The Irish Accounting Review (2000), Vol. 7, No. 2, 91-124

MEASURING FINANCIAL REPORTING HARMONY AND HARMONISATION: PERCEPTION VERSUS REALITY

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ABSTRACT

Techniques for measuring harmony and harmonisation of financial reporting, applied in the literature since 1988, include index-based techniques and statistical models. As empirical evidence increases and the limitations of the models become apparent, the question is raised as to whether we actually observe harmony and harmonisation in seeking to measure these concepts. Although it has been acknowledged in the literature that statistical models measure a different concept of harmony to that measured by indices, the variety of index measures available to measure both national and international harmony has not been comprehensively explained or rationalised. In this paper various index measures are evaluated critically and the notion of harmony underpinning each is explored in the context of incomplete information due to non-disclosure. Formulae previously applied are developed further to incorporate the specific impact of accounts categorised as not-applicable on the index measures. Index-based measures are calculated for actual accounts data relating to deferred tax accounting practices in Ireland and Denmark in order to highlight differences in levels of harmony indicated by competing measures of both national and international harmony. Conclusions are drawn that non-disclosure is a

serious impediment to research and policy formation in relation to harmonisation of accounting practices and that refining the formulae, while helping to quantify the problem more precisely, serves to emphasise the importance of careful specification of the research question before selecting the harmonisation measurement technique.

INTRODUCTION

Harmonisation of financial reporting remains a topical subject for accounting regulators and for the professional and academic press. Techniques for measuring harmony (the state) and harmonisation (the process) have been developed (van der Tas, 1988; Archer, Delvaille and McLeay, 1995, 1996; McLeay, Neal and Tollington, 1999) and applied to empirical data in previous studies (Adhikari and Emenyonu, 1997a, 1997b; Emenyonu and Gray, 1992, 1996; Herrmann and Thomas, 1995). These techniques include index-based approaches and statistical models. Although it has been acknowledged in the literature that indices measure a notion of harmony which is different from that measured by statistical models, exploration of the relationship between competing indices is at a relatively early stage (Morris and Parker, 1998).

Index-based harmonisation measures applied in previous research fall into two groups: those based on concentration of accounting policy choice and those based on mathematical combinations of accounting policy choice. The measures based on concentration (usually H and I indices) reflect the intuitive thinking that harmonisation increases as the accounting choices are reduced and more companies concentrate on one of the choices available. Observations focus therefore on companies which declare their choices but tend to ignore those which do not disclose a choice, whatever the reason for non-disclosure. The measures based on combinations (usually C indices) take a different approach by measuring the number of pairs of companies which use the same accounting policy and comparing this with the total number of pairings available if all companies adopted the same policy. In this approach it is appropriate to consider the pairings of those companies which are silent and to make assumptions about how some of them might pair with other companies which do declare a choice. Previous work (Archer et al., 1995; Christiansen, 1995) has made some inroads into considering whether and how the non-disclosers might pair with disclosers but has

not produced a robust mathematical statement which allows separation of non-disclosers into those for whom the item is not relevant and those for whom the item is relevant.

The contribution of this paper is to propose and illustrate a refinement to the formulae of previous combinations-based measures of harmonisation, in order to address more explicitly the nature and impact of non-disclosers. The proposed refinement is based on the assumption that companies for which the item is not relevant are effectively comparable with all other companies (described in previous work as 'the universal comparability of not-applicable observations').

The research question addressed is:

Does the measurement of harmonisation represent the reality?

In order to pursue this question, the paper draws from prior literature the variety of definitions of 'harmony' and 'harmonisation' and alternative techniques applied to attaching measurements to these concepts. A critique is offered of the relative strengths and weaknesses of these alternatives, leading to conclusions as to their deficiencies in representing the reality of harmony and harmonisation. The paper then proposes a refinement to the formulae of combinations-based index measures of harmony, in an attempt to overcome some of the deficiencies identified in measures that have been applied in prior research. For convenience the full proofs and demonstration calculations are set out in Appendices. The behaviour of existing (competing) harmonisation measures, and the advantages of applying the proposed refinement to the combinations-based index, are then illustrated by reference to levels of harmony observed in deferred tax accounting in and between Ireland and Denmark, using actual accounts data. The paper concludes by discussing the implications for research into accounting harmonisation and for accounting policy-making aimed at harmonisation.

PRIOR RESEARCH

Meaning of Harmony and Harmonisation

Harmonisation (a process) and harmony (a state) have been defined variously in the literature, as follows:

1. Harmonisation takes place when there is a convergence of opinion on the way in which a specific item should be accounted for (van der Tas, 1988). Harmony is the extent of concentration around a particular accounting choice (Herrmann and Thomas, 1995).
2. Harmonisation is the increase in comparability brought about when more companies adopt the same accounting method for an item (Archer et al., 1995). Harmony is the level of comparability at a point in time.
3. Harmonisation is an increasing similarity in the frequency of accounting policy choices across countries over time. Harmony is the similarity in the frequency of accounting policy choices across countries at a point in time (Archer et al., 1996).

In the national context, the first two definitions are applicable and effectively take the same meaning. For both definitions, the extreme case of harmony is uniformity where all companies adopt the same accounting method for a particular accounting issue. Harmony in the national context is measured by calculating *H* and *C* indices for analysed accounting method choices (van der Tas, 1988, 1992; Christiansen, 1995).

In the international context, all three definitions are relevant. Different measurement techniques should be used for the different definitions of international harmony. International harmony as defined in (1) is measured by using either *I* (Emenyonu and Gray 1992, 1996; Herrmann and Thomas, 1995) or between-country *C* (*BCC*) indices (Archer et al., 1995); international harmony as defined in (2) is measured using the basic *C* index (van der Tas 1988, 1992); while international harmony as defined in (3) is measured using statistical modelling approaches (Archer et al, 1996; McLeay et al., 1999). The distinction between *BCC* and basic *C* indices is explained later in the paper.

The notion of international harmony reflected in the third definition is different from that normally understood in the literature and by regulatory harmonisation initiatives. Harmony is perceived to exist when companies in each country select accounting policies with the same relative frequency. This concept of international harmony can be measured by statistical approaches. Index measures, on the other hand, assume that complete international harmony exists where all companies in all countries adopt the same accounting method for similar transactions. This notion of international harmony is consistent with that

espoused by regulators. Consequently, this paper focuses on index-based measures. Although index-based measures reflect a similar and commonly understood notion of international harmony, there is a difference in principle between harmony as defined in (1) and (2) above. This is illustrated by examples 2 and 3 on page 101.

Indices Measuring Harmony and Harmonisation

Two families of indices have been developed to measure harmony of accounting practice at a point in time, one family of indices being based on the Herfindahl index of industrial concentration (*H* and *I*) and the other being based on combinatorial mathematics (*C*). Harmonisation trends are established by comparing index values over time.

Herfindahl-based H and I

The *H* index (van der Tas, 1988) measures the level of harmony of accounting method for a particular item within an individual country. It is represented as follows:

$$H = \sum_{m=1}^{M} (p_m)^2$$

Where: m = Alternative accounting method m.
M = Total number of alternatives.
p_m = *Relative frequency* of adoption of accounting method m (based on accounts disclosing method).

To calculate the *H* index there are two variables: the proportion of companies using a particular accounting method, and the alternative methods of accounting.

The *I* index (van der Tas, 1988) measures levels of international harmony when harmony is defined as a convergence of opinion in two or more countries on the way in which a specific item should be accounted for. It is computed by multiplying across countries the proportion of companies practising a particular accounting alternative and then summing over all alternative practices. It is represented as follows:

$$I = [\sum_{m=1}^{M} (\prod_{n=1}^{n} p_{m,n})]^{1/(n-1)}$$

Where: $p_{m,n}$ = *Relative frequency* of adoption of accounting method m in country n.

For the *I* index there are three variables: countries, proportion of companies, and alternative methods of accounting. The *I* index is distorted where any accounting method is not used in one country because even if a particular method is widely used in other countries, a zero observation in one country eliminates the contribution of that method to the index (Herrmann and Thomas, 1995; Morris and Parker, 1998).

Both the *H* and *I* index formulae have been applied in previous studies to measure levels of harmony based on companies *disclosing* accounting methods used (van der Tas, 1988; Emenyonu and Gray, 1992; Herrmann and Thomas, 1995; Adhikari and Emenyonu, 1997a). This can misrepresent the actual level of harmony because, for the index to be a valid reflection of actual levels of harmony, it must be the case that non-disclosers adopt accounting methods in the same proportions as disclosers.

Combinatorial methods

The *C* index (van der Tas 1988; Archer et al., 1995) is based on mathematical combinations. It is a measure of the total number of pairwise comparisons (given actual accounting policy choices) expressed as a proportion of the maximum number of comparisons that could be made in the event that all companies were to choose the same accounting method (Archer et al., 1995). The *C* index is a ratio with a zero point where no pair of financial reports is comparable, and a maximum value of 1.0 where all companies adopt the same policy (van der Tas, 1992). The minimum level of zero is unlikely to be found in practice. Once the number of companies disclosing their accounting policy exceeds the number of accounting methods, the *C* index must be greater than zero. The basic *C* index can be expressed as follows:

$$C = \frac{\sum_{j} x_{+j} (x_{+j} - 1)}{x_{++} (x_{++} - 1)}$$

The key to notation used in all *C* index formulae in this paper is set out in **Table 1.**

Table 1: Key to notation used in all *C* index formulae

j	=	Number of alternative accounting methods.
i	=	Number of countries.
x_{ij}	=	Number of companies adopting a particular accounting method j in a particular country i.
x_{+j}	=	Total number of companies adopting the particular method j.
x_{i+}	=	Total number of companies in country i.
x_{+na}	=	Total number of companies for which the policy item is 'not-applicable'.
x_{++}	=	Total number of companies including 'non-disclosers' and 'not-applicables'.

In prior research, the *C* index was described as an '...imperfect measure of international harmonisation' (Archer et al., 1995, p. 79). In recognition of this imperfection, Archer et al. (1995) decomposed the *C* index into a *within-country* index and a *between-country* index.

The within-country *C* (*WCC*) index is the ratio of the total number of comparisons that can be made between companies operating within the same countries (given actual accounting policy choices) to the total number of comparisons that can be made between companies operating in those countries if all companies in a given country adopted the same method[1].

Between-country comparability (*BCC*) is indicated by the ratio of the number of pairwise comparisons that may be made between companies selecting the j^{th} accounting method, but operating in different countries, to the maximum such comparisons that may be made. The *BCC* index is expressed thus:

$$BCC = \frac{\sum_i \sum_j (x_{ij}(x_{+j} - x_{ij}))}{\sum_i (x_{i+}(x_{++} - x_{i+}))}$$

Relationship Between Indices

H indices measuring *national* harmony should equal *C* indices where the number of accounts examined is large (van der Tas, 1988). Different treatment of non-disclosers have been developed in applications of *C* index measures in subsequent research (Archer et al., 1995). This leads to different absolute levels of harmony in a given data set when harmony is measured using both *H* and *C* indices. Non-disclosers are ignored in the *H* index formula (van der Tas, 1988), whereas all accounts examined are included in the denominator of the *C* index (Archer et al., 1995). The difference in the level of harmony indicated by *H* and *C* for a hypothetical data set with non-disclosers is indicated in Example 1.

Example 1: Measuring national harmony: *H* and *C* indices compared

Accounting method	No. of companies	% of sample	% of disclosing companies
A	5	0.04	0.05
B	85	0.68	0.85
C	10	0.08	0.10
Accounts disclosing	100	0.80	1.00
Not disclosed	25	0.20	-
Accounts examined	125	1.00	1.00

H index $= [(0.05)^2 + (0.85)^2 + (0.10)^2] = 0.73$

C index $= \dfrac{[(5x4) + (85x84) + (10x9)]}{(125x124)} = 0.47^2$

The critique in the next section explains that the basic *C* and *I* indices measure different notions of international harmony. However *I* and *BCC* are acknowledged as applying similar, although not entirely identical, notions of international harmony (Morris and Parker, 1998). As a special case, *I* indices will equal *BCC* indices for a two-country comparison where there are no non-disclosers[3].

CRITIQUE OF INDEX MEASURES

Harmonisation measurement is potentially useful for accounting policy makers because it provides a mechanism for identifying where harmonisation efforts should be concentrated. It also facilitates a systematic evaluation of the success or otherwise of harmonisation initiatives. The desirability of comparing accounts lies at the heart of financial reporting harmonisation initiatives. Indices quantify the relative capacity, on a scale of zero to one, to compare accounts in a sample. Ability to compare stems from companies adopting the same accounting methods *and* disclosing details of the accounting methods adopted. However, inability to compare accounts because of lack of disclosure should not be taken as necessarily indicative of disharmony of accounting practices adopted.

All indices measuring harmonisation have been criticised for their inability to measure harmony for the accounts as a whole (Gernon and Wallace, 1995). The usefulness of indices is limited to individual transaction types. In addition, harmonisation measures have been criticised for not quantifying the effect of harmony (or disharmony) on key financial indicators (Gernon and Wallace, 1995). Furthermore, problems have been identified with respect to the significance of levels of harmony and changes in those levels. For example, it might be asked whether 0.6 is a high or a low level of harmony, or whether a movement from 0.6 to 0.7 is significant.

Herfindahl-based Indices

An advantage of the *H* and *I* indices is their simplicity and ease of calculation (van der Tas, 1988). However, a disadvantage of Herfindahl-based indices is the exclusion of 'not-disclosed' and 'not-applicable' observations (Archer et al., 1995). Consequently, levels of harmony indicated are deficient to a greater or lesser extent depending on the incidence of non-disclosure and the pattern of accounting policy choice among non-disclosers. If non-disclosers adopt accounting methods in the same proportions as disclosers, *H* and *I* indices reflect actual levels of harmony within or between countries for a particular item in the accounts. However, by definition, patterns of accounting choice among non-disclosers cannot be verified from published accounts. Consequently, the limited conclusion with respect to harmony of accounting

among disclosing companies should be specified when reporting *H* and *I* indices.

Another disadvantage of Herfindahl-based indices is that changes in levels of harmony can be caused by increased disclosure in addition to greater concentration on particular methods. For example, if 100 companies disclosed equal preference for two accounting method choices, A and B, the *H* index would equal 0.5 [Method A: 50 companies (0.5); Method B: 50 companies (0.5); $H = (0.5)^2 + (0.5)^2$]. Assume a further 50 companies disclose their accounting method choice in the following year and they all select method A. Assuming also that the original 100 companies do not change their method, the *H* index would increase to 0.56 [Method A: 100 companies (0.67); Method B: 50 companies (0.33); $H = (0.67)^2 + (0.33)^2$]. Although none of the companies disclosing in the previous year changed their accounting policy, the index increased because more companies disclosed their accounting policy in the second year and the pattern among the new disclosers was different from that among the initial 100 disclosing companies. The increase in harmony indicated by the *H* index may reflect a real increase in harmony (depending on the policy choices adopted by non-disclosers in the previous year) or it may only reflect an increase in disclosure with a different pattern of policy choice among new disclosers.

Combinations-based Indices

An advantage of the *C* index is that the mathematics underlying the measure are readily understood. The *C* index relates harmonisation measurement directly to comparability of accounts (van der Tas, 1992). Two-way combinations measure the number of comparisons possible within a sample of company accounts for a particular accounting item.

C indices have been refined to allow the impact of national comparability on international harmonisation to be measured separately (using *WCC*) from between-country comparability (Archer et al., 1995). Consequently, they provide more comprehensive information on factors contributing to international harmony than the basic *C* index alone. Moreover, suggestions have been made for developing these indices further, to explicitly take account of financial statements for which the particular item under scrutiny is not applicable (Archer et al., 1995; Christiansen, 1995).

Notion of International Harmony Measured by Basic C Index

In the context of a single country, the basic *C* index measures *national* harmony. Using two or more countries, the basic *C* index also measures *international* harmony defined as the increase in comparability within an international *pool* of accounts brought about when more companies within the pool adopt the same accounting method for an item (Archer et al., 1995). This definition ignores the country of origin of accounts and so is not necessarily the most common conception of international harmonisation. For example, in a study of two countries with 100 accounts from each country, identical *C* index values would result where 100 accounts in total adopt method A and 100 accounts adopt method B, regardless of country of origin of each set of 100 accounts. Examples 2 and 3 illustrate how different combinations of country of origin, combined with unchanged overall totals for companies adopting particular accounting methods, leave the *C* index unchanged. However, the situation depicted in Example 3 would intuitively be interpreted as a complete absence of international harmony[4].

Example 2:

	Country 1	Country 2	Total
Method A	50	50	100
Method B	50	50	100
	100	100	200

$$C = \frac{[(100x99) + (100x99)]}{(200x199)} = 0.497$$

Example 3:

	Country 1	Country 2	Total
Method A	100	0	100
Method B	0	100	100
	100	100	200

$$C = \frac{[(100x99) + (100x99)]}{(200x199)} = 0.497$$

Impact of Non-Disclosure

Non-disclosure poses a problem for harmonisation measurement (Archer et al., 1995; Morris and Parker, 1998). It has been treated differently in previous studies calculating Herfindahl-based indices (*H* and *I*) on the one hand, and combinations-based indices (*C*, *WCC* and *BCC*), on the other. Proportions used in *H* and *I* index calculations are of companies disclosing their policy. Archer et al. (1995) discussed the impact of non-disclosure on the index denominator. They argued that the index should be the proportion of actual pairs possible given the policy choices adopted, to the maximum number of comparable pairs possible if all companies applied the same policy for the item in question. Consequently, they revised the *C* index formula to include non-disclosers in the denominator (see Example 1).

Combinations-based indices thus measure harmony conservatively when the denominator includes all companies and the numerator only includes those companies fully disclosing their policy. They represent the minimum level of comparability within the pool of accounts being examined. Where levels of non-disclosure are high, the *C* index is overly conservative, given that it assumes that each non-disclosing company is not comparable with any other company (Morris and Parker, 1998).

Not-applicable observations

One possible mitigating effect of non-disclosure alluded to in Archer et al. (1995) and subsequently illustrated in Morris and Parker (1998) is the positive impact on comparability of those accounts classified as 'not-applicable'. Where a particular accounting policy is not applicable, these accounts can be considered comparable with all other accounts (Archer et al., 1995; Morris and Parker, 1998) on the basis that reported results and financial position would not change whichever accounting method is chosen from available alternatives. Consequently, each non-discloser categorised as not-applicable is comparable with all other non-disclosers and with every disclosing firm for the item in question. This concept has been labelled the 'universal comparability of not-applicable observations' (UCNA) (Archer et a 1995).

Adjustments to *C* indices for the UCNA effect were proposed in the literature (Archer et al., 1995; Christiansen, 1995). Archer et al. (1995) proposed an adjustment to the numerator of the *C* index. They did not apply their proposal to data, but their ideas were applied in a subsequent study (Christiansen, 1995). The numerator adjustment applied in this study was different from that proposed in Archer et al. (1995). The adjusted *C* indices were expressed as follows:

$$\text{Adjusted } C \text{ index (Archer et al., 1995)} = \frac{[\sum_j x_{+j}(x_{+j} - 1)] + [x_{+na}(x_{++} - x_{+na})]}{x_{++}(x_{++} - 1)}$$

$$\text{Adjusted } C \text{ index (Christiansen, 1995)} = \frac{[\sum_j x_{+j}(x_{+j} - 1)] + [x_{+na}(x_{++} - 1)]}{x_{++}(x_{++} - 1)}$$

A simple example is used to evaluate these proposals. In a total population of ten companies, seven companies adopt accounting method A, and for three companies the policy choice item is not applicable. The desired result in such a simple case is that the *C* index adjusted for UCNA should equal 1.0. All ten companies are comparable with respect to the policy choice item. The companies categorised as 'not-applicable' are equivalent to those adopting method A, therefore all ten companies effectively adopt the one method. Neither of the proposed adjustments achieves the desired result in this simple case.

Archer et al. (1995) $\quad \frac{(7x6) + 3(10-3)}{(10x9)} \quad C \text{ index} = 0.7$

Christiansen (1995) $\quad \frac{(7x6) + 3(10-1)}{(10x9)} \quad C \text{ index} = 0.767$

Thus, the adjustments to *C* index calculations for UCNA set out in previous research are neither robust nor consistent. An alternative adjustment is proposed later in this paper to make the necessary general correction to formulae published previously.

Summary of Critique

Prior literature indicates that application of Herfindahl-based and combinations-based indices, as used in prior research to measure levels of national and international harmony, produces different indications of levels of harmony where there are non-disclosers. In addition, two different concepts of international harmony can be measured by combinations-based indices. The prior research has also highlighted that in the context of comparability of financial reports, accounts for which a particular accounting item is not-applicable are a special case.

Although *H* and *C* indices measure national harmony, their values can indicate substantially different levels of harmony in a given data set where there are non-disclosers. Similarly, although *I* and *BCC* indices measure the same notion of international harmony, their values can also be substantially different in a given data set because of non-disclosers.

In prior research, the *C* index was described as an '...imperfect measure of *international* harmonisation' (Archer et al., 1995, p. 79). However, it has been shown in this paper that, rather than the *C* index being imperfect, it measures a different but nonetheless legitimate notion of international harmony. It measures the increase in comparability brought about when more companies in a pool of companies (regardless of their country of origin) adopt the same accounting method. Decomposition of the basic *C* index into *WCC* and *BCC* indices provides potentially powerful analytical tools for interpreting levels of international harmony when defined in the way which supports using the basic *C* index.

In an effort to include non-disclosing accounts in the harmonisation measure, Archer et al. (1995) expanded the *C* index developed by van der Tas (1988, 1992) to include in the index denominator all accounts examined, whether or not they disclosed an accounting policy. They also proposed an adjustment to the *C* index for UCNA in an attempt to reduce the impact of non-disclosure on the index, but that adjustment has been shown to be deficient.

FURTHER REFINEMENT OF THE *C* INDEX

The adjustment proposed in this paper continues to incorporate the assumption that accounts classified as 'not-applicable' are comparable with all other accounts regardless of method adopted. It is based on the description of the disclosure-adjusted index in Archer et al. (1995):

> Pairwise comparisons between companies using same method ... plus pairwise comparisons **with and between** companies which did not include the item in their financial statements ... (p.72, emphasis added).

It offers a solution to the inadequacy of the previously suggested adjustments which was illustrated in the previous section. The refinement required to the Christiansen and Archer index formulae is to add a further correction term. This alternative adjustment to the basic *C* index increases the numerator of the *C* index by the expression:

$$[2\, x_{+na}\,(x_{++} - x_{+na})] + [x_{+na}\,(x_{+na} - 1)]$$

to include comparable pairs possible between not-applicable accounts (x_{+na}) and all other accounts (x_{++}), and between not-applicable accounts themselves. The derivation of this adjustment is set out in Appendix A. Thus, the basic *C* index formula adjusted for UCNA and described as 'NAA *C* index', is expressed as follows:

$$\text{NAA } C \text{ index} = \frac{[\sum_i x_{+j}\,(x_{+j} - 1)] + (2x_{+na}\,(x_{++} - x_{+na})) + (x_{+na}\,(x_{+na} - 1))}{x_{++}\,(x_{++} - 1)}$$

In the NAA *C* index, the basic *C* index numerator is increased by the number of comparable pairs between accounts for which the item is not-applicable and all other accounts regardless of their policy.

To test robustness of this adjusted index, *C* indices calculated using this approach were compared with those calculated using the approaches proposed in Archer et al. (1995) and in Christiansen (1995) for a number of hypothetical examples (see Appendix B). The NAA *C* index formula consistently produced the expected *C* index value of 1.0 where different mixes of 'not-applicable' observations and application of one specific accounting method were assumed. The adjusted indices pro-

posed by Archer et al. (1995) and Christiansen (1995) neither produced the expected index value of 1.0 nor produced the same index value as each other in these hypothetical examples[5].

COMPETING INDEX MEASURES: AN ILLUSTRATION

To illustrate the different indications of levels of harmony that result from using competing indices, national harmony of deferred tax accounting in Ireland and Denmark was measured using *H* and *C* indices following prior research, and subsequently using the NAA *C* index developed in this paper. International harmony between the two countries is measured using *I* and *BCC* indices. These practical applications of the measurement techniques illustrate the potentially misleading indications of levels of harmony at a point in time that can be caused by inadequate appreciation of the differences between the indices.

Data

Deferred tax accounting choices of all Irish and Danish listed companies that survived for seven continuous years of the eight year period 1986 – 1993 were analysed using disclosures in published financial statements[6]. An example of data for Ireland and Denmark is reproduced in **Table 2** for the start and end years, 1986 and 1993.

Table 2: Analysis of taxation policy choices: 1986 and 1993

	1986		1993	
Disclosed	**Ireland**	**Denmark**	**Ireland**	**Denmark**
TP	0	7	0	6
FD/L	1	20	1	57
FD/D	0	1	0	0
PD/L	16	18	21	36
PD/D	1	0	1	0
FLD/L	0	4	0	1
	18	**50**	**23**	**100**
Not disclosed	**18**	**64**	**17**	**25**
TOTAL>	***36**	****114**	**^40**	**125**

> Danish analysis adapted from Christiansen (1995), Irish data extracted from annual reports.

* 1 set of accounts missing, 5 companies not listed that year.

** 11 companies not listed that year.

^ 2 companies not listed that year.

Key:

TP	Tax payable only
FD/L	Tax payable plus change in full deferred tax, liability method
FD/D	Tax payable plus change in full deferred tax, deferral method
PD/L	Tax payable plus change in partial deferred tax, liability method
PD/D	Tax payable plus change in partial deferred tax, deferral method
FLD/L[7]	Tax payable plus change in full deferred tax and tax contingency, liability method

Classification of disclosure and non-disclosure is a complex matter. For analysis purposes, it ranges from comprehensive explanation of accounting methods adopted (as in **Table 2** above), through partial (although clearly incomplete) disclosure, to complete absence of information about methods used. In the latter case, it may or may not be clear from the disclosure provided that the item in question is relevant to the reporting entity. If it is not relevant, the non-disclosure is catego-

rised as not-applicable (NA). If it is relevant, it is categorised as 'not disclosed' (ND). If its relevance is uncertain it is classified as NA/ND. The example data for Ireland and Denmark in **Table 2** above included substantial non-disclosers. They have been analysed in **Table 3** with particular emphasis on complete non-disclosers.

Table 3: Comprehensive analysis of non-disclosers: 1986 and 1993

	1986		1993	
	Ireland	**Denmark**	**Ireland**	**Denmark**
Partial disclosers	13	49	14	14
Complete non-disclosers				
ND	1	7	0	1
NA	2	6	3	8
ND/NA	2	2	0	2
	18	**64**	**17**	**25**

Key:

ND	Not disclosed (and indications that deferred tax is relevant)
NA	Not applicable, no deferred taxation
ND/NA	Not disclosed/not applicable? (Not disclosed and not clear if deferred tax is applicable or not)

Partial disclosure categories were used in a separate study (Pierce and Weetman, 1999) to re-analyse the data according to recognition and measurement criteria. Indices based on these criteria have been calculated but are not reported in this paper. Accounts classified as NA are used in the next section to calculate NAA *C* indices following the refinement of the *C* index formula introduced in this paper.

Results

The results reported are measures of national harmony and international harmony using previously defined measurement approaches. These results are then compared with those obtained using the NAA *C* indices developed earlier in this paper.

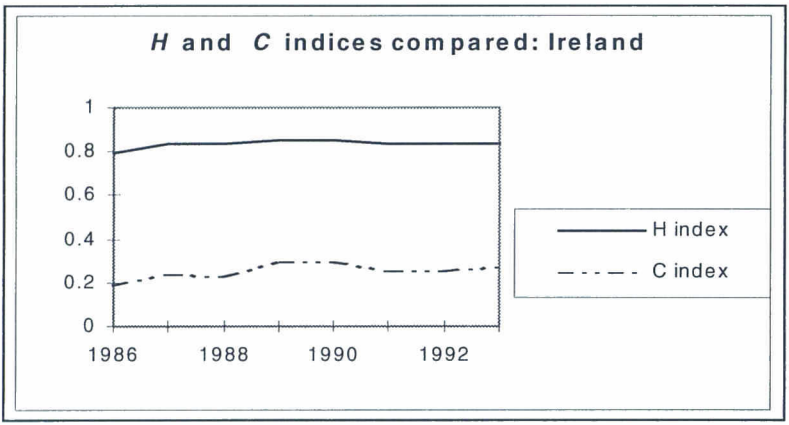
National harmony

Using data for both countries for the eight years 1986-1993, *H* and *C* indices were calculated for both Ireland and Denmark following previous research (van der Tas, 1988 and Archer et al., 1995, respectively). The index values are presented in **Table 4** and those for Ireland are illustrated in **Figure 1**. This figure illustrates the gap in levels of harmony indicated by these two indices.

Table 4: Numbers disclosing method used, and *H* and *C* indices 1986-1993

	Ireland			Denmark		
Year	**n**	***H***	***C***	**n**	***H***	***C***
1986	18	0.796296	0.190476	50	0.316000	0.057444
1987	22	0.830579	0.243590	55	0.310413	0.057960
1988	22	0.834711	0.232927	58	0.329964	0.068975
1989	25	0.849600	0.293844	82	0.403034	0.172305
1990	25	0.849600	0.293844	92	0.427930	0.227742
1991	23	0.837429	0.256098	95	0.461053	0.262323
1992	23	0.837429	0.256098	98	0.455852	0.276129
1993	23	0.837429	0.269231	100	0.458200	0.289161
Mean		0.834134	0.254514		0.395306	0.176505

Figure 1: *H* and *C* indices for deferred tax accounting in Ireland 1986-1993



H indices in both cases indicate higher levels of harmony than *C* indices. In Ireland, the level of harmony indicated by *H* would be considered relatively high (mean *H* index value 0.834134 over 8 years) while *C* indices indicate relatively low levels for both countries (mean *C* index values 0.254514 for Ireland and 0.176505 for Denmark). Neither index reflects the true level of harmony. Because *H* is based on disclosing accounts alone it is only representative of part of the data set. Because the *C* index assumes that no non-disclosing account is comparable with any other, it is unrealistically conservative. What can be taken from these results is that the level of harmony among disclosing accounts is higher in Ireland than in Denmark throughout the period and that the minimum known level of harmony is particularly low in Denmark before 1989.

The scale of non-disclosure is indicated in **Table 5**. The level of non-disclosure in Ireland remained relatively constant over the eight year period. This results in a relatively constant gap between *H* and *C* throughout the time. As disclosure improved substantially in Denmark over the period, the gap between *H* and *C* narrowed in the later years. In addition, the substantial increase in disclosure that occurred in 1988/89 contributed to a noticeable increase in both *H* and *C* index values. In the

absence of an awareness of the effect of non-disclosure on index calculations, these increases in index values could be interpreted as increases in harmony of accounting method alone. However, the reality is that as more companies disclosed their choice of accounting method they indicated a predominant preference for one method and so the numbers of comparable pairs increased. *H* indices increase if the new disclosers adopt methods in different proportions to the previous disclosers, as happened in this case. The level of Danish disclosure in the second four year period lies somewhere between the calculated *H* and *C* index values, which is only a spread of around 0.2.

Table 5: Analysis of accounts not disclosing deferred tax accounting method used: Ireland and Denmark 1986-1993

	Disclosers				Non-disclosers				Total	
	Ireland		Denmark		Ireland		Denmark		Ireland	Denmark
Year	n	%	n	%	n	%	n	%	n	n
1986	18	50	50	44	18	50	64	56	36	114
1987	22	55	55	44	18	45	69	56	40	124
1988	22	54	58	47	19	46	66	53	41	124
1989	25	60	82	66	17	40	42	34	42	124
1990	25	60	92	74	17	40	33	26	42	125
1991	23	56	95	76	18	44	30	24	41	125
1992	23	56	98	78	18	44	27	22	41	125
1993	23	58	100	80	17	42	25	20	40	125

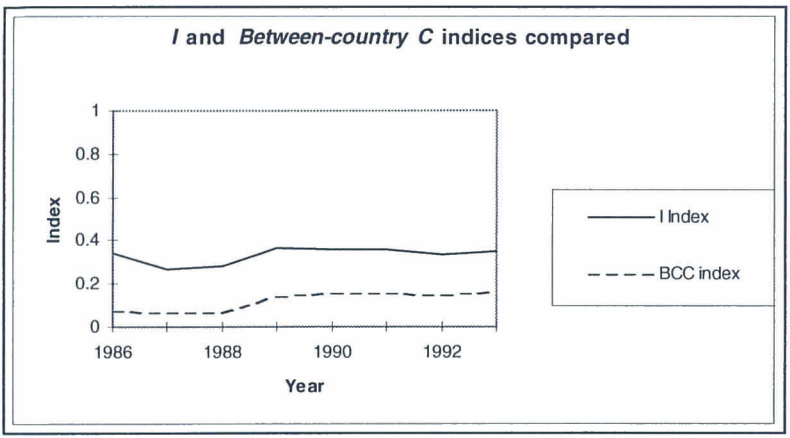
International harmony

I and *BCC* index values should agree for a given data set in a two-country comparison where there are no non-disclosers. The effect of the different treatment of non-disclosers on index values in an actual data set is indicated in **Table 6**. Using data for both countries for the eight years 1986-1993 (an example of which is set out in **Table 2**), *I* and *BCC* indices were calculated following previous research (van der Tas, 1988 and Archer et al., 1995, respectively). The index values are presented in **Table 6**. The gap in levels of harmony indicated by the two indices is illustrated in **Figure 2**.

Table 6: *I* and *BCC* indices compared

Year	*I*	*BCC*
1986	0.342222	0.075049
1987	0.265289	0.064718
1988	0.282132	0.070810
1989	0.367805	0.144777
1990	0.361304	0.158286
1991	0.361098	0.153951
1992	0.332742	0.146341
1993	0.353478	0.162600

Figure 2: *I* and *BCC* indices for deferred tax accounting: Ireland and Denmark 1986-1993



Relatively low levels of international harmony are indicated throughout the period, particularly when focusing on *BCC* indices. There is a substantial difference in the levels indicated for a given year by *I* by comparison with *BCC*. The greater variety of practice in evidence in Denmark brings the level of international harmony below that in either country individually for most years.

NAA C indices

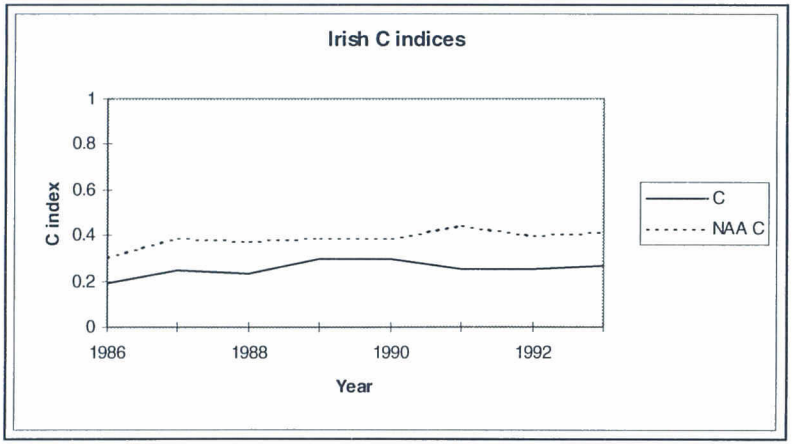
In order to calculate NAA *C* indices, accounts classified as NA have been identified in **Table 3** above. Such accounts are relatively few in this data set. Nonetheless, their impact on *C* indices is substantial as **Table 7** indicates and **Figure 3** illustrates. **Table 7** sets out the Archer et al. (1995) and NAA versions of the basic *C* index for Ireland and Denmark. Mean NAA *C* index values are 0.387408 for Ireland (compared with the unadjusted index value of 0.254514) and 0.258143 for Denmark (compared with the unadjusted index value of 0.176505).

Table 7: Summary of results: *C* and NAA *C* indices:

	Ireland		Denmark	
Year	***C***	**NAA *C***	***C***	**NAA *C***
1986	0.190476	0.300000	0.057444	0.160379
1987	0.243590	0.389744	0.057960	0.105953
1988	0.232927	0.375610	0.068975	0.116968
1989	0.293844	0.387921	0.172305	0.220299
1990	0.293844	0.387921	0.227742	0.306452
1991	0.256098	0.443902	0.262323	0.341032
1992	0.256098	0.398780	0.276129	0.400516
1993	0.269231	0.415385	0.289161	0.413548
Mean	0.254514	0.387408	0.176505	0.258143

Despite the small percentage of NA observations in this study, the impact of adjusting the basic *C* index for the UCNA is very noticeable. It is illustrated in **Figure 3.**

Figure 3: Irish *C* indices



CONCLUSIONS

The question asked at the outset of this paper is: 'Does the measurement of harmony and harmonisation represent the reality?' The paper has shown by a review and critique of previous work that the implicit assumptions of formulae applied in previous empirical work have limited the ability to give a confident affirmative answer to that question. The implicit assumptions have been acknowledged previously by those developing the formulae but have not necessarily been explored in depth in empirical investigation. This paper has shown that the ability to answer the question more strongly in the affirmative may be increased by adding a refinement to the combinations-based *C* index which generalises the assumption that there is universal comparability of 'not-applicable' cases.

The paper has further shown, in the results from measuring levels of harmony of deferred tax in Ireland and Denmark, the dangers of simplistic interpretations of isolated measures of harmony. The presence of non-disclosing cases in any set of real accounting data places severe limitations on the interpretation of trends which at first sight might be taken as indications of harmonisation. The reality of harmony is more

complicated than the summary statistic of a single index measure is currently able to reflect. The analysis has implications for accounting regulators and for researchers undertaking harmonisation studies.

The empirical analysis has demonstrated that Herfindahl-based and combinations-based indices, based on interpretations of index formulae applied in prior studies, can produce very different indications of levels of harmony in a particular context. Calculating both *H* and *C* indices in the manner of prior research provides a range of index values for national harmony, from the quasi maximum level of harmony (*H*) to the actual minimum level (*C*). However, neither would indicate the real level of harmony which lies between the two extremes.

The greatest obstacle to meaningful measurement of harmony and harmonisation is inadequate disclosure in accounts. Despite extant disclosure requirements, ineffective monitoring of breaches of accounting regulation which are considered to be 'technical' exacerbate the problem of non-disclosure. The illustration provided in this paper has shown that, even for an item as generally pervasive as deferred taxation, too many companies gave no information or inadequate disclosure in situations where deferred taxation was very clearly a relevant issue.

Harmonisation trends indicated by concentration and comparability indices can also be distorted by the impact of improved disclosure over time. The impact of accounts categorised as 'not disclosed' in one period being subsequently included in a specific accounting method category in a later period, because adequate information is disclosed, is therefore an issue to be considered by researchers when measuring harmonisation trends over time.

If accounting regulators wish to measure harmonisation of financial reporting, then greater effort is required by the profession to provide the environment within which such measurement can be more reliably undertaken. Harmonisation measurement methods have been developed to a relatively sophisticated level. However, their application to data is hindered by inadequate disclosure. It is essential for accounting regulators to be aware of the existence and scale of non-disclosure, both in general and in the context of its impact on harmonisation measurement. In the context of harmonisation measurement, non-disclosure inhibits

the extent to which conclusions can be drawn from research with regard to the actual level of harmony of accounting for a particular item. Harmonisation measurement is more reliable as disclosure increases.

In the context of national harmony and harmonisation, it is important for researchers and policy makers to understand the different treatment of non-disclosure when using *H* and *C* indices to measure harmony. It may be that each index is relatively more suited to particular circumstances, so that the first question asked should be whether it is more important to identify the level of harmony between accounts disclosing their policy or to identify the extent to which comparisons can be made within the accounts examined. In addition, the scale of non-disclosure in a particular situation must be clearly understood in order to interpret the resulting index measures meaningfully. Simplistic interpretation of these results is potentially misleading.

In the context of international harmony and harmonisation it is important for researchers and policy makers to clarify the concept of harmony to be measured. For example, the initial project design should incorporate the question whether it is more, or less, or equally important to quantify the chances of comparable accounts being available from a pool of accounts than to quantify the existence of a consensus across countries on the best way to account for a particular item. The choice of instrument used in harmonisation measurement research must be matched with the notion of international harmony to be quantified.

It may be concluded that, while the indices are continuing to develop and be more critically understood, their limitations must be better understood if coherent interpretation of harmonisation measurement studies is to take place.

ACKNOWLEDGMENTS

The authors are grateful for access to Danish data provided by the late Dr. Merete Christiansen and her colleagues in Copenhagen Business School. The paper has benefited from useful discussions with Professor Stuart McLeay of the University of Wales and Mr Tony Brabazon of University College Dublin.

APPENDIX A

ADJUSTMENT TO BASIC *C* INDEX FOR UNIVERSAL COMPARABILITY OF 'NOT-APPLICABLE' OBSERVATIONS

The basic *C* index measures the extent to which comparable pairs of companies can be identified within a sample of companies.

Example:
Of six companies in a sample, three use method 1 and three use no method because the item is not applicable to them (NA). The following matrix indicates comparable pairs based on the assumption that only those accounts using method 1 are comparable:

Companies	C_1	C_2	C_3	C_4	C_5	C_6
	$C_1\,C_2$	$C_2\,C_3$				
	$C_1\,C_3$					

Applying the general formula for 2-way combinations, and three companies taken two at a time, the number of combinations in this example is:

Equation 1: $$\frac{[\sum_j \; x_{+j}(x_{+j}-1)]}{2} \quad \text{i.e.,} \quad \frac{3x2}{2} = 3$$

Key: Key to notation used in all equations and formulae is included in **Table 1** of the paper.

Expanding this example to assume that NA accounts are also comparable with accounts adopting method 1, the following matrix indicates comparable pairs:

Companies	C_1	C_2	C_3	C_4	C_5	C_6
	$C_1\,C_2$	$C_2\,C_3$	$C_3\,C_4$	$C_4\,C_5$	$C_5\,C_6$	
	$C_1\,C_3$	$C_2\,C_4$	$C_3\,C_5$	$C_4\,C_6$		
	$C_1\,C_4$	$C_2\,C_5$	$C_3\,C_6$			
	$C_1\,C_5$	$C_2\,C_6$				
	$C_1\,C_6$					

The unboxed pairs are the pairs possible from accounts adopting the same policy. The formula to quantify such pairs is as shown in Equation 1, above.

The pairs boxed in heavy lines, e.g.,

$C_5\ C_6$

are the pairs possible among accounts classified as NA. In general terms, the number of possible pairs within this sub-sample can be expressed as follows:

Equation 2: $$\frac{x_{+na}(x_{+na} - 1)}{2} \qquad \text{i.e.,} \quad \frac{3x2}{2} = 3$$

The pairs boxed in lighter lines are the combinations between all accounts adopting policy method 1, and all accounts for which the policy method is NA. In general terms, this can be expressed as follows:

Equation 3: $$x_{+na}\,(x_{++} - x_{+na}) \qquad \text{i.e.,} \quad 3(6-3) = 9$$

Equations 1 to 3 are used to identify the numerator of the NA Adjusted *C* index (NAA *C*).

The denominator of the NAA *C* index is identical to the denominator of the basic *C* index (Archer et al. 1995), i.e., all pairs possible from the sample of companies. It is expressed as follows:

Equation 4: $$\frac{x_{++}\,(x_{++} - 1)}{2}$$

The basic *C* index is the ratio of actual pairs possible, given the policy choices made, to the maximum number of pairs possible if all accounts adopted the same policy. It is thus made up of equations 1, 2 and 3 divided by equation 4. Multiplying all four equations by 2 produces the following general formula for the NAA *C* index:

$$\textbf{NAA } C \textbf{ index} = \frac{[\sum_j x_{+j}\,(x_{+j} - 1)] + (2\,x_{+na}\,(x_{++} - x_{+na})) + (x_{+na}\,(x_{+na} - 1))}{x_{++}\,(x_{++} - 1)}$$

To test this formula, it is applied to the example in this Appendix as follows:

$$\text{NAA } C = \frac{[(3x2)] + (2x3(6-3)) + 3(2)}{6(5)} = \frac{30}{30} = 1.0$$

CONCLUSION:

The expected *C* index value of 1.0 is achieved by the NAA *C* index developed in this paper.

APPENDIX B: *C* INDICES ALLOWING FOR UNIVERSAL COMPARABILITY OF 'NOT-APPLICABLE' OBSERVATIONS: EXAMPLES TO TEST FORMULA DEVELOPED IN THIS STUDY

EXAMPLE	**1**	**2**	**3**	**4**	**5**	**6**
Method A	5	4	3	7	125	4,500
Not-applicable	1	2	3	3	25	250
Total	6	6	6	10	150	4,750

NA Adjusted *C* index using approach developed in this paper

Numerator	(5x4) +2x1(6-1) +1x(1-1) = 30	(4x3) +2x2(6-2) +2x(2-1) = 30	(3x2) +2x3(6-3) +3x(3-1) = 30	(7x6) +2x3(10-3) + 3x(3-1) = 90	(125x124) +2x25(150-25) + 25x(25-1) = 22,350	(4500x4499) +2x250(4750-250) +250x(250-1) = 22,557,750
Denominator	6x5 = 30	6x5 = 30	6x5 = 30	10x9 = 90	150x149 = 22,350	4750x4749 = 22,557,750
C index =	1	1	1	1	1	1

Appendix B (continued)

Adjusted *C* index using Archer et al. (1995) approach

EXAMPLE	**1**	**2**	**3**	**4**	**5**	**6**
Numerator	(5x4)	(4x3)	(3x2)	(7x6)	(125x124)	(4500x4499)
	+ 1(6-1)	+ 2(6-2)	+ 3(6-3)	+ 3(10-3)	+ 25(150-25)	+250(4750-250)
	= 25	= 20	= 15	= 63	= 18,625	= 21,370,500
Denominator is as NAA *C* above						
C index =	0.833333	0.666667	0.5	0.7	0.833333	0.947368

Adjusted *C* index using Christiansen (1995) approach

Numerator	(5x4)	(4x3)	(3x2)	(7x6)	(125x124)	(4500x4499)
	+ 1(6-1)	+ 2(6-1)	+ 3(6-1)	+ 3(10-1)	+ 25(150-1)	+250(4750-1)
	= 25	= 22	= 21	= 69	= 19,225	= 21,432,750
Denominator is as NAA *C* above						
C index =	0.833333	0.733333	0.7	0.766667	0.860179	0.950128

NOTES

[1] Within-country *C* index is calculated thus:

$$WCC = \frac{\sum_i \sum_j (x_{ij}(x_{ij} - 1))}{\sum_i (x_{i+}(x_{i+} - 1))}$$

[2] The *C* index was introduced by van der Tas (1988) and subsequently applied to better data (van der Tas, 1992). Non-disclosers were ignored in index calculations in these studies. Following van der Tas the *C* index in this example would have been calculated as follows:

$$C \text{ index (van der Tas 1988, 1992)} = \frac{[(5x4) + (85x84) + (10x9)]}{(100x99)} = 0.73$$

[3] An algebraic demonstration of this equivalence is available from the authors.

[4] The *WCC* indices for Examples 2 and 3 are 0.49 and 1.0, respectively, indicating the extent to which comparability of accounts is possible within the individual countries. The *BCC* indices for Examples 2 and 3 are 0.5 and zero, respectively, indicating the extent to which comparability across countries is feasible. Consequently, the *BCC* index measures international harmony when defined as a convergence in two or more countries towards one or more accounting policy choices. This concept of international harmony is consistent with that captured by the *I* index.

[5] Christiansen (1995) also proposed adjustments to the *WCC* and *BCC* indices for the UCNA. However, for similar reasons to those outlined in the paper for the adjusted basic *C* index proposed by Archer et al. (1995) and Christiansen (1995), the proposed adjusted *WCC* and *BCC* indices were also found to be deficient. Alternative NA adjusted *WCC* and *BCC* indices have also been developed as part of this research. The adjusted formulae are available from the authors.

[6] To maximise the use of available Danish data, Irish data for 1986 – 1993 was also used in this study. Deferred taxation was chosen because

of the variety of accounting methods encountered and because it was used in prior studies which provided a benchmark.

[7] FLD is an abbreviation for 'tax payable plus change in full deferred tax and tax contingency'. Tax contingency refers to tax that would become payable in Denmark if certain revalued fixed assets were sold for their book value (Christiansen, 1996; Christiansen and Elling, 1993). Contingent taxes are the potential capital gains taxes which would arise if revalued land or buildings used for business purposes were to be sold at an amount in excess of cost within eight years of acquisition, or if financial investments were sold at a gain within three years of acquisition (Christiansen and Hansen, 1995).

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