

On Replication in Business and Economics Research: The QJBE Case

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In 1984 the Quarterly Journal of Business and Economics (QJBE) became the first journal to give priority to publishing econometric replications. This study is a retrospective on the research published in the QJBE under this policy. Over the 1984-1994 period replications occupied more than 21 percent of the journal's contents. Further, the acceptance rate for replications has been higher than for other studies. The journal also devoted more than 5 percent of its pages to reviews of empirical literature.

Replication articles have focused on financial economics and industrial organization; they tend to use publicly available data sets and not to contradict entirely the findings of earlier studies. Econometric replications have been more heavily represented in the QJBE than in other outlets, but they have not dominated the contents of the journal. This finding suggests that editorial policy can bring forth a supply of replication research, but other active measures are necessary before such studies become more common.

"It is important that econometric replications be taken as seriously as replications in the experimental sciences."

R.A. Mittelstaedt and T.S. Zorn (1984, p. 14).

INTRODUCTION AND REVIEW

In business and economics research, support often is expressed for the concept of econometric replication. For example, Mittelstaedt and Zorn (1984) argue that a result is not worth knowing if it cannot be reproduced. Despite such a declaration, this type of research apparently has been regarded with ambivalence. Reproducing other researchers' findings may be viewed as less creative than generating new results with original research (Dewald, Thursby, and Anderson, 1986; Kane, 1984).¹

In their analysis of the market for econometric studies, Feigenbaum and Levy (1993a) argue that there may be data externalities: would-be replicators may not have access to data used in original studies.² Dewald *et al.* (1986) argue that reproducibility is a public

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¹ Similar ambivalence has been noted in the social and physical sciences. For example, see Lindsay and Ehrenberg (1993) and Kuhn (1970).

² On testing replications with contaminated data, see Levy and Feigenbaum (1990).

good. Readers benefit from knowing whether empirical results can be supported, but it is difficult for a researcher to assess how each reader would value a confirmation. Thus, Dewald *et al.* and Feigenbaum and Levy have urged journals to adopt policies that promote reproducibility.

Editors have acknowledged the importance of reproducing results. Frisch (1933) wrote in the first volume of *Econometrica* that its articles also should include raw data. But editorial attention to reproducibility has been a comparatively recent occurrence. It is only in the past decade or so that journals such as *American Economic Review* and *Journal of Money, Credit and Banking* have requested data and computer programs from authors so that articles may be duplicated.³ Since 1993 the St. Louis Federal Reserve Bank has made data from its *Review* articles available to the public (Anderson and Dewald, 1994).

Some journals have treated replication as more than an auditing device. In response to a suggestion by Feige (1975), the editors of *Journal of Political Economy* (1975) created a "Confirmations and Contradictions" section in the journal. The editorial board of *Industrial & Labor Relations Review* (1993, p. 227) has declared that it will "give serious consideration to publishing replication studies of a kind that we have, for the most part, rejected in the past." But the *Review* has qualified its policy, stating that replications should be brief and that a topic must be deemed to be extraordinarily important.

Although some have done so, most journals do not explicitly encourage econometric replications, and such studies have been rare.⁴ Hubbard and Vetter (1991) analyze four prominent finance journals and find that only 5.3 percent of their articles are replications, accounting for 4.3 percent of journal space.⁵ For three leading economics journals, Hubbard and Vetter (1992) report nearly identical results.⁶ They discuss similar findings of Reid, Soley, and Wimmer (1981) for advertising research and how Brown and Coney (1976) find only 2 percent of marketing publications to be replications.

In the *Quarterly Journal of Business and Economics (QJBE)* Kane (1984) urges editors to invite econometric replications. In the same issue the board of editors announced a new policy, which departs from other journals: the *QJBE* would give *priority* to publishing replication studies. Arguing that replication had been neglected, the editors affirm that the journal would give particular consideration to this type of research.

Since adopting its policy, the *QJBE* has published several replication studies. Hubbard and Vetter (1992) examine a random sample of 52 empirical articles appearing in the journal between 1984 and 1989. This sample represents about one-third of *QJBE* articles

³ Anderson and Dewald (1994) report that in 1993 the *Journal of Money, Credit and Banking* stopped requesting data from authors.

⁴ In addition to the journals mentioned above, some others require authors to make data and programs available or invite replication studies. These journals include *Demography*, *Journal of Applied Econometrics*, *Journal of Business and Economic Statistics*, *Journal of Econometrics*, *Journal of Environmental Economics and Management*, *Journal of Human Resources*, *Land Economics*, *Oxford Bulletin of Economics and Statistics*, and *Public Choice*.

⁵ They examine *Journal of Finance*, *Journal of Financial and Quantitative Analysis*, and *Journal of Money, Credit and Banking* for 1969-1989 and *Journal of Financial Economics* for 1974-1989.

⁶ Their sample includes *American Economic Review*, *Journal of Political Economy*, and *Review of Economics and Statistics* for 1965-1989.

published during this interval. They find that 17.3 percent of the sample consists of replications, a larger proportion than in other journals.

Given the *QJBE*'s unique policy, Feigenbaum and Levy (1993b) write that analysis of the journal would be particularly intriguing. Now that the policy has been in place for a decade, this study examines closely the profile of research published in the *QJBE*.

Instead of a random subsample, I analyze all *QJBE* articles in the 11 complete volumes published under the pro-replication policy. I distinguish two types of replication studies: (1) reproductions and (2) reexaminations. I report the share of articles and proportion of pages devoted to such studies. I also compute the proportion of replications among manuscripts accepted for publication and among those rejected. This study also describes the allotment of journal space to reviews of empirical literature.

Feigenbaum and Levy (1993a) predict that published replications will tend to contradict earlier research; the results reported by Hubbard and Vetter (1992; 1991) provide some support for this hypothesis. For the *QJBE* sample, I investigate the proportion of replications that confirm previous research.

This study also examines topics of replication studies and empirical reviews to see if there has been concentration on particular subjects. Given Feigenbaum and Levy's (1993a) argument that data inaccessibility hampers replication, I determine whether published replications have relied on standardized, widely-available data sets.

QJBE REPLICATION POLICY

When the *QJBE* announced its policy, the board of editors (1984, p. i) declared that "There is a neglected body of research which involves testing the validity of theories, methodologies, and data used in previously published studies." Accordingly, the editors invited replications that emphasized extension, not mere duplication, of published empirical results.

The editorial board also declared (p. i) that "There is also a need for more articles which synthesize the literature on important topics, particularly those which bridge several disciplines." So the journal announced that it also would give priority to literature reviews.

Although the editors wanted the *QJBE* to become an outlet for replications, they did not view publishing such studies as the exclusive mission of the journal. Therefore, the journal continued to publish other empirical and theoretical research.

REPLICATIONS IN THE QJBE

CLASSIFYING REPLICATIONS

Kane (1984) distinguishes attempts to duplicate results, which he calls *econometric audits*, and efforts to reproduce and extend findings, or *improvisational replications*. Brown and Coney (1976), Hubbard and Vetter (1992; 1991), and Reid, Soley, and Wimmer (1981) also differentiate mere duplication and replication with extension. Hubbard and Vetter (1991) define *replication with extension* as "duplication of a previously published empirical research project that primarily is concerned with increasing the external validity (generalizability) of the research design" (p. 71). Similarly, Lindsay and Ehrenberg (1993) distinguish *close replication* (attempts to keep all known conditions similar or the same)

and *differentiated replication* (involving known variations in major aspects of an original study).

Given the various criteria, it is clear that there is no single, official method for classifying replications. According to Mittelstaedt and Zorn (1984, p. 10), "replication" is a term that "nearly defies precise definition."

In their analysis of finance journals, Hubbard and Vetter (1991) independently examine 555 articles to identify replications. There were a few disagreements in the sorting process and they typically designate a disputed study as a replication. In their own words (p. 72), they "erred" on the side of inflating the number of replications.

This study does not focus on methods for classifying replications *ex post*. Instead, I concentrate on a different question. How much material is presented by authors as replication research? The crucial issue is not how to categorize studies *ex post*, but whether authors characterize their articles as replications *a priori*. If replication is explicitly encouraged but few articles are sold as such, then presumed biases against replication are evidently strong. Therefore, I use authors' descriptions of their own articles to identify replication studies.

The *QJBE* editors declare that replication studies should emphasize extension of published empirical results and should not consist of duplication only. A study may attempt to duplicate results, however, to establish a point of departure for its own extension. If an article declares that it includes an effort to duplicate or reproduce outcomes of previously published empirical research, then I designate that self-styled replication as a *reproduction*.

A study may reexamine empirical research, to corroborate findings or extend its results, without attempting to duplicate the original findings. If an article states that it uses a similar research design to confirm past conclusions without attempting to duplicate results, then I classify that self-styled replication as a *reexamination*. A reexamination thus uses similar or different samples or types of data to update or generalize past findings.

My designations rely on author portrayals of their own articles. Consequently, my measures may not include all replicatory work that has appeared in the *QJBE*. I will err on the side of deflating measures of replication.⁷

SAMPLE

Beginning with the first issue of the 1984 volume in which the *QJBE* announced its new editorial policy, I inspected each complete volume of the journal for self-styled replications. The sample includes 44 journal issues between 1984 and 1994. As shown in Table 1 (first column), the *QJBE* published 275 articles over the sample period. Table 2 (first column) reports that articles occupied 4,651 pages of journal space.⁸

⁷ Two *QJBE* articles are presented by authors as attempts to replicate previous studies. Because they use different research designs than the original studies, I did not include them as replications.

⁸ In 1993 the journal published a correction of a 1988 *QJBE* article, in which the author corrected mistakes discovered in the original study. Because the correct results would have been presented in the original study, I do not treat the correction as a separate article, and its pages are not counted in the sample.

Table 1—Replications in the *QJBE*, Number of Articles

Volume	Number of Articles	Number of Reproductions	Number of Reexaminations	Number of Reviews
1984	24 ^a	0	3	0
1985	29	5	3	1
1986	23	0	4	2
1987	27	4	3	1
1988	32	4	5	2
1989	26	7 ^b	3	2
1990	23	1	3	0
1991	24	1	4	2
1992	23	1	1	0
1993	21	2	3	0
1994	23	1	4	0
Total	275	26 (9.45%)	36 (13.09%)	10 (3.64%)

^aTwo articles in the 1984 volume argue in favor of more replication studies, but they do not attempt to reproduce past empirical research. Consequently, I do not count these articles as replications

^bOne reproduction study published in the 1989 volume was accompanied by a comment article and a reply article. Because the comment and reply cover aspects of the reproduction study, I include each of them as reproductions

REPRODUCTION STUDIES

Between 1984 and 1994, 26 articles in the *QJBE* include attempts to duplicate previously published empirical results (see Table 1, second column). Such studies represent 9.45 percent of articles published. Table 2 (second column) shows that the journal committed 419 pages—9.01 percent of journal space—to this form of replicatory research.

The share of reproduction studies varied from year-to-year. Twenty of the 26 reproductions (328 of 419 pages) were published during the 1985-1989 span. During this five year interval, more than 14 percent of the *QJBE*'s articles and pages were committed to such duplicatory articles. In the following five years, the share of reproductions dropped. Between 1990 and 1994 only 5.26 percent of articles, covering just 4.47 percent of pages, tried to reproduce earlier empirical results.

REEXAMINATION STUDIES

Table 1 (third column) also reports the number of reexamination studies in the *QJBE*. Under the new policy, 36 articles sought to update or extend, without duplicating, the results of previous empirical studies. This type of replication occupied 13.09 percent of the journal's articles. As shown in Table 2 (third column), the *QJBE* devoted 568 pages—12.21 percent of journal space—to reexaminations.

Table 2—Replications in the *QJBE*, Number of Pages

Volume	Number of Pages of Pages	Pages of Reproductions	Pages of Reexaminations	Reviews
1984	297 ^a	0	31	0
1985	424	59	41	26
1986	362	0	67	59
1987	394	47	37	16
1988	658	83	89	54
1989	480	139 ^b	48	64
1990	484	16	76	0
1991	446	16	69	34
1992	422	19	26	0
1993	363	23	35	0
1994	321	17	49	0
Total	4,651	419 (9.01%)	568 (12.21%)	253 (5.44%)

^aTwo articles in the 1984 volume, occupying 13 pages, argue in favor of replication research, but do not attempt to replicate past empirical research. Consequently, I do not count their pages among those of replication studies

^bOne reproduction study published in the 1989 volume was accompanied by a comment article and a reply article. Because the comment and reply cover aspects of the replication study, I include their pages in the space allocated to reproductions

In contrast to reproductions, the share of reexamination studies has been steady. For 1984-1989, reexaminations accounted for 13 percent of articles and nearly 12 percent of the journal's pages. The proportions are virtually the same for the latter years of the sample. For 1990-1994 reexaminations occupied 13 percent of articles and more than 12.50 percent of pages in the journal.

REPRESENTATION OF REPLICATION STUDIES

In the years under the *QJBE*'s new policy, self-styled replications occupied 22.55 percent of articles (62 of 275) and 21.22 percent of pages (987 of 4,651) in the journal. Such studies have not dominated the *QJBE*, but their share of space is greater than reported for other journals in finance and economics (Hubbard and Vetter, 1992 and 1991). According to my classifications, replications have occupied a greater share of the *QJBE* than Hubbard and Vetter (1992) find in a random subsample of 52 empirical articles published between 1984 and 1989.⁹

⁹ Based on Hubbard and Vetter's description of *replication with extension*, their term should encompass both reproduction and reexamination studies as defined in this article.

The figures in Tables 1 and 2, especially for reexaminations, suggest that replication research can be cultivated. An outlet for econometric replications will attract many such studies. The drop in reproductions for 1990-1994, however, shows that it is still unclear whether duplicative research can be sustained. Further, even with an explicit policy that gives priority to replications, such research apparently will not overshadow other types of studies.

Another aspect of the *QJBE*'s policy deserves attention: replications have equal footing with other studies. The journal does not segregate replication articles. The editors do not require authors to justify topics of replications. Further, replications have been, on average, the same length as other articles. This conclusion is supported by the fact that the share of replication articles is similar to the share of pages occupied by such articles.

The *QJBE* not only gives equal status to replication articles, they are more prevalent among studies accepted for publication than those rejected. In early 1994 I was given access to the journal's files. The journal typically maintains files for two years, and I was able to inspect manuscripts submitted between January 1992 and February 1994. I was able to identify 162 manuscripts on file for which final decisions had been made regarding publication.¹⁰ Of the 60 articles accepted for publication, 13 were self-styled replications. Thus, more than 21 percent of the manuscripts recently submitted and accepted for publication were replication studies. Among the 102 rejected studies, only 15, less than 15 percent, were self-styled replications.

DO REPLICATIONS SUPPORT PREVIOUS FINDINGS?

Kane (1984) writes that reproducing econometric results has not been encouraged, presumably because it is not sufficiently novel or might be viewed as bullying. Refuting past results, however, may provide a niche for replication research. If there is a bias against verifying past findings, then there may be a tendency for replication articles to report contradictory results.

Feigenbaum and Levy (1993a; 1993b) predict that among replications, negative ones will predominate. Hubbard and Vetter (1992; 1991) report that approximately 20 percent of replications in economics and finance journals support earlier results, with another 15 percent to 20 percent providing partial support of earlier findings.¹¹

Eight of the 26 reproductions in the *QJBE* duplicate earlier findings; nine articles report mixed results, and nine studies are contradictory.¹² Eleven of the 36 articles that try to update or extend past findings are supportive, 22 articles report mixed results, and only three studies are entirely contrary.

Clearly the *QJBE* does not favor negative replications over positive ones. Further, it appears that most replications do not support completely or contradict entirely the results of earlier research.

¹⁰ I do not include manuscripts for which a publication decision had not been made, nor do I include manuscripts returned for revision.

¹¹ On difficulties in trying to duplicate past findings, see Anderson and Dewald (1994), Dewald, Thursby, and Anderson (1986; 1988), Feigenbaum and Levy (1993a; 1993b), Mayer (1980), and Merrick (1988).

¹² One of the contradictory replications generated a comment article and a reply article. The comment and reply are each included among the contradictory reproductions.

TOPICS OF REPLICATION STUDIES

Replicatory studies in the *QJBE* have addressed many issues, but some topics have received special attention. I categorize these studies by topic, using the codes assigned by the *Journal of Economic Literature* (*JEL*).¹³ Many articles receive multiple classifications. Of the replications in the sample, the *JEL* assigned 77 topic listings.

Table 3 reports the topic listings for the *QJBE*'s replication articles, classified according to broad *JEL* topic categories. It also shows entries for narrower, specialized topics with at least three replications.

More than half of the topic listings, 39 of 77, are in the broad category of domestic monetary and fiscal theory and institutions. Two-thirds of these listings are in the specific area capital markets. Ten more of these entries appear in the narrow topic areas monetary and financial economics and commercial banking. Further, another six replications focus on business finance.

After financial economics, industrial organization is the next most frequent topic area, with 14 listings. Most of these studies focus on market structure and manufacturing.

TYPES OF DATA

The prominence of capital market replications may reflect the relative ease of access to standardized data as—for example, data tapes or published bulletins reporting stock returns, interest rates, and other economic variables. Seventeen of the 62 replication articles use (some) private or unpublished data. Nearly three-fourths of the replication studies use widely available computer data tapes—for example, CRSP and COMPUSTAT—or published data from government or other publications.

Feigenbaum and Levy (1993a; 1993b) have expressed concern that replications will be stifled by data inaccessibility. Given the profile of articles in the *QJBE*, replications evidently will be concentrated in those topic areas where standardized databases frequently are used.

EMPIRICAL LITERATURE REVIEWS IN THE *QJBE*

To support its view that research should be reexamined and reconsidered, the board of editors also declared that the *QJBE* would give priority to reviews of empirical literature. Under this policy, 10 articles—3.64 percent of those published—review bodies of empirical research (see Table 1, fourth column). These review articles occupy 253 pages (5.44 percent) of journal space (Table 2, fourth column). Unlike replications, reviews are relatively long.

As with reproductions, most of the literature reviews (seven of ten) appear between 1985 and 1989. Like replication articles, half of the reviews focus on financial economics.

¹³ *JEL* topic codes changed over the 1984-1994 sample period, beginning in March 1991. More specific categories were created from the more general subject divisions that had been used. The *Journal of Economic Literature* classification system (1991) contains a conversion chart to show how the new categories relate to the old ones. To obtain comparable topic classifications across the sample period, I use the old, more general subject categories.

Table 3—Topics of Replication Studies in the *QJBE*

<i>JEL</i> Code	Topic	Number of Replication Listings
100	Economic Growth; Development; Planning; Fluctuations	5
200	Quantitative Economic Methods and Data	1
300	Domestic Monetary and Fiscal Theory and Institutions	39
	311—Domestic Monetary and Financial Theory (6 listings)	
	312—Commercial Banking (4 listings)	
	313—Capital Markets (26 listings)	
400	International Economics	2
500	Administration; Business Finance; Marketing; Accounting	8
	521—Business Finance (6 listings)	
600	Industrial Organization; Technological Change; Industry Studies	14
	611—Market Structure: Industrial Organization and Corporate Strategy (6 listings)	
	631—Industry Studies: Manufacturing (3 listings)	
700	Agriculture; Natural Resources	1
800	Manpower; Labor; Population	4
900	Welfare Programs; Consumer Economics; Urban and Regional Economics	3
		Total 77

SUMMARY AND CONCLUDING REMARKS

Replication should play an important role in business and economics research. As noted by Kane (1984), confirming results is at the core of the scientific method, but econometric replications have been rare.

In 1984 the *Quarterly Journal of Business and Economics (QJBE)* became the first journal of its kind to give priority to publishing replication articles. Under its policy the *QJBE* has devoted more than 21 percent of its contents to self-styled replication studies. Further, more than 5 percent of pages have been committed to reviews of empirical literature.

Financial and monetary economics and industrial organization have been the most common topics of replication articles. This observation should not be surprising, given well-publicized stock market anomalies, conflicting empirical evidence in macroeconomics, and ongoing controversy about market structure and performance. Because standardized databases are widely available in these areas, I expect these topics to continue to generate many more replications. It is still unclear whether other topics will be subjected to frequent replication research.

By examining a journal with a policy of promoting replication, I have identified several characteristics of replication research. But a policy question remains: Is there *enough* replication?

Econometric replications have been more prevalent in the *QJBE* than in other outlets. They have equal status with other articles in the journal. The journal has had a higher

acceptance rate for replications than for other types of studies. These findings suggest that editorial policy can encourage replication research. This conclusion should reinforce the commitment of the *QJBE*'s editors to attract and publish replication studies.

Unfortunately, econometric replications are still comparatively rare. Even with its priority on accepting and publishing replications, such studies have hardly dominated the pages of the *QJBE*. To foster more accurate empirical analysis and confirmation of results, the journal should undertake other active measures to promote replication research.

Each issue of the *QJBE* contains a statement of the journal's replication policy. To illustrate its commitment to this type of research, I urge the journal to publish regularly its acceptance rates for replications and other studies. Further, I encourage the editors to report frequently the share of journal space committed to replication articles.

Anderson and Dewald (1994) argue that journals can lower the marginal cost of performing replications by collecting data and programs from authors. To strengthen its role as an outlet for replicatory research, I urge the *QJBE* to adopt the practice of collecting data from authors and making it available to readers. This should lower barriers to replication and encourage more of this vital research.

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