

博士論文審査結果報告  
Report on Ph.D. / Doctoral Dissertation Defense

National Graduate Institute for Policy Studies (GRIPS)

政策研究大学院大学

Professor MUNRO Alistair

教授 MUNRO Alistair

審査委員会を代表し、以下のとおり博士論文審査に合格したことを報告します。

On behalf of the Doctoral Dissertation Review Committee, I would like to report the pass result of the Doctoral Dissertation Defense as follows.

プログラム名 Program	政策分析プログラム Policy Analysis Program
学位申請者氏名 (ID) Ph.D. Candidate (ID)	Altansukh Bayarbileg (PHD18201)
Dissertation Title  論文タイトル (タイトル和訳)	Social and Economic Impacts of Air Pollution: The Case of Ulaanbaatar, Mongolia 大気汚染による社会・経済的影響：モンゴル・ウランバートルにお ける実証分析
学位名 Degree Title	博士（開発経済学） Ph.D. in Development Economics
論文提出日/ Submission Date of the Draft Dissertation	2022 年 8 月 4 日/ August 4, 2022
論文発表・審査会開催日/ Date of the Defense and the Doctoral Dissertation Review Committee	2022 年 9 月 1 日/ September 1, 2022
論文最終版提出日/ Submission Date of the Final Dissertation	2022 年 8 月 24 日/ August 24, 2022
審査委員会/ Doctoral Dissertation Review Committee	主査 Main referee MUNRO Alistair
	審査委員 Referee WIE Dainn
	審査委員 Referee 山崎 晃生 YAMAZAKI Akio
	審査委員 Referee LIU Haoming National University of Singapore
	審査委員（博士課程委員会） Referee (Doctoral Programs Committee) 土谷 隆 TSUCHIYA Takashi

※ タイトルが英文の場合、文部科学省に報告するため、和訳を付してください

Please add a Japanese title that will be reported to MEXT.

## **1. Summary of Defense and Evaluation**

By almost any measure, UlaanBaatar, the capital of Mongolia, has some of the worse air quality in the world. Levels of SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>2.5</sub> and PM<sub>10</sub> (PM = particulate matter) are particularly high in the winter, when low grade fuels are burnt by households and businesses in order to keep warm in the persistently sub-zero temperatures. Much of the emissions are concentrated in the poorer districts where many Mongolians live in traditional low-level ‘ger’ structures that lack electric heating or other cleaner sources of energy.

This dissertation examines some of the impacts of variation in air quality on behaviour within the city. The first main chapter investigates the link between air quality and the supply of labour; the second main chapter zeroes in on an individual school near to the ger district and links school attendance to levels of pollution. While research on the link between air quality and behaviour is now quite common, the dissertation represents the first serious econometric investigation of Mongolian data.

For the first chapter, data from the Mongolian Labour Force Survey is used. This is a recurrent survey that asks individuals how many hours they have worked in the preceding week. Meanwhile, the air quality data comes from 16 measuring stations located in and around UlaanBaatar. Since many of the stations are quite recent or only record a subset of the pollutants, there are some data quality issues, but based on the available information, the candidate finds evidence that worse air quality lowers hours of work. A fundamental concern with air quality and the link to economic behaviour is that there may be a common, but omitted factor that drives both variables. For example, colder weather may lower the demand for labour as well as driving up emissions from coal fires as people try to stay warm. To deal with this, Bayaraa includes other controls for weather and so on. She also presents some estimation results in which wind speed is used as an instrumental variable for air quality. Higher wind speed lowers pollution, but for the range of wind-speeds seen in Ulaanbaatar, it is reasonable to suppose that there is no direct link from wind-speed to economic activity. Hence, wind-speed is a suitable

instrument. Using it, she finds confirmatory evidence that for some air pollutants, worse air quality lowers labour supply.

In the second main chapter attention turns to school attendance. The candidate was able to persuade one school to release its daily attendance data for two years. This is linked to measurement of air quality at a local monitoring point. Statistically, the link between air quality and attendance is rather weak, but there is some evidence that worse air quality lowers attendance, albeit at a level that is much lower than that found in similar work for Beijing and the USA. This weaker link maybe due to the fact that in Mongolia, the air quality at home may be just as bad as air quality outside the home.

Overall, the dissertation suggests that the marginal impact of the very high level of air pollution in Ulaanbaatar is quite small compared to what is found in other countries. Since this conclusion maybe due in part to measurement problems, she recommends better monitoring of air quality in Mongolia and greater transparency in the release of data e.g. on hospital admissions for respiratory illnesses.

The candidate presented the key features of her dissertation over Zoom to the committee and other audience members for 45 minutes and then faced a further 45 minutes of questions and comments.

## **2. Dissertation overview and summary of the presentation.**

In the committee meeting held via Zoom immediately after the defence, the dissertation received a median vote of 5. The individual members of the committee suggested a number of changes to the dissertation to improve the exposition, and make the chapters more acceptable for publication in academic journals. Many of these changes focused on the introduction, which was seen as sub-standard. Among the suggestions for improvement were:

- A rewriting of the introduction to eliminate irrelevant material and make clear the student's contribution.
- Clarification of the units of measurement used.
- A more careful description of the models employed

The Main Referee undertook to supervise the corrections.

## **3. Evaluation Notes from the Doctoral Dissertation Review Committee (including changes required to the dissertation by the referees)**

On 5th September 2022, the candidate sent the revised dissertation to the main examiner along with a spreadsheet identifying where in the dissertation changes had been made. After a few more emails and subsequent revisions to the dissertation, by 7th September the main examiner was satisfied that it met the requirements of the referees.

## **4. Confirmation by the Main Referee that changes have been done to the satisfaction of the referees and final recommendations**

The doctoral thesis review committee recommends that GRIPS award the degree of Ph.D. in Development Economics to Ms. Altansukh Bayarbileg.