Request for Research proposal

Addressing Biases in Online Job Posting Data for Measuring Job Vacancies

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1. Introduction and project summary

a) Introduction to LMIC

The Labour Market Information Council (LMIC) is a not-for-profit organization created in 2017 by the Forum of Labour Market Ministers (FLMM) to identify and implement pan-Canadian priorities to address the need for more consistent and accessible labour market information for Canadians.

LMIC's mandate is to improve the timeliness, reliability, and accessibility of labour market information to facilitate decision-making by employers, workers, job seekers, academics, policy makers, educators, career practitioners, and under-represented populations.

LMIC is led by an Executive Director supported by a five-person management team. Strategic direction and operational oversight are provided by a 15-person Board of Directors made up of senior representatives from the 13 F/P/T jurisdictions, ESDC and Statistics Canada. LMIC's work is supported through formal and informal expert advisory networks. These include the National Stakeholder Advisory Panel, the Career Development Stakeholder Committee and the Labour Market Information Experts Panel.

b) Project Summary

Online job postings provide a rich source of data on labour demand due to their widespread use as a recruitment tool. When used alongside official vacancy data, online job posting data provide valuable insights into unfilled positions to inform policy decisions related to workforce regulation and development.

Online job posting have several advantages, including timely, local, and detailed data characteristics. Although online job vacancy data is often considered a direct proxy for job vacancies, the two terms refer to different concepts and appropriate adjustments are essential to ensure that online job vacancies are representative of labour demand. Indeed, they are potential biased toward specific occupations, sectors, and locations, which may limit their representativeness compared to job vacancy and labour demand data.

In 2022, LMIC launched a project to measure job vacancies in Canada using online job postings. The objective of the project is to determine the feasibility and process for using online job posting data to assess job vacancies, as a supplement to official vacancy data such as the Job Vacancy and Wage Survey (JVWS). Vicinity Jobs provides a range of data on current French and English job postings with historical data back to 2018. Vicinity Jobs provides a variety of information from job postings including required experience, education, and skills as well as information on the employer, occupation classification, industry classification, position compensation, etc.

The project has three parts:

1) Evaluate the strengths and weaknesses of each data source, Vicinity Jobs and JVWS, to better understand the similarities and differences between them,
2) Compare Vicinity Jobs to JVWS and determine a process to measure the representativeness of online job postings versus job vacancies, and
3) Develop an algorithm to correct for any bias in the measurement of job vacancies through online job postings.

LMIC is seeking a highly experienced researcher with a PhD in economics, or in the process of obtaining one, to conduct a comprehensive analysis on the measurement of job vacancies using online job postings. The analysis must be centered around the third part of the project and build upon previous LMIC work. It must include the development of an algorithm that effectively adjusts the online job postings data for the inherent biases relative to the JVWS vacancy data. The researcher must provide the code for the algorithm in R or Stata format. In addition, the analysis must include a conceptual discussion of the various alternatives of the algorithm, highlighting their strengths and weaknesses.

The project is to be completed within four to six months, allowing for researcher discretion and structure of the research proposal. Reasonable extensions to the timeline may be granted by LMIC.

c) **Project Timeline**

The project timelines are as follows:

Week of April 10	Agreement signed with researcher
Week of April 10	Project kickoff
Week of May 15	Final research plan submitted to LMIC for comment
August	Mid-term progress report
September - October	Final report submitted to LMIC

d) **Project deliverables**

The primary product deliverable will be an in-depth report of 20 pages that meets the above-mentioned criteria, delivered to LMIC in English or French. The document should be submitted to LMIC in the form of a professional report, in PDF format, of the highest quality written and design standards.

The code for the algorithm shall also be submitted to LMIC, in Stata or R format (R preferred). This code will have detailed documentation and comments to facilitate the reproducibility of the script by LMIC researchers.

Initial drafts covering the scope of the report and a mid-term report should be shared with LMIC staff and advisory committee members for their input and guidance, in a frequency determined during initial meetings with LMIC. The product will be considered complete when the final report is delivered to and accepted by LMIC. The result of the project, including the report and the code, will be part of the property of LMIC. LMIC reserves the right to use, share and disseminate the results, algorithm and code in its own right.

After the report and code are submitted, a release period will be considered, during which the LMIC research team will be able to ask questions necessary for the proper understanding and operation of the code and algorithm. In the fall of 2023, a workshop on the use of online job offer data will be organized by LMIC and the researcher will be asked to present his/her research results.

2. Application and selection process

a) Research proposal

The research proposal should not exceed 5 pages (excluding bibliography) and should include the following sections:

    i.   **Title**

    ii.   **Research Context** *(min ½ page)*
This section is to include a brief overview of the general area of study within which the proposed research falls, summarizing the current state of knowledge and recent debates on the topic is necessary. This section should clearly lay out the context in which the research is being conducted and serves to demonstrate familiarity within the field. Why is this research and its related results timely for Canadian society, and what are its implications in economic and policy realms?

    iii.   **Research Questions**
This section should set out the central aims and questions that will guide the research. The questions should be narrow and feasible in nature to allow for research and analysis to culminate within the project timeline.

    iv.   **Research Methods** *(1-2 pages)*
The proposal should outline the chosen research methods and approaches. This section should be the main component of the proposal and include the initial data sources used in the research process and a proposed methodology for the algorithm.

    v.   **Significance of Research** *(min ½ page)*
This section should demonstrate the originality of the intended research, clearly stating the value-add to the field.

    vi.   **Project workplan/timeline, researcher background and additional support** *(1 page)*
This section should contain expected milestones to allow for LMIC validation / feedback

(minimum two milestone / validation dates). In addition, please also indicate in this section your knowledge in this field, your work experience in similar projects and the potential additional support that could be provided during the project.

vii. Bibliography

Each of these elements should be clearly identifiable to facilitate evaluation of the proposal.

Research proposals received after the deadline specified above will not be considered. LMIC reserves the right to extend the deadline for the submission of proposals.

Researchers who fail to raise issues and questions during the RFRP period do so at their own risk. Researchers must recognize that proprietary information may not be released to anyone other than the successful researcher. LMIC assumes no responsibility or liability arising from information obtained by a means other than those prescribed in this RFRP.

b) Assessment Criteria

To qualify for the research opportunity, prospective candidates must have or be in the process of obtaining a PhD in Economics or a related field.

LMIC will evaluate and rank all proposals against the following criteria:
1. The application package is received before the close of the Call for Proposals.
2. The research proposal is well articulated, and states clearly the research methods involved.
3. The research methodology is appropriate and feasible for answering the research question.
4. The proposed research uses new or innovative methods, theories, or approaches.
5. The research activities are feasible, given the available resources, timeline, and budget.
6. The researcher's qualifications and experience in relation to the needs of the proposed research.

Each proposal will be evaluated solely on its content. In submitting a proposal, the researcher agrees that the decision of LMIC will be final. Researchers acknowledge and understand that LMIC is not obligated to seek clarifications concerning proposals. Decisions to request clarifications or to conduct, if needed, interviews/presentations are at the sole discretion of LMIC.

c) Application process

The application package should include:
1. Research proposal (max 5 pages, excluding bibliography)
2. Resume or Curriculum Vitae (max 4 pages)

Please send the research proposal by e-mail to: anne-lore.fraikin@lmic-cimt.ca with the subject line: **"Research opportunity – Addressing Biases in Online Job Posting Data for Measuring job vacancies – [Researcher name]".**

RFRP closing date and time	March 26, 2023, at 23:59 EST
Evaluation of applications	March 27-31, 2023
Selected researcher(s) notified	April 3, 2023
Agreement sign-off	April 10, 2023

Every effort will be made to meet these dates. However, business needs may change timelines. Where dates change, reasonable notice of those changes will be provided to researchers.

The components of the submission should be provided as separate PDF documents.

Any questions regarding the call for proposals and application process can be directed to Anne-Lore Fraikin at anne-lore.fraikin@lmic-cimt.ca no later than 24 March 2023, 11:59pm PST. Questions received beyond this date will not be answered.

Submissions will be received until end of day March 26, 2023, 11:59pm PST. Submissions received beyond this date will not be valid for participation in this call for proposals.

3. Awards

The selected researcher(s) will be awarded a total of $20,000 CAD.

The funds will be released throughout various stages of the project cycle. The initial $5,000 will be awarded upon submission of the final research plan, $5,000 following the mid-term progress report, and the final $10,000 once the research report, and accompanying data and code have been received and validated by LMIC.

LMIC will review drafts at various stages of the process. The final payment will be made assuming the research paper is revised in accordance with feedback provided at each stage. LMIC reserves the right to, at any time, reject the research project and will not be held liable for outstanding disbursements.

4. Data access and resources

LMIC will facilitate access to public data as needed and provide access to Vicinity Jobs' proprietary data.

Note for researchers seeking direct access to the Vicinity Jobs API, a confidentiality agreement must be signed between the researcher and Vicinity Jobs. This agreement will indicate that Vicinity Jobs data cannot be shared with third parties, can only be used for the purpose of this

research project, and will be deleted from the proponent's computers immediately after this project is completed. Future or ongoing access to Vicinity Jobs' data can be determined on a case-by-case basis.

This call provides the selected researcher(s) access to unique, proprietary data.

Online Job Posting Data
The opportunity allows for access to raw data provided by LMIC's partner, Vicinity Jobs. Vicinity Jobs is a Big Data analytics firm specializing in the collection and cleaning of near-real time online job posting data from across Canada. LMIC can provide API access to either pre-processed record-level data or fully processed aggregated data. The successful candidate can propose either or both solutions.

Record level observations of online job postings provided by Vicinity Jobs are cleaned and deduplicated. Each job posting is identified with a source webpage, date posted or found and is linked, wherever possible, to specific geographies across Canada, occupations (1 and 4-digit NOC codes), sectors (2- or 6-digit NAICS codes), education level requirements, employer names and offered wages (where available). In addition, each job posting is associated with "work requirements" (of which one group is "skills") and "certifications". A job posting might be associated with zero, one or many work requirements and/or certifications.

A complete and detailed description can be provided to potential applicants upon request and validation by LMIC and Vicinity Jobs.

Raw, unprocessed data are obtained by LMIC as paginated JSON files which are on the order of 200 Mb/month.

Standard Data Access

Other data that the awarded researcher will have access to are those accessed through the LMIC Data Hub - an open cloud-based data repository that merges different data sources together, cleans, and provides an easy-to-use API for researchers and interested stakeholders.

As of October 2021, data from two providers are included in the LMIC Data hub: **Statistics Canada** and **Vicinity Jobs**. Statistics Canada data is further segmented by one of three access points: CODR, RTRA and Custom Tabulations. Currently only CODR and RTRA data are available in the Hub. Table 1, below, summarizes the key data sources for the Data Hub.

Table 1: Key Datasets in the LMIC Data Hub

Data Provider	Access Point	Ingest type	Update Frequency	Comments
Statistics Canada	CODR	Drop	Monthly	13 CODR tables ingested. Most, but not all, categories from these 13 are available.
Statistics Canada	RTRA	Drop	Monthly	Labour force status and average actual wage information by NOC, NAICS and geographic regions
Vicinity Jobs	API	Automated	Weekly	Aggregate observations (25+) of job postings and work requirements

If required, LMIC will work to support researchers in accessing custom LFS cross tabulations from Statistics Canada directly or through the RTRA system.

5. Contractual agreement

LMIC will negotiate a contractual agreement with the preferred researcher. If LMIC is unable to negotiate an acceptable contractual agreement with the preferred researcher, then the second preferred researcher may be selected, and a formal written contractual agreement will be developed. In any case, LMIC, at any time and without liability, may withdraw from negotiations with any potential researcher.

6. Conflict of interest

Researcher(s) are to fully disclose, in writing, any circumstances of actual or potential conflicts of interest, as well as that which could be perceived as conflicts of interest, to LMIC on or before the closing date of the RFRP. LMIC will review all disclosures made by researchers under this provision and take such steps as it, in its sole discretion, deems necessary to address potential conflicts, including but not limited to requiring the researcher to address and remedy the conflict of interest to the satisfaction of LMIC, or otherwise disqualifying the researcher from further participation.

7. Terms and conditions

- LMIC will not be responsible for any costs incurred by a researcher in preparing and submitting proposals and/or attending interviews/presentations. LMIC accepts no liability of any kind to a researcher unless, and until, its proposal is accepted, and a formal agreement is negotiated.

- Submission of a proposal shall not obligate, nor should it be construed as obligating

LMIC to accept any such proposal or to proceed further with the project. LMIC may, in its sole discretion, elect not to proceed with the project, and may elect not to accept any or all proposals for any reason.

- The working languages of LMIC are English and French and proposals to this Request for Research Proposal can therefore be in either of these languages.

- At all times, the researcher has the responsibility to notify LMIC, in writing, of any ambiguity, divergence, error, omission, oversight or contradiction contained within the RFRP document as it is discovered.

- LMIC assumes no responsibility or liability arising from information obtained in a means other than those prescribed in this RFRP.

- Researchers may amend or withdraw their submissions prior to the closing date and time specified in the RFRP by way of email notification to LMIC. After the closing date and time, proposals may be irrevocable at the discretion of LMIC.

- Proposals submitted shall be final and may not be altered by subsequent offerings, discussions, or commitments unless the researcher is requested to do so by LMIC.

- The confidentiality of the Researcher's proposal will be maintained by LMIC, except as otherwise required by law or by order of a court or tribunal. Researchers are advised that their proposals will, as necessary, be disclosed on a confidential basis, to LMIC advisers retained for the purpose of evaluating or participating in the evaluation of their proposals. If a researcher has any questions about the collection and use of personal information pursuant to this RFRP, questions are to be submitted to the Inquiries Contact.

- There will not be a public opening. All proposals and accompanying documentation received under this competition will become the property of LMIC and will not be returned.

- LMIC may, at its discretion, make certain changes and exceptions to the terms and conditions outlined in this document.

- LMIC has reserved the right to waive minor non-compliance by a researcher with the requirements of the RFRP. This will allow LMIC to consider and possibly accept any proposal which is advantageous to it even though the proposal may be non-compliant in some minor respect.

- LMIC reserves the right to accept or reject, in whole or in part, any or all proposals.

- LMIC reserves the right to cancel and/or re-issue this RFRP at any time for any reason without penalty.

- Prices quoted are to be held firm for a minimum of 120 days following the RFRP closing date and shall remain in effect through the duration of the agreement.

- LMIC shall, at the request of a researcher who responded to this RFRP, conduct a debriefing after the awarding of the agreement, to any researchers, for the purpose of providing researchers with feedback on their proposal. All requests must be made in writing to the Inquiries Contact and must be made within thirty (30) days of notification of award. Only researchers that submitted a proposal to the competitive procurement process may request a debriefing.

- The researcher's proposal may form part of the contractual agreement by attachment and may be incorporated by reference. Claims made in the proposal may constitute contractual warranties. Any provision in the proposal may be included in the contractual agreement as direct provision thereof.

- Governing Law – This Request for Research Proposal is governed by the laws of the Province of Ontario.

- LMIC reserves the right to eliminate mandatory requirements unmet by all bidders/proposers.

8. Definitions

Throughout this RFRP, the following definitions apply:

"Agreement" means the written contract between the preferred researcher and LMIC to provide the services contemplated by this RFRP.

"Client" (referring to LMIC) means the Office or Secretariat of the Labour Market Information Council.

"Conflict of Interest" includes any situation or circumstance where, in relation to a LMIC procurement competition, a participating researcher has an unfair advantage, a perception of an unfair advantage or engages in conduct, directly or indirectly, that may give it an unfair advantage, including:

- having, or having access to, information in the preparation of its proposal that is not available to other researchers, but such does not include information a vendor may have obtained in the past performance of a contract with LMIC that is not related to the creation, implementation or evaluation of this or a related procurement;
- communicating with any person with a view to influencing preferred treatment in the procurement competition (including but not limited to the lobbying of decision makers involved in the procurement competition); or
- engaging in conduct that compromises, or could be seen to compromise, the integrity of the open and competitive procurement competition or renders that competition non-competitive, less competitive, or unfair.

"Desirable" and "should" means requirements that may have a degree of importance to be objectives of this RFRP and may be rated.

"Entity" refers to LMIC for administrative purposes.

"Evaluation Team" means the individuals who will evaluate the proposals on behalf of LMIC.

"Labour market information" or "LMI" is knowledge, facts, data and relevant institutional information on the supply and demand of labour, including economic and labour market trends, education and skill requirements, wage rates, program results and outcomes, etc.

"Labour Market Information Council" or "LMIC" is a federal non-profit corporation with a Board of Directors consisting of FPT government officials and an office located in Ottawa, ON. As a coordinating body, LMIC will help to ensure better value from existing LMI investments across Canada and foster the exploration of new opportunities for collaboration among governments and with stakeholders.

"Mandatory" "shall", "must", and "will" means requirements that are imperative and must be met in order for the proposal to receive consideration.

"Non-Compliant" means the proposal fails to provide sufficient detail necessary to evaluate the proposal against the mandatory requirements outlined in this RFRP document.

"Optional" "may" "might" or "could" means requirements that might be rated.

"Preferred Researcher" means the researcher who has been selected through the competition, but with whom a contractual agreement has not been signed.

"Procurement Competition" means the entity receiving bids from researchers or vendors and evaluating those bids before choosing a researcher.

"Research Proposal" means the document submitted by a researcher in response to the RFRP.

"Rated" "should" means requirements that will be evaluated in accordance with the evaluation criteria and assigned points.

"Researcher" means an individual that submits, or intends to submit, a proposal in response to this Request for Research Proposal.

"RFRP" means Request for Research Proposal.

"Services" means the functions, duties, tasks, and responsibilities to be provided by the researcher as described in this RFRP.

"Successful Researcher" means the researcher responding to this RFRP who is determined to be successful in this competition and has signed a contractual agreement.