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Christopher Nobes, Christian Stadler



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**Investigating international differences in financial reporting: data problems and some proposed solutions**

**Christopher Nobes**

*Royal Holloway (University of London) and University of Sydney*

**Christian Stadler**

*Lancaster University*

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**Investigating international differences in financial reporting: data problems and some proposed solutions****ABSTRACT**

This paper is designed to assist researchers in international accounting by analysing a number of problems which they might meet. In particular, we focus on problems related to selecting the sample, specifying the variables, using databases and hand-collecting data. We provide examples of the problems from prior literature and, on some topics, by supplying original data. We suggest solutions to the problems discussed in the paper.

**Keywords:** international accounting, data, Worldscope

## 1. Introduction

When researchers write about a foreign country, there is a risk of making mistakes. Since papers on international accounting often cover many foreign countries, the risk is heightened. This paper discusses some of the difficulties met when researching international differences in financial reporting. After summarising various types of difficulty, we focus on problems with data. We propose some ways of mitigating the problems.

We hope that the discussion here contributes by assisting researchers (perhaps, particularly, younger researchers) in progressing with their own work and in understanding the limitations of previously published work. We believe that this is the first systematic analysis of a broad range of data problems. It contains new data and many illustrative examples. Although the paper is set in the context of *international* accounting research, many of the problems and proposed solutions also apply to single-country studies.

The paper proceeds as follows. In Section 2, we survey various types of problem met when conducting accounting research in an international context. A number of the problem areas relate to data, and we examine these in greater detail in the core of the paper, which comprises four further sections: selecting the sample, specifying the variables, using databases, and hand-collecting data. Finally, Section 7 contains a summary and conclusions. We draw on our own experiences as researchers into international accounting differences, so we hope that readers will excuse a number of self-citations.

## 2. Types of problems

In this section, we first take a high-level view of the process of research in international accounting. Figure 1 outlines one way of representing this diagrammatically. Although this diagram is particularly relevant for quantitative research, much of it could also apply to research using questionnaire surveys or case studies.

The key starting point for any type of research is the synthesis of prior studies (Box 1), supported by the researcher's own observations of the world (Box 2), leading to (one hopes) an important, interesting and original research question (Box 3) which is susceptible to being addressed using data which is capable of being collected. Related to prior research (Box 1), a potential major problem (not only in international research) is that anglophone researchers might be unaware of relevant previous research contained in journals published in (to them) a foreign language. Walton (2008) complains about this in the context of a published ranking of prolific European researchers which considered only anglophone journals.

The research question should be made as precise as possible by expressing it as a hypothesis or, if the data will not allow statistical testing, a proposition. The research question implies a dependent variable and one or more independent variables (Box 4). The activities involved in Boxes 1 to 3 will also suggest other possible influences on the dependent variable, which can be included as control variables. A variable such as "profit" can be defined in many different ways, so attention must be given to the detailed specification of variables (Box 5). A common independent variable (sometimes merely as a control) is industrial sector. Researchers might decide to exclude some

sectors because they behave differently (Box 6). Either way, there are several different approaches to defining sectors.

So far, this outline could apply to research confined to one country, but certain issues become more important in international research. As examples of such issues: (i) some sectors which might be excluded are more important in some countries than in others, and (ii) some data is not available for some countries. A major further question (Box 7) newly arises when conducting international research: which countries should be examined? The combination of decisions in Boxes 6 and 7 (sectors and countries) is input for Box 8: the sample of firms. However, the researcher must also consider other points about firms, such as: listed or unlisted, large or small.

Having specified the variables and the sample, the researcher decides how to collect data (Box 9), for which there are three broad categories of method (Boxes 10 to 12): prior tables, databases and hand-collection. By “prior tables”, we mean information provided by previous researchers, often comprising classifications, e.g. countries divided into code law or common law. Hand-collection includes the data collected from annual reports or by means of questionnaire surveys or interviews. Although hand-collection is likely to be more accurate, for certain types of data, the use of databases may be the only practical approach for large samples. It is possible to use two or all three categories of data collection in one piece of research.

Relating to prior tables (Box 10), in an earlier issue of this journal, Nobes (2018) marshals many examples of errors in prior published research. These include: (i) showing Switzerland as a mandatory adopter of International Financial Reporting Standards (IFRS), (ii) classifying Argentina as having common law, (iii) showing Portuguese firms as great adopters of international standards in 2000 when that was not legal, and (iv)

showing the Chinese language as closer to English than French is. These four issues could relate to either dependent or independent variables used by researchers. The first of them might have an effect early in Figure 1, because it could influence the countries selected for study (Box 7). All four might affect the quality of data which arrives into Box 13 for testing of hypotheses.

More subtle problems were also raised in Nobes (2018), such as using the legal system as an independent variable when a more proximate variable would be enforcement of financial reporting regulation. In terms of Figure 1, this relates to Box 5. Many of these issues can be summarised as the need to get the regulatory framework right before starting an empirical study. Suggested mitigations of some of the problems discussed in Nobes (2018) include constant exercise of professional scepticism, checking facts with locals, and getting drafts reviewed by experienced and merciless colleagues.

As shown by the dotted lines from Box 9, the process of collecting data might feed back into Boxes 5 (variables) and 8 (sample firms). For example, certain data are unavailable or are only available by hand-collection, so a researcher might decide to use a slightly different specification or a proxy; or it might be difficult to collect data from some types of firm.

Finally in Figure 1, there is the choice of methods for testing the hypotheses (Box 13). After this (not shown in the Figure) is the sceptical interpretation of results, and the making of any policy recommendations.

In the rest of this paper, we concentrate on a key set of issues in international research: data problems. In Section 3, we investigate sampling issues relating to sector and country (Boxes 6 and 7, leading to Box 8). In Section 4, we examine aspects of the

precise specification of variables (Box 5). Sections 5 and 6 look at problems related to databases and hand-collection, respectively (Boxes 11 and 12). Some of these problems are relevant for both single-country and for international research but many are exacerbated when the research is international, and we focus on such examples.

### **3. Selecting the sample**

#### *3.1 Introduction*

This section examines three issues related to selecting an international sample of firms for accounting research. First, readers may have noticed that certain countries tend to dominate samples. We provide examples and discuss whether the bias is a problem. Secondly, many firms are dominated or heavily influenced from abroad. We examine how far one should and can adjust samples for this. Lastly, we look at whether to exclude certain sectors. This is already an issue to be addressed in single-country studies, but it becomes much more important in international research because sectoral mix differs greatly by country.

To illustrate the topics in this section, we survey the most highly cited papers in international accounting. To create the set of papers to be surveyed, we examined the 50 most cited papers, keeping only the most cited paper by any particular author. Of those remaining, 12 papers contained international empirical research involving financial reporting numbers. These papers are listed in Table 1, which also records our selection method.

#### *3.2 Dominance of certain countries*

Partly because of the use of databases, samples tend to be dominated by certain countries. Column VI of Table 1 shows, for our sample of highly cited papers, that



dominance of certain countries is common. In particular, if the US is included in a sample, it constitutes a large part: on average in our survey, 42.0% of the total; and, in the most cited paper, 52.6% of the total (see the first row of Column VI). On average, 61.8% of observations are from the three countries with the highest number of observations (see Column VII). For example, Barth, Landsman and Lang (2008) use a sample of 21 countries but the three countries with the highest number of observations (Switzerland, China and Germany) comprise 71.9% of the sample. This dominance by certain countries does not necessarily constitute a problem, but it can if the research question concerns international differences. This is because the results might then mainly reflect the relationship among the few countries with many observations.

We see four approaches to addressing this problem: (1) exclude the dominant country or countries; (2) include only countries with a sufficient number of observations to influence the results; (3) aggregate the firm-level data into country-level data and run analyses with only one observation per country or per country-year; and (4) use the same or a similar number of observations from each country.

The following provides a brief discussion of key advantages and disadvantages of these approaches and examples of papers which have used them. Approaches 1 and 2 (exclusions) are simple to implement but they result in a restricted sample. Approach 1 is useful for sensitivity analyses, see for example Bae, Tan and Welker (2008, p.622) and Byard, Li and Yu (2011, p.74). Approach 2 was used by Ball, Kothari and Robin (2000): they only included countries with at least 1,000 observations in their primary sample (p.9). Approach 3 (aggregation) ensures that each country is equally reflected in the analysis but it only allows testing for country-level differences and it results in a small sample. This approach was not used by any of the papers of Table 1 but was the method

of Leuz, Nanda and Wysocki (2003, Table 4). Approach 4 (similar sample sizes) avoids some key disadvantages of the other approaches (i.e. no country is excluded and it allows testing for differences at the country and firm level) but it means that many firms from otherwise dominant countries are ignored. This approach was also not used by any of the papers of Table 1 but can be found elsewhere. For example, Cairns, Massoudi, Taplin and Tarca (2011) included the same number of firms (114) from the UK and Australia (p.8).

### *3.3 Foreign influence*

There are two common ways of selecting a national sample: use all firms which are classified by a database as belonging to the country, or use firms included in a particular national stock market index. In both cases, the national sample is likely to include foreign firms or firms with foreign influence. Stock exchanges list many foreign firms, and these can be included in a country's stock market indices. Clearly such foreign firms should be excluded from country samples. However, we believe that researchers should go further, and should also exclude those domestic firms which are controlled or heavily influenced from abroad. This is because policy-making inside such a 'foreign-influenced firm' might be atypical of the firm's country of legal registration. We recommend excluding firms with foreign influence rather than trying to address this problem at the level of data analysis (e.g. by including a dummy variable for firms with foreign influence<sup>1</sup>).

Stadler and Nobes (2014) list the following types of exclusion (with example firms, at the date of their study, given in brackets): foreign firms (e.g. Telecom New

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<sup>1</sup> When following this approach, it might also be necessary to include interaction terms of the dummy and any variables of interest.

Zealand<sup>2</sup> in the Australian sample); subsidiaries of listed foreign firms (e.g. TUI Travel in the UK, which was a subsidiary of the German TUI); Hong Kong firms with a Chinese ultimate parent, i.e. if the ultimate holding company was a Chinese state-owned enterprise (e.g. China Mobile); and firms with other foreign influence, i.e. if the firm either had a dual-listed structure (e.g. BHP Billiton, which was listed in Australia and the UK) or had a headquarters abroad (e.g. Royal Dutch Shell in the UK, which had its headquarters in the Netherlands). By excluding foreign and foreign-influenced firms, the researchers excluded 83 firms (14%) from an initial sample of 578 large listed firms.

This suggests that potential contamination by foreign influence is somewhere between common and universal. However, our survey of highly-cited papers (as in Table 1, Column VIII) shows that none of them excluded foreign-influenced firms, and nor did any of them discuss the issue. Perhaps researchers are unaware of the problem, or they realise that to do the exclusions properly would require hand-collection of data as done in Stadler and Nobes (2014), which is very time-consuming.

However, a simple way of identifying some firms with foreign influence is to use either or both of a firm's International Securities Identification Number (ISIN) and the location of its corporate office. Both are available in Worldscope: data field WC06008 ('ISIN number') for ISIN and WC06026 ('Nation') for corporate office. Firms with a foreign ISIN or a corporate office abroad can then be excluded from the sample.

### *3.4 Excluding certain industry sectors*

It is common to exclude certain sectors, such as financials or extractives, from empirical analysis. Indeed, firms from these sectors do often report differently, including making different accounting policy choices. Table 2 gives examples drawn from Nobes

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<sup>2</sup> Now Spark New Zealand.

and Stadler (2013), who studied IFRS policy choices made by 514 of the largest firms of 14 countries. The table divides firms into three types: financials, extractives and other. There are no sector-specific differences in IFRS *requirements* but, as may be seen in the table, there are highly significant differences in policy *choice* between the sectors.

It is, therefore, tempting for researchers to exclude certain sectors. On the other hand, if financials and extractives are excluded, much of the stock market is excluded in some countries. As examples, the sample of the largest Australian firms in Nobes and Stadler (2013) contained 39% financials and 12% extractives, the Canadian sample was 20% financials and 43% extractives, the Italian was 32% financials and 3% extractives, and the UK was 24% financials and 10% extractives.

On this issue, we can use again our survey of international empirical research. Column IX of Table 1 records that, out of 12 papers examined, four exclude financials (Hope, 2003; Hung, 2000; Pope and Walker, 1999; and Zarzeski, 1996). Two of the other papers perform a sensitivity analysis to address the potential problem that financial firms are different: Li (2010, p.615) excludes financials and Harris and Muller (1999, p.306) match firms by industry.

Whether or not certain industry sectors should be excluded depends on the specific research setting. However, we believe it is important to explain the reason for any exclusion.

#### **4. Specifying the variables**

##### *4.1 Introduction*

In this section, we examine three examples of decisions to be made when precisely defining a variable. First, we look at how to enhance international

comparability of a variable, taking the example of 'profit'. The second example is related to our discussion in Section 3.4 about the potential exclusion of some industry sectors: which industry classification should be used in order to exclude a sector or to control for industry? Thirdly, we consider how to deal with the potential endogeneity of a variable, using the example of leverage.

#### *4.2 International comparability*

Comparability of data from one country to another is vital for reliable analysis. Comparability is enhanced by attempting to ensure international consistency in the definition of a variable. For example, one of the considerations involved in choosing a variable for income is whether or not to include extraordinary items. Worldscope shows earnings both before and after extraordinary items. Its 'Data Definitions Guide' says for "Extraordinary Items" (field 04225):

For Non-U.S. corporations, this item is as reported by the company. Differences in accounting definitions would exist between countries. (Thomson Reuters, 2015, p.475)

Indeed, under many national GAAPs (including US GAAP until recently) "extraordinary items" are shown, whereas under IFRS (and now US GAAP) no such items are shown.<sup>3</sup>

The definition of "extraordinary items" in US GAAP comprised a narrow list of most unusual events; the former definition in IFRS was vaguer but intended also to be very narrow. By contrast, in some national GAAPs<sup>4</sup> the definition has been vague and wide. For example, it is normal for Japanese firms to report large extraordinary items under

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<sup>3</sup> The heading was prohibited by a revision of IAS 1 in 2003 and by an Accounting Standards Update (2015-01) from the Financial Accounting Standards Board in 2015.

<sup>4</sup> This includes French, Italian, Japanese and Spanish GAAPs.

Japanese GAAP,<sup>5</sup> but in their English language “convenience translations” the amounts are re-classified further up the income statement. Assuming that databases use the convenience translations, there will not be a problem. In France and Italy, consolidated statements had stopped showing extraordinary items before adoption of IFRS, although amounts in parent statements can be large.<sup>6</sup> However, in Spain, firms continued to show large “extraordinary” amounts in consolidated statements until adoption of IFRS in 2005. For example, in 2004, Iberia reported net extraordinary income equal to 8.3% of pre-tax income, Telefónica had a net extraordinary loss equal to 26.5%, and Santander had a net extraordinary loss equal to 19.2%.<sup>7</sup>

The above discussion shows that “earnings before extraordinary items” is not comparable internationally or across time. Despite this, most researchers have used it as their metric for income. This was suitable for the earliest papers because they were limited to US firms, for which the definition of extraordinary was very narrow and standard. The problem arises when the approach is extended to international research. Some writers have been alert to the problem. For example, Pope and Walker (1999), when comparing aspects of UK and US accounting, “reach very different conclusions when the comparison is based on earnings after extraordinary items” (p.54). Later, Barth *et al.* (2008) note the international difference in the meaning of “extraordinary” and they run tests both including and excluding them, but report no difference in

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<sup>5</sup> To take the first two Japanese firms (alphabetically) in the list of those which have adopted IFRS: (i) Anritsu shows a net extraordinary loss equal to 19.7% of income before taxes in its reconciliation to IFRS in 2012, and (ii) Asahi Glass shows a net extraordinary loss of 25.6% of income before taxes.

<sup>6</sup> As examples, the 2005 income statement of the Spanish firm, Iberia, shows net extraordinary income of 82.3% of pre-tax income, and the 2014 income statement of the French firm, Alstom, shows a ‘Non recurring’ loss of 5.3% of net profit. Italian listed parent companies now use IFRS, but (to take an example from the last year before the adoption of IFRS for this purpose) the FIAT parent income statement of 2005 shows extraordinary income equal to 223.3% of net income before tax.

<sup>7</sup> 2004 Annual Report of Iberia, p.120; 2004 Annual Report of Telefónica, p.173 (this is the net amount of loss which was not ‘ordinary’); and 2004 Annual Report of Santander, p.166.

conclusions in this case. In other papers in our survey (see Table 1) in which “earnings before extraordinary items” is used, the potential problem is not discussed (Ball *et al.*, 2000; Hung, 2000) and the same applies in another more recent paper cited later in this present paper (Atwood, Drake and Myers, 2010).

For international research, there may be no proper solution to this particular issue other than to use income after extraordinary items. However, one general approach to address the problem of an internationally non-comparable continuous raw variable is to transform it into a ranked variable, e.g. using deciles within countries. Assuming that there is no comparability problem within countries, the observations in each country (or each country-year) can be ranked into 10 groups and the raw numbers replaced with scores of 1 to 10, assigning 1 (10) to the group with the lowest (highest) values. Taking the example of income before extraordinary items, the transformed variable would still distinguish firms with high and low earnings, but it would remove some of the international non-comparability. Transformation of data into ranks has been used in the accounting literature (e.g. Cooke, 1998; Stadler and Nobes, 2014). Instead of using ranks, an alternative approach is to replace, for each country, the raw data with their ‘normal scores’, i.e. to transform the actual observations into the normal distribution (see Cooke, 1998).

#### *4.3 Identifying sectors*

The examples in Section 3.4 make it clear how important it is for researchers to consider sectoral differences. Whether or not some sectors are excluded from a sample, it is usually helpful to control for industry effects. If the sample of a study is relatively small, e.g. because data has to be hand-collected, it is necessary to have a small set of

industry dummies/categories. A standard approach is to use the first digit of an industry classification to distinguish sectors.

Many researchers use SIC codes in order to split populations of firms into industrial sectors. However, there are other industry classifications, e.g. ICB codes.<sup>8</sup> Different industry codes may classify a firm differently. For example, based on the first digit, SIC classifies many integrated oil and gas firms (e.g. BP) as 'manufacturing' because they refine petroleum, but ICB's classifies them as 'oil and gas'. We think that the ICB classification is more appropriate, especially because of the strong US influence on accounting in that sector.<sup>9</sup> We therefore recommend using ICB codes to identify sectors.

#### *4.4 Endogeneity*

Researchers try to avoid endogeneity in a variable. Let us take the example of establishing a definition for 'leverage'. A definition which includes equity or assets is problematic when analysing accounting choices, because the size of equity or assets is affected by some accounting choices.

A solution is to define variables carefully so that endogeneity is avoided. For example, if debt is narrowly defined to only include bank loans and corporate bonds, the ratio of debt to market capitalisation is not affected by many accounting choices.

## **5. Using databases**

### *5.1 Introduction*

Given the need for extensive data in order to enable statistical tests, it is tempting to use databases. However, in our experience, these contain many errors and

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<sup>8</sup> The following example comes from Stadler and Nobes (2014, footnote 16). Those researchers also discuss GICS codes.

<sup>9</sup> IFRS contains no substantial guidance on accounting for exploration costs (see IFRS 6). Also, many non-US oil and gas firms are listed in the US and/or present statements in US dollars.



other problems. In this section, we will discuss four problem areas: 'current data', misleading data, missing data and erroneous data. We focus on Worldscope because that is the most widely used database for international accounting research.

### 5.2 Current data

Most data in financial databases are available over time, e.g. on an annual basis. However, for some data (labelled 'current data') the history is not available but only the current information. When using such data in an analysis that includes two or more years, current facts about a variable are applied over several past years. Two examples that are frequently used in international accounting research are: "Stock Exchange(s) Listed" (Worldscope data field 05427); and industry classifications, e.g. SIC code (Worldscope data field 07021) or ICB code (Worldscope data field 07040).

For industry codes, which are used in the majority of empirical accounting papers, we expect that employing current data is not a problem for the great majority of firms, particularly if the period analysed is short. However, firms evolve and (primary) industry membership can change. This may gradually occur or result from mergers or acquisitions. For example, the first digit of the ICB code of the following three firms changed between 2011 and 2017<sup>10</sup>, i.e. the firms were re-classified into a different 'industry':<sup>11</sup> GDF SUEZ of France changed from 'oil & gas' (ICB 0537) to 'utilities' (ICB 7575); Invensys of the UK changed from 'industrials' (ICB 2737) to 'technology' (ICB 9537); and TOD'S of Italy changed from 'consumer services' (ICB 5371) to 'consumer goods' (ICB 3765).

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<sup>10</sup> Specifically, we downloaded ICB codes from Worldscope on 28.10.2011 and 7.2.2017.

<sup>11</sup> ICB codes have four hierarchical levels: industry, supersector, sector and subsector. Industry is the highest level and is based on the first digit of the code.

We suggest addressing this problem in one of two ways. If the variable concerned is very important for a study, it may be possible to obtain historical data via other sources. For example, for “stock exchanges listed”, US data can be obtained from EDGAR (i.e. a firm-year in which a Form 20-F is filed with the SEC implies a US listing); and international data can be obtained from the websites of national stock exchanges such as the London Stock Exchange. If this is not practicable, it would be helpful at least to acknowledge the problem. This is done by Daske, Hail, Leuz and Verdi (2008, p.1102) for the Worldscope field concerning membership of a stock market index (05661).

It would be helpful if Worldscope were to provide historical information about “Stock Exchange(s) Listed” and industry classifications. For example, Compustat provides historical SIC codes (mnemonic SICH).

### *5.3 Misleading data*

Even if data are objectively correct, they can still be misleading. We give two examples: the free-float number of shares for Chinese H Share firms and pension discount rates.

Datastream contains data on the “number of shares free float” (data field NOSHFF), shown as the percentage of total shares in issue available to ordinary investors. For many large Chinese state-owned enterprises that have shares traded in both Mainland China (A Shares) and Hong Kong (H Shares), the NOSHFF is misleading. This is because Datastream collects NOSHFF for each of the two types of shares individually, even though the share capital of the firm comprises A and H Shares. For example, PetroChina has a NOSHFF of 90% at 31 December 2013 for H Shares (Datastream Code 280366), suggesting that it is not government controlled. However, taking A and H Shares together, 86.51% of the total share capital is in government hands

(see PetroChina's 2013 Annual Report, p.13). This is relevant because PetroChina uses IFRS for its Hong Kong listing and, when the firm is included in an IFRS study, information related to H Shares is probably used.

Worldscope contains data on pension discount rates (Worldscope data field 18806). For Italy's Eni, the field for 2010 shows 8.35%, which looks a very high discount rate for an Italian firm. In Eni's 2010 Annual Report (p.186), the firm discloses the following: discount rates for obligations under "TFR" (which is an Italian defined benefit pension obligation) of 4.8% and for obligations under "Foreign pension plans" of 2.7-14.0%. Worldscope's entry of 8.35% is the middle point of the "foreign" range. There are two reasons why this is misleading. First, it reports a number which has no economic meaning. If the aim is to have a single pension discount rate, a *weighted* average should be recorded. However, it is not possible to calculate this if the firm discloses a range. Second, the entry ignores the discount rate related to TFR which does have an economic meaning, and is the only rate relating to Italy, which should be of most interest for analysing an Italian firm. In such a case, it would be more helpful if Worldscope did not record a pension discount rate, so that analysts had to investigate the issue.

We think misleading data should not be used. Instead, it may be possible to find alternatives or the data can be hand-collected. The NOSHFF problem of Chinese H Shares may be partly addressed by using the NOSHFF of A Shares instead of H Shares, because A Shares usually comprise a much larger proportion of a firm's total share capital. Regarding pension discount rates, we think that Worldscope's data should not be used because it is unreliable. Data for this should be hand-collected. However, in Section 6.3, we discuss further problems with data on discount rates which are unrelated to Worldscope.

#### 5.4 Missing data

We now give two examples of problems related to *missing* data: exclusion of firm/years with insufficient data, and failure by the database provider to record a number even though it is disclosed by firms. To illustrate the first issue, we refer to Atwood *et al.* (2010) who assess the linkage between tax and financial reporting (book-tax conformity, BTC) in 33 countries by measuring the amount of variation in taxable income (proxied by current tax expense) that cannot be explained by the variation in profit before tax. The researchers apply their model for the whole period 1992 to 2005. Their results show Canada, Germany and the USA with the lowest BTC. This position for Germany does not fit with previous qualitative research (e.g. Haller, 1992; Hung, 2000) which depicts Germany as the archetype of high BTC.

Atwood *et al.* (2010, footnote 22) notice this “striking difference” but they do not mention that Germany was most unusual in their period of study in that many large German firms had volunteered to adopt international standards for their consolidated statements (Tarca *et al.*, 2013, p.82), thereby abandoning German GAAP and reducing BTC. At first sight, then, Atwood *et al.* had a mixed sample of German GAAP and IFRS reporters. However, on investigating the data sources, we<sup>12</sup> conclude that there was probably a worse problem: many of the firms that were still using German GAAP were excluded from the sample because of ‘missing data’ (i.e. less disclosure caused by less onerous disclosure requirements). Thus, Atwood *et al.* were largely not measuring the BTC of German GAAP but the BTC of IFRS (as applied by German groups).

Our second example of reasons for missing data is that a data analyst does not record the relevant number. This can happen by mistake or in a systematic way. The

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<sup>12</sup> We are most grateful to Erlend Kvaal (Norwegian Business School) for assistance on this matter.

latter is more serious and therefore we now give an example of it. As part of its pension data, Worldscope includes the 'actual return on plan assets' (Worldscope data field 18816) which is a required disclosure under IFRS (IAS 19, para. 141(c)(i)). However, we observed that some firms do not disclose a single number but two different numbers: (i) expected return on plan assets and (ii) actuarial gains/losses related to the plan assets.<sup>13</sup> According to the pension accounting requirements, the actual return on plan assets is the sum of (i) and (ii). Unfortunately, this seems not to have been understood by Worldscope data analysts: we observed many instances where Worldscope shows an empty field for actual return on plan assets but the two above numbers are reported by the firm and, therefore, we believe this is a systematic error. An example can be seen in Figure 2 which shows an excerpt from the "Report 2008" of Germany's BASF (p.202). It illustrates how (i) and (ii) are disclosed in practice: in this case, as lines 2 and 3 of the table. The actual return on plan assets for 2008 can be calculated by netting the two figures:  $675 + (2,159)$  equals a negative return of €1,484 million. However, Worldscope shows an empty field.

Two potential rationales for a firm deciding to disclose (i) and (ii) but not a figure for actual return on plan assets are as follows. First, it wants to simplify its pension disclosures and does not consider it necessary to disclose the actual return because (i) and (ii) are already disclosed in the table showing the movement of plan assets during the year. Second, it has had relatively poor actual returns on plan assets and wants to obscure this. The firm may be aware that the information is then not recorded by Worldscope and is therefore hidden from analysts who rely on the database.

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<sup>13</sup> We use the terms used before the amendment of IAS 19 in 2011.

Addressing the problem of missing data depends on the cause of it. When the data are missing because they are not disclosed by firms, the only possibility is to reflect this in the research design. For example, in Atwood *et al.* (2010), Germany could have been excluded. When the data are missing because the data analyst fails to record them, the data could be hand-collected.

### 5.5 Erroneous data

Worldscope contains many errors. We provide three examples. First, a data analyst may simply wrongly record the data for a particular firm. This is more likely if the disclosure is not very clear or is complicated. For example, Worldscope's "projected benefit obligation" (Worldscope data field 18809) for Germany's HeidelbergCement in 2002 is shown as 346,000 (in thousands of euros) but the correct entry would be 1,180,963. It is unclear to us how Worldscope arrives at its 346,000, but part of the problem may be that HeidelbergCement separately discloses "Present value of funded obligations" and "Present value of unfunded obligations" (see HeidelbergCement's Annual Report 2002, p.138).

In order to provide an estimate of the frequency of erroneous data in Worldscope, we compare Worldscope's "projected benefit obligation" with data carefully collected by ourselves relating to German HDAX firms in the period 1998 to 2006.<sup>14</sup> There are 433 firm-years for which both Worldscope and we have data. We find 47 firms-years where Worldscope deviates more than 5% from our data which we

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<sup>14</sup> The sample for this analysis includes all firms that were members of the HDAX equity index of the German Stock Exchange at any time during the sample period. The HDAX comprises most of the largest German firms. It started in 1994 with an index composition of 100 firms (DAX-30 and MDAX-70) and increased to 110 firms on 23 March 2003 (DAX-30, TecDAX-30 and MDAX-50). We only analyse firm-years where IFRS or US GAAP was used.

believe to be correct. This suggests that more than 10% of the investigated data in Worldscope are erroneous by a significant amount.

Turning to our second example of errors, we mentioned in Section 5.2 that Worldscope's "Stock Exchange(s) Listed" (Worldscope data field 05427) is a "current data field" which can create a problem for longitudinal studies, but a different point is that the "current data" sometimes includes outdated information. For example, Germany's Bayer delisted from the New York Stock Exchange in 2007 but Worldscope still showed "NYSE" when we downloaded the data for a research project in 2010.

Third, Daske, Hail, Leuz and Verdi (2013) report that Worldscope's "accounting standards followed" (field 07536) contains many "inconsistencies" (p.500). Their Appendix provides details. These authors hand-collected a large amount of data in order to correct the inconsistencies.

Unless all data have been carefully hand-collected, it is necessary to identify any erroneous cases. Checking descriptive statistics, in particular distributional statistics, is a useful tool to identify suspect cases. As part of this, it may be useful to calculate ratios because they can flag cases which are outside of a reasonable range. For example, in the HeidelbergCement pension example above, the funding ratio (plan assets divided by the defined benefit obligation) according to Worldscope is:  $691,000/346,000=200\%$ . Such a high ratio is rarely seen in practice and only occurs because the denominator is incomplete. Another strategy is to compare the data of a firm over time.

If erroneous data are identified, the only proper solution is to correct them. If that is not possible or practicable (for example, because scrutiny of extreme observations does not reveal a specific explanation for apparently anomalous data),

winsorising is useful because it limits the influence of extreme observations which may be the result of erroneous data.

## 6. Hand-collecting data

### 6.1 Introduction

For many research questions in accounting, the necessary numbers are not available in databases (or are not available reliably) and therefore the data have to be hand-collected. However, this process also generates problems. In this section, we present five types of example of difficulties met when hand-collecting data: 'boilerplate' disclosures, non-comparable disclosures, potentially misleading disclosures, exceptions in standards and translation problems. Even experienced research assistants can be misled by some of the issues discussed here. In all these cases, the problems would also apply to data gathered from databases, except that researchers might then be unaware of the problems and not realise that they should try to mitigate them.

### 6.2 Boilerplate disclosures

When collecting data on accounting policies, researchers will find many examples of boilerplate disclosure. For example, most firms state a policy on the 'designation of financial instruments at fair value' whereas closer inspection reveals that many of the firms have no such instruments.<sup>15</sup> This type of problem may be caused by wholesale importing of policy notes from a pro forma supplied by auditors.

Table 3 reports data on IAS 39's designation option which were collected when examining IFRS annual reports from 12 countries. The first row in Table 3 shows the data of Nobes and Stadler (2013). The numbers are the percentages of firms per country that

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<sup>15</sup> This example is drawn from Nobes and Stadler (2013, Appendix C2).



designated some financial instruments at fair value through profit or loss. The researchers only recorded instances where they could find a numerical disclosure of amounts of instruments designated. The second row shows data collected for this present paper for the same sample as in the first row. The numbers are the percentages of firms which report 'designation of financial instruments at fair value' in their policy notes, whether or not they made numerical disclosures of instruments designated in other notes to the financial statements. The difference (third row) is a measure of the likely amount of boilerplate disclosure, shown as percentages in the fourth row. The key lesson is that the problem of boilerplate disclosure differs internationally. For example, as the table shows, there is no problem in the German sample, but all the Chinese and 89% of the Italian disclosures seem to be boilerplate.

In short, the solution to identifying boilerplate disclosures is to examine whether the detailed notes confirm the summary note on accounting policies.

### *6.3 Non-comparable disclosures*

International comparisons can be hampered by lack of disclosure, such that even hand-collection of data will not work. This sub-section provides a summary of a problem met when attempting to collect data in order to investigate international differences in the measurement of discount rates for pension obligations.<sup>16</sup>

Ideally for comparable analysis, firms should disclose a single discount rate for the domestic/home defined benefit pension plans. Table 4 shows data relating to IFRS disclosures about pension discount rates by 348 large listed firms of ten countries in the period 2005 to 2013. As Table 4 shows, most firms do disclose a single rate for their

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<sup>16</sup> This summary is extracted from a non-academic report published as Nobes and Stadler (2017). Table 4 contains extracts of data from a table in that report.

domestic plans, though establishing this is not always straightforward because some pension notes do not mention any country. Nevertheless, it was often possible to link a disclosed rate to the home country because of a mention of the name of national mortality tables or legislation (e.g. 'State Second Pension' in the UK) or because the list of subsidiaries revealed that the firm had no material foreign subsidiaries.

Disclosure can also be made in other ways but still be considered comparable. The following six examples are given in Table 4: disclosure of a discount rate for the Euro area (most often seen in reports by French firms), disclosure of the rate of the main plan when other plans are small (often seen for UK firms), several rates for different plans, all plans immaterial, where an informed reader can make a reasonable assumption, and where other disclosures enable comparisons (e.g. different rates for active members and pensioners).

As may be seen from Table 4, 'comparable disclosure' was achieved in 70.4% of firm-years. Disclosure quality varied substantially between countries. It was highest in the UK (87.5%) and lowest in Switzerland (36.6%). In Australia, comparisons across firms were more difficult than the disclosure score of 61.1% suggests, because some firms disclosed the discount rate gross of tax and others net of tax.

The remaining firm-years (29.6%) had non-comparable disclosure of pension discount rates grouped into six types, as can be seen in the lowest part of Table 4: pension plans but no disclosure of rate,<sup>17</sup> a wide range of rates, a weighted average rate for all countries, unclear to which country the rate related, unclear for other reasons (e.g. a weighted average discount rate was given that reflected both pension and

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<sup>17</sup> Some of the non-disclosure may have been because pensions were immaterial, but then we wonder why those firms disclosed the existence of pension plans or why they did not disclose that pensions were immaterial, as a few firms have done.

medical plans), and disclosure incomplete (i.e. there was disclosure for some but not for all of the significant plans).

In order to address this problem, researchers would need to consider restricting their analysis to those firms which provide comparable disclosures.

#### *6.4 Potentially misleading disclosures*

Under this heading, we give as an example a pitfall met when collecting data on the use of fair value as an accounting policy. It is easy to be misled, by policy notes which refer to fair value, into thinking that a firm has chosen a policy of fair value measurement. For example, GlaxoSmithKline states:

Acquired brands are valued independently as part of the fair value of businesses acquired ... (2017 annual report, p.165)

A too rapid 'word search' might record this as a policy of fair value, whereas the note is referring to the way in which cost is estimated on initial recognition of assets acquired in a business combination. This problem of potentially misleading disclosures can be addressed by avoiding rapid word searches and, instead, carefully reading the notes.

#### *6.5 Exceptions in standards*

Many accounting standards contain exceptions. Let us take the example of the measurement of investment property. Policy choice on this is a fairly common piece of data to collect (e.g. it is included in Kvaal and Nobes, 2010; Quagli and Avallone, 2010; Cairns *et al.*, 2011; Christensen and Nikolaev, 2013; and Haller and Wehrfritz, 2013). IAS 40 allows an entity the options of cost or fair value but, approximately speaking, requires the entity to apply its choice uniformly to all investment properties. However, the standard allows certain financial institutions to use fair value for particular

properties without affecting the general choice (paras. 30 and 32A). Probably researchers will wish to concentrate on the general choice, and therefore ignore any reference to fair value related to the special case. Otherwise, the percentage of firms choosing fair value will be misleadingly high.

In general, data based on exceptions in standards should be excluded. As with the potentially misleading disclosures above, this implies that the researcher (or the researcher's assistant) must carefully read the notes rather than relying on rapid word searches.

#### *6.6 Translation problems*

Researchers also face problems when using English translations of "foreign" annual reports. We give three examples here. First, when conducting empirical research on the amount of impairment, Nobes and Stadler (2018) discovered that many firms use misleading signifiers in the versions of their annual reports published in English. For example, many French and German firms refer to "depreciation" when they mean "impairment", and many German and Italian firms refer vaguely to "write-downs". For the 2005 translated reports surveyed, 39% of German and of Italian firms used misleading signifiers which did not include reference to impairment. This could have a major impact on data collected by unwary researchers or their assistants, and the problem feeds through to databases.

Secondly, when collecting data on IFRS policy choices on government grants related to assets, Stadler and Nobes (2018) began by searching for 'government grant' but it became clear that all the following terms were sometimes used: grants, investment grants, capital grants, construction grants, official grants, government

subsidies, subsidies, investment subsidies, capital subsidies, government assistance and government incentives. To take the example of French firms, the English language reports often refer to “investment subsidies” as a translation of the French heading in the balance sheet for deferred income from grants, “*subventions d’investissement*”.

Our third example of translation problems relates again to research into investment property. In some translated reports, a search for “investment property” reveals nothing because a firm uses American English and refers to “real estate investments” (see the 2013 annual reports of the Italian firm Banco Popolare, the German firm Allianz, and the Dutch firms Aegon and ING).

In order to address translation problems, researchers need to read the notes carefully, being aware of the great variety of terminology used.

## **7. Summary and conclusions**

This paper began by representing the process of international accounting research as a diagram (Figure 1), and by giving examples of problems met at each stage. The paper then focused on problems (and solutions) related to several data issues. The most efficient way of drawing the examples together is to present a table. We do this as Table 5, which lists the problems and our suggestions for researchers about how to mitigate (or at least to admit) the problems. The contents of the table are in the order of the sections of this paper. We acknowledge that the selection of issues here has been a personal one. Other problems could have been discussed, such as the fact that data on a particular topic may differ from one database to another.

Another concluding question is whether the data choices and the data problems cause systematic biases or errors which might affect results. Clearly, efforts should be

made to reduce errors, whether they are systematic or not, but the systematic ones are more serious. Many of the issues in Table 5 are likely to be systematic, for example:

- (a) *Foreign influence* (3.3). If researchers do not remove ‘foreign influence’ from national samples, this will understate the international differences discovered.
- (b) *Comparable variables* (4.2). Extraordinary items tend to be debits. Only some GAAPs involve the presentation of extraordinary items. So, if a researcher uses ‘profit before extraordinaries’ as a variable, it will not be internationally comparable, and the bias will be systematic.
- (c) *Missing data* (5.4). For Worldscope’s data on actual returns on pension plan assets, we observe many missing data and identify a systematic pattern for these.
- (d) *Boilerplate* (6.2). Counting the boilerplate disclosures found in firms’ general policy notes will overstate the real frequency of certain items or policies.

We hope that our discussion will alert some researchers to data problems which might affect interpretation of previously published work and which should be considered when carrying out their own empirical work.

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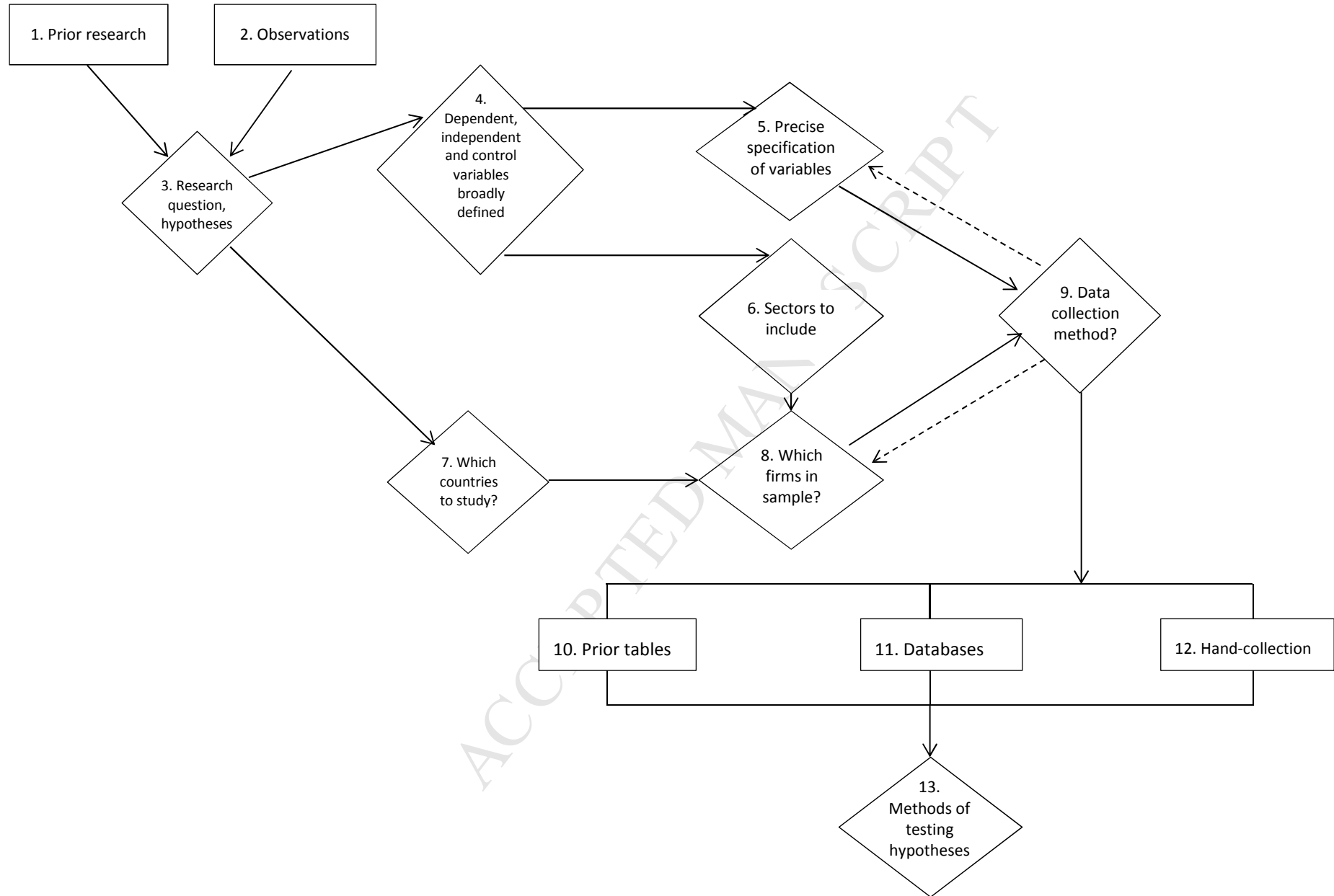
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**Figure 1** An outline of the process of empirical international research

<b>Development of plan assets (million €)</b>		
	<b>2008</b>	2007
Plan assets as of January 1	12,012	12,079
Expected return on plan assets	675	660
Actuarial losses	(2,159)	(119)
Employer contributions	119	131
Participants' contributions	40	41
Benefits paid	(443)	(516)
Other changes	58	6
Exchange differences	11	(270)
<b>Plan assets as of December 31</b>	<b>10,313</b>	<b>12,012</b>

**Figure 2 Excerpt from BASF's pension accounting disclosures in its Annual Report 2008**

**Table 1**  
**Sample of international accounting papers**

I Paper	II Journal	III Citations	IV # countries	V Obs	VI Obs USA	VII Obs from 3 biggest countries	VIII Foreign-influenced firms excluded?	IX Financials excluded?
Ball, Kothari and Robin (2000)	JAE	1,152	7	40,359	52.6%	83.8%	No	No
Barth, Landsman and Lang (2008)	JAR	647	21	1,896	NA	71.9%	No	No
Daske, Hail, Leuz and Verdi (2008) <sup>a</sup>	JAR	550	51	105,527	27.9%	49.2%	No	No
Hope (2003)	JAR	377	22	1,309	37.7%	62.9%	No	Yes
Ashbaugh and Pincus (2001)	JAR	257	13	80	NA	65.0%	No	No
Hung (2000)	JAE	229	21	17,743	51.1%	75.2%	No	Yes
Pope and Walker (1999)	JAR	213	2	25,569	71.9%	NA	No	Yes
Li (2010)	TAR	205	18	4,884 <sup>b</sup>	NA	57.8%	No	Yes <sup>c</sup>
Zarzeski (1996)	AH	191	7	256	25.4%	59.0%	No	Yes
Bae, Tan and Welker (2008)	TAR	168	49	6,169	27.2%	43.5%	No	No
Byard, Li and Yu (2011) <sup>d</sup>	JAR	153	20	1,418	NA	50.6%	No	No
Harris and Muller (1999)	JAE	130	13	89	NA	60.7%	No	No
<b>Average</b>					<b>42.0%</b>	<b>61.8%</b>		

Notes: This table shows some information for a sample of the most highly cited papers in international accounting. To create our sample, we looked at the 50 most cited papers in *Scopus* on 11<sup>th</sup> May 2018 which satisfy the following two criteria: they were published in a journal which includes the word ‘accounting’ or in *Abacus*; and the word ‘international’ appears in the title, abstract or keywords. We deleted the following types of paper: review papers, studies of one country, those not using financial accounting data, and those including an author who had already appeared in our sample. The full titles relating to the abbreviations in Column II can be seen in our References list.

a= for the “full sample”. b= for the pre-IFRS sample. c= in the form of sensitivity analysis. d= for the “test sample” and “control sample”.

**Table 2**  
**Examples of sectoral differences: percentages of firms making particular IFRS policy choices**

<b>Country</b>	<b>Policy choice</b>	<b>N</b>	<b>% Financials</b>	<b>% Extractives</b>	<b>% Others</b>
14 countries	Investment property at fair value	216	61	0	9
14 countries	Actuarial gains/losses to other comprehensive income	414	39	58	73
14 countries	Proportionate consolidation of joint ventures	379	27	56	35
Australia	Investment property at fair value	15	100	-	50
Canada	Actuarial gains/losses to other comprehensive income	39	10	82	100
Canada	Proportionate consolidation of joint ventures	38	30	82	36
UK	Balance sheet showing net assets	93	45	67	89
UK	Balance sheet with liquidity decreasing	93	32	0	3

Notes: This table is a slightly adapted version of Table 6 in Nobes and Stadler (2013). It reports the percentages of financial, extractive and other firms which made the respective IFRS policy choice in 2011. N is the number of observations/firms.

**Table 3**  
**Boilerplate disclosures: some designation of financial instruments at fair value**

	<b>N</b>	<b>AU</b>	<b>UK</b>	<b>CA</b>	<b>CN</b>	<b>HK</b>	<b>FR</b>	<b>ES</b>	<b>IT</b>	<b>DE</b>	<b>CH</b>	<b>ZA</b>	<b>SK</b>
[1] Some fair value designation	383	10	3	13	0	7	24	4	4	6	7	23	19
[2] Some fair value designation (including boilerplate)	383	29	11	31	31	29	29	26	35	6	21	50	58
[3] Boilerplate disclosures = difference ([2]-[1])		19	8	18	31	22	5	22	31	0	14	27	39
[4] Boilerplate disclosures in percentages ([3]/[2])		66%	73%	58%	100%	76%	17%	85%	89%	0%	67%	54%	67%

Notes: This table shows the extent of boilerplate disclosures for the IFRS policy choice ‘some designation of financial instruments at fair value’ in 2011. N is the number of observations/firms. The other numbers in rows [1] and [2] are percentages of firms per country. The numbers in row [1] are from Nobes and Stadler (2013); some fair value designation is only recorded if (i) a firm clearly states that financial instruments have been designated at fair value through profit or loss (i.e. the fair value option in IAS 39.9 was used) and (ii) the notes show a corresponding number to confirm this. The numbers in row [2] are original data for the same sample as in row [1]; these data are hand-collected from the firms’ annual reports; ‘Some fair value designation’ is recorded if (i) applies without considering the restriction in (ii); ‘Boilerplate disclosures’ are all cases where (i) applies but not (ii). The countries are Australia (AU), United Kingdom (UK), Canada (CA), China (CN), Hong Kong (HK), France (FR), Spain (ES), Italy (IT), Germany (DE), Switzerland (CH), South Africa (ZA) and South Korea (SK).

**Table 4**  
**Non-comparable disclosures: pension discount rates**

	AU	CH	DE	ES	FR	UK	HK	IT	RU	ZA	SUM
Firms	44	18	31	29	39	89	19	33	17	29	348
Less: No defined benefit plans in home country	22	1	-	17	1	15	10	-	9	16	91
<b>Firms for analysis</b>	<b>22</b>	<b>17</b>	<b>31</b>	<b>12</b>	<b>38</b>	<b>74</b>	<b>9</b>	<b>33</b>	<b>8</b>	<b>13</b>	<b>257</b>
Firm-years for analysis	198	153	279	108	342	666	81	297	72	117	2,313
<b>Firm-years with comparable disclosure</b>	121	56	218	69	222	583	44	187	47	82	1,629
<b>In %</b>	<b>61.1%</b>	<b>36.6%</b>	<b>78.1%</b>	<b>63.9%</b>	<b>64.9%</b>	<b>87.5%</b>	<b>54.3%</b>	<b>63.0%</b>	<b>65.3%</b>	<b>70.1%</b>	<b>70.4%</b>
Home country shown	106	55	201	41	111	487	32	136	36	59	1,265
Euro area	-	-	8	1	96	-	-	9	-	-	114
Main plan in home country	-	1	-	7	2	72	9	-	-	7	98
Several rates for different plans	2	-	-	2	-	6	2	24	-	5	41
Immaterial	-	-	-	-	-	-	-	-	1	-	1
Assumption can be made that rate is for home country	8	-	9	3	-	17	1	16	10	2	66
Other	5	-	-	15	13	1	-	2	-	9	45
<b>Firm-years with non-comparable disclosure</b>	77	97	61	39	120	83	37	110	25	35	684
No disclosure	3	-	-	10	-	3	1	60	19	5	101
Range	30	2	5	20	49	5	24	25	6	16	182
Weighted average for all countries	20	90	39	1	67	37	-	-	-	-	254
Country unclear	24	5	17	-	4	38	12	11	-	3	114
Other unclear	-	-	-	-	-	-	-	9	-	10	19
Incomplete	-	-	-	8	-	-	-	5	-	1	14

Notes: This table is an adapted version of Table 2 in Nobes and Stadler (2017). It reports information on the disclosure quality of pension discount rates per country in the period 2005 to 2013. The countries are Australia (AU), Switzerland (CH), Germany (DE), Spain (ES), France (FR), United Kingdom (UK), Hong Kong (HK), Italy (IT), Russia (RU) and South Africa (ZA).



**Table 5**  
**Summary of data problems and potential solutions**

<b>Section</b>	<b>Type of data</b>	<b>Problem</b>	<b>Possible solutions</b>
3.2	Sample	Dominance of certain countries	Exclude dominant country or countries; include only countries with sufficient observations; use aggregate data by country; use a similar number of observations for each country.
3.3	Sample	Foreign influence	Exclude firms with foreign ISIN; exclude firms which have their corporate office abroad.
3.4	Sample	Excluding certain industry sectors	Explain why certain industry sectors are excluded.
4.2	Variables	International comparability	Define variables so that non-comparability is avoided; or transform a non-comparable continuous raw variable into a ranked variable (e.g. using deciles within countries) or into 'normal scores'.
4.3	Variables	Identifying sectors	We recommend ICB codes.
4.4	Variables	Endogeneity	Define variables carefully so that endogeneity is avoided.
5.2	Databases	Current data	Use other sources such as stock exchanges; at least admit the problem.
5.3	Databases	Misleading data	Do not use misleading data but find alternatives or hand-collect.
5.4	Databases	Missing data	If data is not disclosed by firms, reflect the problem in the research design. If data is disclosed by firms but not included in the database, hand-collect.
5.5	Databases	Erroneous data	Search for suspect cases via descriptive statistics, including ratios; winsorise; hand-collect.
6.2	Hand-collected	Boilerplate disclosures	Examine whether the detailed notes confirm the summary note on accounting policies.
6.3	Hand-collected	Non-comparable disclosures	Identify firms with comparable disclosures, and restrict the analysis to those firms.
6.4	Hand-collected	Potentially misleading disclosures	Carefully read the notes rather than using rapid word searches.
6.5	Hand-collected	Exceptions in standards	Exclude data based on exceptions in standards.

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6.6 Hand-collected Translation problems Carefully read notes, being aware of great variety of terminology used.

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ACCEPTED MANUSCRIPT