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Evaluating the Quality of IMF Research: A Citation Study

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Abstract

This study compares the performance of IMF research to that of seven peer institutions in terms of publication in refereed journals and of citations in working papers of the comparator group during the period 1999–2009. Publication and citations are commonly used as indicators of quality of research. The comparator group is composed of Bank of Canada, the Board of Governors of the Federal Reserve, Federal Reserve Bank of New York, Federal Reserve Bank of San Francisco, Inter-American Development Bank, Organization for Economic Cooperation and Development, and the World Bank. IMF working papers were cited less often than those of the Federal Reserve, but more than those of the other comparators. Citations by the IMF and other international organizations are underestimated because the data used for the analysis excluded publications in developing countries and in languages other than English.

JEL Classification Numbers: A10, A14, A30

Keywords: International financial institutions, citation counts, publication counts, quality comparisons

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ABBREVIATIONS

BCA	Bank of Canada
BIS	Bank for International Settlements
CBs	central banks
CEPR	Center for Economic Policy Research
ECB	European Central Bank
FedBG	Federal Reserve Board of Governors
FedNY	Federal Reserve Bank of New York
FEDs	Federal Reserve Board of Governors, Federal Reserve Bank of New York, and Federal Reserve Bank of San Francisco
FedSF	Federal Reserve Bank of San Francisco
G-Scholar/GS	Google Scholar
IDB	Inter-American Development Bank
IFIs	international financial institutions
IMF	International Monetary Fund
NBER	National Bureau of Economic Research
OECD	Organization for Economic Cooperation and Development
RePEc	Research Papers in Economics
UCSC	University of California at Santa Cruz
WB	World Bank
WP	working paper

I. INTRODUCTION

1. Research and its timely dissemination are critical to the success of international financial institutions (IFIs) and central banks (CBs) in fulfilling their missions. Research provides the conceptual and empirical basis for better policymaking, and for better communication of policies to affected countries and the public. Consequently, many IFIs and CBs have invested significant resources in recent years to improve their capabilities for research and its dissemination. This study evaluates the quality, relevance, and utilization of IMF research, seen in the context of research by other leading policy institutions. The premise of the study is that research is critical to the IMF's successful operations because it contributes to the development and updating of the analytical tools that the Fund needs to discharge its responsibilities.[1]

2. A significant and growing literature deals with the scientific evaluation of academic research, evaluating and ranking the quality of academic papers, individual scholars, and institutions. A substantial literature on the use and usefulness of citations of academic journal articles for measuring research quality and researcher productivity follows the work of Cole and Cole (1973) and Merton (1973). Studying the quantity and pattern of citations of published research findings has become an important approach for measuring the impact and diffusion of academic research. Article citations are often used as a measure of research quality and utilization in the assessment of individual researchers, university departments, or academic journals. Data on citations of publications may also be used to trace the influence and evolution of knowledge, following the approach of Jaffe and Trajtenberg (2002), who used data on patent citations to study the diffusion of technological knowledge.

3. The usefulness of citations for measuring research impact is also the subject of a large literature in the sociology of science that emphasizes the role of academic culture and the incentives to cite. Much of the interest in citation patterns and the motives to cite stems from the use of citations to evaluate scientific careers and compensate academic researchers. Posner (2000) offers a lucid analysis of the incentives of scholars to cite the work of predecessors. He points out that citations play a key informational role in the written presentation of research, and acknowledge the priority of contributions by others, but can also be used strategically.[2] Citations can eliminate the replication of results, derivations, and arguments that are already known. They can also be used to place new findings or ideas in context, using readers' familiarity with a literature to reduce what needs to be written and read. Because scholarship is costly, information costs and networking may be other important

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[1] See the March 2010 IEO Issues Paper, "Research at the IMF: Relevance and Utilization," available at www.ieo-imf.org.

[2] While citations serve the purpose of conveying information in academic exposition, the rewards to being cited and the role of others in the peer reviewing process affect the incentives to cite.

factors for understanding citation behavior (see Aizenman and Kletzer (2008) for further discussion and references).

4. Recognizing that there are differences among journals, efforts to assess the quality of research often apply two broad measures of quality. One of these is a publication count, weighting the publication record of an institution (or an individual) by the relative quality of the journals in which its publications have appeared. The other measure is a citation count, sometimes weighting each citation by the relative quality of the citing journals. Coupé (2003) applied such a measure to provide a comprehensive ranking of economics departments. His ranking methodology is based on the citations-weighted journal ranking by Laband and Piette (1994), and is used to assess the output of individual researchers and then, according to their affiliation, compute the departmental rankings.[3]

5. The literature that rates the research produced by central banks has applied a similar approach, focusing mostly on publications in refereed journals.[4] But, while informative, this approach frequently ignores the unique dimension of policy institutions, whose mandate goes beyond research and may include the design and implementation of domestic policies (as in the case of central banks); the establishment of rules, institutions, and procedures to regulate the international financial system at the multilateral level (as at the IMF) and Bank for International Settlements (BIS); or fostering the development of poor and emerging markets (as at the World Bank (WB) and regional development banks). The policy role of policy institutions implies that the fast dissemination of their research and position working papers (WPs) is at least as important as the longer-run impact of these papers on knowledge via their ultimate publication in refereed journals.

6. Our paper studies the research impact of the eight policy institutions, focusing on their working papers and using two distinct approaches. First, we evaluate the short-term impact of a working paper by tracing the citations of new working paper in subsequent working papers written within the eight institutions (and in all publications). We use this citation count as a measure of the revealed policy impact (and general impact) of that paper. Looking at the panel patterns of the citation count of a working paper provides a measure of the relevance and the speed of dissemination of research within the peer institutions, and the

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[3] Coupé (2003) is one of four papers sponsored by the European Economic Association to rank European research centers; the other three are Combes and Linnemer (2003), Kalaitzidakis and others (2003), and Lubrano and others (2003).

[4] Jansen (1991) and Rapoport and Yi (1997) compare the publication records of the various components of the U.S. Federal Reserve System; Eijffinger and others (2002) and Jondeau and Pagès (2003) focus on those of central banks in Europe. Goodfriend and others (2004) provide a detailed assessment of the economic research activities of the European Central Bank (ECB), and St-Amant and others (2005) measure the policy relevance of central banks' research.

impact of the research outside the peer institutions. Second, we evaluate the longer-term impact of a working paper by tracing its ultimate publication, if any, in policy-oriented and academic journals. Aggregations of the citations and the publication records of the working papers published by the policy institutions provide measures of these institutions' overall research performance. Such measures are imperfect, due to various aggregation and heterogeneity issues discussed below. Yet, short of better measures, changes in the relative ranking of these institutions provide useful information about the relevance, utilization, and quality of their research.

7. The paper is structured as follows. After Section II, on data sources, Section III outlines the methodology applied. Section IV presents the results for the two approaches outlined above—the citation counts achieved by the working papers and the working papers' record of being published in journals—drawing conclusions about the strengths and weaknesses of Fund research relative to that of peer institutions. Section V summarizes the main findings and concludes. Statistical tables are grouped in the annex.

II. DATA SOURCES

8. Evaluating the quality, quantity, and relevance of the research undertaken by policy institutions is made more difficult by the lack of a single efficient platform where all the questions can be answered in a timely manner at reasonable expense. The sheer volume of such a study, dealing with thousands of working papers, renders manual procedures impracticable.

9. These constraints led us to use two platforms: Research Papers in Economics (RePEc) and Google Scholar (G-Scholar or GS). While these two platforms are subject to various limitations, taken together they provide useful insights about the peer institutions' research.

- *RePEc* (http://RePEc.org) is an initiative to create a public-access database that promotes scholarly communication in economics and related disciplines. All RePEc information is freely available from the web-based RePEc services. A stated limitation of this service is that due to procedural limitations, RePEc thus far covers so far only three-fourths of the relevant electronic documents posted on the Internet. RePEc provided us with a data set that allows analysis of the citations received by all the working papers that were published by the eight policy institutions during 1999–2009.

- *Google Scholar* is an open and rich data source, aggregating and ranking the citations of scholarly papers according to Google's algorithms. The convenient features of GS, and the presumed quality associated with the Google brand, have made this a popular service. We used GS to establish which of the well-cited working papers issued by the peer institutions had eventually been published in professional journals.

10. It is important to note that the use of RePEc and Google Scholar may exclude publications in developing countries that are not captured by these two platforms, particularly if they are in foreign languages. This may generate some bias in the results that are discussed later.

III. METHODOLOGY

11. A common approach for evaluating institutions (or scholars) is benchmarking: comparing the citations and publications record of an institution (or a scholar) to a group of peer institutions (or peer scholars) that share similar characteristics. Short of having a simple metric for measuring the absolute value of research, benchmarking allows the performance of an institution to be assessed relative to that of comparable peer institutions operating in a similar environment.[5]

12. An example of applying a benchmarking approach in evaluating the performance of policy institutions is St-Amant and others (2005). These authors measure the policy relevance of research done by CBs by counting the number of citations of central bank working papers in the publications of BIS. They chose BIS for this purpose because BIS pursues interests in the policy issues that are relevant to CBs, and because its websites are conducive to citation searches. Their methodology is based on the premise that having a paper cited in a publication of a policy institution is a good indicator of its usefulness for addressing relevant policy issues. Our methodology is a natural extension of St-Amant and others (2005) and the references in that article.

13. We study the research impact of the IMF and seven other policy institutions selected for their commonality of purpose and data considerations. As well as the Fund, the group comprises the Bank of Canada (BCA), Inter-American Development Bank (IDB), Organization for Economic Cooperation and Development (OECD), U.S. Federal Reserve Board of Governors (FedBG), Federal Reserve Bank of New York (FedNY), Federal Reserve Bank of San Francisco (FedSF), and the WB.[6]

14. As reported by RePEc, the IMF and WB each issued similar numbers of working papers during 1999–2006—about 260 per year—while the three Fed institutions together

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[5] See Camp (1989) and Boxwell (1994) for further discussion about benchmarking.

[6] The U.S. Federal Reserve System comprises the Board of Governors and 12 regional district offices. To prevent overrepresentation of the Federal Reserve in our study, we chose the Board and the two regional Federal Reserve District Banks with the highest citation counts. These turned out to be the Federal Reserve Bank of New York and the Federal Reserve Bank of San Francisco (we applied several criteria, including the total citations for all papers; the total citations for the top 50 papers, and the largest number of papers with at least one citation). We did not include the ECB in our sample because of some measurement errors caused by RePEc's automated procedures: ECB WPs each include a list of previous working papers, and the automated procedures count those lists as part of the citation statistics.

published about 320 working papers per year and the other three institutions (BCA, IDB, and OECD) together published about 240 working papers per year (see Annex Table A1).

A. Achieving a Stable Panel for Comparison

15. Ideally, we would like to have a stable panel comparison across the eight policy institutions during the period 1999–2009, whereby each working paper has its citations and ultimate publication, if any, measured over the same time horizon (i.e., period of the same length) as the other papers.[7] The wish to have a stable panel of this kind poses a dilemma: longer citation and publication horizons reduce the panel length, because the information is truncated in 2009. As described in detail below, we deal with this dilemma by observing from the data that the citation count per year peaks about two years after a working paper is issued, and that the average working paper gets more than half of its total citations within two years from its date of issue. Hence, we set the citation horizon to be two years from the working paper's date of issue.[8] Similar considerations apply to the analysis of publications. Here the data show, as detailed below, that most of the publications of working papers as journal articles take place within three years from the working paper's date of issue. Therefore, we set the journal publication horizon at three years.

16. Given these choices, the durations of the panels in our analysis reported in Section IV depend on the context of the discussion. Figures and tables reporting on citations and publication of working papers within five years of their date of issue cover those papers that were issued during 1999–2003, while those dealing with citations of working papers within two years of their date of issue cover those papers issued during 1999–2006.

Defining a lag structure: citations

17. To define a lag structure that will allow a stable panel for comparing citation rates among the peer institutions during 1999–2009, we use the RePEc database to compare the citation dynamics across the eight institutions over time. The goal is to select the same time horizon for each working paper to measuring its citations and ultimate impact.

18. As shown in Figure 1, which plots the citation rate in the years following the working papers' dates of issue, we find that the curves follow an asymmetric inverted U-shape, with a fast takeoff and slower decay. Information dissemination is substantially slower among

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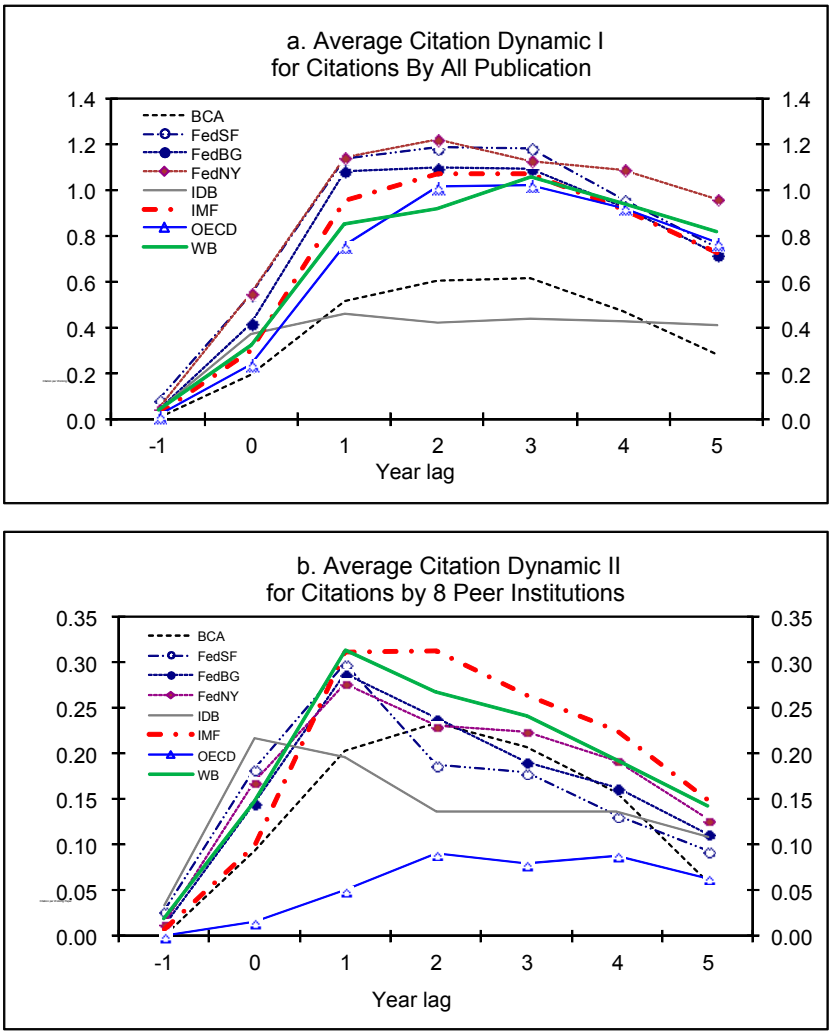
[7] Thus, when measuring the number of citations received, a working paper issued in 2000 should be accorded the same time horizon as a working paper issued in 2004; similarly, when measuring whether or a not a working paper has been published, a working paper issued in 1999 should be accorded the same time horizon as a working paper issued in 2002.

[8] That is, from t–1 to t+2, where t stands for the paper's year of issue.

publications at large than it is within the peer institutions: the citation curve counting all citations (i.e., including those outside the peer institutions) peaks about three years after a working paper's issue date (Figure 1a), thus a year or two later than the peak of the citation curve within the peer institutions (Figure 1b).[9]

Figure 1. Citations Per Paper, for Working Papers Issued in 1999–2003



Note: Compiled using data provided by RePEc. Panel *a* reports the citations of a WP in all the publications in the RePEc database. Panel b reports the citations of a WP in the publications of the peer institutions.

[9] For the same group of papers, issued during 1999–2003, the ratio of citation outside the eight institutions versus inside the eight institutions increased from 2.53 (=8228/3253) two years after their issue dates to 3.26 (=18850/5776) five years after their issue dates (see Annex Tables A6 and A7), indicating the broadening of the WPs' influence from policy institutions to academia, practitioners, and other institutions.

19. We focus our analysis on the citation dynamics during a paper's first two years (i.e., from *t*–1 to *t*+2, where *t* stands for the paper's year of issue), thus covering a year past the peak of the average citation curve for citations by the eight peer institutions. This choice provides us with a longer panel study of possible trends for papers that were written during 1999–2006. Hence, while we use a citation horizon of five years in studying the citation curves shown in Figure 1 (therefore covering working papers issued during 1999–2003), we shorten the citation horizon to two years in some of the subsequent discussions in order to get a longer panel. Working with such a longer panel helps to identify trends.

Defining a lag structure: publications

20. The second measure we use to compare the quality and relevance of the Fund's research with that in the other peer institutions is the rate of publication of working papers in top journals. To begin calculating this rate, we fed Google Scholar with a list of those working papers that were issued by the eight institutions during 1999–2006 and had received at least one citation in RePEc within two years of their issue date. Using the G-Scholar searching program, we identified the papers in our working paper list that had eventually been published in top journals. The list of top journals was extracted from Combes and Linnemer (2003).[10]

21. To define a lag structure that will allow a stable panel for comparing the publication rates across policy institutions, we try to identify the typical number of years between the date that a working paper is issued and the date that it is published in a journal (if indeed it is published). Figure 2 reports the rates of publication in top journals for the working papers that were issued between 1999 and 2003. The "top journals" are defined as those with impact weights equal or above 0.33 in Combes and Linnemer (2003).

22. We find that most of the publication in journals took place within three years from the working papers' date of issue: as shown in Figure 2, publications in journals during the first three years from issuing a working paper account for respectively 81 percent (IMF), 71 percent (OECD), 75 percent (BCA), 58 percent (IDB), 75 percent (FedNY), 73 percent (FedBG), 79 percent (FedSF), and 86 percent (WB) of their overall journal publications.

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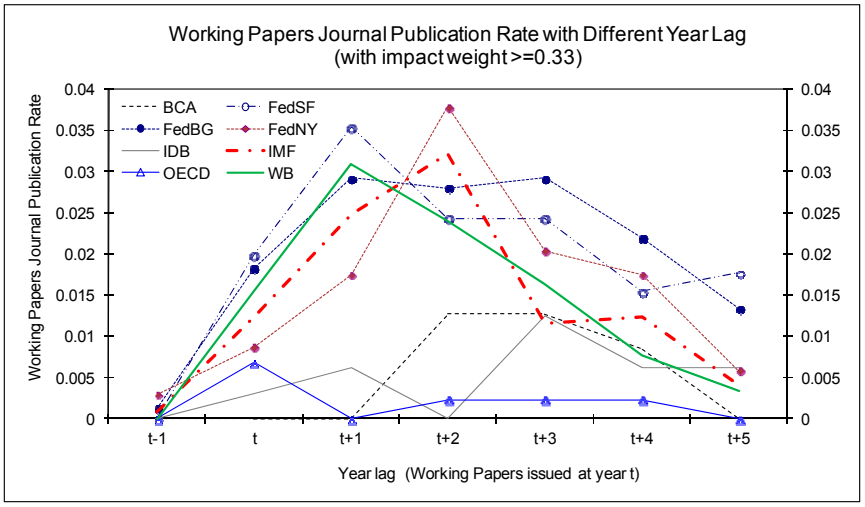
[10] Combes and Linnemer (2003) ranked top journals with impact weights of 1, 0.67, 0.5, 0.33, 0.17, and 0.08. We focused on the top four groups of journals (weighted 1, 0.67, 0.5, 0.33), neglecting journals with impact weights below 0.17. *IMF Staff Papers* is not included in Combes and Linnemer's (2003) journal ranking, presumably because their article focuses on academic scholarship, and therefore on journals that are open to outside academicians. We added *IMF Staff Papers* to their list of journals, attaching to this journal a weight of 0.33. This weight is consistent with the journal ranking reported by Kalaitzidakis and others (2003), and equals the weight attached by Combes and Linnemer (2003) to the *World Bank Economic Review*, a journal that is ranked by Kalaitzidakis and by others as comparable overall to *IMF Staff Papers*.

Thus in the analysis reported in Section IV we focus on journal publications within three years.

Figure 2. Working Paper Publication Rates in Top Journals, by Different Year Lags



Note: Compiled using data provided by G-Scholar. The figure reports the publication rate (i.e., number of publications/number of cited WPs) by year lag for WPs issued during 1999–2003. The data include only those WPs that had achieved at least one citation within two years after their issue date. The top journals include only those journals with impact weights >=0.33, as defined by Combes and Linnemer (2003).

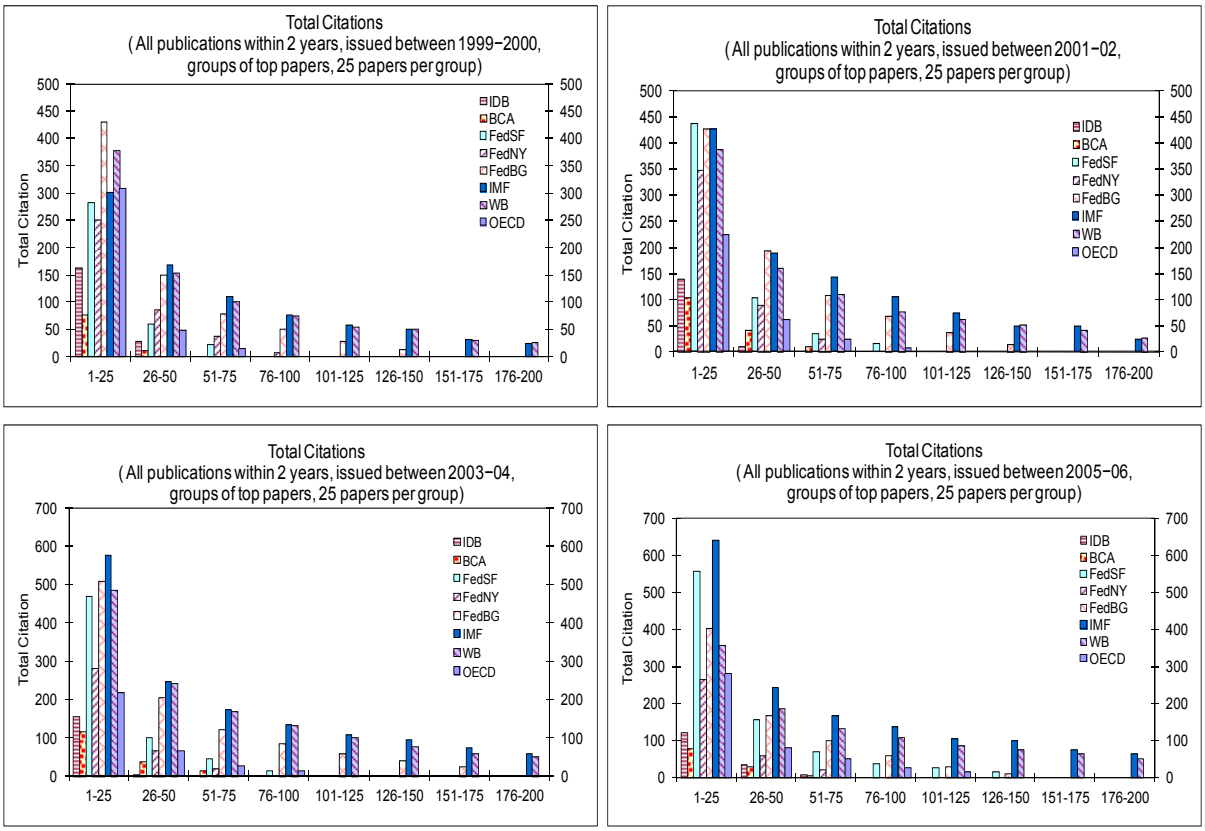
B. Identifying the Effects of Institutional Size

23. The wide range in size of the eight policy institutions may matter for their research culture, quality, and citations, due to scale effects.[11] To investigate systematically the effects of institutional size, we report in Figure 3 the citation patterns of the 200 most cited papers published by each of the peer institutions, grouped in bins of 25. Note the exponential decay of the citation curves.[12] These curves highlight the importance of the size of the peer institutions, as well as allowing us to compare the quality of the top papers across institutions.

[11] Previous studies found that size affects recognition (the "Matthew effect"): a scientific community experiences a nonlinear increase in the amount of recognition it receives as its size increases. See Merton (1968, 1973). A noisy indicator of size is the number of registered scholars at the RePEc web page (as of August 9, 2010) citing a peer institution. The numbers are as follows: IMF (226), WB (265), OECD (138), BCA (53), IDB (62), FedBG (81), FedNY (67), FedSF (28).

[12] The exponential decay of research productivity is consistent with models of knowledge. See Jaffe and Trajtenberg (1996, 2002).

Figure 3. Total Citations, By Groups of Top Papers



Note: Based on data provided by RePEc. The figure reports the top 200 cited papers of each institution, ordered in bins of 25.The citations covered are those achieved within two years of a WP's issue date, and include citations in all publications, not just those of the peer institutions.

IV. Institutional Comparisons: IMF Research Performance in Context

24. This section compares the achievements of the working papers of the IMF with those of the seven other policy institutions, first in terms of citation rates and then in terms of their publication rates in top journals. We then evaluate the Fund's research performance over time, relative to that of the peer institutions, using research quality and importance ratios. Finally we compare the journal-publication impact ratios of the IMF and the other policy institutions, as a measure of the presumed long-term impact of their research.

A. Citation Rates

25. The IMF's record of citations is relatively good. Counting citations by all sources, we find that about half the working papers issued by the IMF, WB, and the three Fed institutions had been cited within two years of their issue date. The IMF leads other IFIs and CBs in this respect, with more than 60 percent of its working papers receiving citations within two years (Annex Table A2, column 4). The citation rates are relatively low for BCA, IDB, and OECD:

on average, only about one-third of their working papers had received citations within two years.[13]

26. The IMF's number of citations per cited paper (4.37) is lower than that of the three Federal Reserve institutions (FEDs, 5.84), but higher than those of the WB (3.87) and the other three policy institutions (3.64), confirming the overall high quality of IMF's research papers (Annex Table A2, column 5).

27. Counting only the citations in working papers prepared by the 8 peer institutions, we find that more than 40 percent of the IMF working papers had been cited within two years of being issued (Annex Table A2, column 8). This is a rate well above those of all the seven other institutions, which range from 20 percent to 36 percent.[14]

28. The IMF's number of citations by peer institutions per cited paper (2.16) is lower than that of the three FEDs (2.31) but higher than that of the WB (2.13) and that of the BCA and IDB combined (2.07) (Annex Table A2, last column).[15]

B. Publication Rates

29. The publication rate of IMF working papers in professional journals is somewhat low compared with those of the other policy institutions. Looking across the eight institutions at the publications that took place within three years of working papers' issue dates, we find that on average 5–20 percent of the cited working papers had been published in a top journal: 14 percent (IMF); 22 percent (three FEDs); 15 percent (WB); and 5 percent (BCA/IDB/OECD combined) (Annex Table A3, column 4).[16]

30. Which top journals most commonly published the working papers from the peer institutions? For the IMF, articles in *IMF Staff Papers* far outnumbered those in any other top journal; the other main publishing journals were *Journal of International Economics* and

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[13] The RePEc database has problems with the records of citation by OECD: most of the OECD WPs do not have a reference list in the RePEc database. This may cause a downward bias of the citation rate for OECD WPs. Therefore in Annex Table A2 we report both the subtotal of "the other three institutions" (BCA, IDB, and OECD), and the subtotal of BCA and IDB without the OECD.

[14] Due to the RePEc database's problem with OECD reference records, OECD WPs' citation count, at 8 percent, is relatively low compared with those of other institutions.

[15] In Section IV we look at the "self-citation" patterns—the citations of an institution's working papers in other working papers issued by the *same* institution. We find significant variation in the self-citation rates across institutions.

[16] Over a time horizon of five years from a working paper's issue date, the comparable rates are 10.1 percent (IMF), 10.0 percent (WB), 11.1 percent (FedSF), 13.9 percent (FedNY), 14.5 percent (FedBG), 1.6 percent (OECD), 3.4 percent (BCA), and 3.7 percent (IDB).

Journal of Development Economics (Annex Table A4). Across all eight institutions, the two top journals most commonly used were the *Journal of International Economics* and the *Journal of Money, Credit and Banking*.

31. We find that some of the institutions published many of their working papers in their own sponsored journals. For example, in the case of the FedNY, more than half of its published working papers appear in its own sponsored journal, *Economic Policy Review*. In the analysis reported below, we consider only the journals that have impact weights equal or above 0.33, according to Combes and Linnemer (2003), in order to eliminate instances of self-publication in relatively low-ranked journals.[17]

C. Research Performance Over Time

32. To evaluate IMF research performance over time, we first trace the evolution of the quality ratio and the importance ratio of the Fund's working papers relative to those of the other peer institutions during 1999–2006. We then apply a range of approaches to check the robustness of our findings, and lastly assess the evolution of the journal-publication impact ratio.

Quality and importance ratios

33. Quality and importance ratios provide a means to control for the presence of the significant fraction of working papers that are not cited within two years of being issued. The average quality ratio of an institution's working papers is defined as the percentage of working papers that have been cited within two years of being issued, and the average importance ratio of an institution's working papers is defined as the average number of citations that a cited paper achieves within two years of being issued.[18] Hence, the importance ratio measures the average feedback received by those working papers that are counted in the quality ratio. The quality ratio and the importance ratio provide information about the overall quality of an institution's working papers.

34. The quality and importance ratios show that the IMF's research performance was at about the mean for the policy institutions in 1999, and improved remarkably during the next seven years (Figures 4 and 5). An apparent deterioration in the last year was not large enough to negate the overall improvement during the period studied. Note that the overall performance of the peer institutions other than the IMF is trendless, both for citations within the peer institutions and for all citations.

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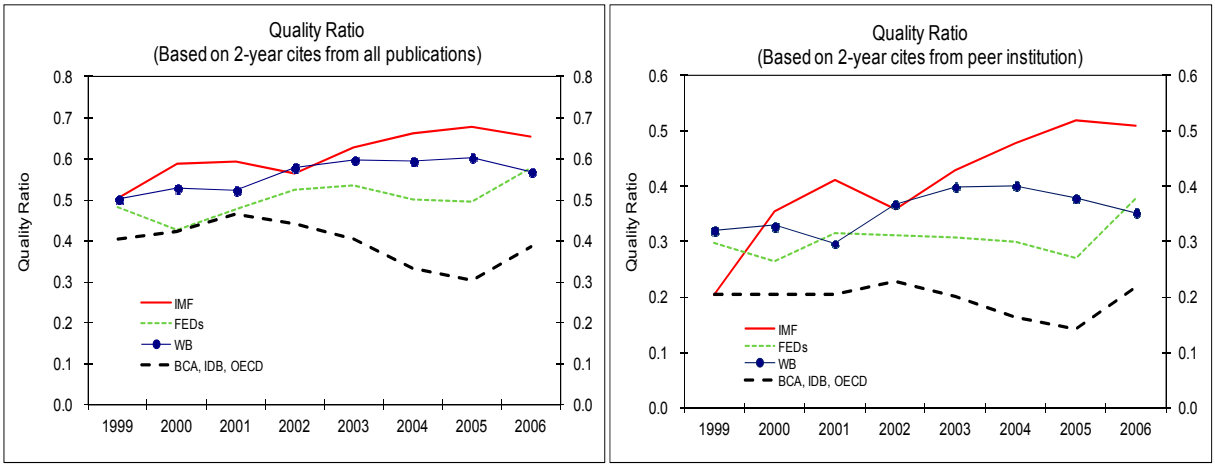
[17] We also used other criteria, the *World Economic Outlook* citation ranks, and obtained similar results.

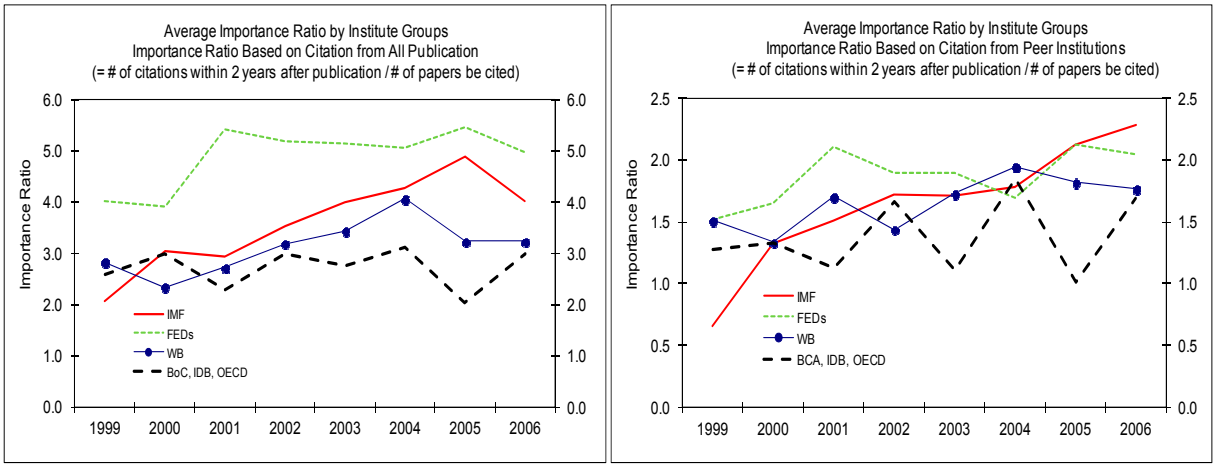
[18] The choice of a two-year window reflects the shape of the citation curves reported in Figure 1. Similar results hold for longer time windows.

Figure 4. Quality Ratios: IMF and Non-IMF, 1999–2006



Note: Compiled using data provided by RePEc. We define the average quality ratio of an institution's WPs as the percentage of WPs that have been cited within two years of being issued. In the averages for the combined three Fed institutions and the combined BCA, IDB, and OECD curves, the weights of the individual institutions are based on the numbers of WPs they issued each year.

Figure 5. Importance Ratios: IMF and Non-IMF, 1999–2006

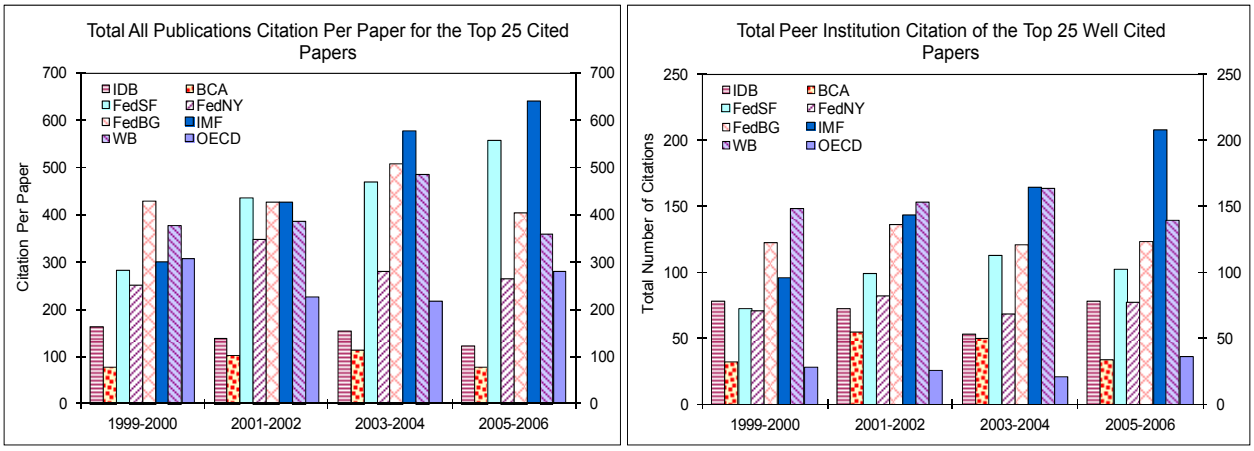


Note: Compiled using data provided by RePEc. We define the average importance ratio of an institution's WPs as the average number of citations that each cited paper achieves within two years of being issued. In the averages for the combined three Fed institutions and the combined BCA, IDB, and OECD curves, the weights of the individual institutions are based on the numbers of WPs they issued each year.

35. To control for the effect of institutional size on the citation rate, and thus on our understanding of the relative performance of the different institutions, we compare the citations of each institution's 25 most cited papers. Looking at the citations of these papers in all publications, we see that the IMF improved its performance relative to that of the WB during 1999–2006 (Figure 6, left panel). In 1999–2000, the FedBG was the top performer, followed by the WB, OECD, and IMF. Over the next six years this ranking changed considerably, with the IMF leading in 2005–06, followed by the FedSF, FedBG, and the WB. The IMF, though a much smaller organization than the WB, "out-performed" the WB by this measure across the entire range of papers during the later period of the sample, 2005–06.

36. Looking at the citations within the eight institutions (Figure 6, right panel), the results are similar, showing a significant improvement in the performance of the 25 most cited papers at the IMF relative to the peer institutions.

Figure 6. Top 25 Well-Cited Papers: Total Citations and Peer Institution Citations

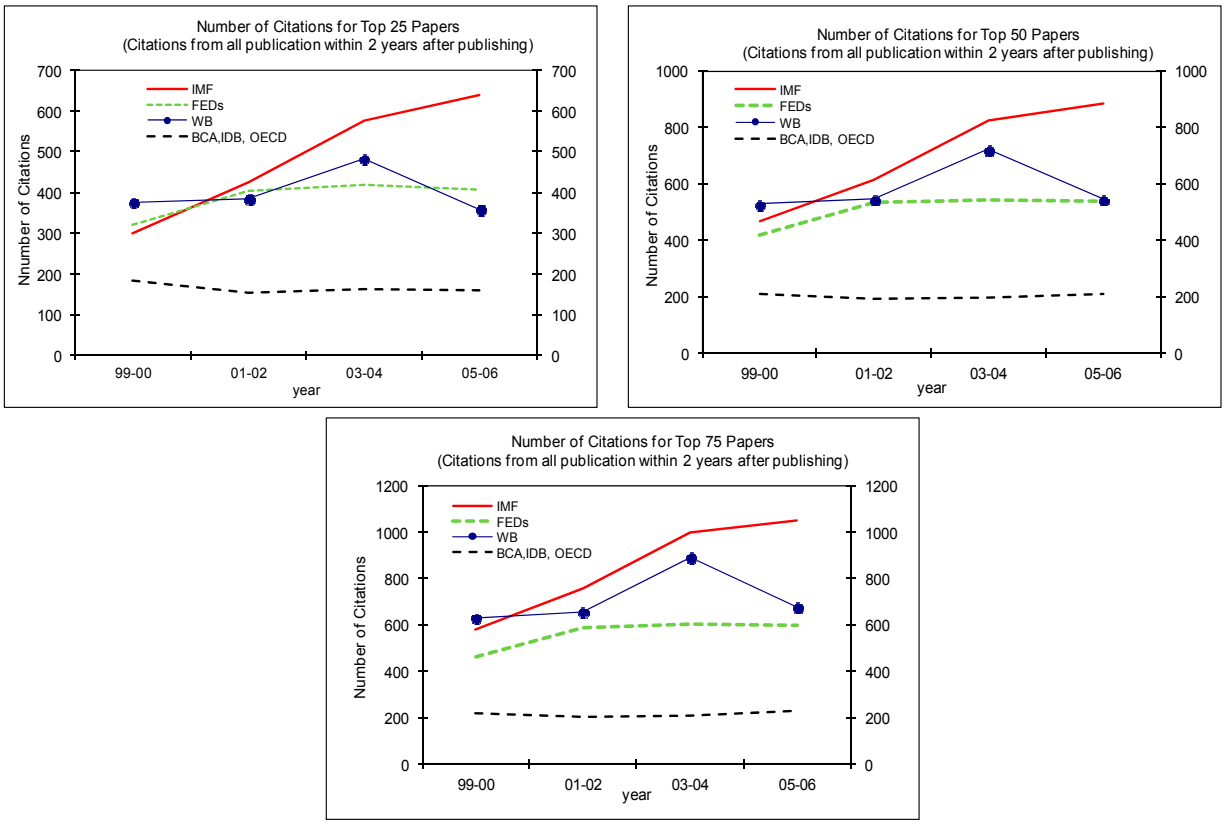


Note: Compiled using data provided by RePEc. Covers citations achieved by WPs within two years of their issue date.

37. Figure 7 provides a robustness check on these findings, verifying that the improvements over time in the citation rates of IMF working papers have depth, and apply well beyond the tranche of the top 25 papers. The figure shows the citation trends of the 25, 50, and 75 most-cited papers of the IMF in comparison to the trends for the other peer institutions, looking at citations in all publications. The IMF's performance improved remarkably between 1999 and 2006, although the rate of improvement declined in the later part of the sample.

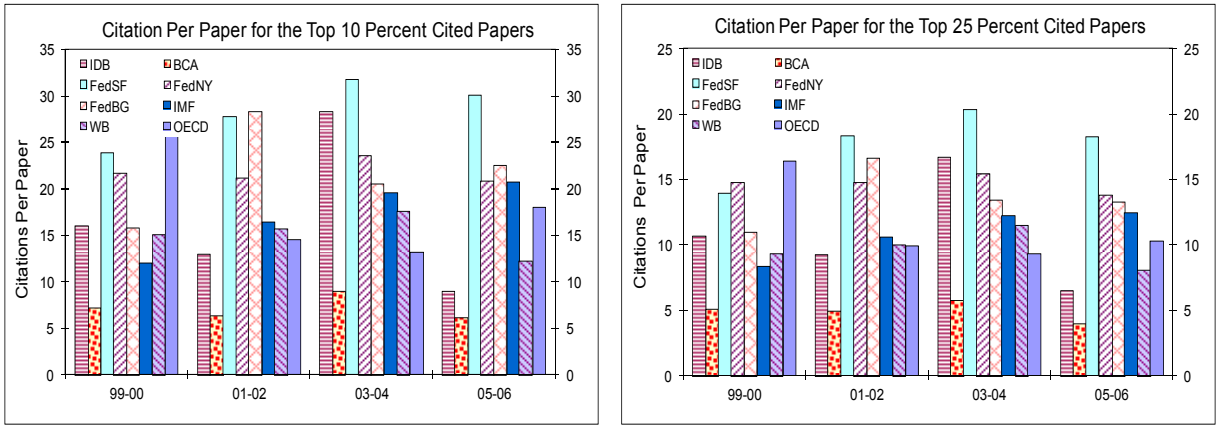
38. Trends in the average number of citations achieved per top paper show that over the study period the IMF steadily improved its research quality relative to that of its peer institutions. Among the Fund's most-cited 10 percent of papers, the citation rate increased from 12 citations per paper in 1999–2000 to 20 per paper in 2005–06 (Figure 8, left panel). As a result, in 2005–06 the Fund's citation rate was higher than those of all the other institutions except for the three FEDs. Similar results apply for the top 25 percent of papers (Figure 8, right panel).

Figure 7. Top Papers of IMF and Non-IMF: Numbers of Citations



Note: Compiled using data provided by RePEc. Covers citations achieved by WPs within two years of their issue date.

Figure 8. Citations Per Paper for the Top Well-Cited Papers

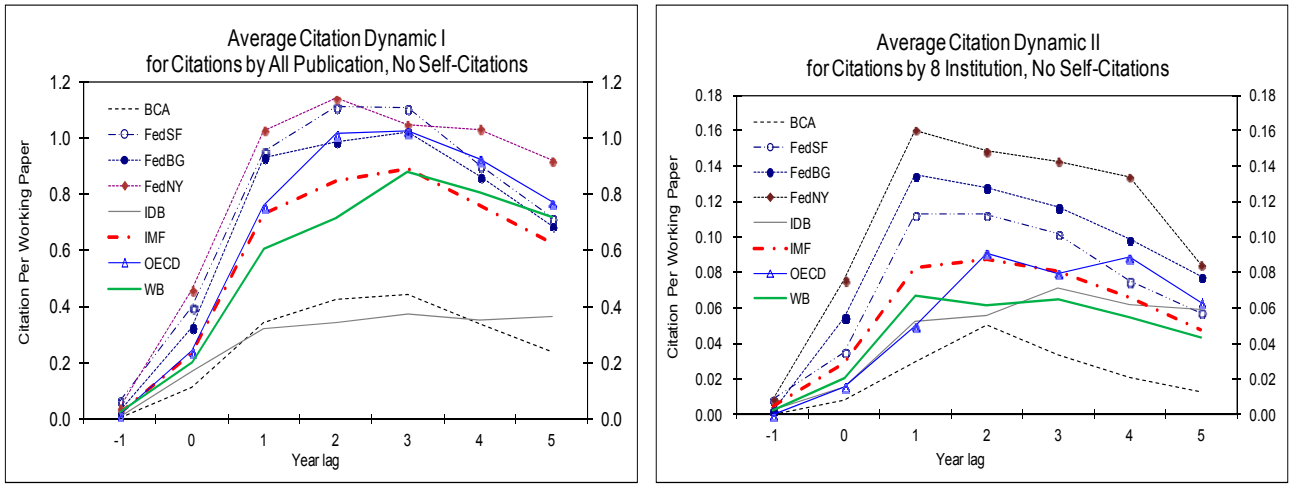


Note: Compiled using data provided by RePEc, covering citations in all sources within two years of the WP's issue date.

39. To further check the robustness of this record of improvement in IMF research quality, we look at what proportion of the citations of all working papers are "self-citations," that is, citations in other papers issued by the same institution. We find that on average during a working paper's first two years, about two-thirds of all the citations it receives are self-citations (Annex Table A5, last column).[19] There is a large range within this average, from zero (OECD)[20] to 0.43 (FedNY), 0.53 (FedBG), 0.61 (FedSF), 0.72 (IMF), 0.78 (IDB), 0.8 (WB), and 0.83 (BCA) (Annex Table A5). Similar results hold when we look at the citations within five years of issue date achieved by the papers that were issued over the same period (Annex Table A6).

40. When self-citations are excluded, the performance gap widens between the three Fed institutions and the other policy institutions including the Fund. On this basis, the three Fed institutions received the most citations, with the IMF performing below the Feds but above the other peer institutions (Figure 9). Recall that when self-citations are included, the IMF appears to be at par with the Fed institutions, as was seen in the lower panel of Figure 1 above.

Figure 9. Citations Per Paper, Excluding Self-Citations, for Working Papers Issued in 1999–2003



Note: Compiled using data provided by RePEc, covering WPs issued during 1999–2003. "Self-citations" is defined as citations in papers produced within the same institution.

[19] Using Annex Table A5 as a benchmark, Annex Table A6 reports the five-year citation rates for papers that were issued during 1999–2003, and Annex Table A7 reports the two-year citation rates for papers that were issued during 1999–2006. These tables allow one to see how changing the time horizon for citation affects the self-citation rate and how the citation and self-citation rates change over time.

[20] Due to the RePEc database's problem with OECD records, data on OECD working papers do not show self-citations.

41. Why should the IFIs show a greater tendency to self-cite, in comparison with the Federal Reserve institutions?[21] Annex Table A8 lists the top 10 working paper series or journals that cite the working papers produced by the 8 peer institutions, and shows that NBER and CEPR are the 2 main working paper series that cite the working papers of the 8 peer institutions. The relatively large numbers of citations of Fed working papers by these 2 working papers series help to explain the relatively low self-citation rates of the 3 FEDs.

Journal-publication impact ratios

42. On the premise that a paper will have a bigger impact if it is published in a top-tier journal, we define an institution's journal-publication impact ratio as its total weighted number of journal publications divided by its total number of working papers in the G-Scholar paper list. The weights are based on the rankings in Combes and Linnemer (2003): each journal is assigned a weight corresponding to four tiers: 1 (5 top-tier journals); 0.67 (16 second-tier journals); 0.5 (39 third-tier journals); 0.33 (69 fourth-tier journals); and zero (other journals).[22]

43. Compared with the average for the other seven policy institutions, the IMF has published fewer of its working papers in top journals. For the Fund, and for the other peer institutions taken as a group, Figure 10 reports the journal-publication impact ratio of working papers issued during 1999–2006 that had received at least one citation within two years of their issue date. On average, the IMF's ratio has been below the average of the other seven peer institutions. It approached the average in 2003 but dropped towards the end of the sample, in 2006.

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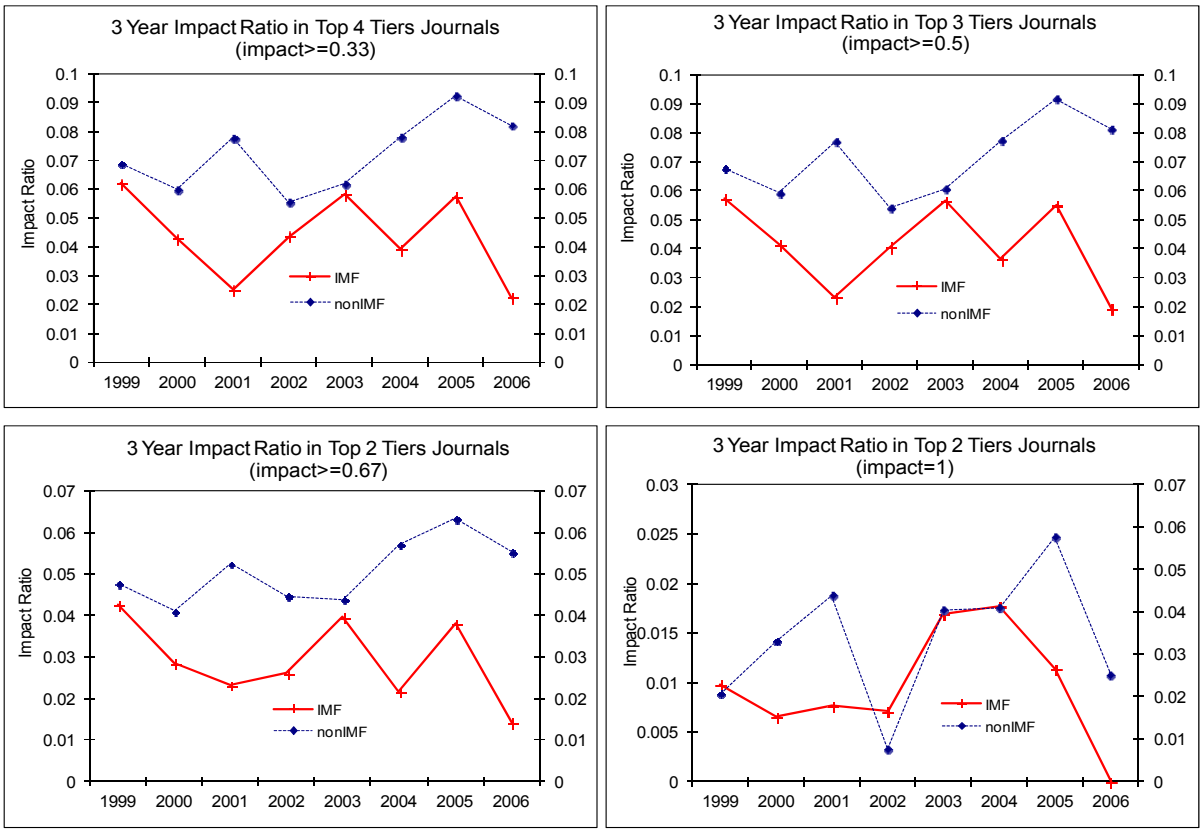
[21] There are a host of issues associated with explaining the variance in self-citation ratios across institutions. Size matters: larger institutions tend to cite more of their own working papers. Cultural issues and the mission of the institution, too, play a role: some institutions that focus on narrower tasks may cite more of their own papers. In some institutions, the research done by different departments may be highly interdependent. In addition, differences in the corporate culture of institutions are likely to affect the frequency of citation of, and relating to, peer scholars in the same institution.

[22] Hence, a weight of 0.1 at year t implies that on average, a working paper published in year t, and cited within the next two years, had an average journal impact of 0.1 during the years t to t+3. This procedure attaches a journal-impact ratio of zero for papers that were not published in the window [t, t+3].

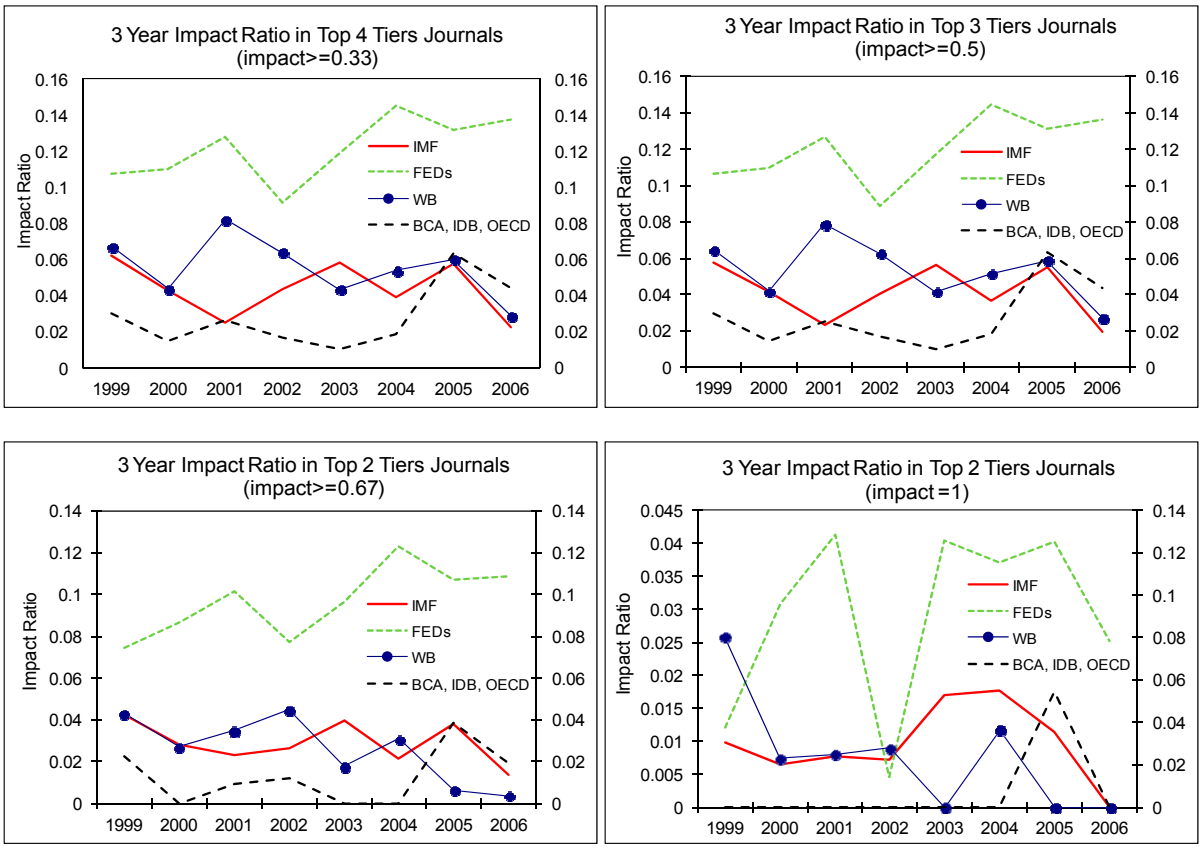
Figure 10. Journal-Publication Impact Ratios: IMF and Average Non-IMF



Note: Compiled using G-Scholar data covering WPs issued during 1999-2006. We count only journal publications within three years after the WP's issue date. Journal impacts are based on Combes and Linnemer (2003).

44. When the other seven peer institutions are disaggregated into three groups, as in Figure 11, the overall performance of the IMF appears to be comparable to that of the WB, well below the combined average of the three FEDs, and well above the combined average of the BCA, IDB, and the OECD. During 2003–05, the IMF performed noticeably better in the top journal tier than did the WB, but this improvement did not last.

Figure 11. Journal-Publication Impact Ratios: IMF and Peer Institution Groupings



Note: Compiled using G-Scholar data covering WPs issued during 1999-2006. We count only journal publications within three years after the WP's issue date. Journal impacts are based on Combes and Linnemer (2003).

V. Conclusion

45. This study has compared the citation and publication records of the IMF to those of seven peer institutions during 1999–2009, focusing on their research contained in working papers. We used the citation count of a working paper in other papers issued by the eight institutions (and in all publications) as a measure of the revealed policy impact (and general impact) of that paper. We also evaluated the longer-term impact of the policy institutions' working papers by tracing their eventual publication, if any, in policy-oriented and academic journals.

46. The relative performance of the IMF is quite sensitive to including or not including self-citations. The reason is that the self-citation rate is higher in the Fund than the average of the eight institutions, and in particular relative to the 3 FEDs' (about 80 percent in the Fund versus about 60 percent for the FEDs). For example, during the period 1999–2009, the IMF led other IFIs and CBs in the number of cited papers as a ratio of total papers (the quality ratio), with more than 60 percent of its working papers receiving citations within two years. However when self-citations are excluded, the three FEDs received the most citations, with

the IMF performing below the FEDs but above the other peer (policy institutions) institutions. This pattern is also observed for the number of citations that a cited paper achieves within two years of being issued (the average importance ratio).

47. For an institution of its size, the IMF has published relatively few of its working papers in top journals. Looking at the publications that took place within three years of working papers' issue dates, the Fund's publication rate of 14 percent compares with 22 percent at the selected three Fed institutions and 15 percent at the WB, though it is well above the combined average of the BCA, IDB, and the OECD. In addition 40 percent of Fund papers in the top journals are published in *IMF Staff Papers*. However this was also true for other institutions. For example 60 percent of the Federal Reserve Bank of New York publications in the top journals are accounted by articles in the institution's *Economic Policy Review.*

48. By several measures, the Fund's research performance improved over the evaluation period. Both in terms of the quality ratio and the importance ratio the IMF's research performance was at about the mean for the policy institutions in 1999 and improved significantly during the next seven years, particularly in terms of the later indicator. An apparent deterioration in 2006 was not large enough to negate the overall improvement during the evaluation period.

49. There are well-known limitations to the information content of citations. While citations provide signals about the research value of a paper, they also reflect other factors such as research networking, and are subject to known biases and challenges. Because this paper compares the research records of relatively large peer institutions, concerns regarding biases related to the idiosyncrasies of an individual scholar and paper are less relevant. The benchmarking approach applied has the advantage of providing a relative ranking of the peer institutions operating in a similar environment. Yet the approach is still subject to possible biases related to differential scales, heterogeneity, and the varying missions of the eight policy institutions studied. Finally, one would also expect that much of the publications in the developing world, in particular those in foreign languages, are not captured by the two data platforms being used. To the extent these publications may tend to cite more often research published by the IFI than the FEDs the use of these two platforms may have underestimated the total citations of the former relative to the latter.

ANNEX. STATISTICAL TABLES

Table A1. Numbers of Working Papers Issued By Policy Institutions in 1999–2006

Institutions	1999	2000	2001	2002	2003	2004	2005	2006	Total
IMF	202	260	219	248	282	255	260	290	2,016
WB	231	255	239	193	248	287	335	304	2,092
FedSF	86	86	89	101	90	105	138	143	838
FedBG	176	157	148	144	196	143	180	103	1,247
FedNY	81	74	65	61	62	57	74	45	519
Fed subtotal	343	317	302	306	348	305	392	291	2,604
BCA	38	37	41	59	61	63	58	65	422
IDB	71	87	56	53	55	43	103	119	587
OECD	52	81	94	88	125	134	152	175	901
Others subtotal	161	205	191	200	241	240	313	359	1,910

Note: This table is based on RePEc data, and includes both cited and noncited WPs.

Table A2. Citations of Working Papers Issued in 1999–2006[1]

		Citations by All Sources[2]				Citations by Peer Institutions[3]			
	Number of WPs in Sample	Number of WPs Cited	Total Citations	Number of Cited WPs/Total Number of WPs	Cites per Cited paper	Number of WPs Cited	Total Citations	Number of cited WPs/Total Number of WPs	Cites per cited paper
IMF	2,016	1,237	5,405	0.61	4.37	838	1,808	0.42	2.16
WB	2,092	1,182	4,576	0.57	3.87	748	1,591	0.36	2.13
FedSF	838	390	2,442	0.47	6.26	240	541	0.29	2.25
FedBG	1,247	583	3,392	0.47	5.82	351	856	0.28	2.44
FedNY	519	292	1,550	0.56	5.31	176	374	0.34	2.13
Fed subtotal	2,604	1,265	7,384	0.49	5.84	767	1,771	0.29	2.31
BCA	422	213	514	0.5	2.41	129	204	0.31	1.58
IDB	587	162	657	0.28	4.06	116	303	0.2	2.61
OECD	901	349	1,466	0.39	4.2	72	111	0.08	1.54
BCA and IDB subtotal	1,009	375	1,171	0.37	3.12	245	507	0.24	2.07
BCA, IDB, OECD total	1,910	724	2,637	0.38	3.64	317	618	0.17	1.95

Note: Based on RePEc data. The RePEc database has problems with the records of citation by OECD: most of the OECD WPs did not have a reference list in the RePEc database. This may cause a downward bias of the citation rate for OECD WPs. Therefore we report both the subtotal of "the other three institutions" (BCA, IDB, and OECD), and the subtotal of BCA and IDB without the OECD.

[1] "All sources" and "peer institutions" citations include only citations within two years of the WP's issue date (i.e., from *t*–1 to *t*+2, where *t* stands for the WP's issuing year).

[2] "Citations by all sources" are citations from all sources (WPs and journals) in the RePEc data.

[3] "Citations by peer institutions" includes self-citations. Self-citations are citations in other WPs issued by the same institution.

Table A3. Top-Journal Publication of Working Papers Issued in 1999–2006

			Top Journal Publication Within Three years[3]		
	Total Number of WPs Issued[1]	Number of WPs in G-Scholar Database[2]	Number of WP Publication	Conditional Publication Ratio	Overall Publication Ratio
	(1)	(2)	(3)	(4)=(3)/(2)	(5)=(3)/(1)
IMF	2,016	1,237	173	0.14	0.09
WB	2,092	1,182	179	0.15	0.09
FedSF	838	390	89	0.23	0.11
FedBG	1,247	583	142	0.24	0.11
FedNY	519	292	45	0.15	0.09
Fed subtotal	2,604	1,265	276	0.22	0.11
BCA	422	213	17	0.08	0.04
IDB	587	162	13	0.08	0.02
OECD	901	349	6	0.02	0.01
BCA IDB subtotal	1,009	375	30	0.08	0.03
BCA IDB OECD total	1,910	724	36	0.05	0.02

Note: Based largely on G-Scholar data.

[1] "Total number of WPs issued" is based on RePEc data.

[2] The G-Scholar data include only those WPs with at least one citation by any source covered by G-Scholar within two years of the WP's issue date.

[3] Top journal publications include only publications within three years of the WP's issue date. Top journals are defined as journals with impact weights >=0.33, as defined in Combes and Linnemer (2003).

Table A4. Numbers of Working Papers Published in Top Journals in 1999–2009

BCA	Number of Publications	Weight	IDB	Number of Publications	Weight
Canadian J. of Economics	8	0.5	J. of Development Economics	5	0.5
J. of Money, Credit, and Banking	3	0.67	Economics Letters	3	0.5
J. of Monetary Economics	2	0.67	J. of International Economics	2	0.67
J. of International Economics	2	0.67	J. of Money, Credit, and Banking	1	0.67
International Finance	2	0.17	J. of Policy Modeling	1	0.17
Quarterly J. of Economics	1	1	Economic J.	1	0.5
European Economic Review	1	0.67	J. of Banking and Finance	1	0.5
Open Economies Review	1	0.33	Review of Economics and Statistics	1	0.67
Review of Financial Studies	1	0.33	J. of Law, Econ, and Organization	1	0.5
Applied Economics	1	0.33	International Economic Review	1	0.67
FedSF	Number of Publications	Weight	FedBG	Number of Publications	Weight
Economic Review (FED SF)	22		J. of Money, Credit, and Banking	30	0.67
J. of Monetary Economics	14	0.67	J. of Monetary Economics	24	0.67
J. of International Economics	9	0.67	J. of Banking and Finance	17	0.5
J. of Money, Credit, and Banking	8	0.67	International Finance	15	0.17
J. of Econ Dynamics and Control	8	0.5	Review of Economics and Statistics	12	0.67
J. of the Japanese & Int'l Econ	8	0.33	J. of International Economics	10	0.67
American Economic Review	6	1	J. of International Money and Finance	8	0.33
Economic J.	6	0.5	J. of Economic Dynamics and Control	8	0.5
Quarterly J. of Economics	5	1	American Economic Review	7	1
Macroeconomic Dynamics	5	0.17	J. of Business and Economic Statistics	7	0.67
FedNY	Number of Publications	Weight	OECD	Number of Publications	Weight
Economic Policy Review (FED NY)	73	0.17	International Finance	2	0.17
J. of Money, Credit, and Banking	9	0.67	J. of International Economics	1	0.67
J. of Monetary Economics	8	0.67	Review of Economics and Statistics	1	0.67
J. of International Economics	7	0.67	Economic Policy	1	0.33
Review of Economics and Statistics	4	0.67	American Economic Review	1	1
American Economic Review	4	1	Brookings Papers on Econ Activity	1	0.33
J. of Int'l Money and Finance	2	0.33	Labour Economics	1	0.33
J. of Econ Dynamics and Control	2	0.5	World Development	1	0.33
J. of Finance	2	0.67	World Economy	1	0.33
Quarterly J. of Economics	2	1	J. of Economic Growth	1	0.33
WB	Number of Publications	Weight	IMF	Number of Publications	Weight
J. of Development Economics	24	0.5	IMF Staff Papers	66	0.33
World Bank Economic Review	22	0.33	J. of International Economics	21	0.67
World Development	14	0.33	J. of Development Economics	16	0.5
J. of Banking and Finance	12	0.5	J. of International Money and Finance	10	0.33
J. of International Economics	11	0.67	J. of Banking and Finance	7	0.5
World Economy	10	0.33	Review of Economics and Statistics	7	0.67
World Bank Research Observer	8	0.17	American Economic Review	6	1
Econ. Dev. & Cultural Change	8	0.17	Applied Economics	6	0.33
J. of Int'l Money and Finance	7	0.33	J. of Money, Credit, and Banking	6	0.67
J. of Money, Credit, and Banking	7	0.67	International Finance	6	0.17

Note: Based on G-Scholar search results in Combes and Linnemer (2003). Impact weights as in Combes and Linnemer (2003).The table covers those WPs issued during 1999–2003 that were published in journals with impact weights equal to or greater than 0.17. This is a more inclusive definition of "top journals" than used in the rest of our analysis, Journals with impact weights less than 0.17 are not included in our publication impact analysis.

Table A5. Two-Year Citation Rates of Working Papers Issued in 1999–2003[1]

WP Issuing Institution	Number of WPs in Sample	Number of WPs cited by 8 Institutions	Number of Citations Cited by Different Institutions									Citations by the 8 Peer Institutions			
			BCA	FedSF	FedBG	FedNY	IDB	IMF	OECD	WB	Citations by others, outside 8 peer institutions	Total number of cites by 8 peer institutions	NSC: non-self-citing[2]	NSC ratio = NSC/total citations in 8 peer institutions	SC ratio = 1–NSC.ratio[2]
BCA	236	73	104	1	6	1	–	11	–	2	187	125	21	0.168	0.832
FedSF	452	134	16	194	77	8	–	16	–	5	1,020	316	122	0.386	0.614
FedBG	821	226	22	104	299	52	6	52	1	26	1,600	562	263	0.468	0.532
FedNY	343	112	19	18	45	102	6	31	–	16	779	237	135	0.57	0.43
IDB	322	73	1	7	3	1	147	12	–	17	229	188	41	0.218	0.782
IMF	1,211	433	21	45	29	12	28	637	–	112	1,967	884	247	0.279	0.721
OECD	440	41	8	3	13	1	8	14	–	22	824	69	69	1	0
WB	1,166	399	9	15	24	2	50	77	–	695	1,622	872	177	0.203	0.797
Total	4,991	1,491	200	387	496	179	245	850	1	895	8,228	3,253	1,075	0.33	0.67

Note: Based on RePEc database (i.e., from *t*–1 to *t*+2), sorted by citing institution.

[1] The table reports the sources of citations by the peer institutions within two years of the paper's issue date.

[2] NSC stands for "non-self-citing" (i.e., citations by publications of the other seven peer institutions); SC stands for "self-citing."

Table A6. Five-year Citation Rates of Working Papers Issued in 1999–2003[1]

WP Issuing Institution	Number of WPs in Sample	Number of WPs Cited by 8 Institutions	Number of Citations Cited by Different Institutions									Citations by the 8 Peer Institutions			
			BCA	FedSF	FedBG	FedNY	IDB	IMF	OECD	WB	Citations by others, outside 8 peer institutions	Total number of cites by 8 peer institutions	NSC: non-self citing[2]	NSC ratio = NSC/total citations in 8 peer institutions	SC ratio = 1–NSC.ratio[2]
BCA	236	110	188	2	13	3	–	17	–	2	411	225	37	0.164	0.836
FedSF	452	158	40	271	114	16	–	47	–	11	2,144	499	228	0.457	0.543
FedBG	821	277	54	153	441	97	16	125	1	58	3,468	945	504	0.533	0.467
FedNY	343	138	32	39	78	165	18	59	–	33	1,682	424	259	0.611	0.389
IDB	322	89	2	9	5	2	208	37	–	48	517	311	103	0.331	0.669
IMF	1,211	570	64	72	46	26	61	1,175	–	214	4,480	1,658	483	0.291	0.709
OECD	440	80	11	14	18	2	14	51	–	61	1,917	171	171	1	0
WB	1,166	526	18	26	28	6	122	168	–	1,175	4,231	1,543	368	0.238	0.762
Total	4,991	1,948	409	586	743	317	439	1,679	1	1,602	18,850	5,776	2,153	0.373	0.627

Note: Based on RePEc database.

[1] The table reports the sources of citations by the peer institutions within five years of the paper's issue date (i.e., from *t*–1 to *t*+5, where *t* stands for the WP's issuing year).

[2] NSC stands for "non-self-citing" (i.e., citations by publications of the other seven peer institutions); SC stands for "self-citing."

Table A7. Two-Year Citation Rates of Working Papers Issued in 1999–2006[1]

WP Issuing Institution	Number of WPs in Sample	Number of WPs Cited by 8 Institutions	Number of Citations Cited by Different Institutions								Citations by the 8 Peer Institutions			
			BCA	FedSF	FedBG	FedNY	IDB	IMF	OECD	WB	Citations by others, outside 8 peer institutions	Total number of cites by 8 peer institutions	NSC: non-self citing [2]	NSC ratio = NSC/total citations in 8 peer institutions	SC ratio = 1–NSC.ratio[2]
BCA	422	129	170	2	9	3		18	–	2	310	204	34	0.167	0.833
FedSF	838	240	42	298	102	28	4	49	–	18	1,901	541	243	0.449	0.551
FedBG	1,247	351	34	154	451	80	7	100	1	29	2,536	856	405	0.473	0.527
FedNY	519	176	24	35	65	177	6	45	–	22	1,176	374	197	0.527	0.473
IDB	587	116	1	11	5	1	230	31	–	24	354	303	73	0.241	0.759
IMF	2,016	838	40	82	43	32	63	1,346	–	202	3,597	1,808	462	0.256	0.744
OECD	901	72	15	3	14	1	8	40	–	30	1,355	111	111	1	0
WB	2,092	748	10	21	28	4	83	151	–	1,294	2,985	1,591	297	0.187	0.813
Total	8,622	2,670	336	606	717	326	401	1,780	1	1,621	14,214	5,788	1,822	0.315	0.67

Note: Based on RePEc database.
[1] The table reports the sources of citations by the peer institutions within two years of the paper's issue date.
[2] NSC stands for "non-self-citing" (i.e., citations by publications of the other seven peer institutions); SC stands for "self-citing."

Table A8. Top 10 Sources of Citations for Working Papers Issued in 1999–2006

BCA Journal or paper series name		IDB Journal or paper series name	
Bank of Canada Working Papers	154	RES Working Papers	222
IMF Working Papers	18	NBER Working Papers	50
NBER Working Papers	12	IMF Working Papers	31
Fed Kansas,Proceedings	12	Policy Research Working Paper Series	24
Bank of Canada, Technical Reports	12	Central Bank of Chile WPs	19
CEPR Discussion Papers	11	CEPR Discussion Papers	18
Central Bank of Chile WPs	8	William Davidson Institute WPs	14
Res.Bank of New Zealand WPs	8	Universidad Torcuato WPs	10
Borradores de Economia	8	MPRA Paper	7
Fed Atlanta Working Paper	8	Boston College WPs in Economics	7
OECD **Journal or paper series name**		**FedSF** **Journal or paper series name**	
IZA Discussion Papers	73	NBER Working Papers	259
CEPR Discussion Papers	58	CEPR Discussion Papers	139
MPRA Paper	53	ECB Working Paper Series	97
IMF Working Papers	39	Fed SF WP in Applied Economics	95
NBER Working Papers	38	FED BOG Finance and Economics	57
CSLS, Int'l Productivity Monitor	35	Fed SF Working Paper Series	55
Policy Research WP Series	30	MPRA Paper	54
CESifo Working Paper Series	29	Fed SF, Proceedings	52
WIFO, working paper	24	IMF Working Papers	48
Kiel Working Papers	22	Fed SF, Economic letters	44
FedBG **Journal or paper series name**		**FedNY** **Journal or paper series name**	
FED BOG Finance and Economics	302	NBER Working Papers	158
NBER Working Papers	293	Fed NY Staff Reports	130
ECB Working Paper Series	147	CEPR Discussion Papers	88
CEPR Discussion Papers	142	ECB Working Paper Series	46
FED BOG International Finance	139	IMF Working Papers	45
IMF Working Papers	99	FED BOG Finance and Economics	37
Fed NY Staff Reports	56	FED BOG International Finance	26
Fed SF WPs in Applied Economics	53	Fed NY Economic Policy Review	24
EconWPA Macroeconomics	49	MPRA Paper	23
Fed SF, Proceedings	42	Bank of Canada Working Papers	22
WB **Journal or paper series name**		**IMF** **Journal or paper series name**	
Policy Research WPs	1294	IMF Working Papers	1334
NBER Working Papers	219	NBER Working Papers	342
CEPR Discussion Papers	182	CEPR Discussion Papers	218
IMF Working Papers	147	Policy Research Working Paper Series	202
(UNU-WIDER) Working Papers	103	MPRA Paper	132
MPRA Paper	97	EconWPA Macroeconomics	88
IZA Discussion Papers	81	ECB Working Paper Series	87
RES Working Papers	80	Central Bank of Chile Working Papers	75
Central Bank of Chile WPs	49	CESifo Working Paper Series	73
William Davidson Institute WPs	49	William Davidson Institute WPs	65

Note: Based on RePEc data. We only include citations within two years after a WP is issued (i.e., from *t*–1 to *t*+2, where *t* stands for WP's issuing year.

REFERENCES

Aizenman, Joshua, and Ken Kletzer, 2008, "The Life Cycle of Scholars and Papers in Economics—the 'Citation Death Tax,' " NBER Working Paper No. 13891 (Cambridge, Massachusetts: National Bureau of Economic Research). Forthcoming, *Applied Economics.*

Boxwell, Robert J. Jr., 1994, *Benchmarking for Competitive Advantage* (New York: McGraw-Hill).

Camp, Robert C., 1989, *Benchmarking: The Search for Industry Best Practices That Lead to Superior Performance* (Milwaukee, Wisconsin: ASQC Quality Press).

Cole, Jonathan R., and Stephen Cole, 1973, *Social Stratification in Science* (Chicago: University of Chicago Press).

Combes, Pierre-Philippe, and Laurent Linnemer, 2003, **"**Where Are the Economists Who Publish? Publication Concentration and Rankings in Europe Based on Cumulative Publications," *Journal of the European Economic Association*, Vol. 1, No. 6, pp. 1250–1308**.**

Coupé, Tom, 2003, "Revealed Performances: World Wide Rankings of Economists and Economic Departments: 1990–2000," *Journal of the European Economic Association*, Vol. 1, No. 6, pp. 1309–45.

Eijffinger, S.C.W, J. de Haan, and K. Koedijk, 2002, "Small Is Beautiful: Measuring the Research Input and Output of European Central Banks," *European Journal of Political Economy*, Vol. 18,No. 2, pp. 365–74.

Goodfriend, M., R. König, and R. Repullo, 2004, "External Evaluation of the Economic Research Activities of the European Central Bank," paper prepared for the Executive Board of the European Central Bank (Frankfurt).

Jaffe, Adam, and Manuel Trajtenberg, 1996, "Flows of Knowledge from Universities and Federal 39 Labs: Modeling the Flow of Patent Citations over Time and Across Institutional and Geographic Boundaries," NBER Working Paper No. 5712 (Cambridge, Massachusetts: National Bureau of Economic Research).

_____, 2002, "*Patents, Citations, and Innovations: A Window on the Knowledge Economy* (Cambridge, Massachusetts: MIT Press).

Jansen, D.W., 1991, "Ranking Federal Reserve System Research Departments by Publications in Professional Journals," *Journal of Macroeconomics*, Vol. 13, No. 4, pp. 733–42.

Jondeau E. and Pagès H., 2003, "Benchmarking Research in European Central Banks," Working Paper (Paris: Banque de France).

Kalaitzidakis, P., T. Mamuneas, and T. Stengos, 2003, "Rankings of Economic Journals and Economic Departments for the 1995–2000 Period," *Journal of the European Economic Association*, Vol. 1, No. 6, pp. 1346–66.

Laband, David, and Michael Piette, 1994, "The Relative Impact of Economic Journals," *Journal of Economic Literature*, Vol. 32, pp. 640–66.

Lubrano, M., L. Bauwens, A. Kirman, and C. Protopopescu, 2003, "Ranking Economics Departments in Europe: A Statistical Approach," *Journal of the European Economic Association*, Vol. 1, No. 6, pp. 1367–1401.

Merton, Robert K., 1968, "The Matthew Effect in Science," *Science*, Vol. 159, pp. 56–63. Available at: www.garfield.library.upenn.edu/merton/list.html.

_____, 1973, *The Sociology of Science* (Chicago: University of Chicago Press).

Posner, Richard A. 2000, "An Economic Analysis of the Use of Citations in the Law," *American Law and Economics Review*, Vol. 2, No. 2, pp. 381–406.

Rapoport, D., and K.-M. Yi, 1997, "Research Output by Federal Reserve System Economists Employed as of January 1997," internal paper (New York: Federal Reserve Bank of New York).

St-Amant, Pierre, Greg Tkacz, Annie Guérard-Langlois, and Louis Morel, 2005, "Quantity, Quality, and Relevance: Central Bank Research, 1990–2003," Bank of Canada Working Paper 2005-37 (Ottawa: Bank of Canada, December).