Replications in the Finance Literature: An Empirical Study

Raymond Hubbard
Drake University

Daniel E. Vetter
Central Michigan University

Abstract

Replication is rare in the finance literature. Of the 1,028 papers sampled from four major finance journals, only one was a replication. Only 5.3 percent were replications with extensions, and they accounted for merely 4.3 percent of journal space devoted to research reports. Published replications with extensions typically produce results that conflict with the original studies; of the 54 extensions published, 60 percent conflicted with the earlier results, and only 20 percent provided full confirmation.

Introduction

Replication of previously published findings preserves the integrity of a discipline's cumulative empirical foundation. Until a result is corroborated, preferably by an independent researcher, its status should be considered tentative. Failure to reproduce the result indicates the need for more detailed investigation of the topic. Replications with extensions help to increase the generalizability of research findings. It is for no small reason that the principle of replicability has been called the touchstone of the scientific method (Kane, 1984), an essential part of scientific methodology (Dewald, Thursby, and Anderson, 1986), the Supreme Court of the scientific system (Collins, 1985), and the most important criterion of genuine scientific knowledge (Rosenthal and Rosnow, 1984).

In view of the critical role that replications and their extensions play in knowledge development, one would expect their conduct to be commonplace among members of a given field. Unfortunately, it is difficult to know how much replication activity occurs within a discipline. How many replications and replications with extensions are published in that discipline's leading journals, however, can be estimated. Consequently, this paper addresses the following issues: How often are replications/extensions published in the finance literature? How does this publication incidence compare with other social and business sciences? Has the trend in the publication of replications/extensions increased or

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decreased over time? To what extent do replication studies confirm or disconfirm previously published results? How much discussion regarding the authenticity of published studies occurs in the finance discipline?

The Publication Frequency of Replications/Extensions in Finance

Replication and *replication with extension* are defined following Brown and Coney (1976) and Reid, Soley, and Wimmer (1981). Thus, a *replication* is a substantial duplication of a previously published empirical research project that chiefly is concerned with increasing the internal validity of the research design. An example would be repeating the experiment with another sample drawn from the same population. A *replication with extension* is a duplication of a previously published empirical research project that primarily is concerned with increasing the external validity (generalizability) of the research design. The intent is not to alter the conceptual relationships investigated in the original study but to test them differently by modifying either the manipulated (independent) or measured (dependent) variables, but not both.

The above definitions are analogous to Kane's (1984) econometric audit and improvisational replication. They are also generally consistent with the four types of replications distinguished by Mittelstaedt and Zorn (1984, p. 10). Briefly, their classification scheme is as follows: Type I replication employs the same data sources and methods (models, proxy variables, statistical techniques) as the original study; type II replication uses the same data sources, but different methods; type III replication applies the same methods to different data; and type IV replication employs different data and different methods. The following examples, offered from a number of possibilities, illustrate the compatibility of their definitions and the current definitions. For instance, the current definition of replication can accommodate Mittelstaedt and Zorn's (1984) type I and III cases respectively, as when a researcher performs an econometric audit or repeats the experiment with a different sample drawn from the same population. Similarly, the present definition of replication with extension can include their type II and IV cases, respectively, as when a researcher analyzes the same data with modified definitions of the dependent variable or some of the independent variables or analyzes a different data set (population) with modifications in some variable definitions.

This research examines the incidence of replications/extensions in the finance literature by analyzing the content of a random sample of 27 issues of the *Journal of Finance* (JF) and 21 issues each of the *Journal of Financial and Quantitative Analysis* (JFQA) and the *Journal of Money, Credit and Banking* (JMCB) published from 1969-1989. The study also analyzes 18 issues of the

Journal of Financial Economics (JFE) published from 1974-1989.[1] This constitutes a 25 percent simple random sample, drawn from a sampling frame consisting of all regular issues published in four of the most prestigious journals in the finance discipline for the time periods mentioned above. This analysis involves the inspection of 1,028 research reports (articles and notes), of which 555 were empirical.

The 555 empirical papers were classified independently by each of the authors. A high level of agreement was reached, as measured by Cohen's (1960) kappa ($k = .88$, $z = 9.4$, $p < .001$). When disagreements over an article's status occurred, they were resolved by both authors. Typically, they were included in the study. Thus, to the extent that the analysis has erred, such error has been in the direction of overstating the frequency of published replications/extensions.

Only one replication was encountered in the sampling of finance journals (Table I). This is consistent with evidence furnished in other social and business sciences. Sterling (1959), for example, found that zero replications were published in a study involving 362 psychology articles. Likewise, Bozarth and Roberts' (1972) review of 1,046 psychology papers showed that less than 1 percent were replications. Brown and Coney (1976) found no evidence of replications in an examination of 649 reports appearing in marketing journals, while only 0.8 percent of 501 advertising articles inspected by Reid, Soley, and Wimmer (1981) were replications.

The publication frequency of replications with extensions is higher. An average of some 5.3 percent (54) of all reports published in the four journals included in the present study belonged to this category (Table I).[2] This figure

[1]Volume 1 of JMCB was published in 1969, hence JF, JFQA, and JMCB are compared over the period 1969-1989. JFE first was published in 1974, thus the period 1974-1989 was covered for this journal. The particular journal issues included in the sample are: JF: June, Dec. 1969; June 1970; March 1971; June, Sept. 1972; March, June 1973; March 1974; Dec. 1975; Dec. 1976; Dec. 1978; June, Sept. 1979; Sept. 1980; Dec. 1981; March 1982; June 1983; March, Dec. 1984; Sept. 1985; March, June, Sept. 1986; March 1987; June 1988; Sept. 1989. JFE: May 1974; Sept. 1975; Oct. 1976; March, Aug. 1977; March, June 1979; March 1980; March 1981; Dec. 1982; June, Dec. 1983; March, Dec. 1985; Dec. 1986; Dec. 1987; Sept. 1988; Sept. 1989. JFQA: Sept. 1969; June, Sept. 1970; Sept. 1971; June 1973; Jan., Sept. 1974; Sept., Dec. 1976; June 1978; March 1979; Dec. 1980; Sept. 1981; Dec. 1983; June, Dec. 1984; June 1985; Sept. 1986; March 1987; June 1988; Sept. 1989. JMCB: Nov. 1969; May, Aug. 1970; Nov. 1971; May 1973; Feb. Aug. 1974; Aug., Nov. 1976; May 1978; Feb. 1979; Nov. 1980; Aug. 1981; Nov. 1983; May, Nov. 1984; May 1985; Aug. 1986; Feb. 1987; May 1988; Aug 1989.

[2]The percentage of the literature devoted to the publication of replications with extensions was calculated using both the total number of research reports (because such works must compete with all other studies for a limited amount of journal space), as well as only the empirical ones.

exceeds Brown and Coney's (1976) finding that only 2 percent of marketing publications are replications with extensions, and it is virtually identical to the 5.2 percent of such studies published in the advertising literature estimated by Reid, Soley, and Wimmer (1981).

Table I shows that JF (7.6 percent) published more extensions than JFE (6.1 percent), JFQA (1.0 percent), and JMCB (3.8 percent). This difference in publication rates is statistically significant ($\chi^2 = 14.3$, $p < .01$). An analysis of the publication incidence of replications with extensions based on empirical studies only also reveals a statistically significant difference between journals ($\chi^2 = 18.3$, $p < .001$). JF (15.3 percent) again has the highest incidence, followed by JFE (10.0 percent), JMCB (6.1 percent), and JFQA (1.8 percent). On the average, some 10 percent of the empirical literature published in these four finance journals deals with replications and extensions (Table I).

A common perception exists among some researchers that because replication/extensions compete with original studies for a limited amount of journal space, editors are reluctant to publish them. Therefore, the percentage of journal pages devoted to research reports that were allocated to replications/extensions was calculated.[3] On the average, only 4.3 percent of journal space is consumed by such works (Table I). JF (6.4 percent) again leads in this respect, followed by JFE (5.1 percent), JMCB (2.2 percent), and JFQA (1.2 percent). These differences are statistically significant ($\chi^2 = 166.0$, $p < .001$).

Publication Frequency of Replications/Extensions: 1969-1982 Versus 1983-1989

Has the publication frequency of replications/extensions increased or decreased over time? The sample was split, and results were compared for the time periods 1969-1982 and 1983-1989. This was done for two reasons. First, there were no obvious breaks in the data to suggest a comparison between other specific time periods.

Second, as Dewald, Thursby, and Anderson (1986) describe, in July 1982 JMCB began the *JMCB Data Storage and Evaluation Project*. As part of this project, JMCB modified editorial policy by asking authors for copies of their data and computer programs so that they would be available to other researchers upon request. This change was implemented retroactively and applied to all empirical works published in JMCB during and after 1980. Has this 1982 policy change of making data more accessible to researchers stimulated a greater interest in performing econometric audits and/or replications with extensions? This

[3]The authors are grateful to Edward Kane for this suggestion.

question cannot be answered directly; it is unknown how many requests for data have been made either to JMCB editors or to the authors of the original papers. But the frequency of such works published in JMCB and the other three finance journals for the periods 1983-1989 and 1969-1982 can be compared. Table 2 summarizes the findings.

Whether computed on the basis of all (2.4 percent to 5.6 percent) or only the empirical (4.2 percent to 8.3 percent) papers, JMCB recorded increases in the publication incidence of replications/extensions. Neither of these increases, however, was statistically significant (χ^2 = 1.4 and 0.9, respectively). Based on this sample information, despite the greater availability of raw data made possible by the JMCB project, the frequency of replications/extensions published in JMCB remains unaltered. Results for JF, JFE, and JFQA are presented in Table 2.

Across all four journals, the average frequency of published replications/extensions rose from 4.3 percent to 6.9 percent when considering all papers, and from 8.8 percent to 11.2 percent when calculated on the basis of empirical papers alone. But neither of these increases was statistically significant (χ^2 = 3.2 and 0.9, respectively).

Do Replications/Extensions Confirm Previous Findings?

Given that highly replicable results instill confidence in the robustness of a discipline's epistemological base, to what extent do replications/extensions published in the finance literature corroborate the findings of previous studies? Table 3 presents some disturbing evidence. Of the 55 replications/extensions appearing in JF, JFE, JFQA, and JMCB between 1969 and 1989, only 11 (20 percent) supported the original work. Eleven further studies conferred partial support,[4] while 33 (60 percent) contradicted earlier results.

This high frequency of conflicting outcomes suggests that one should be concerned about the validity of empirical findings reported in the literature. These outcomes also underscore the continuing need to encourage and reward scholars for performing replications/extensions. Unfortunately, researchers generally shy away from such works. Why is this the case? Kane (1984, p. 3) speculates that:

> ... uninventively verifying someone else's empirical research is not a completely respectable use of one's time. Choosing such a task is widely regarded as *prima facie* evidence of intellectual mediocrity, revealing a lack of creativity and perhaps even a bullying spirit.

[4]An example of a work receiving partial support upon replication might be as follows: The original study found support for two hypotheses, whereas the replication supported only one of these.

He further observes that conducting replications is unlikely to enhance the careers of those involved, an inference endorsed by scholars such as Armstrong (1982), Broad and Wade (1982), and Dewald, Thursby, and Anderson (1986). McGrath and Brinberg (1983) view the problems associated with replication as a "tragedy of the commons." Although the development of any given discipline would be well served by replications/extensions of important works, the individual researcher is better off pursuing novel avenues and leaving replications to others. In this manner, the individual researcher prospers while the discipline suffers.

Additional Checks on the Accuracy of Published Results

Although the routine practice of replication offers the most powerful check on the accuracy of a discipline's literature, other valuable research activities deserve mention in this context. Instrumental among these is the role played by the research comment and rejoinder. Between them, they help to establish a scholarly dialogue and exchange of ideas, foster a diversity of opinion, and provide a forum for publicly debating the authenticity of research findings.

Table 4 shows the number of comments and rejoinders published by the four journals for the time period 1969-1989.[5] JF (14.1 percent) published more of these works than did JFE (2.0 percent), JFQA (9.2 percent), and JMCB (9.9 percent). These differences are statistically significant ($\chi^2 = 14.0, p < .01$).

An examination of the publication frequency of comments and rejoinders over time, however, indicates a downward trend. To maintain consistency with earlier analyses, the time period 1969-1982 was compared again with the 1983-1989 period. On average across all four journals, there was a substantial decline in the occurrence of comments and rejoinders between 1969-1982 (15.3 percent) and 1983-1989 (4.7 percent). This decline is statistically significant ($\chi^2 = 27.9$, $p < .001$). All four journals revealed decreases, especially JF (18.8 percent to 6.3 percent) and JFQA (14.0 percent to zero).

Table 4 also shows a marked decrease ($\chi^2 = 167.7, p < .001$) in the average amount of journal space consumed by comments and rejoinders between 1969-1982 (5.3 percent) and 1983-1989 (1.2 percent). Again, all four journals contributed toward this downward trend.

[5]Although most replications/extensions are published as comments, they are not included (i.e., double counted) in Table 4.

Summary and Conclusions

Mittelstaedt and Zorn (1984, p. 14) suggest "That which isn't worth replicating isn't worth knowing." Replication of previous research promotes confidence in the veracity of a discipline's empirical findings. Prior to this study, however, estimates concerning the number of replications/extensions published in the finance literature have remained impressionistic in nature. The present content analysis of a 25 percent random sample of research reports appearing in JF, JFE, JFQA, and JMCB between 1969 and 1989 constitutes the only empirical evidence on the subject.

Only one replication was encountered in the sample of these four journals. Furthermore, only 5 percent of the total (10 percent of the empirical) literature consisted of replications with extensions. These works occupied a mere 4 percent of journal space devoted to scholarly research.

When replications/extensions were published, they generally conflicted with the original findings. Only 20 percent provided full confirmation, while conflicting results were found in 60 percent of the extensions.

Replication activity, especially the extensions, should be encouraged and rewarded. The perceived stigma currently associated with such work is unfortunate. Until the practice of replication becomes habitual, the validity of empirical results in the finance literature cannot be taken for granted.

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Table 1
Replications/Extensions Published in Selected Finance Journals
1969-1989

Journals	Number of Studies	Replications	Replications with Extensions	Percentage of all Replications
JF	511 (255)	0	39	7.6 (15.3) [6.4]
JFE	98 (60)	0	6	6.1 (10.0) [5.1]
JFQA	207 (109)	0	2	1.0 (1.8) [1.2]
JMCB	212 (131)	1	7	3.8 (6.1) [2.2]
Totals	1,028 (555)	1	54	5.4 (9.9) [4.3]

Values in parentheses indicate the number of empirical studies and the calculations based on these. Values in brackets refer to the percentage of journal space in pages allocated to replications/extensions. Volume 1 of JMCB was published in 1969, hence the point of departure for this study. Volume 1 of JFE was published in 1974, so the time period for this particular journal covers 1974-1989

Table 2
Replications/Extensions Published in Selected Finance Journals
1969-1982 Versus 1983-1989

Journals	1969-1982 Number of Studies	1969-1982 Replications with Extensions	1969-1982 Percentage	1983-1989 Number of Studies	1983-1989 Replications with Extensions	1983-1989 Percentage
JF	319 (158)	24	7.5 (15.2) [5.5]	192 (97)	15	7.8 (15.5) [7.6]
JFE	44 (15)	0	– – –	54 (45)	6	11.1 (13.3) [9.1]
JFQA	136 (62)	0	– – –	71 (47)	2	2.8 (4.3) [3.4]
JMCB	123 (71)	3	2.4 (4.2) [1.4]	89 (60)	5	5.6 (8.3) [3.3]
Totals	622 (306)	27	4.3 (8.8) [2.6]	406 (249)	28	6.9 (11.2) [6.5]

Values in parentheses indicate the number of empirical studies and the calculations based on these. Values in brackets refer to the percentage of journal space in pages allocated to replications/extensions. For JFE, the initial time period is 1974-1982 rather than 1969-1982

Table 3
Outcomes of Replications/Extensions Published in Selected Finance Journals 1969-1989

	Outcomes of Replications with Extensions			
Journals	Conflict	Partial Support	Support	Total
JF	24	9	6	39
JFE	2	2	2	6
JFQA	1	0	1	2
JMCB	6	0	2	8
Totals	33 (60.0)	11 (20.0)	11 (20.0)	55

Values in parentheses are percentages. For JFE the time period covered is 1974-1989

Table 4
Research Commentary Published in Selected Finance Journals
1969-1989

Journals	1969-1982 Number of Studies	1969-1982 Number of Comments/ Rejoinders	1969-1982 %	1983-1989 Number of Studies	1983-1989 Number of Comments/ Rejoinders	1983-1989 %	1969-1989 Number of Studies	1969-1989 Number of Comments/ Rejoinders	1969-1989 %
JF	319	60	18.8 [6.2]	192	12	6.3 [1.3]	511	72	14.1 [4.1]
JFE	44	2	4.5 [2.0]	54	0	– –	98	2	2.0 [0.01]
JFQA	136	19	14.0 [5.1]	71	0	– –	207	19	9.2 [3.3]
JMCB	123	14	11.4 [5.5]	89	7	7.9 [3.5]	212	21	9.9 [4.7]
Totals	622	95	15.3 [5.3]	406	19	4.7 [1.2]	1,028	114	11.1 [3.5]

Values in brackets refer to the percentage of journal space in pages allocated to commentary. For JFE, the initial time period is 1974-1982 rather than 1969-1982