, 2018), the economics of CO2 EOR, tax incentives for facilitating new field developments, tax incentives for incremental investments in PRT-paying fields, tax relief for decommissioning (Abdo et al., 2018), economics of infrastructure and third party tariffing (Kemp & Stephen, 2012) are much more towards incentives than charges, impositions and obligations which are outside the domain C-TAI aims to cover. That is not surprising considering that the North Sea is maturing basin, the target of the policymakers is to offer incentives rather than additional impositions to attract investment and ensure sustainable developments by addressing economic concern of government, social and environmental concerns of the society. Lastly, Google search was carried out using same keywords used in CEPMLP Annual Review database and ACREEF North Sea Study Occasional Paper database, however, very few articles discussed ‘crypto tax’; these include earlier works by Helliwell, et al.(1988) who mentioned quasi taxes in oil and gas industry such as PCC, and the work of Miller and Alalade (2003), Ekern (2005), Jojarth, (2008), Abdulkarim (2009), McPhail et al. (2009), Isehunwa and Ifeoma (2011), Iledare(2014) and Manaf, et al.(2014) who categorically refer to it as crypto taxes. Our search and categorization resulted in the items presented in table 1 above.

2.2 Combining the items into an index

Following the successful selection of comprehensive items offered by extant literature, the next step in index construction used by Zyl and Puth (2015) from a synthesis of works of Babbie (2011), Spector (1992) and Jensen et al., (2002) and consistent with Diamantopoulos and Winklhofer (2001) is combining the item into an index. In so doing, we analyzed the literature and identified the possible dimensionality of the items based on the conceptual domains of the

proposed index. Thus, exhaustive analysis was carried-out into the content of available articles that explain the concept of '*crypto tax*'. Johnston (2003) was the first to describe the concept as '*fine, penalties and duties*', it is inarguable that the combined name of these items could be '*charges*'. It is from this that the first-dimension of the index called '*crypto charges*' emerged. For the second-dimension reference was made to the works of Jojath (2008) and Iledare (2014) in whose description of the concept '*imposition*' was mentioned, thus giving birth to the '*crypto impositions*' as the second dimension. Lastly, the third-dimension reference was also derived from the works of Ekern (2005) and Iledare (2014) who used the word '*obligation*' in describing the concept of '*crypto taxes*'. Consequently, the third dimension was named '*crypto obligations*'. Thus, after consulting experts of oil and gas taxation, the three-dimensional pillars are used in constructing the C-TAI (see table 2)

[TABLE 2 HERE]

2.3 Emperical Research Design

Constructing the C-TAI involved extensive and comprehensive literature review. In addition to the professional knowledge of the authors, technical expertise of some professionals from the oil and gas industry has been used to construct and validate the index. Questionnaire survey was used to solicit the experts' opinions; Likert scale was selected based on the reasons discussed in section 2.3.3 below. The survey questionnaire used here enabled the researchers to understand the experts' perceptions on the construct validity of the proposed index using relevant measurement scale. Thus, having selected and combined the available items into dimensions for the proposed C-TAI, the final step is validating the index through empirical analyses. To achieve this, experts were deployed from the Malaysian oil and gas industry. The methods adopted for these processes are discussed hereunder.

2.3.1 Data collection

Initially, we identified 25 items for constructing the C-TAI (see Table 1). However, based on experts' evaluation through content validity, the items were reduced to 20 (see Table 2). These 20 items were used in constructing the C-TAI. Soliciting the opinions of experts for validation of the index as well as the actual data collection from the main samples spanned the period of six months (August, 2014 to January, 2015). To ensure no bias exists in the responses due to extensive follow-up and long duration for the data collection, recommendations by Armstrong and Overton (1977) were followed in which a non-response bias test was conducted. Initially, the data collection was planned to be completed within three months, however, after the expiration of these initial three months, only 71 responses through survey instruments were generated. Thus, extensive follow-up over another three months was made which resulted in the collection of an additional set of 52 responses, giving a total of 123 responses. After running the non-response bias test in line with Armstrong and Overton (1977), it was found that at 5% level of significance, there were no mean differences between early and late responses, indicating no bias in the responses (see Table 1 in Appendix), therefore the 123 responses were considered for the study.

2.3.2 Population and sample

In an effort to ensure key experts are engaged in the validation of the proposed C-TAI, three participant clusters: government, industry and practitioners, were used to drive the sample. Combining these three groups offered a robust view on the proposed index. Due to the Malaysian government's desire to attract investment into marginal oil fields, these fields were considered as the case study. Thus, 16 institutions related to these fields were identified and categorized into

the aforementioned three clusters.² In each of these institutions, the respondents have relevant job specializations; Oil and Gas Accountants, Auditors, Tax Consultants, Business Development Managers and Contract Managers. From these three pools of experts, 361 respondents were identified for the survey and the questionnaires were distributed to all 361 participants. Eventually, 123 questionnaires were retrieved representing 34.07% of the population. This response is considered sufficient following Sekaran (2003), who suggested 30% as adequate for a survey research. Nevertheless, only 120 valid questionnaires were utilized for the final analysis. The remaining three cases were omitted through data screening processes for being outliers. Leaving such cases would have temper the statistical accuracy of the index's estimate in line with the suggestion of Tabachnick and Fidell (2007). The screening process of the data was performed using SPSS version 22.

2.3.3 Instrumentation

Given its popularity, a 7-point Likert measurement scale was used in measuring the perception of experts regarding the proposed C-TAI indicators. Prior to delivering the questionnaires to the targeted respondents, and in line with DeVellis (2011), it was subjected to content, structure and face validity by two groups: two experts from industry and three from academia. The experts offered their perceptions on the relevance of the items in measuring the proposed C-TAI and the appropriateness of the wording for the targeted respondents' understanding. The items presented to these experts are contained in Table 2 in the Appendix. The experts were asked to rate each item for its relevance in constructing the index and the clarity of the statements used; they were also asked to offer relevant suggestions for enhancing the proposed C-TAI. In assessing the relevance of the items, the Content Validity Index (CVI) guidelines proposed by Polit and Beck

² Four (4) government agencies, eight (8) oil and gas companies, and four (4) accounting firms that have experience in oil and gas accounting, tax and business practices.

(2006) were followed.³ Following these guidelines, the results of content validity of the relevance of the measures for both I-CVI and S-CVI are presented in Table 2 in the Appendix.

From Table 1 in the Appendix, S-CVI/Ave is calculated as: $(0+1.00+0.60+0.40+1.00+1.00+1.00+1.00+1.00+1.00+1.00+1.00+1.00+1.00+1.00+1.00+1.00+0.40+0.60+1.00+1.00+1.00+1.00+1.00)/25=0.86$. Similarly, the mean expert proportion is calculated as $(.84+0.84+0.84+0.96+0.84)/5=0.86$. It can be seen that the index failed to meet the minimum recommended score for S-CVI of 0.90, indicating the need for optimization. To achieve this optimization, item I-CVI was verified, and, as can be seen from the Table 1 in the Appendix, the item failed to meet the minimum requirement of 0.78. Therefore, further written comments of the experts were looked into and a selection-by-elimination technique was used (see Abdo, 2006). First, regarding VAT (CBC1), experts recommended for its removal from the index because at the time of conducting this study, VAT was not applicable in Malaysia, thus, it was removed. Export duty (CBC3) and Stamp duties (CBC4) were not supported by two and three experts, respectively. While some recommended for deleting export duty and stamp duty, others suggested to merge them with import duty in the final instrument by grouping all three duties together, the latter opinion was considered for three reasons; (i) they are all duties and crypto charges, (ii) all relate to customs, and (iii) experts and investors may have similar views on these duties, thus, separating them could amount to duplication and redundant opinions.

Furthermore, experts advised that local office requirements (CBI6) should be removed; the

³ As part of the guideline, Polit and Beck (2006) recommended four-point measures in evaluating items for an index (or scale); 1= *not relevant*, 2= *somewhat relevant*, 3= *quite relevant* and 4= *highly relevant*. Polit and Beck (2006) further recommend for dichotomizing of the four-point measure for assessing item level CVI (I-CVI) and scale level CVI (S-CVI). This means collapsing options 1 and 2 as *not relevant* and 3 and 4 as *relevant*. A threshold of 1.00 was recommended when 3 to 5 experts evaluate the items or 0.78 for 6 to 10 experts for I-CVI (Polit& Beck, 2006). Moreover, for S-CVI/Ave, Polit and Beck (2006) recommend of 0.90 or higher at scale level. These recommendations are consistent with earlier studies on content and face validity of measurements (Waltz and Bausell, 1981; Sauls, 2004; Lynn, 1986; Davis, 1992; Champion et al., 2005).

justification for such removal is that, in an ideal situation, an OGC needs local offices to manage its affairs. Therefore, local office requirements could not be considered as either crypto imposition or an external obligation; for this reason, the item was eliminated. Finally, mandatory currency conversion was not commonly applicable in the context of the study as suggested by some experts, thus, its effect could be difficult to assess in relation to the area chosen for the study, however, it could be used elsewhere, consequently, it was also eliminated. After validating the items used in constructing the index, the I-CVI, S-CVI and Mean Expert Proportion all achieved a value of 1. Thus, coding was rearranged, and the proposed C-TAI was constructed based on 20 indicators for which the final instrument was drafted and assessed for non-response bias test after the data collection from the respondents as contained in Table 1 in the Appendix.

2.3.4 Data analysis techniques

In order to validate our proposed C-TAI empirically, we followed suggestions by Diamantopoulos and Winklhofer (2001). Internal and external validity measures were used. Internally, collinearity among the proposed dimensions was assessed to ensure its discriminant validity. External validity of the index was assessed through testing a correlation between the dimensions and an external indicator outside the index. Such external indicator should be the one that summarizes the essence of the index so as to foresee its potential effects. For instance, in our case, and as being documented in the literature, taxes affect investment location decisions. It is generally known that taxes can affect investors' return which is an indicator of investment climate (see Mas'ud et al., 2017), and thus are key for the initial investment decisions and any consequent CSR activities, implying high tax payments to substitute CSR (Davis, et al., 2016) in terms of social sustainability such as skill training and technology transfers. Thus, the collinearity of C-TAI dimensions with one dimension of investment climate (risk/return) was considered.

Additionally, consistent with the views of Zyl and Puth (2015) and Diamantopoulos and Winklhofer (2001), it was suggested as an alternative support to correlation analysis to model the formative dimensions of the proposed index against another variable with reflective indicators through Multiple Indicators and Multiple Causes (MIMC) Model and nomological validity. Diamantopoulos and Winklhofer (2001) concluded that if the overall model fit proves acceptable, then it can be considered as a justifiable evidence for the formation of a proposed index. Towards this end, risk/return as a dimension of investment climate was modeled against the three dimensions of the proposed C-TAI: crypto charges, crypto impositions and crypto obligations. These analyses were undertaken by using SPSS version 22.0 and Analysis of Moment Structures (AMOS) version 23.

2. Index Empirical Validation

In order to ensure empirical validation of the C-TAI, three analyses were undertaken: indicator collinearity, external validity and index overall model-fit.

3.1 Collinearity of the Dimensions

To establish non-existence of multi-collinearity among the three formative indicators of the proposed C-TAI; crypto charges, crypto imposition and crypto obligations, we followed the recommendation of Kleinbaum et. al. (1988), who suggested a cut-off threshold of 10 for Variance Inflation Factor (VIF) and a minimum value of .10 for Tolerance. The results of this analysis are presented in Table 3 below.

[TABLE 3 HERE]

The results in Table 3 confirm that collinearity is not an issue among the three indicator-dimensions that formed the proposed C-TAI. All three indicators have a VIF of less than 10 and Tolerance above .1 indicating the absence of collinearity. Thus, it confirms the validity of the proposed three indicators of the proposed C-TAI through collinearity analysis as no evidence of redundancy among them was detected.

3.2 Indicator External Validity

The external validity of the indicators of the proposed index was tested through correlation with an external variable – investment risk/return. Risk/return was used for the external validation. Charges imposed on investors upon signing a contract or a license enable the government to receive revenue earlier on but shift risks to investors (Boadway & Keen, 2009). Thus, crypto taxes can influence investments' location decisions and sustainability of their investment through the economic aspect of profitability. Results of this analysis are presented in Table 4.

[TABLE 4 HERE]

The above table depicts that crypto imposition has the highest correlation with the external variable; investment risk/return with $p < .05$ while for crypto charges and obligations $p < .10$ as reported, which, according to Dahiru (2008), are within the acceptable values. This external validation confirms that the C-TAI can be used for correlation and regression analysis with other variables in order to establish its association, relationship, effect and influence with, or on, such variables.

3.3 Index Overall Model Fit

Following a recommendation by Diamantopoulos and Winklhofer (2001), nomological validity of the proposed index was tested through modeling the three indicators; crypto charges, crypto impositions and crypto obligation with an external variable. This external variable is logically expected to be influenced by the three indicators. Considering that the essence of the proposed index is to enable policymakers and investors to assess the effect of crypto taxes on investment location decisions and sustainability - a dimension of investment climate – specifically, risk/return was chosen. The results of the model fits indices are compared with the base-line measures as shown in Table 5.

[TABLE 5]

Compared to the benchmarks, C-TAI achieved acceptable level of all indices (RMSEA, χ^2/df , TLI, CFI, NFI, GFI and AGFI) for global fitness and index parsimony. In other words, this confirms that the data used in this validation fits the C-TAI, indicating that the index is usable by the relevant stakeholders and for its intended purposes of aiding investment and sustainability related decision-making.

Furthermore, analysis of the standardized regression weights on the possible effects of C-TAI indicators on investors' risk/returns revealed that crypto impositions have the highest effect, followed by crypto obligations and, lastly, crypto charges. Though, common sense could believe that crypto charges would have more severe effect on investment climate and projects' profitability, however, critical analysis from the data informed a contrary view. For instance, while the financial burden of most of the crypto charges can be predicted with some level of precision, the effect of some impositions and obligations such as inefficient allocation mechanism, domestic market obligation, price-cap formula and reinvestment obligation could

result in more adverse effects and could be highly difficult to estimate; thereby creating uncertainty for the investors about profitability and sustainability of their investment amidst stiff obligations. Where inefficient allocation mechanism or risk and reward exist, investors may feel disadvantaged and high return might not be possible. Similarly, when an investor is forced to sell the crude within domestic market, they may be unable to export to more competitive global markets or to their foreign refineries. Likewise, putting a price-cap will constrain investors to take advantage of high oil price especially during windfall gains. Similarly, if reinvestment obligations constrain investors to reinvest locally; such could deter them from taking advantage of putting their capital into frontier and emerging profitable destinations. In essence, this shows the possibility for impositions and obligation to have more severe effects on investors' risk/returns than crypto charges; thus a severe impact on sustainable development of host countries because the companies may not have sufficient resources to execute their social and environmental obligations.

4. Summary of Results

Johnston's (2003) work has led to the identification of a number of '*crypto taxes*', however, a number of other crypto taxes were identified by this study through extensive literature review. In a more practical sense, Johnston's work was also constrained by a lack of validation through experts' opinions in establishing an index for '*crypto taxes*'. This has been addressed here through empirical validation of C-TAI. To the best of the researchers' knowledge, there is no validated and fitted index relating to '*crypto taxes*' in the resource-based literature that turns down the relevance of this research's study.

Additionally, a gap has been identified in relation to concentration of the methodological literature on scale development and validation with neglect of index construction despite the indices being appealing in many contexts (Diamantopoulos & Winklhofer, 2001), including natural resources sector such as the oil and gas industry. In an effort to contribute towards this end, extensive review of literature was carried-out, which showed the need for an index construction for assessing effects of crypto taxes on OGCs' investment location decisions. Steps recommended by researchers were identified and applied in developing the index. In this, the reference has been made to the high-quality criteria for index development steps identified by Diamantopoulos and Winklhofer (2001) and consistent with the views of Zyl and Puth (2015).

The first step requires selection of items for index construction, so extensive review of literature was conducted which led to the identification of twenty-five potential items for the index construction as depicted in Table 1. The 25 items identified from the literature were divided into three indicators based on the conceptual definition of crypto taxes. The first indicator is crypto charges which consisted earlier of thirteen items but was later reduced to ten items. All the items under crypto charges have elements of monetary payments by the investor. This indicator includes sustainability related taxes such as environmental taxes, surface rentals and taxes related to water use which are important indicators for sustainable development and cleaner production. The final items were shown in Table 2. The next indicator identified was crypto impositions which initially had seven items but was later reduced to five items. The items under this indicator are more of impositions that could have some burden indirectly on the investors even though no direct monetary payments may be necessary. Similar to the first indicator, this also consists of sustainability related taxes such as social sphere development cost that can ensure socially

responsible investment. The third indicator, which is crypto obligations, consists of five which were agreed by experts to all work in the study's context. Like the other two indicators, this indicator also consists of sustainability related issue in form of employment and hiring obligation. Provision of employment is a CSR issue capable of preventing social crises in the investment location.

The last step is validating the index through empirical analyses. This involved, firstly, the evaluation of indicator collinearity, and, secondly, testing external validity through correlating the indicators of the proposed index with an external variable. Third is establishing nomological validity of the index by modeling its indicators with an external variable that can be explained by the proposed index through evaluation goodness of fits for the index. The results of these three analyses produce results that support the construction of the proposed index. First, as reported in Table 3, multi-collinearity had not been an issue for all three indicators; crypto charges, crypto impositions and crypto obligations. Secondly, correlating the three indicators with external variables revealed significant correlation at acceptable level of probability as shown in Table 4. Lastly, nomodological validity of the index was also confirmed through modeling all the indicators with an external variable. In this, the model fit indices (RMSEA, χ^2/df , TLI, CFI, NFI, GFI and AGFI) met an acceptable benchmark suggested by the literature as contained in Table 5. Importantly, validation of the index within the Malaysian context implied that crypto impositions, when they exist, could have more severe effects to investors' return than the crypto charges, and, consequently, could be a deterring factor for OGCs to locate marginal fields as potential investment destination.

5. Conclusions and Index Usability

Constructing the C-TAI contributes to elaborative discussion in resource rent literature. It also addressed an important gap in resource-based literature, for instance, from the general effort of Blalock in 1971 to specific social and managerial guidelines and suggestions for index construction offered by Diamantopoulos and Winklhofer in 2001. Fewer efforts have been witnessed regarding index construction mostly due to perceived difficulty and anticipated painstaking job associated with the process. In fact, such efforts have not been commonly visible in the resource sector's literature generally and oil and gas in particular.

The C-TAI is constructed with validated and fitted indicators. Thus, it is deemed to be of significant benefits to host oil and gas producing and other resource-based countries, OGCs and researchers. For host countries, C-TAI can serve as a survey instrument for seeking experts' opinion of the perceived impact of crypto taxes for particular resource-based development projects or the industry in general. The outcome of such will inform policymakers on the level and instruments of intervention in the oil and gas business on one hand, and the impact of such intervention of investors' location decision on the other hand. The host government can use the index in designing a fiscal regime that will reap fair share of countries' mineral resources to the nation and also attracts foreign investors and achieve sustainability through addressing its economic, social and environmental concerns. The index can be used as a tool for making such balance particularly where host governments aim to maintain and enhance sustainable development of their mineral, and other resources. Host government can deploy the index to increase taxes where controlling pollution through the reduction of gas flaring and carbon emission in the production process in order to protect the environment is the aim. Therefore, whether or not adjustment would be required to cushion effects of those crypto taxes to attract

investors, the Index would be a suitable tool for governments when deploying an interventionist approach in the oil and gas business to enhance investments or their tax takes from their petroleum resources, and ensures environmental and social sustainability in the projects' development areas.

For OGCs, C-TAI can serve as a checklist to assess the existence of crypto-taxes among the mutually exclusive investment destinations. Such is expected to result in dwelling into a location with better investment climate that could enhance returns and mitigate risks. Moreover, using C-TAI as a checklist will enable OGC to identify environmental related taxes among the crypto-taxes; this identification will enable them to devise means for environmentally-friendly innovations in the exploration and production processes for efficient and cleaner production through reductions of emission and gas flaring, which will eventually help them to avoid rather than evade their environmental and social obligations. Lastly, for researchers, C-TAI can be a potential exogenous variable that can be correlated or regressed to understand its effect and influence against many endogenous variables such as investment climate in its aggregate or disaggregate forms through its dimensions (strategy, operating environment and risk/return). Other possible variables to which C-TAI can be a predictor or correlate may include resource-project viability, productivity, efficiency and CSR through experts' perception analyses. Specifically, researchers can use C-TAI to address possible questions relating to the effects of crypto taxes on individual oil and gas project or overall petroleum sector of a country. For instance, what is the effect of crypto taxes on the profitability of a mature basin? What is the effect of crypto taxes on the profitability of marginal oil fields? What is the effect of crypto taxes on the investment climate of a frontier petroleum basin? What impacts crypto taxes may

have on companies CSR? And what impacts crypto taxes may have on sustainable development of host countries? These questions are suitable drivers for future similar research.

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Appendix

Table 1: *Non-response bias for early and late responses*

Items and Responses			Levene-test		<i>t- statistics</i>		<i>P</i>
Items	Response	No.	F	Sig.	T	Df	Sig. (2-tailed)
CBTC1	Early response	68			-.393	118	.695
	Late response	52	1.045	.309	-.397	113.735	.692
CBTC2	Early response	68			-1.507	118	.134
	Late response	52	5.149	.025	-1.557	117.922	.122
CBTC3	Early response	68			-.586	118	.559
	Late response	52	4.198	.043	-.598	116.543	.551
CBTC4	Early response	68			-.597	118	.551
	Late response	52	5.386	.022	-.609	116.268	.543
CBTC5	Early response	68			-.711	118	.478
	Late response	52	.003	.956	-.707	107.057	.481
CBTC6	Early response	68			.564	118	.574
	Late response	52	.485	.488	.568	112.248	.571
CBTC7	Early response	68			1.230	118	.221
	Late response	52	4.649	.033	1.261	117.268	.210
CBTC8	Early response	68			.034	118	.973
	Late response	52	.730	.395	.035	114.763	.972
CBTC9	Early response	68			-.046	118	.964
	Late response	52	.072	.789	-.045	105.511	.964
CBTC10	Early response	68			.504	118	.615
	Late response	52	.769	.382	.512	114.894	.610
CBTI1	Early response	68			1.189	118	.237
	Late response	52	2.853	.094	1.209	115.588	.229
CBTI2	Early response	68			1.026	118	.307
	Late response	52	.000	.998	1.030	111.307	.305
CBTI3	Early response	68			.054	118	.957
	Late response	52	.540	.464	.053	103.734	.958
CBTI4	Early response	68			-.250	118	.803

	Late response	52	.022	.882	-.247	105.621	.805
CBTI5	Early response	68			-.950	118	.344
	Late response	52	.783	.378	-.939	104.840	.350
CBTO1	Early response	68			.328	118	.744
	Late response	52	.000	.997	.327	108.229	.745
CBTO2	Early response	68			-.840	118	.403
	Late response	52	3.431	.066	-.860	116.997	.392
CBTO3	Early response	68			-.543	118	.588
	Late response	52	.248	.620	-.549	113.481	.584
CBTO4	Early response	68			.614	118	.540
	Late response	52	.000	.994	.610	106.565	.543
CBTO5	Early response	68			-1.649	118	.102
	Late response	52	1.409	.238	-1.658	112.070	.100

Table 2: *Operational definition of the proposed c-tai items for experts' assessments*

Items	Measurement	Code
VAT	VAT paid on goods and services by investors will have a negative effect on their decision to invest in marginal oil fields.	CBC1
Import Duty	Import duty paid on machines and materials imported by investors will have a negative effect on their decision to invest in marginal oil fields.	CBC2
Export Duty	Export duty paid on petroleum products exports by investors will have a negative effect on their decision to invest in marginal oil fields.	CBC3
Stamp Duty	Stamp duty paid on petroleum products exports by investors will have a negative effect on their decision to invest in marginal oil fields.	CBC4
Capital Gain Tax	Capital Gain Tax on disposal of fixed assets by investors will have a negative effect on their decision to invest in marginal oil fields.	CBC5
Property Taxes	Property tax charged by government on operators' assets will have a negative effect on their decision to invest in marginal oil fields.	CBC6
Surface Ren Tax	Surface rent tax paid on land used by investors will have a negative effect on their decision to invest in marginal oil fields.	CBC7
License/Lease/Data fees for prospecting/exploration/extraction	License/Lease/Data fees for prospecting /exploration/ extraction will have a negative effect on investors' decision to invest in marginal oil fields.	CBC8
Local taxes applied to water, road use and stamp duties	Local taxes applied to water and road used by operators will have a negative effect on their decision to invest in marginal oil fields.	CBC9

Withholding Tax on investment	Withholding Tax imposed on return on investment earned by operators will have a negative effect on their decision to invest in marginal oil fields.	CBC10
Signature Bonus	Signature bonus paid by oil companies to host government will negatively affect the investors' decision to invest in marginal oil fields.	CBC11
Environmental Taxes	Environmental taxes paid by operators on restoration and compensation to host communities will have a negative effect on their decision to invest in marginal oil fields.	CBC12
Pipeline Tariffs	Excessive government pipeline tariffs paid by operators when transporting oil and gas will have a negative effect on their decisions to invest in marginal oil fields.	CBC13
Oppressive Government Control and hostile audit	Oppressive government control and hostile audits on investors' activities within the country will have a negative effect on their decision to invest in marginal oil fields.	CBI 1
Inefficient Allocation Mechanism	Inefficient allocation mechanism in contracts between operators and host government will have a negative effect on their decision to invest in marginal oil fields.	CBI 2
Performance Bond Imposition	Imposing bond on operators that they must meet certain level of performance will have a negative effect on their decision to invest in marginal oil fields.	CBI 3
Social Sphere Development Cost Imposition	Cost incurred by operators to local communities as a social responsibility will have a negative effect on investors' decision to invest in marginal oil fields.	CBI 4
High Visa Requirements	High visa requirements for operators' expatriate staff will have a negative effect on their decision to invest in marginal oil fields.	CBI 5
Local Office Requirements	Forcing investors to open local offices for in-country operations will have a negative effect on their decision to invest in marginal oil fields.	CBI 6
Mandatory Currency Conversion	Forcing investors for local currency conversion will have a negative effect on their decision to invest in marginal oil fields.	CBI 7
Domestic Market Obligation	Obligation imposed on operators to sell oil and gas produced in the domestic market will have a negative effect on their decision to invest in marginal oil fields.	CBO 1
Employment Quota/Hiring Obligation	Obligation on operators to employ indigenous individuals will have a negative effect on their decision to invest in marginal oil fields.	CBO 2
Reinvestment Obligation	Obligation that operators must reinvest the profit within the country	CBO 3

instead of investing it abroad will have a negative effect on their decision to invest in marginal oil fields.

Price Cap Formulas	Obligation on operators that they must sell oil and gas within the country at a specific price will have a negative effect on their investment decision in marginal oil fields.	CBO 4
Short Loss Carried Forward	Granting few years for which loss will be carried forward as a tax relief will have a negative effect on investors' decision to invest in marginal oil fields.	CBO 5

Table 3: Rating of Items Scale by Five Experts: Item rated 3 or 4 on a 4-Point Relevance Scale

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Number Relevant	I-CVI
CBC1	-	-	-	-	-	0	0.00*
CBC2	X	X	X	X	X	5	1.00
CBC3	X	-	-	X	X	3	0.60*
CBC4	-	X	-	X	-	2	0.40*
CBC5	X	X	X	X	X	5	1.00
CBC6	X	X	X	X	X	5	1.00
CBC7	X	X	X	X	X	5	1.00
CBC8	X	X	X	X	X	5	1.00
CBC9	X	X	X	X	X	5	1.00
CBC10	X	X	X	X	X	5	1.00
CBC11	X	X	X	X	X	5	1.00
CBC12	X	X	X	X	X	5	1.00
CBC13	X	X	X	X	X	5	1.00
CBI 1	X	X	X	X	X	5	1.00
CBI 2	X	X	X	X	X	5	1.00
CBI 3	X	X	X	X	X	5	1.00
CBI 4	X	X	X	X	X	5	1.00
CBI 5	X	X	X	X	X	5	1.00
CBI 6	-	-	-	X	-	1	0.20*
CBI 7	-	-	X	X	-	2	0.40*
CBO 1	X	X	X	X	X	5	1.00
CBO 2	X	X	X	X	X	5	1.00
CBO 3	X	X	X	X	X	5	1.00
CBO 4	X	X	X	X	X	5	1.00
CBO 5	X	X	X	X	X	5	1.00
S-CVI/Ave =0.86							
Mean Expert Proportion =0.86							
	0.84	0.84	0.84	0.96	0.84		