

**EXTERNAL REVIEW
OF ECONOMIC RESEARCH ACTIVITIES
AT THE BANK OF CANADA**

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Note: The views expressed in this document are solely those of the members of the External Review Committee and are not intended to reflect the views of the Federal Reserve Bank of New York, the Board of Governors of the Federal Reserve System, or of anyone else associated with the Federal Reserve System.

I. Overview

A. Composition of the Committee

1. In spring 2007, the Governing Council of the Bank of Canada appointed a committee of five outside experts to conduct an independent evaluation of the economic research activities at the Bank of Canada. The selection of the committee members was intended to facilitate an assessment of the relatively broad scope of research at the Bank, and to evaluate the extent to which this research has had a significant impact on researchers at other central banks as well as at academic institutions.
2. For these reasons, the Committee's chair is an individual with a background in academics and monetary policymaking who is well-versed in a wide array of policy-relevant research. Two of the committee members are distinguished academic economists whose fields of expertise are in macroeconomics and finance, respectively. The other two committee members have been active in both research and policy analysis within the Federal Reserve System on topics related to macroeconomics and financial infrastructure, respectively. (See Appendix A for further information regarding the composition of the Committee.)

B. Mission and Activities of the Committee

1. The Committee's primary mission was to evaluate the *quality of research* at the Bank of Canada in comparison with other leading policy institutions and to assess the extent to which this research has had a significant impact on economists at other central banks and academic institutions. The Committee's secondary mission was to consider the *research environment* at the Bank of Canada and to provide some specific recommendations about how to enhance the quality and policy relevance of research.
2. The Committee visited the Bank of Canada and spent the better part of two days talking to the Governor, other policymakers, senior research officers, and economists at the Bank. Committee members at this time also exchanged views with each other about the broad direction of recommendations we might make. A consensus evolved that was tightly held by committee members. We were able to spend some of the time at the end of the first day and during the second day previewing and getting feedback from senior officers at the Bank about the basic direction of our recommendations.
3. The Committee believed from the outset that many of the recommendations that we would make would evolve from discussions with the economists and senior officers at the Bank. We built on those discussions to sharpen our assessment of the best directions to improve the quality of research and achieve the appropriate balance between research and policy analysis at the Bank.
4. Following the mandate given by the Governing Council, this report is intended to convey the Committee's findings with respect to both of these missions. (The "Terms of Reference" given to the Committee may be found in Appendix B.)

C. Defining ‘Research Activities’

1. Starting in the early stages of the evaluation process, the Committee discovered that the term ‘research’ has a very wide range of meanings for many senior managers as well as staff economists at the Bank. For some people, this term describes virtually any longer-term project that is intended to contribute to the work of the institution, even if the project never becomes visible outside the Bank. For others, the defining characteristic of a successful ‘research’ project is the issuance of a *Bank of Canada Working Paper*. And for still others, the term seems to have rather negative connotations, denoting any project with little or no relevance for addressing any practical policy questions. Unfortunately, this lack of consensus is not merely a matter of semantics but appears to have significantly hampered the research environment at the Bank.
2. Thus, to perform an external evaluation of research activities at the Bank of Canada, it was essential for the Committee to agree on the definition of the term ‘research.’ Fortunately, the usage of this term in the academic world is essentially consistent with its usage in the Federal Reserve System, so the Committee had unanimous agreement that the term ‘research activity’ should be used to denote any project aimed at expanding the general state of knowledge. And given this definition, ‘high-quality research’ denotes a project with a particularly significant impact on the work of economists at other central banks and academic institutions. Thus, a research paper should *not* be considered to be of sufficiently high quality merely because it’s been issued in the *Bank of Canada Working Paper* series, if in fact the research never gets presented at any external conferences or seminars and the paper is never published in a refereed journal.
3. This definition of research does not include either short-term analysis or medium-term projects that are aimed at addressing a specific policy question with no expectation of generating any publishable research output, even if such projects do have a direct impact on practical policy issues at the Bank and elsewhere. However, it should be emphasized that short-term analysis and medium-term projects can indeed be highly *complementary* with longer-term research, because such activities are typically informed by current research and ideally stimulate new research papers. For example, if a given medium-term project is aimed at enhancing the Bank’s macroeconometric model—with the goal of informing the Bank’s macroeconomic projections and policy strategy—then its contribution is likely to be maximized if the economists involved are also active in longer-term research and hence familiar with state-of-the-art modeling and econometric techniques. Furthermore, if some significant conceptual or methodological issues are addressed in the process of conducting the medium-term project, then that progress may well be carried over into a longer-term research project, with the goal of producing a paper that can be presented at conferences and published in a journal so that the information can be disseminated to a wide audience of academic economists and other central bank researchers.

D. Gauging the Quality of Research

1. Publication in a refereed academic journal is an important—but not perfect—indicator of the quality of a research paper. The publication process is intended to provide an independent check on the methodology and results, and the reports of the editor and referees can be very useful in providing constructive criticism and suggestions for how to enhance the paper’s contribution to the topic. Furthermore, publication in a journal tends to serve as a “stamp of approval” that raises the likelihood that the paper is read and ultimately cited by others in the field. Nevertheless, it is also important to recognize that the journal review process can be lengthy and unpredictable, so that a paper’s information content may be relatively stale by the time the paper finally appears in print.

2. Over the past fifteen years or so, the typical process of information dissemination in economics has changed dramatically due to the advent of the internet and the declining relative price of air travel. As a result, making a research paper available on the web (e.g., via the *Bank of Canada Working Paper* series) and presenting the paper in conferences and seminars now plays a crucial role in determining its impact on other central bank researchers as well as academic economists.

E. Standards of the Evaluation

1. From the early stages of the evaluation process, the Committee was inspired by the exceptionally high performance objective that has been set by policymakers and senior staff at the Bank of Canada, namely, that the Bank’s aim is to be ‘second to none’ in all of its endeavors. This objective certainly implies that the Bank should be producing research that has a highly significant impact on economists and policymakers around the globe, and the Committee’s approach to assessing that impact will be discussed below. Nevertheless, it is essential to recognize that the Bank is relatively small compared with some other policy institutions (such as the European Central Bank and the Federal Reserve Board) and hence the ‘second to none’ objective should not be interpreted as implying that the Bank should try to match those institutions in terms of quantity of research, breadth of coverage, or overall visibility in the economics profession. Rather, the Committee concluded that this performance objective should primarily be interpreted with reference to the central banks of other small and medium-sized open economies, including the Bank of England, the Norges Bank, the Reserve Bank of Australia, the Reserve Bank of New Zealand, the Sveriges Riksbank, and the Swiss National Bank.

2. Setting the standard relative to other leading policy institutions—subject to the proviso mentioned above—is consistent with a steady flow of research papers published in top-tier field journals that are specialized in macroeconomics, monetary policy, and finance. The Committee used the experience of the members as editors and/or referees for a range of professional journals to make a judgment relative to this standard.

3. The evaluation of a paper, however, should at least partly reflect the extent to which the paper has been accepted for presentation at high-profile research conferences or invited to be presented in seminars at other central banks and academic institutions.

4. In conducting its evaluation, the Committee did not rely primarily on simply counting publications or citations; instead, the Committee directly reviewed a broad selection of about 40 papers authored or coauthored by Bank of Canada researchers in the fields of macroeconomics, monetary economics, finance, and financial infrastructure. All of the papers were written over the past four years—the period covered by the latest Medium-Term Plan—with somewhat more weight given to relatively recent research.

5. Members of the evaluation committee have outstanding credentials that testify to their ability to assess research relative to the standard of journal publications. The Committee chair, Laurence Meyer, currently serves on the board of the National Bureau of Economic Research. Martin Eichenbaum is an associate editor of the *Journal of Monetary Economics* and the new *AEA Macro Journal*. Douglas Gale is an associate editor of *Games and Economic Behavior* and advisory editor of *Macroeconomic Dynamics* and was formerly a co-editor of *Econometrica* and of *Economic Theory*. Andrew Levin is a co-editor of the *International Journal of Central Banking*. James McAndrews has regularly served as a guest editor of the *Review of Network Economics* and the *Journal of Financial Services Research*. Finally, all of the committee members have extensive familiarity with research at other central banks and policy institutions.

F. Summary of Recommendations

1. While the Committee judged the research at the Bank to be of relatively high quality, there remains significant room for improvement to meet the standards relative to publication in top-tier specialized journals and relative to other leading policy institutions. The Committee is therefore making a set of recommendations aimed at enhancing the research environment at the Bank and enabling the quality of research to reach the high standard of the Bank's 'second to none' objective.

2. Some of the recommendations will clearly require additional resources devoted to the research function at the Bank of Canada. First and foremost, achieving the objective of being second to none in research will require the Bank to be more successful in hiring and retaining top researchers. To do so, the Bank needs to devote additional resources to research in order to raise the initial pay package for new Ph.D.s, provide for merit pay increases in the initial years of new Ph.D.s at the Bank, set up a variable pay structure that uses bonuses to reward success in both research and policy analysis, provide direct incentives to promote a focus on publication in professional journals, and fund career paths that allow top researchers to be promoted but retain a significant amount of time for their research.

3. Other initiatives call for increasing the efficiency with which existing resources are deployed. Principal among this set of recommendations is that researchers should be given more freedom to select their own topics and manage their own research agendas. Today, research is managed to an important degree to meet the objectives set out in the medium-term plan for policy relevant research. This policy not only interferes with the staff's ability to produce publishable research, but is also not the best approach for generating analysis to inform policy decisions.

4. To enhance the policy relevance of the research conducted at the Bank of Canada, all researchers should be required to allocate a portion of their time directly to medium-term projects and/or short-term policy analysis. The *typical* time allocation for economists at the Bank might be to spend 1/3 of their time engaging in longer-term research, 1/3 of their time conducting medium-term projects, and 1/3 of their time carrying out short-term policy analysis. For each individual researcher, the specific allocations to these three categories of responsibilities would be likely to evolve over time, reflecting their preferences and demonstrated ability in each area. However, even the most talented researcher should devote a meaningful amount of time—perhaps 20 percent—to some combination of medium-term projects and short-term policy analysis, leaving a maximum of 80 percent of their time to engage in longer-term research. There should also be an effort to improve collaboration between individuals in different economics departments and between economists who focus most of their time on research and those who focus more on policy analysis. Concern for the research environment should be an active consideration of management, with attention focused on economists' career tracks, computing resources, and interaction of Bank staff with the broader profession.

5. The medium-term plan should focus on topics directly relevant to policy, and senior management should determine how much time should be set aside to meet the demands of short-term policy analysis. These changes will connect all researchers, and specifically the top researchers, directly to the policy mission of the Bank. Balance between research and policy relevance would be achieved not by trying to direct longer-term research but rather by allocating a specific portion of every researcher's time to medium-term projects and/or short-term policy analysis.

G. Organization of the Report

Section II presents the Committee's evaluation of research at the Bank. The Committee concludes that the research it reviewed is of high quality. But there is room for improvement to meet the standards set in the mission statement and reinforced in our discussions with senior management and members of the Governing Council. The Committee therefore sets out a set of principles in section III that it believes should guide the research effort and in addition ensure an appropriate contribution of the researchers to the policy mission of the Bank. In light of these principles, section IV provides a set of specific recommendations that would require increased resources devoted to the research function, while section V lays out a set of initiatives to enhance the efficiency with which existing resources are deployed.

The report concludes with three appendices. Appendix A provides information on the background of the committee members. Appendix B presents the mission statement for the committee that was provided by the Governing Council. Appendix C offers some tentative findings from a cross-country comparison of research at twelve other medium-sized central banks as well as the twelve Federal Reserve Banks.

II. Evaluation of Research at the Bank of Canada

A. Summary

1. Over the past five years, about 240 papers have been issued in the *Bank of Canada Working Paper* series, which is the primary means of disseminating the research output of the Bank. During this period, the Bank also issued four *Technical Reports* and twelve *Discussion Papers*. While only a single paper has been accepted for publication in a top-ranked general interest journal (the *Review of Economic Studies*), the Committee does *not* view this rarity as alarming, because such outcomes are exceptional for research produced at any central bank, even at much larger institutions such as the European Central Bank or the Federal Reserve Board. Rather, as noted above, the Committee believes that the appropriate standard is that Bank researchers should be producing a steady flow of research papers that are publishable in top-tier specialized journals in the fields of macroeconomics, monetary economics, finance, and financial infrastructure. But this standard does suggest significant room for improvement, because only two papers produced at the Bank in recent years have been accepted for publication in top-tier field journals, and only a few others are currently under editorial review at such journals.

2. In conducting its evaluation, the Committee did not rely primarily on simply counting publications or citations. Instead, the Committee directly reviewed a broad selection of about 40 papers authored or coauthored by Bank of Canada researchers over the past four years. While judging this research output to be of relatively high quality, the Committee also found significant room for improvement in meeting the high standards of the Bank's 'second to none' objective.

3. Virtually every paper considered in this review was well organized and clearly written in a style accessible to non-specialists, but only a few papers appeared to be suitable for publication in specialized field journals whereas the rest of the papers do not constitute substantial contributions to economic research. Put differently, many of the papers do not address questions of sufficient interest or importance to merit publication in a refereed journal, much less a top-tier field journal. In most cases, the problem does not appear to be a lack of analytical or technical skills, but rather an insufficient understanding of what constitutes an interesting question or a useful answer from an economic perspective. This analysis suggests that Bank researchers might benefit from additional advice from visiting scholars and external referees and from engaging in further collaboration with academic economists and researchers at other central banks.

B. Macroeconomics and Monetary Policy

1. A few papers that have been produced at the Bank serve as outstanding examples of high-caliber policy-relevant research in macroeconomics. These papers consider issues related to the design of monetary policy in the context of dynamic stochastic general equilibrium (DSGE) models. In each case, the microeconomic foundations of the model are clearly laid out, the results are striking, the interpretation is transparently presented, and the sensitivity analysis of alternative calibrations is very helpful for underpinning the conclusions. Several other papers in this field are also well-written and carefully executed, but the analysis is more narrowly focused and somewhat less innovative; hence, these papers are likely to be publishable in more specialized field journals.
2. In recent years, the Bank has been at the forefront—relative to other central banks as well as academic economists—in formulating and estimating DSGE models that can actually be used for forecasting and policy analysis. The detailed specifications and properties of these models have been disseminated via the Bank's *Technical Papers* and *Working Papers*. These publications mainly serve as useful references for modelers at other central banks and tend to become obsolete very quickly due to the rapid evolution of various practical details of the model. Thus, in addition to engaging in various *medium-term projects* aimed at enhancing various aspects of these models, it is important for the members of the modeling team to have sufficient time to conduct *longer-term research* and to produce research papers that present and clarify the key conceptual and methodological contributions which may have occurred in the course of these medium-term projects. Such research papers (like the ones noted in point 1 above) are the primary channel through which this scientific knowledge can be disseminated to a much wider audience of researchers at academic institutions as well as other central banks.
3. Another example may be helpful in illustrating the potential for leveraging medium-term projects into longer-term research that has a highly visible impact on the profession. The Bank of Canada coordinated a pathbreaking project several years ago that compared the dynamic properties and policy implications of virtually every existing empirical model of the Canadian macroeconomy. The main results of the project were very striking, but the resulting papers were published in journals with very limited readership and had a negligible impact on subsequent research. Nonetheless, one can imagine such a project serving as the foundation for a sequence of innovative research papers of substantial interest to economists and policymakers across the globe. Since the project involved various models used by professional forecasters and financial institutions, this line of research could address questions such as how the central bank should communicate to the public when its own macro model differs significantly from those used by the private sector, and how the private sector's forecasts are likely to evolve in response to a shift in the monetary policy regime (e.g., moving from an inflation target to a price-level target).
4. Finally, a number of papers issued in the *Bank of Canada Working Paper* series are directed at specific policy questions but do not make significant contributions to the broader state of knowledge. These papers would not normally be suitable for

presentation at research conferences, would be difficult to publish even in a very specialized field journal, and are unlikely to have any significant visibility or impact on economists at academic institutions or other central banks.

C. Finance

1. The researchers in finance at the Bank are a young, well trained, and talented group who have produced work that is generally on a par with the other groups assessed by this Committee. The research in finance includes some of the best individual pieces among all the working papers that were reviewed by the Committee. The potential for producing first rate work is definitely present, but more could be done to exploit the talent available. The crucial ingredient is leadership from senior researchers who can help identify important issues and provide guidance in formulating the most productive research strategies. Some thoughts on the directions that might be explored are mentioned below.
2. In addition to the theoretical paper that is forthcoming in the *Review of Economic Studies*, a couple of other papers make significant conceptual and methodological contributions and are likely to be publishable in applied finance journals. Several other papers are technically competent and provide interesting factual information, but do not make any methodological contributions, test novel empirical hypotheses, or obtain specific policy conclusions. Finally, a number of other papers were clearly not intended as original research, but may well be useful reference works for economists at the Bank of Canada and elsewhere.
3. A general characteristic of the papers in this field is the absence of structural modeling that would facilitate an economic interpretation of the estimates and that could serve as a basis for policy analysis. Rather, most of the papers have focused on estimating reduced-form models or have been confined to describing statistical relationships in the data. As a result, these papers often seem to strain for policy relevance, rather than being motivated by any particular policy question. Furthermore, replication studies—applying existing methods to Canadian data—are certainly useful but should generally be viewed as routine medium-term projects, *not* as research that is likely to have a significant impact on the broader state of knowledge.
4. The Committee recognizes that much of the research published in finance journals—such as continual refinement of asset-pricing models—has been motivated by the interests of the financial community rather than the priorities of public institutions like the Bank of Canada. Therefore, given the Bank’s objective of fostering high-quality research with particular relevance for policymaking, a promising direction may be to encourage research that employs structural modeling to reunify macroeconomics and finance. Researchers like Monika Piazzesi, Martin Schneider, Joao Gomes, Lu Zhang, Ron Giammarino, Jonathan Berk and others have had a significant impact on the field by asking economic questions that require explicit structural modeling of institutions and equilibrium relationships, rather than simply running regressions based on arbitrage conditions. And in light of the Bank’s active interest in dynamic stochastic general equilibrium models, there seems to be a clear opportunity for fruitful collaboration among the researchers in macroeconomists and finance.

D. Financial Infrastructure and Payments System

1. The overall impression one gains in reviewing these papers is one of expertise in the workings of the financial infrastructure, and a clear understanding of the design and current behavior of these systems. A number of papers address original questions or utilize innovative techniques and are aimed at making substantive contributions to the banking or finance literature on a particular topic, and these papers also tend to be informative about policy considerations; thus, this research output should be viewed as broadly consistent with the Bank's 'second-to-none' objective, especially compared with other central banks of similar size.

2. Another set of papers performed simulations or relatively straightforward tests of either new policies or losses of some sort on the performance of important parts of the financial infrastructure, such as the banking system, the Bank of Canada itself, or on the payment system infrastructure. These papers are useful in evaluating the effects of policy and are necessary to the mission of the Bank of Canada; furthermore, the quality of the measurement techniques is comparable to similar work done at other central banks. Conducting these studies is useful in providing in-depth knowledge of the relevant systems, and the resulting papers convey that knowledge to a wider audience. Similarly, literature reviews are useful as part of a larger research program, and issuing the review as an external working paper is a means of disseminating the review to a wider audience. However, because these studies and reviews do not involve any new methods or innovative results, the resulting papers are generally not viewed as contributing to the broader state of knowledge and hence do not merit publication in a refereed journal. Thus, it might be appropriate for the Bank to publish such of papers in a distinct publication rather than in the *Bank of Canada Working Paper* series.¹

3. In the Committee's assessment, the best research in this field involved the evaluation of models with explicit equilibrium conditions. Further emphasis on this approach might well lead to the development of innovative research that can also be deployed in the analysis of specific policy issues.

III. Strategic Principles for Promoting Research

1. The Committee believes that policy analysis and longer-term research are highly complementary activities. Therefore, the Bank should move in the direction of creating an environment in which every staff economist is engaged in a combination of both activities. Of course, the time allocations for policy-related responsibilities and longer-term research will vary widely across staff members and may well evolve over time for each individual economist, reflecting their specific skills, interests, and demonstrated abilities. Nevertheless, even the most talented researchers should spend a significant fraction of their time (e.g., 20 percent) on policy-related responsibilities, while even the most talented policy analysts should maintain some involvement in longer-term research.

¹ The *Discussion Series* that was recently introduced by the Bank of Canada effectively accomplished this objective.

An exception to this rule might be advisable during a newly-minted Ph.D. economist's first year at the Bank, when a relatively light load of policy analysis can be combined with encouragement to submit dissertation chapters to refereed journals. Such an approach would also help signal the Bank's commitment to sustaining a high-quality research environment over time.

2. Although the operational work of the Bank must be planned and directed by policymakers and managers (with an essential role for strategic plans and short-term deadlines), longer-term research should generally be initiated and self-directed by individual economists. This approach to research is essential for fostering higher-quality research output, because substantial creativity and flexibility are needed to ensure that the focus and direction of the research project can be adjusted in response to preliminary findings, unanticipated obstacles, new methodological developments, and results from other academic and central bank researchers working on related topics. Furthermore, by giving researchers sufficient freedom to pursue longer-term research projects, the Bank will encourage and will attract and retain new economists with strong analytical abilities in both research and policy analysis. We see no alternative to this approach for achieving the Bank's "second-to-none" objective.

3. While avoiding "micro-management" of longer-term research, the senior staff does have a crucial role in promoting high-quality research that informs the Bank's short-term analysis and policy decisions. The Bank should establish and reinforce the incentive system—in terms of financial rewards and promotion opportunities—for conducting high-quality research on policy-relevant issues. In addition, senior staff should identify broad topics and policy questions on which the state of knowledge is currently insufficient but could be significantly expanded by long-term research that stretches over a few years, which is the relevant horizon over which the research is likely to be successful in addressing such issues. Finally, the senior staff should incorporate these considerations in initiating and managing medium-term projects; as noted above, such projects are not directly aimed at producing publishable research output, but in many cases, the economists working on a given medium-term project will end up pursuing new longer-term research that contributes to the broader state of knowledge on that topic.

4. The Committee does not believe that the Bank's output of high-quality policy-relevant research is likely to be maximized by designating some economists as full-time researchers. This view was reinforced by numerous comments from a diverse set of staff members—including managers and economists from "special studies" sections as well as "operational" sections of the Bank—and is also bolstered by the experience of many other central banks (including the Federal Reserve System). Engagement in policy analysis can provide an invaluable stimulus to longer-term research activities, because the operational work generates a continuous stream of topical issues and unresolved questions that have not yet been investigated or even recognized by academic economists. Furthermore, connecting all researchers to the policy mission of the Bank will likely have favorable spillovers to the choice of research topics that these researchers pursue. So the spillovers will increase the longer-term payoffs of long-term research in informing the operational work of the Bank. Finally, emphasizing the extent to which positions at the Bank involve a mixture of research and policy-related responsibilities can be a valuable tool for attracting talented young researchers to the Bank.

5. This strategy will also promote greater interaction and collaboration between economists who are primarily oriented towards longer-term research and those who are primarily engaged in current analysis. This collaboration would contribute to keeping the models that underpin the current analysis at the forefront of the profession, and would help researchers identify topics that would best advance the operational work of the Bank.
6. In implementing this broad strategy, it will be useful to establish an internal committee to investigate how other central banks manage the balance between motivating high-quality research and carrying out the operational work required by policymakers.

IV. Initiatives Requiring Additional Resources

A. Compensation

1. The Committee perceived a substantial inconsistency between the “second-to-none” objective and the Bank’s current pay structure, which clearly hampers the Bank’s ability to recruit and retain highly-talented economists. Therefore, the Bank faces a difficult choice: either abandon the objective, or increase the amount of resources for economist salaries. No amount of creativity on the part of senior management can be expected to overcome a fundamental inconsistency between its objectives and its resources.

2. In recent years, the Bank’s salary for entry-level economists has been aligned with the *median* pay for *second-tier* Canadian universities—a level which is substantially below that of top-tier Canadian universities and even further below that of comparable positions at U.S. universities or international institutions such as the IMF. This salary structure seems like a clear recipe for mediocrity rather than excellence. Indeed, in its interviews with some recently-hired staff economists, the Committee heard several comments like “I didn’t receive *any* other job offers, so I accepted the position at the Bank of Canada.”

3. To meet the “second-to-none” objective, the Bank should set the salary level for entry-level Ph.D. economists to be competitive with first-tier Canadian universities as well as research-oriented economics departments at U.S. universities. Based on some preliminary investigation, achieving this target salary level would probably involve an increase of \$15,000 to \$20,000 in the salary of entry-level Ph.D. economists (which are currently set at about \$90,000).

4. In conjunction with raising the salaries of entry-level Ph.D. economist salaries, the Bank would need to examine the salary structure for Ph.D. economists in more senior positions. It is likely that the Bank will require additional resources to avoid excessive compression of the salary structure. Such compression should be avoided to ensure that the Bank not only succeeds in attracting but also continues to retain highly talented economists.

5. A pay structure that attracts and retains top researchers depends not only on initial salaries, but also on opportunities for pay increases and promotions. The Bank might consider a salary structure giving more emphasis to merit increases during a researcher’s early years at the Bank, as well as variable performance pay for economists who make distinguished contributions in terms of high-quality policy-relevant research as well as short-term policy analysis and completion of medium-term projects (see below). These merit increases and variable pay should provide incentives for carrying research through all the key stages of the dissemination process: presentations at conferences and invited seminars outside the Bank; issuance in the Bank’s working paper series; and publication in refereed academic journals. In addition, the performance evaluation process should also recognize other professional activities, such as preparing referee reports for journals and serving as a discussant at conferences and workshops. These activities contribute significantly to—and provide signals of—a researcher’s visibility and impact on the broader state of knowledge in the field.

B. Conference and Seminar Travel

1. The Bank's policies and budget for conference and seminar-related travel should reflect the extent to which such travel is a crucial means of disseminating research, receiving invaluable feedback, and facilitating ongoing interaction with economists at other central banks and academic institutions.
2. Funds for research-related travel should be allocated to each department on an annual basis, and these funds should be administered by the senior management of each department and approved on an incoming basis.
3. The Bank should allocate sufficient funds to cover the travel of any economist who will be presenting research or serving as a discussant at an external conference or seminar, subject to the approval of the economist's senior management. It should be recognized that a complete and polished paper is not essential in all cases; for example, economists frequently give presentations of research-in-progress at international conferences (such as the annual meetings of the American Economic Association). The Bank should also allocate funds for occasional instances (perhaps once a year or so) in which an economist would benefit significantly from attending a research conference even though the economist is not giving a presentation or serving as a discussant at that conference.
4. The Bank should encourage greater interaction with researchers at other central banks. By allocating more funds for this purpose, the Bank could facilitate travel for visits of substantial length to central banks with larger economics departments (such as the European Central Bank and the Federal Reserve Board) as well as other central banks with similar research and policy interests (such as the Bank of England and the Sveriges Riksbank).

C. Additional Recommendations

1. The Bank should designate a specific budget allocation for the acquisition of research-related datasets. Good empirical research is not possible without adequate data. In particular, there is a trend toward more use of micro data for answering macroeconomic questions.
2. Hiring additional editors and paying external referees to review submissions to the *Bank of Canada Working Paper* series will economize on staff time, allowing some reallocation of time for research and increase external feedback and validation of the Bank's research output.

V. Initiatives for Enhancing the Efficiency of Existing Resources

A. Organizational Structure

1. Based on the strategic considerations described in section III above, the Committee believes that the Bank should move away from special studies sections in which economists spend virtually all of their time on longer-term research (much of which has tended to be directed by management rather than self-initiated). Instead, even the most talented researchers should be moved into operational sections, and these economists should spend a significant portion of their time in policy-related responsibilities, while spending most of their time on self-initiated and self-directed research. For the typical economist, the split might be 1/3 of the time on long-term research, 1/3 of the time on medium term projects, and 1/3 of the time on shorter-term policy analysis. Even the most talented researchers should be expected to devote a meaningful amount of time, perhaps 20%, to a combination of short-term policy analysis and medium-term projects. Over time, this arrangement would enable management to adjust these time allocations—that is, operational work relative to longer-term research—to reflect each individual economist’s skills, interests, and demonstrated abilities, while still retaining a strong sense of identification with the Bank’s policy objectives.
2. The Committee believes that the current organization of the economics departments is not ideal for facilitating a “second-to-none” research environment. In its meetings with younger staff economists, the Committee heard multiple references to the degree of “balkanization” of the current organizational structure, which inhibits interaction and collaboration among researchers who have closely-related interests but happen to work in different departments. Several managers also mentioned the challenges of coordinating research projects as well as policy analysis that cross the existing departmental boundaries. The current structure also imposes unnecessary obstacles to the promotion of talented economists, who typically face the prospect of switching departments in order to move up the career ladder.
3. The Committee discussed several potential options for reorganizing the structure of the economics departments. For example, one possibility would be to consolidate the existing departments into two broad divisions (macroeconomic analysis and financial analysis). An alternative approach would have three broad divisions (macroeconomic stability, financial market stability, and financial market operations). Such a reorganization is likely to generate some significant gains in terms of collaboration as well as management oversight (such as greater uniformity of performance evaluations), but some alternatives could pose new obstacles to communication between the economics departments and other operational units within the Bank. The Committee recognizes that any major departmental reorganization would be associated with substantial challenges in terms of planning and implementation. Therefore, the Committee recommends that senior management should take a fresh look at this issue and develop a longer-term plan for moving over the next several years to a more efficient organizational structure that promotes collaboration.

B. Expanded Career Trajectories for Talented Researchers

1. The current structure of the economics departments is not well-designed for attracting and retaining talented researchers on a long-term basis, because promotions to more senior positions generally involve an increasing amount of administrative responsibilities. Based on the Committee's conversations with staff economists, this bottleneck primarily reflects the extent to which a principal researcher only has a single option for promotion, namely, to become an assistant chief with a heavy load of administrative tasks and little or no time for longer-term research.
2. This deficiency could be resolved by expanding the set of potential career tracks for talented researchers. For example, in the Federal Reserve System, a senior economist—which is the title roughly comparable to that of a principal researcher at the Bank—can be promoted directly to the official staff as an “adviser” who continues to have a portfolio of longer-term research as well as policy-related responsibilities, and may then receive a further promotion to the position of “senior adviser.” This approach would have even more resonance were the Bank to combine the existing research units, as under that organizational structure there could be a reduced number of managerial positions in the combined units relative to the current arrangements.

C. Research Activities of M.A. Economists

1. In recent decades, one of the Bank's greatest strengths has been its ability to attract and retain highly talented M.A. economists. A number of these economists are now in relatively senior management positions in the Bank. However, in its conversations with management as well as staff economists, the Committee identified several problems related to the Bank's current situation in this regard. The Bank's recruiting strategy has emphasized the extent to which newly-hired M.A. economists will have a large fraction of their time to engage in longer-term research. The reality is that many M.A. economists do not have the background or research skills to carry out high-quality research that could be presented at external venues or submitted for publication in refereed academic journals.
2. Moving talented Ph.D. researchers into operational sections will almost certainly be helpful in stimulating collaborative projects. The basic model is that a Ph.D. economist identifies the key issues and develops the methodological approach while the M.A. economist contributes to the project by compiling the relevant dataset, performing the statistical analysis, and drafting the text of the research paper. Such projects can “leverage” the skills of Ph.D. economists while providing unique opportunities for M.A. economists to collaborate on cutting-edge research that truly contributes to the overall state of knowledge. Thus, emphasizing this collaborative approach could become a valuable tool for recruiting both Ph.D. and M.A. economists to the Bank.

3. With this approach, the general expectation would be that newly-hired M.A. economists would engage in a combination of operational work and collaborative research with Ph.D. economists. A newly-hired M.A. would generally *not* spend significant time on self-initiated or self-directed research, at least for the first several years after joining the Bank.
4. The Bank should also invest additional resources in enhancing the skills of selected M.A. economists who have shown particular promise in research activities as well as operational work. For example, the Bank could arrange for academic consultants to teach advanced courses in macroeconomics, financial economics, and econometrics.

D. Visiting Scholars

1. The Committee would like to endorse the Bank's recent initiatives to expand the flow of multi-day academic visitors, who thereby have sufficient time to meet with economists at the Bank and provide invaluable guidance and feedback on their research. A crucial aspect of this initiative is to provide younger researchers with additional guidance in choosing research topics and formulating research strategies, for example, by bringing in visiting academics for a two-week period with the specific task of reviewing research projects and giving advice to researchers at the Bank.
2. We also endorse the Bank's efforts to develop ongoing relationships with selected visitors who collaborate on research projects with staff at the Bank. These efforts might be enhanced by establishing a program of summer grants to academics who engage in collaborative research with Bank economists; such an approach could help leverage limited amounts of money in initiating relationships and research projects that can become self-sustaining over time.
3. Nevertheless, the Committee believes that a large fraction of the collaborations between prominent academic economists and researchers at other central banks have occurred as a result of individual relationships that were formed in graduate school. This consideration underscores the importance of establishing a compensation framework that can attract and retain Ph.D. economists from well-established research universities; that is, the Bank will face ongoing challenges in developing closer ties with the academic community unless the Bank becomes more competitive in recruiting new economists.

E. Additional Recommendations

1. The Committee understands that the Bank is currently engaged in reorganizing the Information Technology (IT) department. IT difficulties have had considerable adverse consequences on the research computing environment. Even apart from the immediate situation, however, the Committee believes that there would be significant longer-run benefits of establishing a distinct unit—separate from the IT department—that is specifically oriented towards providing support for computing within the economics departments. In pursuing this approach, senior management may wish to consult with other central banks (such as the Federal Reserve Board) that are already following such an approach.
2. The Committee thinks that the funding for the fellowship program for Canadian academics (aimed at encouraging them to remain at Canadian universities) might be at least partially redirected to providing additional resources for research at the Bank.

Appendix A

Composition of the External Evaluation Committee

In spring 2007, the Governing Council of the Bank of Canada appointed a committee of five outside experts to conduct an independent evaluation of the economic research activities at the Bank of Canada. The selection of the committee members was intended to facilitate an assessment of the relatively broad scope of research at the Bank, and to evaluate the extent to which this research has had a significant impact on researchers at other central banks as well as at academic institutions. For these reasons, the Committee's chair is an individual with a background in academics and monetary policymaking who is well-versed in a wide array of policy-relevant research. Two of the committee members are distinguished academic economists whose fields of expertise are in macroeconomics and finance, respectively. The other two committee members have been active in both research and policy analysis within the Federal Reserve System on topics related to macroeconomics and financial infrastructure, respectively. (See Appendix A for further information regarding the composition of the Committee.)

The chairman's role was to coordinate the activities of the committee and the writing of the report. The other members of the committee evaluated the research drawn from the period of 2003 through 2007, each focused on papers in their area of specialization. The evaluators both prepared individual reports on each appear they reviewed and a summary of the research in their area of specialization.

The Committee reached a consensus on the recommendations for improving the research at the Bank of Canada and collaborated on the writing of the final report.

Brief summaries of the background of the members of the committee are given below:

Martin Eichenbaum is the Ethel and John Lindgren Professor of Economics at Northwestern University, a Research Associate of the National Bureau of Economic Research, a Fellow of the Econometric Society, and a Senior Consultant to the Federal Reserve Bank of Chicago. He received his Ph.D. in economics from the University of Minnesota in 1981.

Douglas Gale is a Silver Professor and Professor of Economics at New York University, a Fellow of the Econometric Society, a Senior Research Fellow of the Financial Institutions Center at the Wharton School, and a Research Associate of the Financial Markets Group at the London School of Economics. He completed his Ph.D. from the University of Cambridge in 1975.

Andrew Levin is Deputy Associate Director of the Division of Monetary Affairs at the Federal Reserve Board of Governors. He received his Ph.D. in economics from Stanford University in 1989 and was an assistant professor of economics at the University of California, San Diego prior to joining the Federal Reserve Board's staff in 1992. In recent years, he has also served as an adjunct professor of economics at Columbia University, Georgetown University, and the Johns Hopkins University.

James McAndrews is Vice President and Head of the Money and Payments System Function at the Federal Reserve Bank of New York. He received his Ph.D. in economics from the University of Iowa. Mr. McAndrews research interests include the industrial organization of banking and the economics of payments. He has published articles in both academic and Federal Reserve publications and has worked on many strategic projects for the Bank in its payment services area. He has served as a consulting economist to the Bank of England, Reserve Bank of Australia, the Swedish Riksbank, and to the World Bank.

Laurence H. Meyer is Vice Chairman of Macroeconomics, a former professor and Chairman of the Economics Department at Washington University in St. Louis, and a former Governor of the Federal Reserve Board. He received his Ph.D. from MIT in 1970.

Members of the evaluation committee have outstanding credentials that testify to their ability to assess research relative to the standard of journal publications. The Committee chair, Laurence Meyer, currently serves on the board of the National Bureau of Economic Research. Martin Eichenbaum is an associate editor of the *Journal of Monetary Economics* and the new *AEA Macro Journal*. Douglas Gale is an associate editor of *Games and Economic Behavior* and advisory editor of *Macroeconomic Dynamics* and was formerly a co-editor of *Econometrica* and of *Economic Theory*. Andrew Levin is a co-editor of the *International Journal of Central Banking*. James McAndrews has regularly served as a guest editor of the *Review of Network Economics* and the *Journal of Financial Services Research*. Finally, all of the committee members have extensive familiarity with research at other central banks and policy institutions.

Appendix B

Terms of Reference External Evaluation of the Economic Research Activities and Environment of the Bank of Canada

I. Introduction

The Governing Council of the Bank of Canada has requested an independent external evaluation of the economic research activities and environment at the Bank of Canada. There are three main focal points for this external evaluation: (i) evaluate the correct balance between “basic” and policy relevant research²; (ii) evaluate how well our research addresses, in a complete and thorough manner, key questions regarding monetary policy and financial stability in a small-open economy; and (iii) provide the staff, Governing Council and our Board of Directors with a benchmark of the contribution of our work to the academic and policy-relevant literature. The evaluation will be undertaken by a committee of independent external experts. The committee will be comprised of a chair who will coordinate the evaluation, and experts in macroeconomics, finance and financial infrastructure, respectively. At the same time a balance will be sought to ensure we retain evaluators with experience in policy relevant research. Since a large proportion of research conducted at the Bank of Canada rests in the area of macroeconomics, we envision that the chair will be well-versed in multiple lines of economic research but primarily an expert in macroeconomics and monetary policy.

For the purpose of these Terms of Reference, research is defined as the set of activities conducted over the past Medium Term Plan (four years) that has led to economic analysis that meets or exceeds the standards of a Bank of Canada working paper, including research contained in Bank of Canada conference volumes and other non-working paper outlets³. Therefore, activities such as briefings, responses to ad-hoc requests, analytical work for internal purposes (e.g. projection or monitoring) or speech writing are not included in this review. The respective Research Directors will be responsible for guiding each evaluator to the appropriate body of research.

² We define “basic” research to mean core research that needs to be undertaken to advance work in policy-relevant research. For example, a solution method for non-linear problems would help us study the zero-bound on nominal interest rate.

³ In principle, the evaluation would review our work from the past four years. In practice, however, given the upward trend of the volume of our research, the evaluation will focus more on the past two years. For the sake of brevity, the term “economic analysis or research” will encompass work in macroeconomics, finance and financial infrastructure.

II. Goals of Research at the Bank of Canada

The goal of economic research at the Bank of Canada is to provide a strong conceptual and empirical basis for formulating monetary policy and policies to help ensure financial system stability and efficiency. High-quality, innovative research is particularly relevant to ensure that the Bank of Canada is well-equipped to make important policy decisions as well as cope with any unprecedented challenges associated with the conduct of monetary and financial stability policy in a small open economy.

Against this back drop, the primary objective of economic research at the Bank of Canada is to improve our understanding of the functioning of the Canadian economy and financial system, and, more specifically, to provide high-quality models, tools and analyses relevant to monetary and financial system policy in a small-open economy. Other objectives of research include its use as a human resource management tool (to attract and retain top professionals) and to contribute to the reputation of the Bank of Canada as a top policy-relevant research institution.

III. Purpose of the Evaluation

The evaluators will assess the extent to which economic research conducted at the Bank of Canada contributes effectively to the achievement of the objectives stated above. In this context, the evaluators are requested to evaluate the following.

Primary Areas for Evaluation:

1. The quality and value-added of our economic research relative to the standards of the profession as applied in leading policy institutions;
2. The relevance of Bank of Canada research for the conduct of monetary and financial system policy; and
3. The balance between basic and policy-relevant research.

Secondary Areas for Evaluations (as time and interest permit):

4. The influence of the research within the academic community and other policy-making institutions; and
5. The focus, organization and environment of economic research conducted at the Bank of Canada

Appendix C

Some Tentative Findings from Cross Country Comparisons

The Committee evaluated the research at the Bank of Canada by reading the papers and assessing their quality relative to top tier specialized journals, based on committee members' experience with publication in and as editors of economics journals. After the assessment was completed, the committee undertook a cross-country comparison of research productivity by comparing the output of journal articles per capita over the period 2003 -2007 for twelve medium-sized central banks as well as for the twelve Federal Reserve Banks. For this purpose, the committee followed the approach in St-Amant et al. (2005).⁴ The tables below highlight some of the key points that were made in the main body of the committee's report.

First, a relatively small fraction of "research" papers written at the Bank of Canada end up being published in articles in refereed journals. For example, abstracting a bit from lags in publication, more than 300 papers were issued in the Bank of Canada Working Paper series from 2003 through 2007, whereas only 70 articles co-authored by researchers at the Bank of Canada were published in the set of journals covered by EconLit. In terms of international comparisons, the problem is evident in the relatively low rate of journal publications per researcher at the Bank of Canada compared to most other medium-sized central banks (that is, institutions with 10 to 75 researchers) and compared to most of the Federal Reserve Banks.

Second, a very small fraction of "research" papers written at the Bank end up being published in top-tier general interest journals or top-tier field journals (classified as Tier I and II, respectively, in the St-Amant study). In terms of international comparisons, this problem is evident in the low rate of "high-quality" journal publications per researcher (that is the sum of Tier I and Tier II journal articles published during 2003-2007) at the Bank of Canada compared with other medium sized central banks or most of the Federal Reserve Banks.

⁴ Pierre St-Amant, Greg Tkacz, Annie Guerard-Langlois, and Louis Morel, "Quantity, Quality and Relevance: Central Bank Research, 1990 – 2003, Bank of Canada Working Paper 2005-37.

Table C-1
The Ratio of Journal Publications to Researchers
at Twelve Medium-Sized Central Banks

	<u>Number of</u> <u>Researchers</u>	<u>Publications per Researcher</u>	
		<u>Total</u>	<u>High-Quality</u>
Australia	15	2.6	0.1
Canada	42	1.7	0.2
Finland	26	2.3	0.1
France	25	1.2	0.0
Germany	16	5.5	0.3
Italy	49	4.0	0.4
Netherlands	19	4.2	0.3
Portugal	17	2.2	0.5
Spain	13	8.7	0.8
Sweden	12	4.3	1.0
Switzerland	12	3.7	0.6
United Kingdom	50	2.9	0.5

Notes: The number of researchers at each institution is taken from Table 1a of St. Amant et al. (2005). The number of journal articles published during 2003 to 2007 was determined from the EconLit database, using the keywords indicated in Appendix C of St. Amant et al. (2005). The six Tier I and fifteen Tier II journals are identified in Appendix B of St. Amant et al. (2005), based on the work of Combes and Linnemer (2003); however, the non-refereed papers in the annual AER Papers and Proceedings are not counted as Tier I articles, and the Journal of the European Economic Association (which was initiated in 2003) is now counted as a Tier II journal.

Table C-2
The Ratio of Journal Publications to Researchers
at Federal Reserve Banks

	<u>Number of</u> <u>Researchers</u>	<u>Publications per Researcher</u>	
		<u>Total</u>	<u>High-Quality</u>
Atlanta	15	2.6	0.7
Boston	42	4.0	2.0
Chicago	26	5.0	1.9
Cleveland	25	3.6	1.4
Dallas	16	3.2	0.2
Kansas	49	5.7	1.5
Minneapolis	19	7.6	4.4
New York	17	2.3	0.7
Philadelphia	13	4.3	1.5
Richmond	12	3.6	1.8
San Francisco	12	10.6	2.1
St. Louis	50	7.3	1.2

Notes: see the notes to Table 1.

Table C-3
Central Bank Researchers and Journal Publications

	Number of Researchers in 2003	Journal Articles, 2003-2007		
		Total	Tier I	Tier II
Australia	15	39	0	2
Canada	42	70	1	7
Finland	26	59	0	2
France	25	31	0	1
Germany	16	88	0	5
Italy	49	195	2	19
Netherlands	19	79	0	5
Portugal	17	37	1	7
Spain	13	113	0	10
Sweden	12	52	0	12
Switzerland	12	44	1	6
United Kingdom	50	147	5	21

Notes: see the notes to Table 1.

Table C-4
Researchers and Journal Publications of Federal Reserve Banks

	Number of Researchers in 2003	Journal Articles, 2003-2007		
		Total	Tier I	Tier II
Atlanta	37	96	10	17
Boston	17	68	8	26
Chicago	30	151	27	31
Cleveland	17	61	5	19
Dallas	17	55	0	4
Kansas	10	57	2	13
Minneapolis	14	106	35	26
New York	75	170	13	40
Philadelphia	15	65	6	16
Richmond	16	57	7	22
San Francisco	9	95	3	16
St. Louis	19	138	1	22

Notes: See the notes to Table 1.