Title: Focussing on the Extremes of Good and Bad: Media Reporting of Countries Ranked Via Index-Based League Tables

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Abstract

The paper provides the first published evidence for a ‘U’ shaped relationship between country ‘league-table’ ranking based on the Human Development Index (HDI) and Corruption Perception Index (CPI) and media reporting. The results suggest that the Extremity Hypothesis proposed by Heath (1996) applies to such data rather than the alternative of the Centrality Hypothesis. In the Extremity Hypothesis people are more likely to transmit information regarding extremes, perhaps because people value ‘surprisingness’ or think that others do so, and the inevitable polarity of league-tables would appear to invite greater attention on those countries that rank high and low. This is an important finding as it suggests that countries at these extremes could act as exemplars. However, this is not to say that at more regional scales the media may pick-up on differences between ‘peer group’ countries ranked towards the middle of the league-table. Much more attention needs to be given by researchers to the use of indicators and indices and what helps to influence this, especially as it would help inform further development of existing indicators/indices and the creation of new ones.

Keywords: Human Development Index; Corruption Perception Index; league tables; media reporting; Extremity Hypothesis

Introduction

Much effort has been placed into the development and promotion of indicators and indices (where an index is an amalgam of indicators) as tools to help achieve the goal of sustainable development (Pissourios, 2013), and this is likely to accelerate with the recent (2016) publication of the new Sustainable Development Goals (SDGs; Hák et al., 2016) and the growing interest in the ‘planetary boundaries’ concept (Steffen et al., 2015). The Earth Summit held in Rio de Janeiro in 1992 was arguably a significant catalyst for this effort to create and promote sustainable development indicators but even prior to that date there had much emphasis on indices such as the Human Development Index (HDI) as well as more specialised indicators and indices such as the Gross Domestic Product (GDP) and Shannon-Wiener Index of Biodiversity (H) in the realms of economics and ecology respectively. The idea behind all of these is to try and capture complex ideas and indeed datasets into single values that can readily be grasped and hence utilised by groups including decision makers (Morse, 2015). The ‘simplifying’ assumption behind all indicators and indices has been criticised by some as resulting in a low utility for decision making (Hinkel, 2011; Preston et al., 2011) in an instrumental sense whereby they are used to inform decisions and measure the impacts of those decisions (Rinne et al., 2013). But it has also been argued that they may have some value in terms of communication and thus can help bring about an indirect influence on decision-makers. However, there are limitations here. While the history of economic indicators such as the GDP suggests influences that stretch back to the 18th century (Coyle, 2014) it can be said that they were essentially born out of the maelstrom of the recession (‘Great Depression’) in the 1930s with the work of Simon Kuznets in the USA and Colin Clark in the UK and Australia which aimed to establish systems of national accounting that allowed for an assessment of change over time and especially for Clark the ability to make comparisons between countries. Clark (1940) produced one of the first published rankings (league table format) of countries based upon income/capita where income had been adjusted for local purchasing power (Table 1). The USA and Canada came top of the table while China and the developing world (notably Africa and Asia) dominated the bottom. Indeed, it is perhaps rather sobering to consider how this table developed in the late 1930s, nearly 80 years ago at the time of writing, has a broad resemblance to contemporary league tables of GDP/capita adjusted for purchasing power.

<Table 1 near here>

GDP as a measure of economic activity was intended to be used by managers of the economy and was not primarily intended as a means of communicating complex economic ideas to a non-specialist audience, and indeed much confusion can arise amongst a lay audience as to what the GDP is and how it is calculated. This is understandable, especially as the calculation of the GDP is methodologically challenging and founded upon a number of key assumptions that have changed over time (van den Bergh, 2009), but the GDP is nonetheless widely reported by groups such as the media as a measure of the economic prowess of a country. But the very meaning of what GDP represents can be open to multiple interpretations; something that can be surprising to economists. For example, in a recent article following the decision in June 2016 of the UK to leave the European Union (so-called 'Brexit'), Anand Menon (2016) describes a town hall meeting in Newcastle, a city in the north east of England, where he raised the possibility that 'Brexit' would reduce the country's GDP. The response from one member of the audience was bluntly dismissive of such a warning - "That's your bloody GDP..... not ours"; a response that clearly surprised the author but perhaps is symptomatic of the GDP representing an economic activity that was simply not visible or experienced by the member of the audience.

The HDI, on the other hand, represents a conscious attempt by its founding organisation, namely the United Nations Development Programme (UNDP), to create an index designed to capture what the UNDP regarded as important within their vision of human development and convey that to a broad group of 'index-consumers', including the media, meant to use that information to bring about positive change (Stanton, 2007). Therefore, for the UNDP 'use' of the HDI was founded on its ability to spur and guide decision-makers to improve human development in their jurisdiction. The idea behind the HDI, first published in the 1990 Human Development Report (HDR), was to provide an alternative to what the UNDP saw as a dominance of economic indicators such as the GDP within an international development discourse dominated by institutions such as the World Bank and the International Monetary Fund (Stanton, 2007). That is certainly not to say that social indicators were ignored by the World Bank up to that time. The World Bank began reporting a series of development indicators in its first 'World Development Report' (WDR) of 1978, and amongst the economic indicators that dominated the tables in this report were two tables referred to as "social indicators" that "provide some information on health conditions and on the availability of health and education services" (page 73). Between 1987 and 1996 the World

Bank published a series of annual ‘Social Indicators of Development’ (SID) reports that included a wider array of social indicators than those seen in the WDR of 1978. But even so, the UNDP in the later 1980s thought that a new index was required to help shift the balance more firmly towards human development while at the same time acknowledging the importance of economics in development (Stanton, 2007). Hence, from the very start, the HDI was (and still is) a tool whose *raison d’être* was to catalyse human development, and this is facilitated via a ‘league table’ approach similar to Table 1 but where countries are ranked in terms of the value of their HDI rather than economic prowess. The best performing countries (higher HDI = better human development) are at the top of the table and worst performers (lower HDI = poorer human development) are at the bottom of the table. The ‘league table’ style of presentation is meant to provide a ‘name and shame’ spur to human development as the rankings are meant to be picked up by the media, and through them the public, non-government organisations, pressure groups, aid agencies etc. and ultimately provide pressure upon decision-makers to bring about positive change (Morse, 2015). While the HDI may be amongst the better known of a group of indices designed to reach a broad audience there are many others. Another example is the Corruption Perception Index (CPI) designed and promoted by a non-governmental pressure group called Transparency International (TI) as of the mid-1990s. The CPI addresses a more focussed issue (corruption) than does the HDI and the methodologies are very different, but the ‘league table’ style of presentation and the desire to reach out to a broader and non-technical audience, presumably in this case within the public and the private sectors, is the same. In both cases the desire is to use the index to help promote positive change, and the league table style of ranking countries by performance is a means to help bring that about.

Given that the HDI and CPI are intended, at least in part, to be picked up and reported by groups such as the media, previous research has explored the extent to which this has happened in the UK and globally and identified differences between the indices in the extent to which they are reported (Morse, 2013, 2016). Perhaps surprisingly given that the HDI was first published in 1990 and the CPI in 1995 there is still a lack of research focussed on the use of these indices by intended ‘users’; the extent to which they are used and what those uses may be. There are few studies in this area and much of the research emphasis with indicators and indices arguably remains highly focussed on their more technical aspects such as their design. One interesting dimension that should be considered is how the media reporting of indicators and indices may vary depending upon a country’s place within the published

league tables. The media are an important group for influencing decision-makers, although this influence is in both directions of course, and given that indicators and indices are tools that aid with communication of what can be complex concepts then one would expect them to be used by the media (Frønes, 2007; Saltelli, 2007).

However, there is little in the way of theory to draw from here, itself a reflection of how under-developed the indicator/index use literature is at present, but one possibility is that media reporting is greater for countries at the two ends of the league table with those towards the middle receiving less coverage. This is entirely founded on the notion that the media will focus on good and bad news stories represented by those extreme ranks. At one end of that scale there is certainly an extensive literature which explores media bias towards the reporting of bad news (Haskins and Miller, 1984; Garz, 2014), including analyses which suggest how bad news is more economically valuable for media outlets (McCluskey et al., 2015). There are various explanations for such ‘bad news bias’ in a variety of sectors including the reporting of economic trends (Kollmeyer, 2004). For example, Soroka (2006) suggest that ‘Prospect Theory’ in economics may play a role here as people, including journalists, care about losses more than gains of an equal magnitude and this becomes reflected in a tendency towards reporting bad news. Hence:

“Journalists will thus regard negative information as more important, not just based on their own (asymmetric) interests, but also on the (asymmetric) interests of their news-consuming audience. Observed trends in media content are, in this view, a product of asymmetric reactions to information at the individual level.”
(Soroka, 2006; page 374)

Research has shown that this tendency to spread bad news also applies to social media such as Twitter (Naveed et al., 2011). Aday (2010; page 146) makes the following point:

“Indeed, one reason for the persistence of a negativity bias across news genres can be traced to the fact that conflict is what Herbert Gans (1980) found to be a fundamental news norm, something that journalists look for in defining a story as newsworthy. “Good news” is generally seen as less interesting to viewers than “bad news,” especially on television.”

Such a tendency towards “negativity bias” could in turn have a significant influence on public opinion and behaviour (Garz, 2014) and sense-framing of the realities can become a complex interplay between events, those seeking to create a dominant interpretation of those events and how the media portrays all of this (Lewis et al., 2008). The media can also pick up on representations of claimed ‘success’ as well as the bad news of failure. For example, Blackmore and Thomson (2004) explore how the discourse of successful schools in the UK and Australia, where success may be regarded through the lens of a narrow set of performance indicators, tends to crystallise around the heads of those schools; a process the authors call ‘media-tion’. Governments and schools play into this portrayal of school ‘success’ and “in all this, heads have themselves become both ‘celebrities’ and ‘saviours’, but they are also equally open to losing out badly when things get really tough” (Blackmore and Thomson, 2004; page 316). The use of league tables in a variety of contexts, including the ranking of educational institutions, and how these are created and represented within the media has also long been a matter for discussion (Brown, 2006). University league tables, for example, are often claimed to help facilitate student choice by their creators and have been said to increase the number of applications to those institutions ranked high (Sauder and Lancaster, 2006) but critics such as Brown (2006; page 35) makes the rather intriguing point that:

“perhaps the greatest irony of all is the fact that whilst the evidence that league tables have a significant influence on student choice is limited, there is some evidence to the effect that institutions, and particularly Vice-Chancellors, pay a great deal of attention to them.”

But is this use of league tables by Vice Chancellors really such an irony? If the league table is having an impact on one important group (Vice Chancellors) with power (and at the time of writing his critique Brown was a Vice Chancellor of a UK university) then presumably the creators of the league tables can still regard this as an important contribution.

There have been attempts to formalise media reporting in terms of how it reacts to perceived good and bad news. Heath (1996; page 81) provides a set of models of media reporting based upon two dimensions:

- (1) the valence of the news, whether the news is “good” or “bad”;

(2) the extremity of the news, how good or bad the news is.

For the ‘extremity’ of news dimension Heath (1996) suggested that two models may be possible:

1. Centrality hypothesis. Here people are more likely to transmit moderate information over more extreme information, perhaps because they are unwilling to believe the extremes.
2. Extremity hypothesis. Here people are more likely to transmit information regarding extremes, perhaps because people value ‘surprisingness’ or think that others do so.

These hypotheses are represented by the graphs in Figure 1. Figure 1a is what one would expect to see with the Centrality hypothesis, with greater media reporting of news not perceived as being at the extremes, and Figure 1b the expectation of the Extremity hypothesis where the emphasis tends to be towards the good and bad news. But which of these is the case in reality? Following a number of analyses of media reporting Heath (1996) suggests that in terms of ‘valency’ there is a tendency to pass along bad news more than good news which confirmed the analyses of Haskins and Miller (1984) and subsequently reinforced by Soroka (2006), Garz (2014) and others. In terms of the ‘extremity’ dimension Heath (1996) suggests that there is a tendency towards “central rather than extreme news” as represented by the Centrality hypothesis. However, is this always the case? After all, the league table format can arguably invite a readership to concentrate their attention more towards the top and bottom of the table (good and bad news respectively) and in the research reported here it was assumed that with regard to indicator/index league tables the extremity hypothesis is more likely to be the case. If true, then the polarisation of media attention towards the top and bottom end of league tables based on indicators/indices would have important repercussions as media reporting of the tables can reasonably be regarded as a significant source of information and hence influence for the public and indeed decision makers (Morse, 2013).

The objective of the research reported here was to test whether indicator/index-based league tables, notably those of the HDI and CPI, do follow the Extremity Hypothesis in terms of media reporting. In effect the country league tables were employed to address the debate on centrality and extremity reporting. It should be noted that the paper makes no attempt to critique the basis of the HDI or the CPI and neither does it seek to critique the methods of

calculation and assumptions that were employed. Instead the analysis makes use of the published league tables of the indices as it is the published tables that would be available to the media each year and thus be the basis for their subsequent reporting.

<Figure 1 near here>

HDI and CPI

Since its origin in the late 1980s, and first publication in 1990, the HDI has comprised three components encompassing health, education and income (Morse, 2014). These are measured as:

1. Life expectancy as a proxy indicator for health care and living conditions.
2. Adult literacy combined with years of schooling or enrolment in primary, secondary and tertiary education.
3. Real GDP/capita (\$ PPP) as a proxy indicator for disposable income.

The choice of these three as components for the HDI is not in itself all that surprising, they can be found in many lists of development indicators including those of the World Bank from 1978, but their selection does pose an immediate problem in that the units by which they are measured are obviously different; life expectancy is measured as years, education typically as a percentage and real GDP/capita in dollars (adjusted for PPP). The three components of the HDI have had a more-or-less equal weighting since inception, although the journey from raw data to the HDI has varied somewhat since 1990 (Morse, 2014). It is not necessary here to go into the details of the calculation of the HDI and assumptions that were made by its creators each year, but suffice it to say that changes in methodology have impacted upon league table rankings for the countries. Thus a country may find itself moving up or down the league table between successive years not because of any fundamental change to the three components but because of the ways in which they have been aggregated and assumptions that rest behind this (Morse, 2014).

The CPI was first published in 1995, and unlike the HDI the CPI is based on people's perception of corruption. It is not a direct measure of the degree of corruption within a country but how it is perceived by those who are most likely to encounter it. For obvious reasons the measurement of corruption raises many challenges (Heywood and Rose, 2014), hence there tends to be a reliance on measuring the perception of corruption. The CPI is an index of indices in the sense that it utilises a number of published indices of corruption that are published each year and published by bodies such as the World Economic Forum, the World Bank, Freedom House and Pricewaterhouse Cooper. In essence the various indices of corruption are based on surveys of those most likely to experience it, such as international business people. The calculation of the CPI is complex and changes in methodology both at the level of the component indices and the CPI can also alter league table ranking. Unlike the HDI, countries at the top of the CPI league table are those that are deemed to be less corrupt while those at the bottom are most corrupt.

Both the HDI and CPI have certainly had their critics over the years. For example, some critiques of the CPI can be found in de Maria (2008) and Warren and Laufer (2009). For the CPI the reliance on surveys designed to assess the perceptions of business people and others who may not necessarily be resident in the countries they are asked to comment on results in a picture of corruption that may not necessarily match reported experiences (Donchev and Ujhelyi, 2014), especially of those who live in those countries including the poorest who may suffer the most from corruption. In the case of the HDI some early critiques can be found in Kelly (1991), Srinivasan (1994), Streeten (1994), Noorbakhsh (1998), Sagar and Najam (1999) and Lüchters and Menkhoff (2000). For the HDI the critiques have largely centred around the use of just three components, with no dimension covering, for example, environmental impacts (Neumayer, 2001), and the assumptions over their relative weighting. The UNDP has consistently argued that including more elements to the HDI would make it more complex and less transparent (see, for example, the discussion in the UNDP HDR, 1994; page 91). Critiques over the weighting of the three components have continued ever since the first HDI was published in 1990 and while the UNDP have made changes it is fair to say that the issue remains deeply contested (see for example Ravallion, 2012). There are also distributional issues that may be hidden by the device of having a single value of the HDI for a country. A country may have a high value for GDP, and this in turn can 'push' the HDI higher, but there can be many within society who will simply not recognise this 'wealth'; as witnessed by the point made above by Menon (2016).

While the HDI has no component that assesses corruption or indeed good governance, these are clearly related as one can readily imagine that corruption acts as brake which limits human development within a country. Various studies have explored this relationship, and it has been well reported over some years that values of the HDI and CPI do have a statistically significant relationship (Ortega et al., 2014, 2016); suggesting that better human development is achieved when there are lower levels of corruption, or conversely that lower levels of corruption are found in countries with higher levels of human development. However, the strength of the relationship with CPI has been known to vary between the three components of the HDI.

Methodology

The research had a number of stages. First it was necessary to standardise the published country ranks to allow for the different number of countries included each year from 1995 onwards. Table 2 shows the number of countries included in the published league tables for the HDI and CPI from 1995 to 2014. Country rank was adjusted by standardising the published league table ranking provided by the UNDP and Transparency International so that the highest ranked country had a score of 1 and the lowest ranked country had a score of 2; although it should be noted that low values for the adjusted rank based on the HDI and CPI equate to higher human development and less corruption respectively.

Adjusted rank = (mean rank – country rank)/standard deviation

The mean and standard deviation of the ranks were based on these league tables and adjusted ranks for the HDI were calculated for the years 1995 to 2014 although for the years 2007 and 2008 just one HDI was published. For the CPI the adjusted ranks were calculated for the years 1995 to 2014. All of the countries included in the HDI and CPI league tables over those years were included in the analysis, even if a country (e.g. Yugoslavia) does not exist at the time of writing. No attempt was made to select a sub-set of countries as it was deemed important to work with the league tables as they were published, as it is the published tables that would be accessible to the media and thus would potentially influence reporting by the media.

<Table 2 near here>

The second stage involved an assessment of the degree of linkage between adjusted league table ranks of the HDI and CPI and the degree of media reporting of the indices. Correlation coefficients of both the HDI and CPI ranks for countries across years suggest that there is a high degree of correlation between years. Thus the pattern of ranks across countries in any one year is highly correlated with the pattern in other years, suggesting a relative degree of stability in country rankings over time. This is not all that surprising as even a cursory glance at the HDI and CPI league tables from 1995 onwards suggests that the same countries tend to dominate the top and bottom of the league tables albeit with some fluctuation in precise rank. The data ranks were formally tested for multicollinearity by calculating Variance Inflation Factors (VIF) of index rank for countries across years (independent variables) with total number of media articles as the dependent variable and they were very high (typically in the hundreds).

In order to avoid problems arising from multicollinearity in regression analysis, it was decided to use Principal Components Regression (PCR). In PCR, the dependent variable (in this case number of media articles) is not directly regressed on the independent variables (HDI and CPI) but instead is regressed on principal components (PCs) derived from the independent variables. Principal Component Analysis (PCA) is probably the most commonly employed multivariate technique in statistical analysis. Its purpose is to extract important information from a dataset of inter-related variables. The first Principal Component (1st PC) accounts for the largest degree of variance in the dataset with subsequent PCs (2nd, 3rd etc.) accounting for the highest degree of variance possible under the key constraint that they have to be orthogonal to the preceding components. PCR is very effective in dealing with issues of multicollinearity but is not the only technique that could have been applied to deal with this. Other options that handle multicollinearity while allowing all the explanatory variables to be retained are Partial Least Squares Regression (PLSR) and Ridge Regression (Tikhonov regularization). PLSR reduces the full set of predictors to a smaller set of uncorrelated components and performs least squares regression on them rather than the original data. However, interpretation of the results based on components can be challenging in PLSR and there is a lack of model test statistics. Ridge regression is also a popular approach but is also controversial as the solution is found by adding rows of data to the original data matrix to disrupt the high correlations between them (Myers, 1990). PCR was selected above these

options as all that was being looked for was a quadratic relationship that suggested an increase/decrease in media reporting for countries at the top and the bottom of the league tables. Hence it was only necessary to reduce the dataset to a few principal components.

For the PCR, the time-series data for the HDI and CPI across countries were reduced by using PCA and the results are shown in Table 3 (HDI) and Table 4 (CPI). The principal component coefficients in Tables 3 and 4 were used to produce scores for the 1st and 2nd PCs for each country. As the 1st and 2nd PCs for the HDI accounted for 93% of the variation and for the CPI these PCs accounted for 82% of the variation it was decided in the research reported here to only work with the 1st and 2nd PCs. While useful as a means for exploring a quadratic relationship between the two indices and article counts, this does result in some limited shrinkage of the variation in the dataset as only the first two PCs were selected; this is an issue with the use of PCR to address multicollinearity and is a reason why some prefer Ridge Regression. However, here there are high levels of variation in the index rank dataset covered by the first and second PCs.

<Tables 3 and 4 near here>

The level of media reporting for the two indices over the period 1995 to 2014 was found by determining the number of articles reporting the HDI and CPI by country over the period 1st January 1995 and 31st December 2014 using the subscription-based Nexis database and search tools available via LexisNexis (internationalsales.lexisnexis.com/english-is/home.page). The sources selected in the Nexis database were ‘All news, All languages’. For each year the Nexis database was used to return the number of articles referring to HDI or the CPI and each country at least once in the article. Thus the search terms were:

- Country AND ‘Human Development Index’
- Country AND ‘Corruption Perception Index’

The outputs from the database search were the number of articles published across the globe (after adjustment for duplication) that have the respective search term. For example, the search term ALGERIA AND ‘HUMAN DEVELOPMENT INDEX’ will return all of the media reports published over the period 1/1/1995 and 31/12/2014 no matter where they were

published. However, while the media reports included in the search span the globe it should be noted that no adjustment was made to allow for the extent of readership. Also, it should be noted that even in non-English publications an index is often reported using its English name, but this may not always be the case and hence the search returns using the Nexis database are likely to be an underestimation. In effect the use of the English names for the two indices will have the effect of picking up a segment of the media reports, and reports that solely employ, for example, the French term of the HDI (l'indice du développement humain) would not be included. Hence, the use of total counts of media reports over the 1995 to 2014 period is admittedly a somewhat basic measure by which to gauge media interest but it does have the significant advantage of simplicity.

The final stage of the research involved the regressing of HDI and CPI principal component scores for each country (computed from the adjusted ranks) on the total number of media reports for the country that mention the HDI and CPI at least once. For example, the HDI score for each country in the dataset was derived using the PC1 coefficients in Table 3 as follows:

$$PC1\ Country\ Score_{HDI} = \sum_{i=1995}^{i=2014} Adjusted\ HDI\ rank_i \times PC1_i$$

The calculation was repeated for the PC2 coefficients of the HDI and for the CPI dataset. Following the Extremity hypothesis of Heath (1996) it was hypothesised that countries at the extremes of the ranks (low and high) would be more likely to attract media attention than countries that are middle-ranked. Hence one would expect to see a 'U' shaped curve (Figure 1a) with media reporting as the dependent variable and rank (based on the HDI and CPI) as independent variables. In this instance the use of PCR allowed for the selection of the 1st and 2nd PCs which allowed for the testing of a quadratic relationship between scores and article counts rather than explore the contribution of each year. The quadratic models tested were as follows:

Total article count (HDI) = intercept + 1st PC score + 1st PC² score

Total article count (HDI) = intercept + 2nd PC score + 2nd PC² score

Total article count (CPI) = intercept + 1st PC score + 1st PC² score

Total article count (CPI) = intercept + 2nd PC score + 2nd PC² score

Results

The total article count achieved for each country between 1995 and 2014 are presented in Table 5 along with the mean and standard deviations of the adjusted ranks for that country over that same period.

<Table 5 near here>

Plots of the HDI and CPI 1st and 2nd PCs against the average rank of the indices over the time periods are shown in Figure 2. Higher values for the HDI 1st PC and lower values for the HDI 2nd PC tend to equate to a higher HDI rank (higher human development). For the CPI, higher values for the PC1 and lower values for the PC2 tend to equate to higher ranks of the CPI (lower corruption).

To check whether the use of PCA based on ranks, rather than the values of the indices, provided a reliable measure that could be used to explore a relationship with media reporting it was necessary to test whether the 1st and 2nd PCs of the HDI and CPI rank were related to each other. Plots of the 1st and 2nd PC scores of the HDI (dependent variables) and CPI (independent variables) are shown in Figure 3 along with the results of regressions based upon a quadratic model. Coefficients of determination (R^2) for all four of the regressions are between 47 and 54% and all four of the models are statistically significant at $P < 0.001$. All the models come to the same conclusion; namely that high human development equates to low corruption and vice versa. As noted earlier, this is a well- reported conclusion in previous studies using values for the HDI and CPI (rather than rank) and provides a significant degree of confidence that that HDI and CPI PC scores based upon rank are capturing the same phenomenon.

Plots of the HDI and CPI 1st and 2nd PC scores against the number of media reports recorded from the Nexis database are shown in Figure 4 along with the results of fitting a quadratic regression model. The latter were the best fit models for these data distributions, although the coefficients of determination were not that high (all less than 20%). Even so, three of the models were statistically significant at $P < 0.001$ while one was almost statistically significant ($P = 0.051$). This suggests that for both the HDI and the CPI there is indeed a ‘U’ shaped (quadratic) relationship between league table position of a country and the number of media reports as suggested by the Extremity Hypothesis of Figure 1b.

<Figures 2, 3 and 4>

Discussion

This paper provides the first published evidence for a 'U' shaped relationship between media interest and league table rank based on both the HDI and CPI. It would appear that media interest is indeed greatest for countries at the low and upper end of the league tables, and is less for countries that are ranked towards the middle of the league table. This follows an expected pattern of the media picking up on both bad and good news, represented by countries ranked at the bottom and top of the HDI and CPI league tables, although it is important to note that while the reporting for countries towards the middle of the league tables tends to be less there is much variation in the data (as represented by the relative low values for R^2) and some mid-ranked countries do attract a great deal of media attention. Nonetheless the research does provide the first evidence for the Extremity Hypothesis developed by Heath (1996) applied here to the media reporting of two prominent indices. While Heath (1996) suggested that his Centrality Hypothesis is more likely, the polarity of league tables with clear top and bottom ranked countries arguably lends itself to an emphasis on those extremes as this is where the 'news' (good and bad) is to be found.

Given that the use of the league table format by the creators of the HDI and the CPI, and indeed various other indices, is intended to promote comparison and a 'naming and shaming' of those countries that do poorly then perhaps this greater media attention at the extremes is desirable. Media focus on those countries that do well (good human development; low corruption) and badly (poor human development; high corruption) can provide exemplars of what to do and indeed what not to do in terms of governance. However, while the results highlight the significance of league table ranking for attraction by the media it should be noted that the article counts have been taken from sources across the globe. While a middle-ranked country may attract less attention on global scales it is quite likely that it would attract a significant degree of attention at national or perhaps regional scales, and this may have an influence on public perception and indeed on politicians and decision makers. Thus care does need to be taken in assuming that global media reporting as assessed here is directly related to influence upon decision makers and others. While the assumption may seem reasonable,

further work is required to explore to what extent, if any, media reporting of indices has an influence on decision makers as intended by the creators of the HDI and CPI.

Nonetheless the results suggest that the use of league tables to present the HDI and CPI does help attract media attention especially for those countries at the extremes of the ranking. While the use of the league table format has been criticised given that it can over-simplify what are in effect very complex topics such as human development and corruption or indeed education (Brown, 2006) it is nonetheless a powerful vehicle for highlighting differences between countries and is widely employed for a variety of indices (Pissourios, 2013) such as the Ecological Footprint (EF) and Environmental Performance Index (EPI). The HDI is a very simplified index in the sense that it only has three elements and the CPI is based on perception of corruption derived from a rather specific group rather than being an empirical measure (Donchev and Ujhelyi, 2014), and there is a danger that these nuances may well be lost within media reports that focus on ranks based on the indices.

There is much scope for further research in terms of the 'use' of indicators and indices, including by group such as the media. For example, it is important to know the types of journalistic pieces (editorials, news, opinion pieces etc.) that report indices such as the HDI and CPI and the use of content analysis to explore the ways in which the indices are used within those pieces. For example, there may be two types of article:

1. Those that focus on the indices. For example, articles that discuss the press release of the latest version of an index and any trends that may be evident.
2. The use of indices to support wider points being made in articles rather than necessarily being the main focus. For example, an article may focus on the issue of corruption and the CPI may be used to support some points being made.

Both these types of use may represent a valid use of indicators, but it could be argued that the second represents a deeper embedding of the use of indicators in ways that the creators of the indicators intended. The first type of article is perhaps more ephemeral and represents a focus on indicators at their time of release. The research reported in this paper makes no distinction between these two types of use. However, it also needs to be remembered that the media are but one group of 'consumers', albeit an important one in terms of potential influence, and one

could also explore use of indices such as the HDI and CPI by groups such as civil servants, politicians, managers etc. The literature here is very sparse indeed but is certainly one that deserves to grow. Lessons that can be gleaned from the use of indicators and indices will provide much insight for the evolution of existing indicators/indices and the creation of new ones. After all, there seems little point in putting much effort into the creation and development of indicators and indices if they are not going to be used, and media attention is certainly an important step to help facilitate use.

Conclusions

This research provides the first published evidence for a 'U' shaped relationship between country ranking based on HDI and CPI and media reporting and suggests that the Extremity Hypothesis of Heath (1996) applies to such data rather than the alternative of the Centrality Hypothesis. It does indeed seem to be the case that the media focusses more on those countries ranked at the top and the bottom of the league tables, and this is an important finding given that countries at these extremes can act as exemplars of what to do/not to do. However, this is not to say that at more regional scales the media may pick-up on differences between 'peer group' countries ranked towards the middle of the league-table. Much more attention needs to be given by researchers on the use of indicators and indices and what helps to influence it as this will help inform the further development of existing indicators/indices and the creation of new ones.

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Table 1. One of the first published rankings of countries based upon income/capita where income has been adjusted for purchasing power (after Clark, 1940; page 54)

Average yearly income/capita *	
1300 – 1400	USA, Canada
1200 – 1300	New Zealand
1100 – 1200	
1000 – 1100	Great Britain, Switzerland, Argentina
900 – 1000	Australia
800 – 900	Holland
700 – 800	Ireland
600 – 700	France, Denmark, Sweden, Germany, Belgium, Uruguay
500 – 600	Norway, Austria, Spain, Chile
400 – 500	Czechoslovakia, Yugoslavia, Iceland, Brazil
300 – 400	Greece, Finland, Hungary, Poland, Latvia, Italy, Estonia, USSR, Portugal, ‘Rest of America’, Japan, Palestine, Philippines, Algeria, Egypt, Hawaii, Guam
200 – 300	Bulgaria, Rumania, Lithuania, Albania, Turkey, Syria, Cyprus, South Africa, Morocco, Tunis
Under 200	China, British India, Dutch Indies, ‘Rest of Asia’, ‘Rest of Africa’, ‘Rest of Oceania’

* 1925-34. Artificial monetary unit which had been adjusted for local ‘purchasing power’.

Table 2. Number of countries included in the published league tables of the HDI and CPI between 1995 and 2014.

Year	Number of countries in league table	
	HDI	CPI
1995	174	42
1996	174	54
1997	175	52
1998	174	85
1999	174	99
2000	174	90
2001	162	91
2002	173	102
2003	175	133
2004	177	146
2005	177	159
2006	177	163
2007~08	179	180 (in both years)
2009	182	180
2010	169	178
2011	187	183
2012	187	176
2013	187	177
2014	188	175

Note: only one HDI league table was published spanning 2007 and 2008.

Data sources: Human Development Reports (1995 to 2014) and CPI league tables provided by Transparency International.

Table 3. Results of a Principal Component Analysis on the HDI

	PC1	PC2
Eigenvalue	11.5	6.151
Proportion of variation accounted for	0.605	0.324
Cumulative proportion of variation accounted for	0.605	0.929

	Coefficients for calculating the Principal Component scores	
Year of HDI publication	PC1	PC2
1995	0.257	0.101
1996	0.271	0.121
1997	0.265	0.142
1998	0.257	0.159
1999	0.075	0.371
2000	-0.033	0.38
2001	-0.089	0.376
2002	-0.124	0.359
2003	-0.164	0.325
2004	-0.215	0.261
2005	-0.229	0.237
2006	-0.242	0.21
2007~08	-0.28	0.07
2009	-0.281	0.054
2010	-0.271	-0.111
2011	-0.277	-0.091
2012	-0.274	-0.108
2013	-0.256	-0.169
2014	-0.25	-0.185

PC1 = first principal component

PC2 = second principal component

Table 4. Results of a Principal Component Analysis on the CPI

	PC1	PC2
Eigenvalue	10.864	5.53
Proportion of variation accounted for	0.543	0.277
Cumulative proportion of variation accounted for	0.543	0.82

	Coefficients for calculating the Principal Component scores	
Year of CPI publication	PC1	PC2
1995	0.244	-0.202
1996	0.158	-0.268
1997	0.241	-0.076
1998	0.233	0.067
1999	0.232	0.189
2000	0.225	0.15
2001	0.131	0.347
2002	0.168	0.308
2003	0.073	0.408
2004	-0.034	0.413
2005	-0.109	0.383
2006	-0.216	0.254
2007	-0.273	0.156
2008	-0.291	0.064
2009	-0.284	0.019
2010	-0.275	0.019
2011	-0.276	-0.015
2012	-0.271	-0.057
2013	-0.247	-0.111
2014	-0.249	-0.103

PC1 = first principal component

PC2 = second principal component

Table 5. Mean and standard deviation of adjusted rank along with the article count over the period 1995 to 2014.

Country	HDI			CPI		
	Article count	Mean rank	SD rank	Article count	Mean rank	SD rank
Afghanistan	877	1.94	0.03	1568	1.96	0.08
Albania	86	1.47	0.09	990	1.65	0.12
Algeria	352	1.54	0.07	756	1.59	0.05
Andorra	19	1.17	0.01	5	-	-
Angola	647	1.88	0.06	1263	1.91	0.04
Antigua and Barbuda	51	1.28	0.06	32	-	-
Argentina	235	1.21	0.03	695	1.63	0.07
Armenia	68	1.49	0.05	966	1.63	0.10
Australia	1671	1.02	0.03	1447	1.08	0.04
Austria	209	1.09	0.02	758	1.14	0.09
Azerbaijan	96	1.51	0.07	1203	1.85	0.09
Bahamas	77	1.24	0.05	52	1.12	0.01
Bahrain	177	1.23	0.02	805	1.25	0.04
Bangladesh	897	1.80	0.03	1168	1.88	0.11
Barbados	149	1.19	0.05	238	1.11	0.03
Belarus	108	1.33	0.04	1035	1.66	0.17
Belgium	463	1.06	0.03	644	1.19	0.13
Belize	59	1.43	0.10	64	1.45	0.10
Benin	301	1.89	0.03	624	1.57	0.08
Bhutan	274	1.79	0.07	558	1.21	0.04
Bolivia	164	1.63	0.03	399	1.72	0.13
Bosnia and Herzegovina	86	1.40	0.03	989	1.50	0.06
Botswana	453	1.63	0.10	1281	1.21	0.04
Brazil	831	1.40	0.04	1058	1.48	0.14
Brunei Darussalam	83	1.18	0.03	238	1.23	0.02
Bulgaria	125	1.33	0.03	1245	1.45	0.11
Burkina Faso	627	1.98	0.01	642	1.51	0.08
Burundi	465	1.97	0.01	486	1.88	0.08
Cambodia	236	1.77	0.05	690	1.89	0.03
Cameroon	302	1.79	0.03	1081	1.86	0.08
Canada	2169	1.02	0.02	1478	1.06	0.02
Cape Verde	147	1.64	0.05	658	1.24	0.02
Central African Republic	335	1.94	0.05	234	1.85	0.03
Chad	568	1.96	0.02	797	1.95	0.03
Chile	362	1.21	0.02	724	1.18	0.09
China	2406	1.54	0.05	3719	1.56	0.17
Colombia	211	1.40	0.07	602	1.56	0.19
Comoros	64	1.80	0.04	34	1.77	0.06
Congo	693	1.76	0.03	584	1.85	0.03
Congo (Democratic Republic of the)	654	1.92	0.07	541	1.92	0.02
Costa Rica	226	1.27	0.07	406	1.31	0.06
Côte d'Ivoire	272	1.89	0.03	719	1.81	0.09
Croatia	94	1.28	0.06	1175	1.43	0.11
Cuba	277	1.33	0.08	292	1.36	0.03
Cyprus	113	1.15	0.02	765	1.19	0.03
Czech Republic	143	1.18	0.03	1370	1.36	0.09
Denmark	494	1.08	0.02	1647	1.01	0.01
Djibouti	125	1.88	0.03	79	1.56	0.04

Dominica	36	1.38	0.09	29	1.23	0.04
Dominican Republic	108	1.52	0.02	422	1.61	0.07
Ecuador	123	1.46	0.06	437	1.78	0.09
Egypt	597	1.64	0.04	1219	1.60	0.09
El Salvador	122	1.60	0.04	352	1.45	0.09
Equatorial Guinea	242	1.71	0.06	480	1.94	0.01
Eritrea	200	1.93	0.04	323	1.74	0.12
Estonia	133	1.25	0.08	1078	1.20	0.06
Ethiopia	697	1.96	0.02	911	1.69	0.08
Fiji	94	1.43	0.11	45	-	-
Finland	438	1.07	0.03	1355	1.01	0.02
France	1450	1.07	0.03	1704	1.19	0.09
Gabon	220	1.64	0.06	420	1.55	0.04
Gambia	246	1.91	0.03	132	1.66	0.13
Georgia	129	1.49	0.07	1134	1.55	0.26
Germany	971	1.08	0.03	2775	1.13	0.07
Ghana	739	1.75	0.03	1221	1.45	0.11
Greece	261	1.13	0.02	1432	1.42	0.10
Grenada	49	1.40	0.08	30	1.42	0.03
Guatemala	153	1.67	0.02	379	1.67	0.10
Guinea	1060	1.93	0.02	994	1.91	0.05
Guinea-Bissau	315	1.95	0.02	97	1.88	0.04
Guyana	71	1.60	0.03	372	1.72	0.04
Haiti	341	1.86	0.02	671	1.95	0.05
Honduras	122	1.66	0.02	454	1.77	0.08
Hong Kong	432	1.12	0.03	1189	1.14	0.10
Hungary	142	1.23	0.03	1298	1.33	0.12
Iceland	578	1.04	0.03	506	1.04	0.02
India	3343	1.73	0.03	2576	1.62	0.15
Indonesia	632	1.61	0.03	1499	1.81	0.15
Iran	438	1.48	0.08	1241	1.72	0.12
Iraq	542	1.68	0.05	1487	1.95	0.05
Ireland	669	1.06	0.03	511	1.14	0.05
Israel	416	1.12	0.02	1067	1.19	0.03
Italy	541	1.11	0.01	1623	1.39	0.14
Jamaica	111	1.49	0.04	419	1.48	0.05
Japan	1330	1.05	0.02	1925	1.18	0.11
Jordan	191	1.49	0.05	931	1.34	0.09
Kazakhstan	133	1.42	0.06	1184	1.74	0.09
Kenya	790	1.79	0.04	1551	1.87	0.05
Kiribati	16	1.68	0.04	24	1.53	0.05
Korea (Republic of)	53	1.14	0.04	20	1.36	0.15
Korea (Democratic Republic of)	2	1.45	0.03	4	2.00	0.00
Kosovo	76	-	-	334	1.62	0.01
Kuwait	225	1.25	0.05	832	1.33	0.05
Kyrgyzstan	75	1.61	0.05	922	1.87	0.04
Lao PDR	196	1.77	0.03	628	1.81	0.13
Latvia	126	1.31	0.09	1032	1.41	0.17
Lebanon	197	1.43	0.06	919	1.64	0.12
Lesotho	198	1.80	0.05	401	1.42	0.07
Liberia	666	1.94	0.03	545	1.60	0.17
Libya	421	1.35	0.05	962	1.81	0.11
Liechtenstein	76	1.07	0.04	103	-	-
Lithuania	122	1.29	0.09	1052	1.31	0.08

Luxembourg	259	1.10	0.04	327	1.10	0.09
Macau	36	-	-	30	1.22	0.04
Macedonia	66	1.40	0.04	977	1.50	0.15
Madagascar	125	1.83	0.03	389	1.63	0.13
Malawi	370	1.92	0.02	418	1.57	0.08
Malaysia	597	1.33	0.01	1349	1.34	0.10
Maldives	154	1.55	0.06	457	1.67	0.13
Mali	635	1.96	0.02	719	1.61	0.06
Malta	73	1.18	0.02	76	1.21	0.04
Mauritania	166	1.85	0.02	636	1.69	0.08
Mauritius	319	1.37	0.04	540	1.31	0.07
Mexico	480	1.31	0.03	780	1.56	0.13
Micronesia	20	1.63	0.02	7	-	-
Moldova	66	1.60	0.04	1012	1.65	0.12
Mongolia	132	1.62	0.06	833	1.56	0.08
Montenegro	42	1.30	0.04	899	1.41	0.04
Morocco	286	1.70	0.02	808	1.48	0.05
Mozambique	650	1.96	0.01	909	1.67	0.08
Myanmar	222	1.76	0.03	836	1.97	0.04
Namibia	343	1.67	0.03	1011	1.32	0.02
Nepal	603	1.82	0.04	717	1.74	0.07
Netherlands	747	1.03	0.01	1255	1.07	0.04
New Zealand	598	1.08	0.04	1910	1.01	0.02
Nicaragua	138	1.67	0.03	413	1.72	0.05
Niger	1456	1.99	0.01	821	1.70	0.10
Nigeria	2088	1.84	0.03	2380	1.89	0.11
Norway	1596	1.01	0.01	828	1.07	0.05
Palestine	83	1.58	0.02	35	1.67	0.08
Oman	191	1.41	0.08	808	1.26	0.07
Pakistan	1826	1.78	0.02	1691	1.82	0.09
Palau	13	1.29	0.03	2	-	-
Panama	108	1.31	0.03	393	1.50	0.07
Papua New Guinea	214	1.78	0.04	141	1.84	0.05
Paraguay	82	1.52	0.04	435	1.87	0.09
Peru	182	1.46	0.04	474	1.44	0.03
Philippines	402	1.53	0.07	1033	1.70	0.10
Poland	187	1.23	0.04	1413	1.37	0.11
Portugal	350	1.18	0.03	474	1.23	0.10
Puerto Rico	22	-	-	160	1.19	0.01
Qatar	224	1.24	0.05	929	1.17	0.05
Romania	132	1.36	0.07	1363	1.54	0.15
Russian Federation	900	1.35	0.04	3036	1.80	0.09
Rwanda	566	1.91	0.04	712	1.44	0.17
Saint Kitts and Nevis	26	1.30	0.06	4	-	--
Saint Lucia	23	1.42	0.06	34	1.12	0.01
Saint Vincent and the Grenadines	18	1.46	0.06	43	1.17	0.02
Samoa	70	1.51	0.07	40	1.33	0.03
Sao Tome and Principe	57	1.73	0.03	312	1.54	0.11
Saudi Arabia	377	1.36	0.08	1058	1.38	0.07
Senegal	433	1.88	0.03	704	1.54	0.09
Serbia	59	1.36	0.03	1060	1.52	0.12
Seychelles	138	1.30	0.05	189	1.30	0.04
Sierra Leone	1409	1.99	0.02	910	1.78	0.07
Singapore	833	1.13	0.04	2087	1.04	0.04

Slovakia	106	1.21	0.02	1159	1.39	0.11
Slovenia	125	1.15	0.03	1089	1.21	0.06
Solomon Islands	0	1.73	0.05	50	1.62	0.02
Somalia	415	1.97	0.02	1253	1.99	0.03
South Africa	1586	1.62	0.06	1952	1.36	0.09
South Sudan	152	1.90	-	166	1.99	0.00
Spain	439	1.10	0.03	985	1.24	0.14
Sri Lanka	484	1.51	0.05	707	1.50	0.03
Sudan	668	1.85	0.05	1310	1.94	0.06
Suriname	45	1.46	0.07	89	1.47	0.08
Swaziland	208	1.73	0.06	247	1.51	0.11
Sweden	912	1.04	0.02	982	1.03	0.02
Switzerland	643	1.06	0.02	1081	1.07	0.05
Syria	244	1.59	0.07	1000	1.70	0.17
Taiwan	276	-	-	838	1.28	0.13
Tajikistan	93	1.66	0.03	948	1.88	0.03
Tanzania	581	1.86	0.04	1155	1.68	0.14
Thailand	513	1.43	0.07	1197	1.56	0.13
Timor-Leste	142	1.79	0.08	54	1.73	0.06
Togo	208	1.83	0.03	617	1.73	0.06
Tonga	53	1.45	0.09	42	1.67	0.20
Trinidad and Tobago	102	1.30	0.05	418	1.41	0.06
Tunisia	355	1.51	0.04	889	1.36	0.06
Turkey	328	1.46	0.05	2185	1.47	0.15
Turkmenistan	77	1.54	0.04	1019	1.94	0.04
Uganda	707	1.87	0.03	1279	1.78	0.10
Ukraine	199	1.45	0.06	1516	1.79	0.09
United Arab Emirates	255	1.23	0.04	748	1.18	0.04
United Kingdom	1133	1.09	0.03	1574	1.11	0.06
USA	3726	1.03	0.02	3588	1.15	0.07
Uruguay	137	1.24	0.03	424	1.24	0.16
Uzbekistan	90	1.60	0.04	1037	1.89	0.10
Vanuatu	67	1.69	0.03	13	1.50	0.08
Venezuela	0	1.35	0.06	1	1.85	0.08
Viet Nam	85	1.65	0.03	193	1.73	0.08
Yemen	250	1.83	0.03	880	1.80	0.11
Yugoslavia	62	-	-	176	1.87	0.14
Zambia	503	1.86	0.06	1039	1.62	0.10
Zimbabwe	704	1.80	0.09	1299	1.76	0.14

- Could not be calculated

Figure 1. Two hypotheses suggested by Heath (1996) regarding the extremity dimension of news.

Figure 2. Relationship between the 1st and 2nd Principal component scores of the HDI and CPI and the mean rank for countries.

Figure 3. Relationship between the 1st and 2nd Principal Component scores of the HDI and CPI. The PCs were derived from country league table ranks between 1995 and 2014,

Figure 4. Relationship between the total number of media articles published between 1995 and 2014 for countries mentioning the HDI and CPI and their 1st and 2nd PC scores.