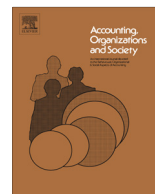




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## Causal inference in empirical archival financial accounting research <sup>☆</sup>

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### A B S T R A C T

This study discusses the challenges and opportunities of establishing causal inference in empirical archival financial accounting research. Causal inference requires identification of a theoretically predicted causal mechanism in a research setting optimized to avoid endogenous causes and using a suitable statistical inference strategy. After briefly describing potential research design strategies, I analyze the frequency of causal studies published in leading business and economics journals. I identify causal studies by their abstract including an explicit reference to their causal nature and find that they are significantly more common in the areas of economics and finance compared to other business-oriented research disciplines like accounting. Also, the extent to which research designs are optimized for causal inference differs significantly between causal empirical archival studies in the area of financial accounting and finance. I discuss potential reasons for this gap and make some suggestions on how the demand for and supply of well-designed causal studies in the area of empirical archival financial accounting research might be increased.

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### Introduction

Identifying causal relationships in archival data is crucial whenever a researcher is interested in understanding whether theoretical predictions manifest themselves in data. Thus, positivistic empirical studies that aim beyond description should allow the reader to conclude whether the observed effect is likely to be caused by the mechanism proposed by the study, or, in short: they should allow for causal inference (Angrist & Pischke, 2010; Leamer, 1983).

Causal inference requires ruling out alternative explanations. An observed correlation or significant coefficient in a multivariate regression does not imply causality since it can be the result of reverse causality, omitted correlated variables or a miss-specified functional form. A causal

study is designed so that the reader can be reasonably confident that the observed empirical relation is indeed caused by the proposed mechanism. This aspect of research design is also being referred to as the internal validity of a study.

Basing causal conclusions on archival data is challenging since archival data are not the result of a perfectly controlled random experiment. As an example: Assume that a researcher is interested in understanding whether managers that face an earnings-linked bonus plan tend to artificially inflate reported earnings numbers.<sup>1</sup> We could try to address this research question by comparing the accrual patterns of earnings reported by managers with earnings-linked bonus plans with accrual patterns reported by managers without such a bonus plan. If we can assume that bonus plans are randomly assigned to managers then such a research strategy would be suitable to draw causal inferences.

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<sup>1</sup> See Armstrong, Jagolinzer, and Larcker (2010), which investigates the impact of equity incentives in managerial compensation on accounting irregularities, as an example for a recent study in this field addressing the challenge of causal inference.

Obviously, the central identifying assumption of the above example (that bonus plans are randomly assigned) is courageous to say the least. In reality, bonus plans and managers are endogenously and simultaneously determined by, e.g., the recruiting and compensation committee. What this means is: Certain types of managers and certain types of firms will have a tendency to agree on certain types of compensation packages: The bonus plan will be endogenous to the problem at hand and not random. What can a researcher do to address this challenge? Four options seem feasible.

First, one could decide not to address the problem. In a carefully written paper, this would mean choosing a non-experimental descriptive research design, avoiding any causal interpretation of the findings and explicit caveats at prominent places throughout the paper.

Second, the researcher can try to model the bonus plan choice. If the researcher assumes (another identifying assumption) that the bonus plan decision is based on observable variables only, then matching or regression approaches of standard micro-econometrics can be used to address the endogenous nature of the bonus plan. Again, the assumption that the determinants of the bonus plan choice can be observed is questionable. As an example, it seems reasonable that the unobservable psychological nature of a manager has a direct impact on earnings management behavior. It also seems likely that compensation committees cater to the psychological profile of a manager when designing the compensation package.

If the researcher feels that the endogenous choice at hand is at least partly based on unobservable variables, the third potential strategy is to identify an instrumental variable or a set of instrumental variables that are correlated with the endogenous choice but have no direct impact on the outcome variable of interest (here, the earnings management choice). The problem that a researcher faces when identifying a suitable instrument lies with the impossibility to test for the validity of an instrument. The use of an instrument must be justified theoretically. In the area of social science, a tight theoretical argument seems fairly unlikely in many cases.

Thus, a critical empirical researcher might be tempted to resort to strategy number four: Identifying a setting where bonus plans can be assumed to be exogenously imposed on firms. For example, it might be possible that some legislation(s) at some point in time introduced a regulatory ban of earnings-based bonus plans. Such a natural experiment allows for research designs that help causal inference by exogenously manipulating the treatment of interest. Identifying such a setting requires institutional expertise of the researcher.

Summing up, a causal research design based on archival data requires (a) a clear understanding of the theoretical mechanism (the cause-effect relationship) that the researcher wishes to test, (b) a concept for a first-best random experiment that would allow her or him to test for the existence of this mechanism, (c) information on why this first-best experiment is not feasible, (d) a quasi-experimental research setting that is feasible and deviates from the first-best experiment as little as possible and (e) tools for statistical inference that address the unavoidable

shortcomings of the second-best research design (Angrist & Pischke, 2008; Shadish, Cook, & Campbell, 2001).

## Causal studies: A publication analysis

### *Time trends across areas of research*

While several methodological surveys stress the relevance of causal studies and voice the demand for a methodological shift towards studies optimized for causal inference (Antonakis, Bendahan, Jacquart, & Lalive, 2010; Chenhall & Moers, 2007; Larcker & Rusticus, 2007; Larcker & Rusticus, 2010; Lennox, Francis, & Wang, 2012; Roberts & Whited, 2012; Tucker, 2010) until now little evidence exists about the relative importance of causal studies in the literature across time and research fields. I aim to fill this gap by providing descriptive evidence about the share of causal studies in leading journals in the area of Business and Economics.

To identify causal studies I conduct a content analysis of all abstracts of articles published over the 2000–2012 period in business and economics journals included in the current Financial Times 45 journal list and indexed by the Social Science Citation Index. The content analysis classifies an article as causal whenever the abstract contains the keyword strings “causal”, “endogenous”, “endogeneity” or “natural experiment”.<sup>2</sup> Each journal for which at least one article is classified as causal over the 2000–2012 period is included in the subsequent analysis (42 journals, see Appendix A for a list of the included journals). Publication, classification and abstract data are taken from Thomson Reuters Web of Knowledge. The analysis includes a total of 30,097 studies of which 906 are classified as causal (3.0%). I verify this measurement approach by re-evaluating a sub-set of 136 studies that the mechanism identified as causal to identify the likelihood of generating false positives. I find 6 false positives, indicating that the number of false positives is below 5%.

Nevertheless, this approach likely generates a significant amount of false negatives (causal studies miss-classified as non-causal). These false negatives can be because authors do not stress that their results allow for causal inference in the abstract or because they use a different terminology. Whereas I address the second concern by experimenting with the search strings that identify causal studies, I am unable to rule out the first concern without evaluating the research design of 30,097 studies in detail. It might also be that authors get increasingly aware about the difference between causal and descriptive archival studies over time and thus get more likely to explicitly state in their abstract that their results allow for causal inference. Summing up: My measure is only able to pick up “explicitly causal studies”. While the trends of my measure remain informative, the absolute percentages should be viewed as a lower bound and thus interpreted with care.

<sup>2</sup> As a robustness test, I modify this approach by adding additional keywords like “exogenous”, “counterfactual” and “instrumental variable”. Obviously this increases the amount of identified studies while also significantly increasing the amount of false positive identifications. My main inferences remain unchanged.

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