INTERNATIONAL MIGRATION AND OCCUPATIONAL INTEGRATION OF SKILLED HEALTH PROFESSIONALS

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Abstract

This thesis comprises three chapters (two are empirical) that focus on the international migration and occupational integration of foreign-trained health professionals and their labour market outcomes in host nations. Chapters 1, 2 and 3 are presented sequentially.

In chapter 1, the objective is to survey and discuss the relatively small economic literature on the frontier interdisciplinary policy issue of international migration of health professionals taking both developed and developing country perspectives. Health workforce shortages in developed countries are perceived to be central drivers of health professionals' international migration, one ramification being negative impacts on developing nations' healthcare delivery. After a descriptive international overview, selected economic issues are discussed for developed and developing countries. Health labour markets' unique characteristics imply great complexity in developed economies involving government intervention, licensure, regulation, and (quasi-)union activity. These features affect migrants' decisions, economic integration, and impacts on the receiving nations' health workforce and society. Developing countries sometimes educate citizens in expectation of emigration, while others pursue international treaties in attempts to manage migrant flows.

Chapter 2 empirically investigates whether the possession of foreign credentials affects the integration of health professionals in the labour market. It examines eight selected regulated health occupations. We perform statistical multivariate analyses using the 2006 Canadian Census to investigate the effects of location of birth and highest education on the likelihood of employment as a healthcare professional and on labour market outcomes. The results show that immigrant, foreign-trained degree holders are less likely to work as licensed healthcare

professionals after controlling for foreign experience, socio-demographic factors, and family compositions. A similar pattern emerges for labour market outcomes among those holding licensed health credentials; however, in some occupations we find mixed results. The results show earnings deficits associated with immigrants holding foreign credentials, not foreign birth exclusively (in some occupations), controlling for labour market activities, demographic and human capital factors.

Finally, in chapter 3 we find that foreign-trained dentists practicing in Canada earn approximately 30% less than their locally (Canada/US) trained counterparts. What explains such an earnings gap and what does it tell us about the content of services dentists provide? To address the issue, we apply a two-fold Oaxaca-Blinder decomposition to disentangle composition and market factors. We find that individual characteristics (such as gender, potential Canadian experience, visible minority status, geographic location and language) explain 61% of the gap, but 39% can be attributed to differences in rates of return for individual characteristics and unobservable characteristics. Possible causes of such differences in rates of return include differences in quality of training, dentists' productivities, language skills, and duration of stay in Canada for foreign-trained persons. The foreign-trained dentists have positive rates of return for characteristics, but suffer training location effects (or penalties) for being trained abroad. Moreover, significant negative effects are associated with being a foreign-born, foreign-trained dentist in comparison to being a foreign-born Canada/US-trained dentist. We conclude that the location of a dentist's highest training is the major factor influencing his/her labour market outcome, not immigration status exclusively.

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Preface

The first chapter is a joint work with co-authors, Professor Michel Grignon, Yaw Owusu and Professor Arthur Sweetman and it has been published as a chapter, "The International Migration of Health Professionals" in *The International Handbook on the Economics of Migration*, Amelie F. Constant and Klaus F. Zimmermann (eds.). Cheltenham, UK: Edward Elgar; 75-97. I was primarily responsible for the literature search, descriptive statistics and participated in all stages of the research work. Only the "Developing Country Perspective" section has been modified (i.e. given further details) since the thesis has less restriction on the page limit than in the published book.

The second chapter, which is also a joint work with Professor Arthur Sweetman, has been submitted to *Canadian Public Policy* for peer review, and I was primarily responsible for the empirical analysis of several drafts, and participated in all stages of the research work. All my thesis committee members provided comments and suggestions on various draft versions that were incorporated into this final version.

I was responsible for conceiving of and designing the third chapter along with my supervisors (Prof. Michel Grignon and Prof. Arthur Sweetman). I performed all the data analyses of several drafts. My thesis committee members also provided comments and suggestions on various draft versions that were incorporated into this final version. The third chapter will be submitted to the journal *Health Economics* for peer review.

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Introduction

Globalization has influenced the international migration of health professionals, as world economies have become more competitive for health human resources (Bach, 2008). Health professionals are mobile internationally, graduating in one country but seeking to practice in another. As of 2000, the proportion of foreign-born population [1] in the Organization for Economic Cooperation and Development (OECD) countries was 9.9%, while 10.6% constituted the share of foreign-born nurses and 18% represented the share of foreign-born physicians. A combined proportion of all other foreign-born health professionals (e.g. dentists, pharmacists and others) in all the OECD countries was 15.7%.

In 2004, the rate of medical brain drain (defined as 'the proportion of the total number of domestically trained doctors working abroad') for all the OECD countries was at 3.4% compared to, for instance, 19% for sub-Saharan African countries and 8% for South Asia (Docquier and Bhargava, 2007). As much as 10% of all African-trained physicians are practicing in the United States and Canada alone. About 20%, 30%, and 43% of medical graduates from Uganda, Ghana and Liberia, respectively are practicing in the United States and Canada alone (Hagopian *et al*. 2004).

The literature on the international migration of health professionals turns to the difference in average earnings (as well as work environments) between countries of training and host countries to explain the pull factors involved in immigrants' and/or foreign-trained health

[1] A noteworthy distinction is that "foreign-trained" health professionals are not necessarily "foreign-born" health professionals. Native-born Canadians may receive their post-secondary training abroad.

professionals' decision to leave their country of training. Of course social, political and economic instabilities in the country of origin (or push factors), mostly for those graduating in developing countries, also influence their migration decisions.

Pull factors in host countries include decisions to admit more or less immigrants in general and foreign-trained health professionals in particular, as well as the better working conditions, improved personal safety and overall good quality of life available in developed countries. However, one of the main decision variables explaining the proportion of foreign-trained health professionals (FTHPs) is the average earnings differential (Hagopian *et al.*, 2005; Vujicic *et al.*, 2004).

From an economic perspective, though, a crucial but under-studied question concerning the international migration of health care professionals is the degree to which they can use their training and credentials to work in their field in the host country, and whether or not they become as successful as their locally trained counterparts. This is crucial because, if we want to understand the motives of those trained in one country to migrate to another, we cannot simply take the average earnings differential across the two countries as a key variable; rather, the differential between what a FTHP can expect to earn in the host country relative to what they can expect to earn in their country of training must be considered. So we ask: which earnings information should inform a prospective FTHP's/immigrant's decision to migrate? Is it the difference between average host country earnings and average source country earnings or the difference between what a FTHP from the source country can earn in the host country versus what they can earn if they stayed in their country of training?

This is a complex question because it requires assessing earnings conditional on migration at both ends of the migration. In other words, do those who emigrate earn on average

more or less than those who stay? Do immigrant health professionals earn less than domestically trained ones in the host country? In this thesis, we primarily address the latter of these two questions, though the former is briefly touched on in chapter 1. This thesis asks: what are the labour market outcomes of foreign-trained health professionals in a destination (usually rich) country?

The answer to such a question is obviously dependent on the institutional context in the host country, notably as it influences foreign credential recognition and evaluation, and this is why one particular context, Canada, is the topic of this thesis. In Canada, FTHPs are welcomed and professional associations support their right to practice and use their skills. In addressing the Canadian House of Commons Standing Committee on Human Resources, Skills and Social Development,[2] the Canadian Medical Association (CMA) underscored the relevance of foreign credential recognition in their statement:

> *"The CMA fully supports bringing into practice qualified [International Medical Graduates] IMGs already in Canada. Canada has historically benefited from a steady flow of IMGs to our country. In fact, close to one-quarter of all physicians in Canada are IMGs"*
> *"The CMA recommends that the federal government continues to support efforts of medical organizations to streamline the process of credential verification and assessment of eligibility of licensure for IMGs" (Dr. Haggie, President of Canadian Medical Association, 2012)[3].*

However, in its presentation to the same Standing Committee, the Canadian Dental Association stated that

> *"…Some foreign-trained dentists are essentially at the same level as their Canadian colleagues, while others simply do not even come close to making the grade, even missing some of the prerequisites to enter dental schools in Canada. The variability is our biggest challenge and the reason a dental degree on its own cannot be taken as confirmation of competency. We either have to have formal knowledge of the educational process through accreditation or we need to test individual candidates in some way." (Dr. Soucy, Director, Clinical and Scientific Affairs, Canadian Dental Association, 2012)[4].*

[2] "A Framework For Success: Practical Recommendations To Further Shorten The Foreign Qualification Recognition Process". Source: http://www.parl.gc.ca/HousePublications/Publication.aspx?DocId=5456697&File=90#_ftn37[10 December, 2013)
[3]A Doctor for Every Canadian – Better Planning for Canada's Health Human Resources. Source: http://www.amc.ca/multimedia /CMA/Content_Images/Inside_cma/Submissions/2012/HUMA-HHR-May2012_en.pdf [10 December, 2013)
[4] Dr. Benoit Soucy, Director, Clinical and Scientific Affairs, Canadian Dental Association. Source: https://openparliament.ca/ committees/human-resources/41-1/9/dr-benoit-soucy-1/ [10 December, 2013).

The Canadian Nurses Association's (CNA) position statement makes it clear that the

> *"CNA recognizes that it is essential for internationally educated nurses to have access to timely information as well as tools and resources (e.g., transition courses) to assist them in meeting regulatory requirements such as demonstrating language proficiency and passing the Canadian Registered Nurse Examination (CRNE). Assistance should also be made available with respect to achieving successful clinical and cultural integration into the Canadian health care environment" (Canadian Nurses Association, 2013)*[5].

The thesis addresses the following four distinct knowledge gaps in the health economics and immigration literature of international migration and occupational integration of highly skilled health professionals: (1) the paucity of an economic perspective on the international migration of skilled health professionals throughout a vast interdisciplinary literature; (2) the lack of attention placed on the evaluation of labour market outcomes (LMOs) of FTHPs; (3) the lack of empirical evidence of economic integration of FTHPs in less-documented regulated health professions other than medicine and nursing, e.g. dentistry; and (4) the little attention placed on the effect of being foreign-trained in itself on the LMOs of foreign-trained dentists in a host nation such as Canada. I discuss each in turn in the following.

First, a substantial interdisciplinary literature exists on the international migration of skilled professionals, but there is a limited literature from an economic perspective that discusses the issues surrounding the international migration of health professionals. This thesis focuses on the key economic question: What are the true earnings differentials potential migrant health professionals face, given that they may not earn the same as the average health professional in the host country?

Second, this thesis addresses the two key components of expected earnings in the host country: the ability to work in one's own area of training (which speaks to access into a regulated

[5] Canadian Nurses Association, Position statement, September 5, 2013 "Regulation And Integration of International Nurse Applicants into The Canadian Health System". Source: http://www.cna-aiic.ca/en/search-results?q=foreign%20trained%20nurses [10 December, 2013].

health occupation), and, conditional on being able to do so, the earnings differential between locally and foreign-trained professionals. While the regulatory bodies of health professions and governments seek to recognize credentials, identify knowledge gaps of FTHPs, and to find ways to streamline and accelerate the credential evaluation processes, little attention has been placed on the statistical evaluation of LMOs of these FTHPs whether or not they get licensed and are able to work in their trained occupations. Being a foreign-trained person and holding foreign credentials does not necessarily translate into work in that trained occupation in a host nation. This is especially so in highly regulated health occupations, where a host nation's competency standards must be satisfied, which may result in FTHPs not being able to work in the occupation in which they are trained. The health and the immigration literatures lack evidence of economic occupational integration in terms of the LMOs of these FTHPs in a host country such as Canada.

Third, where empirical studies on FTHPs exist, the focus has been, to a large extent, on international medical graduates and foreign-trained nurses. However, there are other equally vital healthcare professionals such as foreign-trained graduates in pharmacy, dentistry, psychology, physiotherapy, medical radiation technology and medical laboratory technology that have not received the much needed attention in the literature and that warrant our examination. This thesis provides information on the LMOs of these under-studied professions in the case of Canada.

Besides being less-documented, these healthcare professionals (for example, dentists) are also of interest because, contrary to physicians and nurses (in Canada), they can set the fees they charge their patients.[6] Physicians cannot set their fees freely, but, rather, must follow

[6] Provincial dental associations publish fee guides which are not mandated. "...[A] suggested fee in a fee guide cannot be applicable to every dentist since every dentist does not have the same equipment, instruments, furniture, lease expenses for their office premises, leasehold costs, cost of supplies, leased equipment costs, office overhead expenses, staff expenses, qualifications, skills, knowledge and experience as the next dentist, etc. As such, it is possible that every practising dentist/dental practice should have a fee schedule which differs from that of other dentists depending on the particulars of the dentist's dental

provincially negotiated fee schedules; as a result, their earnings are mostly a function of the quantity of patients they see. Nurses are generally salaried and contracted under a unionized agreement with the payer; their earnings are therefore dependent on how many hours they work. Other healthcare professions allow for variation in fees as well as volumes, variations which speak to issues surrounding perceived quality and/or discrimination associated with visible minority status or fluency in English and/or French. By including less-documented health professions in the analysis we thus fill a void in the empirical/quantitative knowledge of FTHPs' earnings and their likelihood to work in the face of lack of foreign credential recognition.

Fourth, the effects of being foreign-trained in itself, as it translates into labour market outcomes of FTHPs, have also not been well examined in the health literature. Although the effects of foreign education and foreign experience have been examined more broadly across all sectors (all immigrants with different occupations) in the labour economics immigration literature, they have not specifically been related to healthcare professionals.[7] The thesis addresses that gap in the specific case of dentists in Canada.

The issue of LMOs of FTHPs in Canada is linked to four important policy-related issues: (1) the "brain waste" phenomenon; (2) the cost of immigration to immigrants trained in health care services; (3) variations in professional education across countries, both in quality and cultural differences; and, (4) perception of quality by patients in the host country in the provision of health care services by professionals trained in different countries. The brain waste phenomenon, or the notion that host countries underutilize the human capital of immigrant health professionals, could be related but not limited to the inability of immigrant health professionals

practice. For instance, should a new graduate charge the same professional fee for restorations as an experienced dentist? Is the patient receiving the same value within the same practice from a recent graduate vs. the senior principal dentist?" (Matsui, 2009).

[7] A high level of occupational aggregation that exists in the broader migration literature has limited the understanding of labour market dynamics, particularly the participation and earnings of regulated health professionals.

to understand, or their lack of exposure to, the licensure or registration procedures of regulated health occupations, credential equivalencies and skill upgrading requirements. Moreover, the brain waste phenomenon has links to issues regarding English/French communication skills in Canada, and time and costs associated with assessments (Bourgeault, 2007). In regards to the cost of immigration to immigrants in health care, it is often taken for granted that immigration is motivated by the earnings gap between host and source countries. However, we need to know more about the expected earnings of FTHPs in their host countries to better understand any economic incentives they might have to migrate. Finally, variations in professional education across countries may contribute to FTHPs' struggle to get accredited, pass the competency tests and subsequently become licensed to practice, while the (perceived) quality in the provision of health care services may correlate with the large differences in earnings across location of training we see even among licensed health professionals.

The thesis seeks to study three separate, but related, areas of inquiry (of which two are empirical chapters) to understand the central themes of long-term retention in one's field of training, and occupational integration among those whose training prepares them for health occupations. It contributes to the literature by answering three overarching questions to address the knowledge gaps mentioned earlier: (1) Why do foreign-trained health professionals migrate? (2) Does the possession of foreign credentials affect the labour market integration of health professionals in terms of likelihood of employment and earnings? (3) Does the location of post-secondary training (foreign or domestic) affect the labour market outcomes of foreign-trained health professionals? The theoretical framework underpinning the research is the human capital framework, which, briefly, states that investments in education, job training, and other forms of knowledge acquisition together with abilities raise one's work productivity (Becker, 1993).

The first chapter examines the interdisciplinary literature on the international migration of the health workforce from an economic perspective. The second chapter compares data across eight selected regulated health occupations. This comparison describes the likelihood of foreign-trained graduates to practice with their health credentials and examines their earnings relative to the domestic-trained health professionals. This second study also describes the stock and characteristics of foreign-trained graduates who do not obtain employment in their trained health occupations. The third chapter, which is a case study focusing on dentistry practice in Canada, investigates differences in earnings between domestic-trained health professionals and foreign-trained health professionals. Further, it tests whether the earnings differential can be explained by location of where one's highest education was acquired.

Chapter 1 sets the stage and presents a review of the economic literature on the migration of health care professionals. Although the literature by health clinicians and health services researchers on the subject is substantial, there is a paucity of research that has taken an economic view of the policy issue. The survey conducted in this chapter adopts both developed and developing countries' perspectives, while addressing issues pertaining to *receiving* and *sending* countries of those migrating. Chapter 1 attempts to answer the following questions: Why do rich countries import health professionals? How do immigrant health professionals perform in the labour market of receiving nations? And what is the impact of licensure and other institutional barriers on the integration of foreign-trained professionals?

The notion that there are shortages of health professionals is one key driver for international migration of health professionals. There is evidence that health professionals leave low-wage countries and immigrate to high-wage countries. Foreign-trained health professionals face credential recognition barriers in the complex web of licensure processes, regulations, and

unionized activities involved in establishing themselves in their trained occupations in rich nations, and this could have substantial consequences on their labour market outcomes in the host country (they do not perform as well as their native counterparts). There are also negative consequences to underprivileged nations, with fragile healthcare systems, whose health professionals migrate to more affluent nations.

Last, some of the institutional barriers are motivated by genuine information asymmetries and the need to guarantee quality of care, but the literature indicates that institutional barriers also reflect protection of the incomes of domestic-trained health professionals. Managed migration through international bilateral agreements is one policy solution to this problem of migration. More in-depth empirical cross-country analysis may not be feasible due to data unavailability, but international organizations such as World Bank, WHO and OECD are making strides in this direction.

The survey literature unveils future areas of economic research in the international migration of health professionals. These include: (1) the emergence of native-born professionals who receive foreign medical training and then return home to practice; (2) the lack of credible, causal impacts of programs intended to address underserviced areas of healthcare problems; (3) the limited examination of the causal effects of language skills/literacy on earnings and employment outcomes of international immigrant health professionals; (4) the practice styles and treatment delivery standards of immigrant health workers; and, (5) the economic operation of medical associations and other provider unions in international comparisons. This first study is published with co-authors (M. Grignon and A. Sweetman) as a chapter in the 'International Handbook of the Economics of Migration'.

Chapter 2 examines some selected regulated health occupations, namely, physicians, pharmacists, dentists, psychologists, physiotherapists, medical radiation technologists, medical laboratory technologists, and registered nurses. These are highly regulated health professions requiring provincial licenses for practice. FTHPs face institutional barriers that include passing third party assessments evaluating their language skills, fundamental knowledge, clinical skills and judgment, and ethics, among a host of other criteria. Bearing the cost of these assessments or re-skilling/bridging programs and navigating through the licensure process at the provincial level represent other barriers for FTHPs. These institutional barriers seek to maintain competency standards for public consumption and safety, and control the supply of licensed health practitioners (Kleiner, 2000). Obviously, unsuccessful FTHPs may not practice in their foreign-trained health occupation.

Chapter 2 examines whether occupations where foreign-trained persons have a better chance to work in their field are also the occupations where earnings differentials across locations of highest training are small or insignificantly different from domestically trained ones (Canada/US trained). This chapter empirically contributes to the literature by estimating, through multivariate logistic and ordinary least squares (OLS) regression models, the likelihood of employment and earnings across locations of study. Consistent with the general literature, the study empirically finds evidence that foreign-trained degree holders are less likely to work as licensed healthcare professionals accounting for socio-demographic and human capital factors. It is plausible that licensure affects the ratio of practicing to total trained professionals across all the selected regulated health professions. Mixed results pertaining to earnings emerge. Even after obtaining licenses to practice, foreign-trained persons suffer from earnings gaps relative to their Canada/US-trained counterparts (in some occupations) controlling for labour market activities,

demographic and human capital factors. In particular, foreign-born, foreign-trained health professionals are less likely to work in a regulated health occupation.

Another key message of chapter 2 in relation to chapter 1 is that, in examining which earnings information should inform a prospective FTHP's or immigrant's decision to migrate, we find that an earnings gap exists between foreign-trained health professionals (FTHPs) and domestic-trained ones in general, and dentists in particular that is not a spurious effect of the composition (i.e. the fact that FTHPs are more likely to have characteristics that earn less than their domestic-trained counterparts), but seems to be linked to being a foreign-trained professional in itself. As a result, the true earnings difference that prospective FTHPs have to consider to inform their decision to emigrate is the difference between what a FTHP from the source country can earn in the host country and what they can earn if they stay in their country of training rather than using the difference in average earnings between the origin and host countries as a key motivation.

This empirical study was possible because of the availability of the variable that identifies one's location of highest education in the 2006 Canadian census data, which was unavailable in earlier censuses. A limitation in using the census is that the location of highest education variable is likely to be post-graduate education since the locations of undergraduate medical degrees, for physicians as an example, are unknown in the census. This study was based on joint research with Professor Arthur Sweetman and has been submitted to the *Canadian Public Policy* journal at the time of writing this thesis.

A major observation emerges from this second study of eight selected, regulated occupations: a statistically significant difference in earnings exists between foreign-trained dentists and those trained in Canada and the United States (US). Foreign-trained dentists earn, on

average, approximately 30% less than the Canada/US-trained dentists. Chapter 3 of the thesis engages with this observation; it explains the gap in earnings across location of highest education. The institutional settings influencing how dentists work and are paid in Canada are discussed to furnish the context for the interpretation of the findings. Earnings are defined as pre-tax (positive self-employment earnings plus wages and salaries) less dental practice operational expenses. Thus, differences in earnings could be related to timing of starting dental practices at different ages, differences in practice pattern and treatment delivery standards, firm seniority for employees who start at different ages, differences in the quality of dental programs, and the experiences and productivities of dentists.

In this third study, after accounting for personal and market characteristics (although no patient information is included, which is a limitation in the census data), we use the Oaxaca-Blinder decomposition technique to decompose the earnings gap between foreign-trained dentists and Canada/US-trained dentists into three components: (1) measured individual characteristics; (2) differences in rates of return for individual characteristics (e.g. how much more do you make when trained in Canada/US or dollar value of each year of schooling); and, (3) differences in constants or unobservable characteristics, which could be unobservable differences in educational quality (e.g. a dentistry degree in India/Japan may not be the same as a dentistry degree from the US), or a characteristic that is not captured in the dataset (e.g. work ethics, motivation). The evidence shows that personal and market characteristics and possibly some forms of consumer-discrimination account for about 61% of this gap, while 39% is attributed to the differences in the rate of returns for individual characteristics and unobserved characteristics.

This third study finds that location of training is the most important determinant of earnings, and is further supported in subsequent robust analyses, where the sample of dentists is

restricted to only foreign-born dentists who received their highest training in Canada or the US and Canadian-born, Canadian/US-trained dentists. Remarkable evidence shows that foreign-born, Canadian/US-trained dentists experience a much narrower earnings gap relative to their Canadian-born, Canadian/US-trained counterparts. 86% of the gap is solely attributed to individual characteristics with a statistically insignificant 14% related to rates of returns for individual characteristics (e.g. value of rate of return for each schooling year) and unobserved characteristics. The unobserved characteristics (i.e. differences in constants) contribute to most of the 14% and speak to the mere fact of being trained abroad in itself (or location of training effects) and other characteristics not captured in the data, for e.g., the number of patients seen each week, ability, work ethics, motivation, etc. Further, the sample is then restricted to only foreign-born, foreign-trained and Canadian-born, Canadian/US-trained professionals; here the decomposition of earnings differential yields similar results (i.e. 57% and 43%) as in the base decomposition of the earnings gap (i.e. 61% and 39%) mentioned above.

Through the decomposition technique we also pose an experimental counterfactual question and our simulations show that adjusting the levels of foreign-trained dentists' characteristics to the levels of the Canadian/US-trained dentists reduces the earnings gap from about 30% to approximately 12.2%.

The literature contribution of the third chapter is two-fold. First, it shows evidence of the effect of location of training on the practice and labour market outputs of dentists. Second, it shows that foreign-born, Canadian/US-trained dentists are similar to Canadian-born, Canadian/US-trained dentists in terms of their rates of return for individual characteristics and unobservables. It also adds to the economics of dental services by showing that location of highest training affects the earnings potential of dentists. The economics of dental services has

generally examined utilization, supplier induced demand, productivity, technical efficiency, and allocative efficiency in the practice of dentistry, which in turn affect earnings potential.

In summary, the three studies compiled in this thesis show, with Canada as an example, that when FTHPs settle in host nations, they face challenges in the health labour market. Not all FTHPs are able to practice in their regulated health occupations; however, the majority of those who are unable to work in their trained field still utilize their human capital skills in related health occupations. A substantial proportion leaves the labour market, (perhaps) representing a loss of human capital. In short, even after passing through the stringent institutional hurdles FTHPs must face in order to obtain their licenses to practice in Canada, FTHPs experience a significant earnings differential relative to domestic-trained health professionals, suggesting that there are still problems in the health labour market beyond licensure. This earnings gap reduces if foreign-born professionals obtained their highest education in the host country, showing that it is the location of training that matters more so than location of birth in determining the success of economic integration of FTHPs. This finding supports increasing bridging programs aimed at professional and cultural acculturation/acclimatization for FTHPs in Canada, with a focus on communication skills, work ethics, creating awareness of cultural/societal norms, and network building.

From an academic perspective, knowing more about LMOs of FTHPs will improve our knowledge of the true earnings gaps contemplated by potential migrant professionals when they make the decision to leave the country where they graduated. It will also shed light on the quality differential in health education across countries. This literature is the junction of two well-established literatures: labour economics of international migration, and health economics of health human resources.

From a policy perspective, the thesis will inform health policy makers in three areas. First, chapter 1 discusses briefly the ethical issue of the effect on countries of training of the emigration to rich countries of skilled health professionals. The literature suggests detrimental effects on the health care systems of developing countries (i.e., loss of human capital and public investments in the training of those health professionals who emigrate) from the emigration of these skilled health professionals. Therefore, it is the responsibility of policy-makers in attracting/receiving (and, often, rich) countries to find alternatives to short-term immigration policies in order to mitigate the (perceived) short-run shortages of health professionals.

The policy options of self-sufficiency in the supply of regulated health professionals in developed countries that can be undertaken, include: (1) training more domestic-health professionals through increased funding for residency spots in medical schools; (2) using return of service agreements; (3) demarcating areas with severe maldistribution of health professionals and using financial rewards to incentivize professionals to relocate and practice (e.g., the rurality index used by the Ontario's government financially rewards physicians who relocate to certain areas); and, (4) managing migration of health professionals in pursuit of advancement of knowledge and skills to reduce the emigration rates in developing countries.

The second area in which the thesis will inform health policy makers is the likelihood of employment of regulated, FTHPs in a regulated health profession. Here the likelihood of employment is influenced by institutional arrangements such as regulatory bodies, and bridging and language training programs to increase the chances of foreign-trained professionals practicing in their fields. For example, the Office of the Fairness Commissioner in provinces such as Nova Scotia, Manitoba, Quebec, and Ontario were set up to examine and ensure the transparency, objectivity, and fairness of the requirements of regulatory bodies in assessing the

foreign credentials of FTHPs.[8] Given that provincial governments regularly require licensing for additional health occupations, a key policy implication from this study is that as the number of regulated occupations keeps growing, one can expect that FTHPs who are less likely to work in regulated occupations could experience even more challenges or require more effort to gain access into their trained regulated health occupations. For example, in Ontario, kinesiologists, pharmacy technicians, and practitioners of traditional Chinese medicine have all recently been regulated.

The third and final way in which the thesis will inform health policy is its analysis of the earnings disparities that exists between Canadian/US-trained and foreign-trained health professionals even after FTHPs have crossed stringent licensure processes. The earnings disparities are correlated with visible minority status, potential Canadian practical experience, gender, speaking a foreign language (other than English or French) as a mother tongue, and the geographic location of residents. Policies aimed at addressing the fundamental inequality problems based on gender and visible minority status would be beneficial, while settlement programs could be directed towards language skills upgrading, cultural, societal norms and network building for foreign-trained health professionals.

[8] Contrary to expectations, immigration policy may lead to an increase in highly skilled professionals, but may also result in a rising unemployment/underutilization of the same highly skilled professionals if they do not find employment or work in related occupations that underutilize their professional skills (mismatch of job skills) (Docquier and Rapoport, 2012).

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Chapter 1

The International Migration of Health Professionals[9]

1.1 Introduction

International migration by health professionals is an area of increasing policy interest. Shortages of medical personnel in several developed countries are perceived to be central drivers of this phenomenon, and there are critical ramifications for developing countries (e.g., World Health Organization – WHO, 2006). After a period of perceived excess supply in many developed countries in the 1990s, more recent years have seen an increased demand for health professionals, a growing concern about the need to provide healthcare services to aging populations, and an increasing focus on health human resources more generally.

The *International Migration Outlook* (Organization for Economic Cooperation and Development – OECD, 2007a) identifies "several international initiatives … formulating policy recommendations to overcome the global health workforce crisis" (p.162).[10] In response to these flows, in 2010 the WHO adopted a global code of practice on the international recruitment of health personnel with a focus on ethics and protecting less-developed sending countries (WHO, 2010). Aligned with this initiative, several developed countries have devised their own protocols regarding the ethics of international health professional migration (e.g., Canada's ACHDHR,

[9] An earlier version of this chapter is published as Grignon, Michel, Owusu, Yaw and Sweetman, Arthur (2013), 'The International Migration of Health Professionals' in *The International Handbook on the Economics of Migration*, Amelie F. Constant and Klaus F. Zimmermann (eds.). Cheltenham, UK: Edward Elgar; 75-97.

[10] A useful summary of the shortages and maldistribution of the health workforce is the OECD's (2008) report: *The Looming Crisis in the Health Workforce*.

2009; Norway's Directorate of Health and Social Affairs, 2007; UK Department of Health, 2011). Moreover, migration among more developed countries is also an issue. In particular, the enlargement of the EU has heightened concerns regarding an exodus of health workers from accession countries towards Western Europe (Wismar et al., 2011).

A substantial amount of academic research by health clinicians, health services researchers, migration scholars, and those from other backgrounds, together with significant contributions from international organizations, advocacy groups, and others has explored the broad issue of health workforce migration. Economists are adding a particular perspective to this interdisciplinary discussion, but much work remains to be done. This paper surveys the topic from an economic perspective while also being situated within the broader interdisciplinary literature. Moreover, this survey employs selected well-known theoretical tools from economics in an effort to conceptualize the substantive phenomenon and to point to areas for future research. After this introduction, the second section provides an empirical overview to elucidate the magnitudes of international flows of health professionals and set the context for the analysis that follows. In the third section the focus is on developed countries, which implies simultaneously addressing issues regarding both receiving and sending health workforce migrants. Less-developed, primarily sending, countries are addressed in the fourth section. The final section concludes.

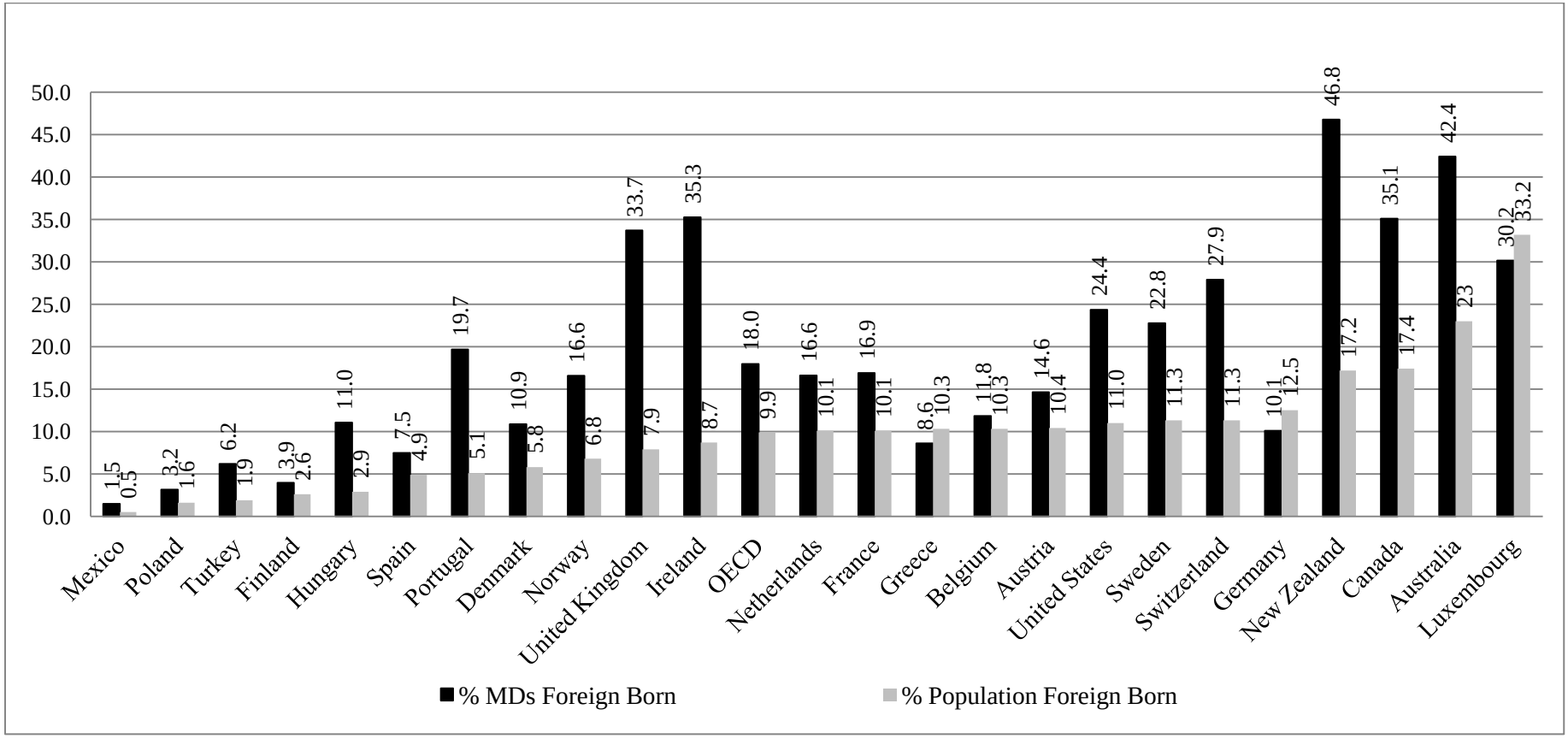
1.2 Descriptive Statistics of the International Context

International comparisons and analyses of health human resources have become much easier in recent years because of the work of the WHO and the OECD. Building on this, Figure 1.1 depicts the percentage of physicians that are foreign born in a wide variety of (mostly) OECD countries circa 2000 and compares it to the percentage of the entire population that is foreign

born. It is clear that in almost all countries, immigrants are much more likely to be physicians than are native born persons, Germany and Greece being notable exceptions. Most OECD countries import a very substantial share of their physicians.

In contrast, in Figure 1.2 , nurses are seen to be, on average, roughly proportionately drawn from each country's immigrant and native born populations, although there is also greater variation across nations for nurses with some nations drawing a disproportionate share of their nursing workforce from the immigrant population and others doing the reverse. Clearly, there are important differences in the migration of physicians and nurses. Figure 1.3 displays a similar plot for the aggregation of a variety of other health professions. On the whole, these other professions look more like physicians than do nurses, with a disproportionate share of these health workers being drawn from the migrant population.

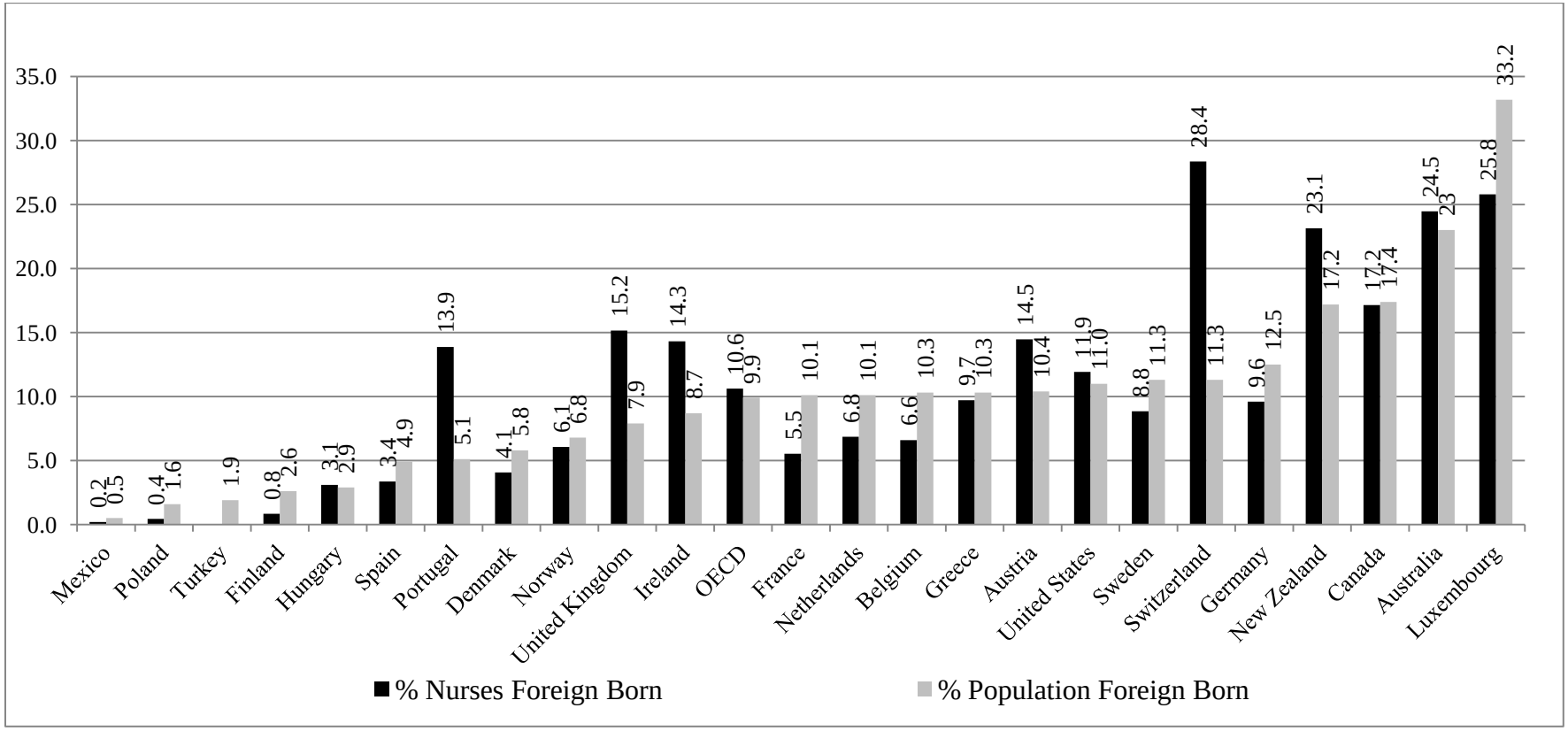
Figure 1.1: Share of physicians and total population that is foreign born, OECD countries circa 2000 (%)



Sources: OECD (2007a, b) and OECD (2011).

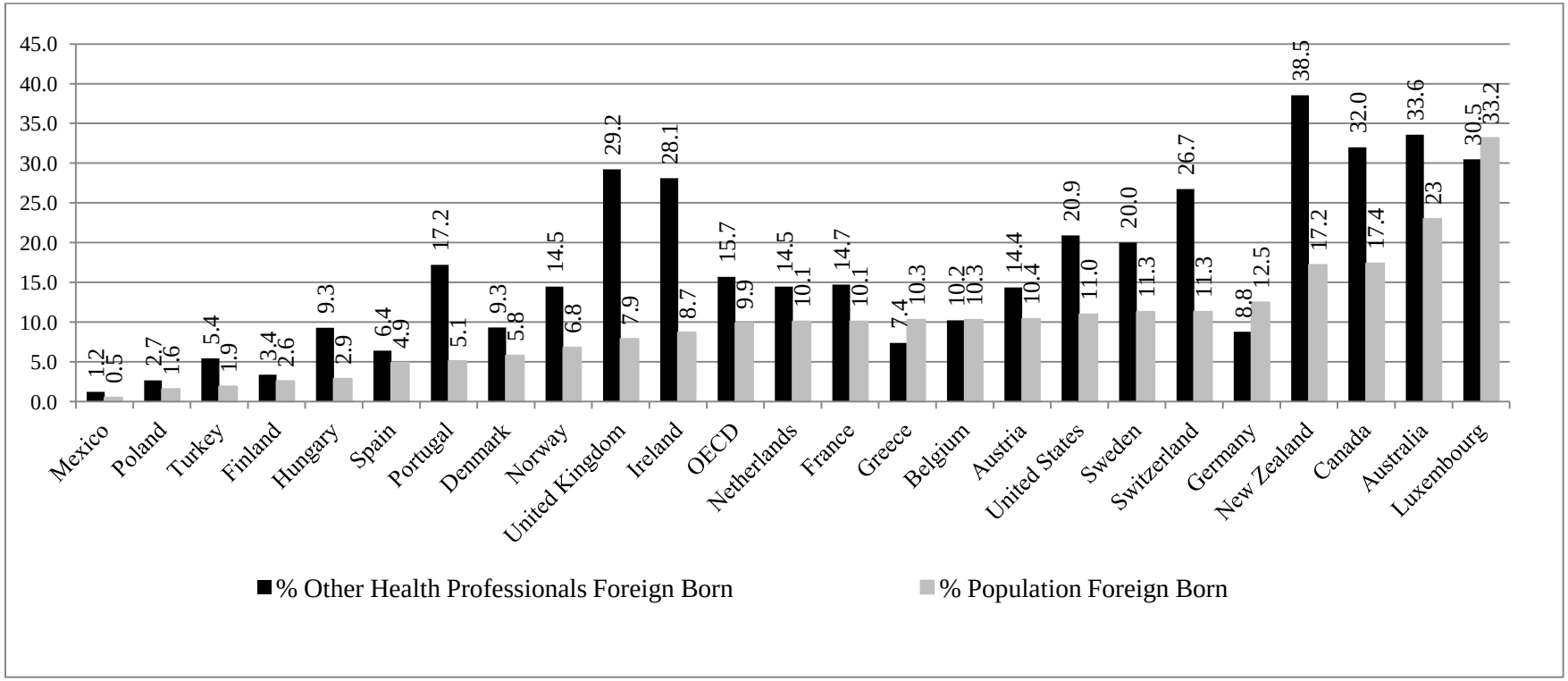
Notes: Poland and Greece's foreign born population is from OECD (2007b); all others are from OECD (2011).

Figure 1.2: Share of nurses and total population that is foreign born, OECD countries circa 2000 (%)



Sources: OECD (2007a, b) and OECD (2011).

Figure 1.3: Share of other health professionals and total population that is foreign born OECD countries circa 2000 (%)



Sources: OECD (2007a, b) and OECD (2011).

Notes: Other professions defined as ISCO 222: dentists, pharmacists, veterinarians and other health professionals not elsewhere classified.

Of course, being foreign born does not imply being foreign educated since immigrants may arrive in their host country prior to completing their education. Also, the aptly named 1.5 generation – those who immigrate as children – may have a different probability of obtaining health professional certification than does the average native born person. This difference is addressed in Table 1.1. The traditional immigrant receiving countries of Australia, Canada, and New Zealand clearly have a substantial number of immigrants educated in the domestic school system; surprisingly the US does not. Also, in France and Portugal a substantial proportion of the foreign-born are educated domestically, although as noted in OECD (2007a) this may reflect the repatriate community.

Conversely, being native born does not imply receiving a domestic health professional education. An increasing phenomenon is the emergence of medical and other health professional schools offering education for export. Such institutions provide medical and other health professional education to an international clientele of foreign students as an export industry. The best known of these medical schools are probably in the Caribbean, Ireland, and more recently Australia. This implies that there are increasingly two major types of international medical and other health professional graduates: residents/citizens of the country providing their education who emigrate post-graduation, and international students who obtain their medical/health professional education at an international "destination" school with the primary intention of departing that country to return home or to practice in some other nation. This is particularly the case for the US where, for physicians, the American Medical Association (AMA - 2010) reports that in 2008 about 15 per cent of International Medical Graduates (IMGs) among those in

Accreditation Council for Graduate Medical Education programs are native US citizens.[11] Of course, as discussed by Hawthorne and Hamilton (2010), countries housing such medical schools may also come to view these foreign students as a source of potential domestic supply. In fact, it could be argued that from some perspectives this is an ideal supply since it is both inexpensive, with the students paying international student fees, and the graduates are already fully acclimatized to local medical practice.

This (increasingly) revenue generating education for non-residents is distinct from the well-known practice of some countries training their citizens with the explicit intent of serving international markets with migrants – such as some Philippine and Indian medical and nursing schools (Masselink and Lee, 2010; Nullis-Kapp, 2005).

Table 1.1: Foreign born and foreign trained in selected OECD countries circa 2000

	Physicians		Nurses	
Country	Foreign Trained	Foreign Born	Foreign Trained	Foreign Born
	(%)	(%)	(%)	(%)
Australia	25.0	42.4	12.1	24.5
Austria	1.8	14.6	--	--
Canada	23.1	35.1	6.4	17.2
Switzerland	11.8	27.9	--	--
Denmark	7.7	10.9	6.0	4.1
Finland	3.6	3.9	0.2	0.8
France	3.9	16.9	--	--
United Kingdom	33.1	33.7	8.0	15.2
Ireland	10.3	35.3	14.0	14.3
Netherlands	6.2	16.6	1.4	6.8
New Zealand	34.5	46.8	19.3	23.1
Sweden	4.3	22.8	2.5	8.8
United States	25.5	24.4	3.5	11.9

Notes: Foreign trained MDs for Australia, UK and Netherlands, and foreign trained nurses for Australia, Ireland, Netherlands and United States, are 2005 data. Circa "Latin" means about or around.
Source: OECD (2007a, b) and OECD (2011).

[11] This can be thought of as the flow of new MD graduates. Given the integration of Canadian and American medical education, graduates of Canadian medical schools are not classified as IMGs in the US.

Cycling and permanent migration among developed countries is also quite common. For example, Mullan (2005) provides a useful description of the flows of domestic physicians among Australia, Canada, the UK, and the US, summary statistics from which are presented in Table 1.2. At the top is the UK and Canada, both of which are net exporters in this quadruple, and at the bottom are Australia and the US, which are net recipients.[12] Turning to nurses, the OECD (2007a) takes a somewhat broader view looking at all intra-OECD migration and characterizing it as having a cascading-pattern. Australia and Canada, and to a lesser extent Great Britain, New Zealand, and Switzerland, are positioned near the bottom of the chain and receive nurses from other OECD nations. However, similar to the situation for physicians, the US is at the very bottom of this migratory flow and is by a substantial amount the largest net recipient of immigrant nurses. Given the enlargement of the EU – and associated treaties and regulations regarding the mutual recognition of credentials – substantial geographic mobility within that area is observed and more is expected, although to date there has perhaps been less mobility than some feared (Wismar et al., 2011).

Table 1.2: Emigration and immigration of physicians among Australia, Canada, UK and US

		Immigration					
		Australia	Canada	UK	US	Total Out	%
Emigration	Australia	54,212	247	872	1,144	2,263	4.2%
	Canada	65	68,096	50	8,990	9,105	13.4%
	UK	4,664	2,735	138,667	3,439	10,838	7.8%
	US	73	519	79	836,036	671	0.1%
	Total In	4,802	3,501	1,001	13,573	--	--
	%	8.9%	5.1%	0.7%	1.6%	--	--

Source: Mullan (2005)

[12] Of course, when all nations are included then all of these four countries are net recipients.

1.3 A Developed Country Perspective

This section addresses three questions. Why do rich countries import health professionals? How do these immigrant health professional fare in the healthcare market of recipient countries? And, what is the impact of licensure and other specific institutions of the healthcare market in recipient countries on the integration of foreign-trained professionals?

Health Labour and Product Markets – Brief Overview

Before focusing on the international migration of the health workforce it is worth briefly considering relevant economic aspects of health product and factor markets since these are crucial for interpretation. As is well-known, the product market for health services is nonstandard, and asymmetric information problems are extremely serious. Most health service provision is "custom work" employing specialized knowledge that makes it very costly to judge provider effort and the quality of the work performed. Principal-agent models are also often employed to characterize the context, as are models of monopolistic competition (see, e.g., McGuire, 2000). It is not even clear that the patients/customers have sufficient information to know the optimal quantity of services to purchase leading to (somewhat controversial) models of supplier induced demand whereby if providers (usually physicians) perceive that they do not have sufficient business/income they can influence the demand for additional services (McGuire, 2011). One ramification of professional knowledge and other sources of asymmetric information is licensing and/or regulation by government, which is frequently delegated to a professional college or similar organization of experts. Licensing bodies become important hurdles for the international migration of health professionals, and it is often argued that in addition to simply verifying ability/credentials these organizations serve to create provider monopoly power, as will be discussed below.

Another important determinant of the structure of healthcare product markets is the potential occurrence of infrequent unanticipated large-scale expensive negative health shocks in contexts where borrowing is not normally feasible. One response to this is private health insurance, which is ubiquitous in developed countries. Health insurance can be viewed as a pay-in-advance approach to funding healthcare service purchases that spreads risk across the population. However, "pure" insurance is not sufficient in healthcare markets since there are individuals whose health status (sometimes from birth) is uninsurable in an actuarially fair system. This would lead to a profound – and morally/ethically unacceptable – market failure. However, society in the form of government intervenes to provide (or at least pay for and/or subsidize) healthcare services.

In practice, government for various reasons normally provides far more healthcare services than those medically necessary because of this example of a market failure. Although the structure of healthcare systems and the nature and extent of governments' roles vary dramatically across nations, in most developed countries governments play a very significant role in the operation of the healthcare system. In terms of international migration, this institutional structure serves frequently to separate healthcare recipients (that is, patients) from those who in the first instance pay for those services (that is, governments, insurance companies, patients and others). This separation of the "payer" from the recipient adds an important characteristic to the marketplace. The aggregate-level payers are concerned about costs, but akin to patients, they face asymmetric information challenges regarding courses of treatment for individuals. In an effort to control costs governments in particular sometimes seek to control the number of providers, which has a variety of quite complex ramifications for the international migration of health professionals.

On the factor market side it is important to recognize the enormous time lags in training health professionals, especially physicians, which can lead to a type of "overshooting" whereby a perception of a current surplus generates a cap on or a reduction in enrolments, which seems frequently to lead to a shortage in the medium- to long-term (see, e.g., Bärnighausen and Bloom, 2011, for a survey of the literature). In large part these caps are motivated by concerns about cost containment. For example, there are caps on both undergraduate (MD) and graduate (specialty/residency) positions in the US (AMA, 2010),[13] and the central governments of Australia, France, Sweden, and the UK control medical school enrolment through university funding. Some countries, such as Canada, have a more decentralized, though still government mandated, approach with each province setting local medical enrolment.[14] Mis-targeting can lead to oscillating periods of (perceived) surplus and shortage, as have been observed in recent decades (Bloor and Maynard, 2003). Given the extended training periods of physicians and other health professionals, almost by default, international migration is used as a short-term quantity adjustment mechanism.

From a different perspective, employers/payers in healthcare are frequently viewed as monopsonistic, especially for nurses (e.g., Hirsch and Schumacher, 2005; Machin and Manning, 2004; Staiger, Spetz and Phibbs, 2010), although there is some controversy. Monopsony explains the ongoing perception of shortages concurrent with unemployment or underemployment in the sector and/or a queue of potential immigrant workers willing to work at the going wage who are prevented from practicing in the relevant profession. Simultaneously, public-sector unionization also plays an extremely important role, with some professional associations/unions in healthcare

[13] In 1997 the Balanced Budget Act froze the number of resident physicians at 1996 levels. Currently, a 2009 bill to increase resident physician positions by 15% is pending in the U.S. Congress.
[14] Not all countries follow this approach. In Germany, for example, there is no centralized control over the size of the medical workforce.

having enormous influence (see, e.g., Drexler, 2008). In fact, in some jurisdictions health human resource decisions might best be viewed as the outcomes of a bilateral monopoly with governments on one side and professional unions/associations on the other. Of course, there are usually also many influential economic actors, such as associations of hospital administrators, medical schools, and accreditation bodies as well as patient advocacy groups and policy think tanks among others. All of these combine to determine the "pull" factors that attract health workers to developed countries or act to limit their entry into national labour markets.

1.3.1 Why Do Developed Countries Import Health Professionals?

It is not immediately obvious why developed countries would want to import health professionals en masse. Although a small number may be involved in entrepreneurial health research or delivery with substantial spillovers for the domestic economy and that provides an economic justification for the receiving country, this is unlikely to represent the majority of migrants. In many countries these are "good" jobs that are rationed among a domestic population eager to become health professionals, especially physicians, but prevented from doing so via quotas on, in particular, medical school entry.[15] We, therefore, next discuss a few candidate explanations for the acceptance of health professional migration by many developed countries – though certainly not all, as evidenced by Germany.

A key rationale for the international migration of health professionals is a response to perceptions of short-term shortages – although these can alternate with perceptions of surpluses

[15] This is, in part, evident in the increasing number of individuals from developed countries, especially the US and Canada as reported by McAvinue et al. (2005), who pursue their education in "destination" medical schools. See, for example, St. George's school of medicine in Grenada (http://www.sgu.edu/about-sgu/medical-students-demographics.html; Dec. 2011), which in 2011 had 3,272 US citizens (68% of its total) as students in its medical program. Canadians were the next largest group at 15% (665 students), while native Grenadians accounted for only 5% of total MD enrolment. Hawthorne and Hamilton (2010) provide an accounting of foreign student enrolment in Australian medical schools. There is a substantial number of individuals who meet the requirements for entrance to medical school, are willing to pay very substantial tuition, and end up practicing in their native or some other developed country via this circuitous international route.

that can induce barriers to entry.[16] As mentioned, governments have multiple incentives for managing the size of the workforce for physicians and other health providers, especially cost containment. Other payers as well as provider associations have similar incentives, though different objective functions, but ultimately governments have the authority to act whereas the others only have influence. Further, governments can and do overshoot – more frequently toward shortages than surpluses. Given the extended education/training durations (planning horizons) involved, international migration is frequently used by wealthy countries as a tool to manage short-term shortages. An interesting variation on this theme is put forward by Rutten (2009a) who, using a computable general equilibrium model for the UK, and very specific assumptions, argues that for some situations importing immigrant health providers has superior welfare implications to increasing the health service's budget since the former avoids pay increases for inframarginal (existing) workers.

A related but distinct rationale involves local or specialty-specific shortages (Zurn et al., 2004). Rural, remote, and underprivileged areas are underserviced by domestic health professionals in many developing (e.g., Kanchanachitra et al., 2011) and developed (e.g., Rabinowitz et al., 2008) countries. Surprisingly, for an important issue that has been a focus of discussion for decades, there are essentially no studies that credibly estimate medium- and long-term causal impacts of programs seeking to address health services provision in underserviced areas; systematic reviews that have found no such studies are by Grobler et al. (2009) and Wilson et al. (2009). Nevertheless, there is a large research literature looking at non-causal relationships, and some jurisdictions, particularly Australia, Canada, New Zealand, and the US,

[16] It is worth noting that payer, provider, and patient perceptions of the adequacy of the supply of health professionals are not necessarily in accord. An overview of the history of forecasting in this area is by Bärnighausen and Bloom (2011).

clearly and explicitly employ immigration as a tool to service rural and remote areas (for a survey of one aspect of this literature see Bärnighausen and Bloom, 2009b). To tie them to appropriate geographical areas, at least in the short run, such workers are frequently admitted under limited visas, for example J-1 visas in the US (e.g., Hagopian et al., 2003, US GAO, 2006) or given limited/provisional licenses to practice in Australia and Canada (e.g., Auda et al., 2005).

Secondary migration by international migrants, and internal migration more generally, is a key mechanism explaining why underserviced areas have been the focus of an ongoing policy issue for decades as described by McDonald and Worswick (2010) for Canada. They focus on out migration from underserviced rural areas that actively recruit IMGs, and in the Canadian case physicians practicing in these regions also typically receive additional financial and non-financial benefits. Their research observes low retention rates, which are not entirely associated with pecuniary factors but have substantial relationships with marital status and spouse's level of education. Further, the migrants tend to move not to other underserviced areas, nor to regions with intermediate levels of service, but to the very largest cities with the highest physician densities. Overall, regions with the greatest need and lowest entry hurdles are effectively stepping stones to other locations within the country for many IMGs. Although the international migration of health professionals clearly provides practitioners to underserviced areas, it appears that a steady flow of such practitioners is required.

Closely related to finding workers for geographic locations that are (by some) deemed less desirable, is the need to find health workers for less desirable work shifts (times of the day/week) and other practice characteristics (e.g., Drexler, 2008; Denour and Junker, 1995). Again, immigrants tend to be found working in these situations – at least initially upon arrival in a new country. Lastly, it has been suggested that importing countries should try to match their

increasingly diverse population through importing physicians of the same ethnic backgrounds who would be more culturally sensitive than native-born and locally educated ones. There is not, however, clear evidence that sharing the same ethnic background makes healthcare professionals more effective.

Since the education and training of health professionals is both subsidized and costly to government in many countries (e.g., McGuire, 2000), savings on these fronts is sometimes suggested as motivating immigration. While this may indeed prompt some short-term decisions, it's hard to believe that governments would be sufficiently myopic (and insensitive to the demands of prospective domestic health/medical students) as to drive policy based on these upfront costs that are relatively modest as a percentage of total healthcare expenditures.

Population aging is an often mentioned rationale for health worker migration. However, the link to the demand for immigrant health professionals is more tenuous than it might at first appear. It is not a short term problem but one of the few public policy issues that can be forecast decades in advance. Also, while the associated increased demand for health professionals cannot be ignored, it is more modest than popular perceptions allow although there is a need to alter the composition of the health professional workforce since demand will shift from, for example, pediatrics, obstetrics and gynecology to ophthalmology and chronic diseases (e.g., Denton, Gafni, and Spencer, 2009). On the other hand the story is quite different for low skilled healthcare providers since, as Haberkern et al. (2012) point out, the need for elder care will likely increase substantially in rich countries. Because home and long-term care are labour intensive, with limited possibilities for automation, lower skilled healthcare workers from developing or less rich countries will probably supply it in wealthier nations. Canada's "live-in caregiver

program" is a formalized immigration stream that is increasingly used for elder care, whereas it was formerly primarily used for childcare.

1.3.2 The Labour Market Integration of Health Providers

Unlike much of the immigration literature, there has been relatively little analysis of economic integration that is specific to health professionals. However, recent work using US data by Schumacher (2011) has begun to address this issue for nurses as a precursor to looking at the impact of immigration on domestic workers in that occupation, and it is worth reviewing this article at length. Using the US National Council Licensure Examination where candidates are required to pass qualifying exam(s) that are set by a third party rather than an educational institution where the conflict of interest between pedagogical delivery and assessment is obvious, Schumacher initially observes that first time internationally educated test takers have pass rates roughly 20 per cent below those of US-educated ones. This influences the interpretation.

Schumacher employs two datasets in his analysis: the US Current Population Survey (CPS), and the National Survey of Registered Nurses (NSRN). Only country of birth is identified in the CPS, whereas the NSRN records country of education. CPS descriptive statistics show that while the foreign-born have hourly earnings slightly below those of the native born, the average wage of those with foreign education is higher. However, controlling for observed characteristics, the foreign-born have earnings about 5 to 8 per cent less than the US born, although there is no difference for those from Canada, and the gap is less than 3 per cent (and not statistically significant) for those from the Philippines – the second largest and largest source countries respectively. Also, the years since migration profile suggests that full earnings equality occurs within about six years. Data from the NSRN show effectively no gap in average wages

between the domestic and foreign educated, and the years since migration profile indicates even swifter integration.

One aspect of the specifications employed is that they may "over-control" for background variables. For example, some models control for union membership and others for hospital employment. While these variables are undoubtedly important, it is entirely possible that they are determined simultaneously with wages and may mask relevant wage effects. If immigrant nurses are, for example, less likely to obtain “good” union jobs or are differentially likely to be employed in hospitals because of their immigrant status, then controlling for these factors may answer an economic/policy question different than the one being posed. Future work could include specifications with and without these potentially endogenous regressors to see how the coefficient on the variable of interest changes. Similarly, a specification excluding those who immigrated younger than age 25 could differentiate between individuals most likely to have been educated in the US and those educated elsewhere. As seen in Schaafsma and Sweetman (2001) for example, there is a noticeable difference in labour market outcomes between those who immigrate as children and are educated domestically and those who immigrate later in life. Nevertheless, overall the evidence indicates that practicing immigrant nurses have hourly earnings that are extremely similar to those of the domestic born. Of course, these results are for practicing nurses and say nothing about outcomes for those who immigrated intending to practice, but who are not doing so.

Schumacher next attempts to estimate the impact of immigrant nurses on the wages of domestic nurses, which is very similar in intent to work by Kaestner and Kaushal (2012) who use the NSRN. However, the two take distinct methodological approaches. Schumacher employs a "factor proportions" methodology that exploits (potential) changes in wage gaps between nurses

and other occupations not affected by nurse migration, while Kaestner and Kaushal pursue an instrumental variables strategy. Both draw similar conclusions. These results are interesting in their own right, but it is difficult to extrapolate to other occupations since nursing is primarily female, highly unionized, regulated, and potentially monopsonistic (this last is very controversial, but, minimally, perennial labour shortages are reported). For both studies, a credible identification strategy is crucial since nurses are not randomly assigned employment but end up in particular locations because, for example, opportunities are greatest, social networks exist, and/or information is available. While estimating causal impacts is extremely difficult and it is not clear that either of these strategies identifies the desired parameter perfectly, they are useful exercises. Comparisons across these identification strategies, and across specifications for each, are informative.[17] Altogether, the regression results suggest either no effect, or an extremely small negative effect, on domestic nurses' wages as a result of immigration.

Huang (2011) pursues a similar strategy to the first portion of Schumacher's paper using the NSRN data. She finds those nurses licensed to practice are able to transfer their foreign human capital with relative ease and, indeed, obtain a premium in the labour market. The premium is driven almost entirely by international nursing graduates from English-speaking countries working in hospitals. Even within a narrowly defined occupation, she finds substantial

[17] Identification for Schumacher is threatened if, for example, similar to the inclusion of endogenous variables in the economic integration regression in the first half of the paper, the comparison group "over controls" for any wage impact on domestic workers correlated with the local nursing immigration rate. His factor proportion – the location-specific percent foreign-born (or foreign educated) in nursing – could be picking up general local labour market effects, and might be correlated with similar immigrant percentages in the comparison occupations, with both occupational wage structures responding not only to the common location-specific economic shock (as desired for identification), but also the common effect of immigrants on domestic wages (thereby removing too much of the variance in nursing wages across cities). Inference in Schumacher's paper is also an issue since the inclusion of the percent of nurses who are immigrants implies including a macro variable in the micro regression, which requires appropriate estimation of the standard errors reflecting the "clustered" nature of the data. It is not clear if this was undertaken or not. A controversial assumption that nursing labour markets are not monopsonistic is important for Kaestner and Kaushal's approach, and identification in their data is also threatened by weak instruments. Despite these technical challenges, this is an important area in which additional work would be worthwhile.

earnings heterogeneity across source country and work environment. Kalist, Spurr, and Wada (2010) undertake research similar to the second part of Schumacher's paper, but using an instrumental variables approach, and find largely consistent results.

An issue raised but not analyzed by Schumacher is host country language ability. Although this is much discussed in the literature and is clearly extremely important in labour markets, relatively little is known about the effect of language facility on earnings and employment outcomes of international immigrants in health professions. Unlike the general labour market, these regulated professions frequently require language proficiency to be tested prior to licensure. A small piece of evidence is provided by Sharieff and Zakus (2006) who interview 21 non-randomly selected IMGs in Canada. Although one of the study's selection criteria was self-assessed English language fluency, some had appreciable difficulty with the Test of English as a Foreign Language (TOEFL) and the Test of Spoken English (TSE). Although all passed the TOEFL, it took some four attempts to do so and of the 15 who took the TSE after three attempts only 83 per cent had passed. While not directly relevant to health professionals, a similar problem is noted by Ferrer, Green, and Riddell (2006) among Canadian immigrants in general. There appears sometimes to be a gap between literacy/language skills as measured by these tests and individuals' self perception. This is an important area for future research.[18]

Turning to physicians, recent papers focus on the impact of being granted a license to practice on labour market outcomes. Kugler and Sauer (2005) take advantage of a discontinuity in the relicensing requirements for physicians leaving the former Soviet Union for Israel. Crucially, the Israeli administration assigned immigrant physicians with 20 or more years of

[18] Other recent work looking at language and immigration includes Chiswick and Miller (2010), Goldmann, Sweetman, and Warman (2011), and the references cited therein.

experience to an observation track, whereas those with fewer years had to undertake a relicensing exam. The observation track was both immediate and associated with a high probability of licensure whereas the exam track delayed entry to practice and had a lower probability of licensure. While OLS results show a very substantial, in the area of 100 per cent, return to licensure on monthly earnings, the instrumental variable estimates around the discontinuity imply that the causal impact is actually in the range of 180 to 340 per cent. Clearly, the forgone earnings of an immigrant physician not, or being delayed in, receiving a license to practice are enormous.

Given that the instrumental variable results are larger, the authors impute the presence of rents accruing to practitioners and negative selection into licensing. This implies that higher-quality physicians – those with valuable outside options – are unwilling to bear the cost of acquiring a license. It is not clear how generalizable these results are since the migration of Jews from the former Soviet Union to Israel was part of a large and unusual event, but it does point to a methodology that could easily be used in other countries to evaluate the value of licensure to immigrant practitioners. It also highlights the importance of both licensing criteria and the cost of the licensing process for health professionals, which in most countries is complicated, time-consuming, and expensive. This is stressed by Sharieff and Zakus (2006). Lesky (2011) outlines the administrative process for physicians entering Canada and the US, and Forcier et al. (2004) provides an overview for OECD countries.

In a set of papers, McDonald, Warman, and Worswick (2011a, 2011b) compare immigrants with medical degrees in Canada and the US. Interestingly, although some observers in both countries argue that there is a shortage of physicians, both countries control the number of IMGs who can enter each year and facilitate immigration for physicians willing to work in

underserviced areas. One interpretation for this follows from the distinction discussed above between the perspective of patients and payers where cost control is important. Of course, quality control is also important and the two issues frequently intermingle as will be discussed in a subsequent section. Both papers exploit differences in the immigration processes in Canada and the US: Canada has a points system and the US uses employer or State nomination (through the H1-B and J-1 visas). Points systems may be designed in a variety of manners, and may admit new immigrants with medical degrees who have a low probability of being licensed to practice, whereas employer nomination improves the probability of professional employment.[19] Of course, immigrant physicians may enter both countries through other administrative channels, such as spousal or refugee streams. Nevertheless, this is an important specific case of the general issue regarding the importance of the details of the administrative implementation of points systems. There may be a gap between the allocation of educational points for immigration and the value of those same credentials for occupational licensing – and Kugler and Sauer's results suggest that that the value of that gap is enormous for applicants if not necessarily for the receiving society.

Comparing an earlier Canadian regime, when it more closely resembled that in the US, to the one following 2002 when the Canadian points system facilitated the entry of highly educated individuals, including physicians, without regard for the likelihood of occupational recognition for regulated/licensed professions, McDonald, Warman, and Worswick observe the emergence of a substantial gap in the probability of practicing. Additionally, immigrants reporting medical education from non-English-speaking countries are more likely to be either not employed or employed in a low skilled occupation. Clearly, the structure of the administrative process

[19] At times Canada's points system was structured in such a way that physicians without prearranged employment were inadmissible, but since 2002, years of education regardless of field of study/occupation has been a key determinant of points awarded. This permitted physicians to enter with neither pre-arranged employment nor any guarantee of licensure.

adjudicating entry (immigrant selection) into developed countries can have important implications for the ability to practice post-immigration in regulated health professions (and plausibly in other regulated and/or licensed occupations) , which have domestic language as well as occupational skill requirements. It appears likely that the Canadian government did not appreciate these ramifications of the legislation, and associated regulations, in shifting the system to more general and generic entrance criteria in 2002. Of course, the licensure process may have biases as discussed below.

A distinct, but related and understudied issue involves practice styles and treatment delivery standards of immigrant practitioners following migration. Chalkley, Tilley, and Wang (2011) compare the practice patterns of comparable in-service foreign and domestically trained dentists in Scotland using administrative data. Given the discretion in treatment protocols exercised by health professionals, this is a particularly important issue. Using a difference-in-differences approach, they observe that in particular situations and for male patients, foreign and domestically trained dentists have modestly dissimilar treatment patterns, but these attenuate within two years of post-immigration practice.

1.3.3 Licensing/Registration, Regulation, and Unionization

Although not a problem exclusive to health professions, immigration for health professionals, as became clear in the previous section, is far more costly, administratively complex, and fraught with risk than is the case for the typical worker. These are important elements in the calculus of migration. For expositional purposes we categorize the institutional hurdles in health into three "pure" concepts: licensing/registration (with licensure being more common in North America and the approximately synonymous term registration used in Europe), regulation, and unionization. However, we recognize that these terms do not have standardized definitions in the

literature, with regulation and licensure/registration sometimes, but not here, being close to interchangeable. Also, in practice the agencies involved frequently implement versions of more than one of these concepts simultaneously. Nevertheless, for our purposes licensure refers to the objective adjudication of skills, knowledge, and abilities. It is an expert assessment of an individual's ability to perform his or her profession safely and in accord with the standards in place in the relevant jurisdiction.

We will define regulation to embody a broader set of goals reflective of the objective function of society in a particular jurisdiction and typically overseen by government. Hence, for example, an individual might satisfy a jurisdiction's licensure requirements in that the person has the appropriate qualifications to practice but still might not be granted permission to practice because of, for example, issues regarding the optimal allocation of resources within society. Regulation may be socially beneficial; however, in the extreme, regulation may also reflect an objective that is deemed unethical by some. For example, a regulatory body may exclude or restrict a particular gender or racial group from practicing despite individuals from that group being appropriately qualified (see, e.g., OECD, 2002; Forcier et al., 2004). Regulatory bodies may also intervene by limiting access to educational and training programs providing occupation specific skills. For example, a regulatory body might limit the number of entry positions available in health professional education programs; this is frequently associated with controlling costs.

A trade union or a professional association in this context is an organization that facilitates collective action by the members of a health profession.[20] Its objective function is not that of society but of its membership. There is a very large literature discussing the economic

[20] In some jurisdictions certain health professions, for example physicians, have tended to shy away from the term "union", whereas others, for example nurses, have used this nomenclature.

implications of unionization (see, e.g., Addison and Schnabel, 2003) and a small one looking at the economic operation of medical associations and other provider unions/interest groups that frequently act to protect their members from increased competition that might reduce incomes (e.g., Drexler, 2008; McGuire, 2000).

Internationally, some jurisdictions believe that the conflict between the alternative functions and perspectives requires distinct organizations, whereas others do not.[21] At issue in this context is that migrating health professionals need to navigate a series of competency tests, credential verifications, and location-specific hurdles motivated by social and/or professional objective functions. Having appropriate qualifications is not sufficient to practice in many jurisdictions.

A very long and at times controversial economic literature looks at licensure/regulation/unionization in health professions (Friedman, 1962; Arrow, 1963; Kleiner and Kudrle 2000; and Inoue, 2010), and most studies conclude that while a socially beneficial function is served on average, on the margin licensing practices satisfy a union/association motive more than a socially beneficial regulatory one.

Overall, more so than for most occupations, institutions are crucial for migrants who are health professionals and for consumers of immigrant health services. For instance, Noether (1986) shows that the ease with which foreign medical graduates can practice in the US is a key element of the degree of competition on the health labour market in that country. Credentialing and licensing bodies, regulatory agencies, and professional associations/trade unions all play important roles serving distinct and sometimes conflicting purposes. In many countries the role

[21] Perhaps most commonly there is a distinction between the union/association that serves the professional membership and a regulatory college (at arm's-length from, or a branch of, government) comprised primarily of experts from within the profession but whose duty is to serve the broader social perspective. In this context the college is sometimes charged with licensure, although that is sometimes administered directly by government.

and function of these institutions is not well studied from an economics perspective, and international comparisons are likely to yield fruitful insights in the future regarding the strengths and weaknesses of alternative structures.

In this respect, country-to-country bilateral agreements can play a very important role in regulating the migration of health professionals. Inoue (2010) shows these are common, and he also points to the legal and practical conflicts in some jurisdictions, especially the EU, around language requirements. From an industrial relations perspective and with reference to the international migration of nurses to the UK, Bach (2007) similarly notes the importance of bilateral agreements that allow the tailoring of professional education in one country to the requirements of another. He views the institutional and regulatory framework as crucial to the short term operation of the immigration process for health professionals and describes current trends being towards internationalization rather than globalization. Manning and Sidorenko (2007) also look at the importance of regulatory frameworks but focus on migration within a trading arrangement among ten Southeast Asian nations with an emphasis on the supranational influence of mode 4 under the General Agreement on Trade in Services (GATS).[22] They observe that more developed economies have more liberal regulations regarding worker mobility, and comparing the information technology and healthcare sectors they find healthcare to be more highly regulated given both social considerations and professional interests.

1.4 A Developing Country Perspective

In the broader migration literature, earnings differentials between developing and developed countries are key drivers in the migration of skilled professionals, who are likely to be economic

[22] However, GATS' application to the healthcare sector has limitations since it does not cover public services, that is, services provided under government authority where there is neither a commercial nor competitive basis.

migrants with stronger incentives to migrate than those who are relatively less deprived (in terms of income) or than those who stay in the country of origin (Stark and Bloom, 1985; Chiswick, 1999). This section addresses the question of why it is important to study the migration of health professionals from a developing country's perspective.

Many developing countries face a crisis in healthcare due to a crippling shortage of health professionals. While emigration to developed countries is not the only source of the problem, it is an important aspect of the issue. In sub-Saharan Africa the shortage is particularly acute, and Dal Poz and Gupta (2009) estimate that 36 countries do not have sufficient workers to provide minimal services for maternal, newborn, and child health. Important externalities arise from the health of the population, which is influenced by the size and quality of the health workforce. In particular, although causality goes in multiple directions, improved population health can lead to a higher growth rate of GDP and more rapid economic development. Many observers, therefore, see shortages of health professionals as not only affecting the current, but also the future, well-being of a nation's population.

A very large research and advocacy literature exists discussing the migration of health professionals from less-developed to developed countries and highlights the negative effect this migration has on the health workforce and population needs of resource-strapped, less-developed countries. Although somewhat arbitrary, research can be classified as falling within academic disciplines, primarily: medical, although typically not clinical. For example, Mills et al. (2011) discuss the substantial loss of investment in medical education through emigration of trained physicians, and Mullan (2005) analyzes the reduced ability of the health workforce of poor nations to meet population needs due to the heavy reliance on international medical graduates by receiving/destination countries.

Another category of the literature focuses on health services. For example, Parkash et al. (2006) discuss issues of global dental workforce (i.e., workforce planning, migration, gender, oral health needs and dental curriculum) that potentially affect health service deliveries, and Zurn et al. (2004) provide a review of the term imbalance (shortage or surplus) and factors driving the imbalances in the labour market. An additional category of the literature discusses the possible beneficial effects of brain drain, i.e., "when the average level of human capital is higher in the economy opened to migrations than in the closed economy" as seen in Beine, Docquier and Rapoport (2001).

Finally, a section of the literature is on health economics. Overviews by Rutten (2009b) discuss the economic impact of medical migration, where medical migration is not the main cause of poor population health status in developing countries; rather broader political and economic development problems are identified as underlying issues. Bärnighausen and Bloom (2009a) categorize research on the health workforce since 1960s to the 2000s into three phases. The first phase (1960s-1970s) covers research on the health workforce planning methods in terms of shortage of health workers in developed countries. The second phase (1980s-1990s) spans research on licensed health workers as economic actors and whether licensure regulation benefits health workers (interest groups) or serve public interest in developed countries. Also in the second phase, they review literature covering the level of competitiveness in the health care market (pointing to monopolistic structures), benefits of licensure on incomes of health workers and political power attained by licensed health worker interest groups. In the third phase (1990s-2000s), the health worker is seen as a necessary resource in developed and developing countries and effective ways of intervention (including financial incentives and return of service agreements) are investigated to increase the supply of health workers in underserviced and

remote areas of developed countries. Research also led to investigations into health worker migration from resource strapped poor nations to rich nations.

Kangasniemia, Winters, and Commander (2007) argue the irrelevance of the beneficial brain drain hypothesis—which encourages more skill-creation than skill-loss in the destination country—among foreign-trained doctors in the U.K. Hagopian et al. (2005) assess the magnitude, causes and consequences of the migration and further interview and conduct focus groups of deans, provosts and students and report that a culture of medical migration in medical schools in Ghana and Nigeria actually encourages migration as some of the medical schools pride themselves on having graduates abroad.

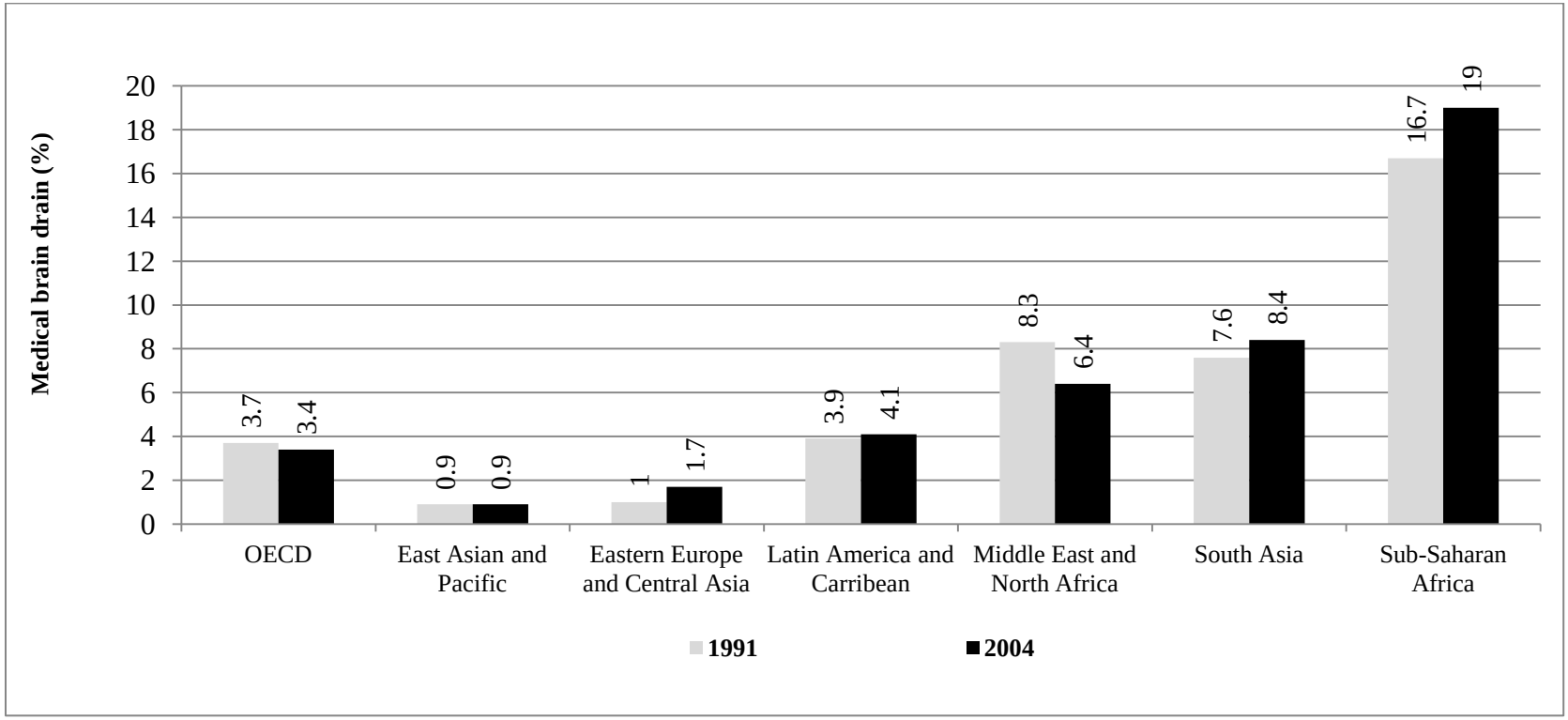
1.4.1 Data

It is very difficult to obtain information globally, but the WHO, OECD and World Bank have led in developing consistent and internationally comparable data on the migration of health professionals looking both at developed and developing countries (e.g., OECD, 2007a; Diallo, 2004; Bhargava and Docquier, 2007). Bhargava and Docquier, (2007) build an annual panel data of medical brain drain, (or emigration rates of physicians) for all countries in the world between 1991 and 2004. They define medical brain drain as the proportion of physicians trained in their home country but employed abroad. Their data depict that the highest rates of emigration of physicians are found in small nations and low-income nations. The consequences of medical brain drain pose a serious concern in particular for the majority of the small and low-income nations found in the sub-Saharan African and South Asia regions (see Figure 1.4), for these countries have a limited supply of medical services.

Despite the data collected by the WHO, OECD, and World Bank, and the studies cited above, a lack of detailed comparable data tends to cause research projects to be narrowly defined

on one dimension or another. Most empirical studies either focus on the flow or stock of (immigrant) health professionals in individual source or receiving countries, or a small set of such countries, frequently with a focus on physicians or nurses (see Figure 1.5, showing the percentages of African IMGs in the US and Canada). Some, such as Mills et al. (2011), calculate the cost of the lost human capital and/or productivity to the source country, while others measure the value of the benefit to the receiving country. Another stream, such as Goldfarb, et al., (1984), focus on remittances with some evidence that this revenue on average more than makes up for the loss to source countries and explains why some developing countries and/or medical schools in those countries have effectively set themselves up as exporters. However, even if some countries benefit from the export of health professionals, this does not take away from the healthcare crisis that they and other developing countries face.

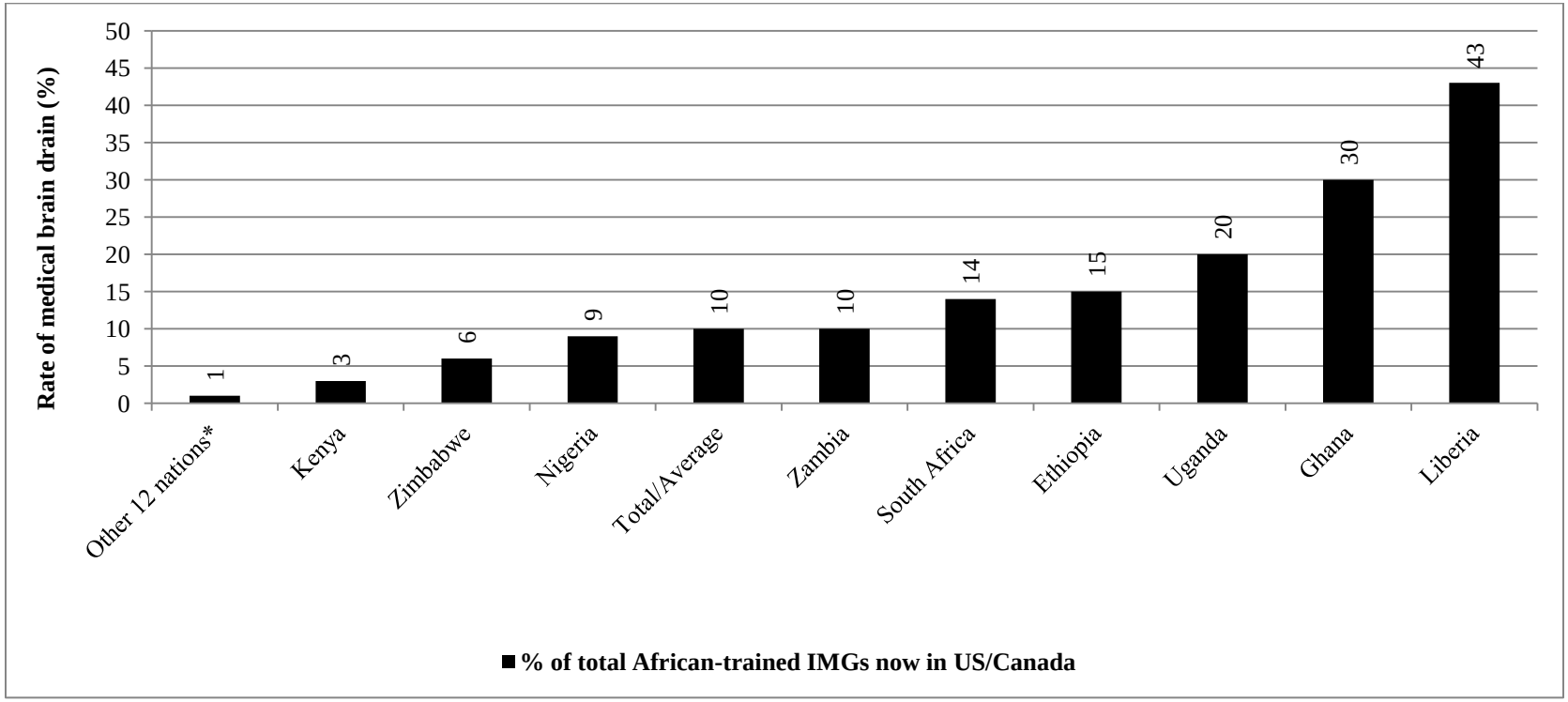
Figure 1.4: Rate of medical brain drain (%, 1991, 2004) across world regions compared to OECD average



Notes: medical brain drain is defined as the proportion of physicians trained in their country but employed abroad. OECD denotes the Organization of Economic Co-operation and Development countries

Source: Bhargava and Docquier (2007).

Figure 1.5: Location of medical training of African international medical graduates in the US and Canada



Notes: * denotes 12 countries with at least one graduate in the U.S.

Source: Hagopian et al. 2004

1.4.2 Push and Pull Factors, and "Beneficial" Migration

Discussions in the field of migration of health care professionals concerning developing countries often centre on two main questions: (1) what are the determinants of emigration out of developing countries and how does the whole of push-pull literature inform our understanding of these determinants?; and, (2) Could emigration have beneficial effects for the country of origin and could these effects be strong enough to offset the loss of human capital and/or disruption of services in the case of healthcare?

To understand both the determinants of emigration and the possible beneficial effects for countries of origin, we describe the three main components of the standard model in the economics of migration literature. Push is described as wage imbalance, where wages are low in the country of origin and, as a result, the cost of migration is lower than the difference in utility provided by the difference in wages between the country of origin and the host country. Other push factors include: poor remuneration and work environments, lack of professional career advancement, lack of educational opportunities for children and economic instabilities and political unrest in source (mostly developing) countries. Pull is described as an issue of immigration and licensure policy, where host countries have more or less open policies regarding foreign-trained health professionals and these policies vary over time. Some other pull factors include shortage of health professionals, partly related to poor health human resource planning in receiving nations, high earnings potential for migrants, career advancement opportunities, well resourced healthcare systems, better working conditions and personal safety, political stability, and opportunity for quality education for children as well as overall good quality of life in receiving (mostly developed) countries. Last, we describe the credit constraint issue, where low wages might hinder emigration if migration costs must be covered by current earnings (i.e., no credit is available to fund leaving the country).

A number of studies address the "push and pull" factors that motivate health professionals to migrate (Rutten, 2009b, and Bärnighausen and Bloom, 2011, provide an extensive catalogue of studies; Astor, 2005, provides an extensive opinion survey). In examining the push effect and estimation of the effect of wages in the country of origin, Dräger, Dal Poz and Evans (2006), in a descriptive study, find substantial wage differentials for health workers (physicians and nurses) between developing and developed economies mostly using the October Inquiry and the Occupational Wages around the World data file of the International Labour Organization (ILO) across 42 different countries.

Two studies analyze the role of earnings differentials between source and destination countries in the emigration flow and report contrary results. Vujicic et al. (2004) find that no plausible increase in domestic earnings can reduce the out-flow of health professionals from the source countries; however, Antwi and Philips (2013) conclude that policy makers can retain health workers in source countries by increasing domestic earnings or giving rewards for staying and implementing salary supplements as an effective policy option that can have causal impact on emigration of health professionals. Both studies suffer from limitations, and we present them in detail below.

Interestingly, Vujicic et al. (2004), in a purely correlational study, investigate the relationship between wages and the migration decision of physicians and nurses. They discuss the possibility of source country wage increases discouraging the outflow from less-developed countries. Using average monthly data (adjusted for purchasing power parity and representing cost of living adjusted wages for cross country comparison) on wage differentials between source countries (African countries) and receiving countries, they test the hypothesis that a larger wage differential lead to a larger supply of migrant healthcare professionals in two ways.

First, using the variation of wages across destination countries, Vujicic et al. (2004) assume that the perception of migration costs, working conditions and living standards are similar across five popular destination countries (the U.S., the U.K, Canada, Australia and France).They find no distinct pattern of preference for the U.S. (being the destination country with the largest earning potential for both doctors and nurses) among migrant health professionals, and suggest a close to zero elasticity (the measure of responsiveness) of the supply of migrant health professionals in relation to the wage premium in the sample of countries.

Second, using the variation of wages across source countries, they show, for example, that nurses in Canada earn 14 times that of nurses in Ghana and 2 times that of those in South Africa. For doctors, the U.S. physician wage is 22 times that of Ghana and 4 times that of South Africa. Based on the assumption that migration costs, living standards, and working conditions are similar across source countries, one would expect that if the supply of migrant health professionals is sensitive to changes in wages, then source countries with the lowest wage premiums would have a lower supply of migrant health professionals than source countries with the highest premiums. Using Ghana and South Africa as case studies, due to data availability, Vujicic et al. find no significant difference in intention to migrate, but rather find equal proportions of health professionals, in both countries, who want to migrate to destination countries, suggesting a close to zero wage elasticity of supply of migrant for the range of premiums.

A general observation by Vujicic et al. is that the gap in earnings between source and destination countries is so enormous that no plausible increase in source country wages will have an effect on emigration rates. They suggest that if supply-side policy options do not curb the emigration rates, then health policy makers could look into demand-side policies such as aligning the medical training and nursing training to domestic population needs in source countries.

In a more recent study, Antwi and Phillips (2013) add to the literature on the push effect among healthcare professionals by exploiting a quasi-natural experiment to test a causal relationship between wages and retention. They do not actually observe emigration directly from the data but infer it from attrition from the public health care payrolls in Ghana, which is a limitation of the study. More specifically, they measure the causal impact of source-country wages on attrition of skilled health workers from the public sector. In 2006, the Ghanaian government implemented a new salary policy, the Health Salary Structure (HSS), resulting in salary increases of varying degrees to all health workers with some receiving increases of more than 50% in real wages and in some cases a 10% decrease in real wages.

Antwi and Phillips use administrative data containing individual-level monthly payroll records (predominantly for doctors and nurses) from 2003 to 2009. Based on attrition rates prior to the salary policy change, they classify the data into two groups of health professionals, both aged 20-35 years: potential migrants and non-migrants (i.e., those who do not tend to migrate), noting that those who leave the public sector migrate, join the private sector or retire. One can also argue that attrition can imply withdrawing from the labour force, at least temporarily, for instance, women on maternity leave. Antwi and Phillips argue that potential migrants' attrition from the public sector could be taken as a proxy for emigration for two reasons: (1) because they are early-career starters and are not likely to retire; and, (2) because the private sector does not have the capacity to absorb all those who leave the public sector, leaving the emigration option as a viable one for potential migrants.

Antwi and Philips exploit the variation in wages as a consequence of policy-induced wage variations from 2005 to 2006 since workers in the same step (i.e., seniority level) of the same grade-level receive the same salaries, allowing them to take the wage variations in the changes

across different grade-step combinations as exogenous and estimate the causal impact of wages on attrition using a difference-in-differences estimator. Their identification strategy "relies on the assumption that wage changes from 2005 to 2006 for different groups of workers can be taken as exogenous" (p. 107).

The authors find a causal effect of wage increase on attrition (reasonably inferred as emigration). They find that a 10% wage increase reduces the annual attrition rate by 1.02 percentage points among individuals, aged 20-35 years, who are likely to migrate. They repeat the analysis and find no wage reform effects on attrition of the non-migrants in the public payroll, to justify their assessment of impact of wages on migration. They replicate the analysis on the entire sample of health workers less than 65 years and do not find a causal effect of wages on attrition, which shows a positive coefficient of 0.49 (the impact of wage increase on probability of attrition or migration) that is insignificantly different than zero. Further, they report a larger magnitude of wage impact on male health workers than female ones.

As with any experiment, the nagging question is the issue of generalizability of the results (or external validity) and the context: what holds in Ghana around 2006 may be very specific to a historical situation and might not apply elsewhere.

All told, there is a substantial list of financial and nonfinancial reasons influencing migration decisions. One central conclusion from this stream of research is that there is no single "magic bullet" that will stop health professional migration, nor is it obvious that stopping migration altogether would be beneficial. Rather, managing the migration flow is a more realistic approach to protecting developing nations' investments and serving their populations' healthcare needs. Developing countries that manage their health professional education systems with an eye on graduates' migration decisions will be able to extract greater benefits for their populations; if

nothing else, active management may increase remittances and/or obtain offsets for the costs of education.

The concept of managed migration coincides with the development of bilateral and multilateral national agreements as discussed regarding licensure above. Although this will clearly not solve all of the relevant problems, formalizing some of the key relationships may provide management tools to both sending and receiving governments. One trend that is evident is the movement of migrant health professionals within or across sets of countries with common or closely related languages. Even more so than with the average immigrant, practicing in a health profession requires advanced language skills – and these skills are frequently tested. This appears to be a key motivating factor for relevant existing international agreements.

One particularly important hypothesis justifying the receipt of economic migrants from less developed countries by developed countries is that the source countries benefit from the exchange. One argument is simply that successful (especially, skillful and well-educated) immigrants transfer money back to their countries of origin, making the economies of the source countries richer than they could have ever been without emigration (this is the "remittances justifying emigration" story, found, for instance, in Adams and Page, 2005 and Ratha et al., 2011).

However, Mountford (1997) suggested another channel through which emigration can benefit the source country and it works as follows: the probability to emigrate and live a better life increases the incentive to receive more education or skill by prospective migrants (or residents) in the sending countries.[23] It is likely that not all the educated individuals will leave and so some of this increased human capital will stay and work in the source country, which in turn can be good for the local economic growth (assuming a positive externality of human capital). The gist of the

[23] A revised version is developed by Stark and Wang (2002)

argument is that, without the possibility of emigrating there would be less rather than more skilled health care professionals in developing countries. We assess these two potential benefits based on what is known from the literature.

The issue with remittances is to measure whether the value of these remittances exceeds the loss of health human resources in countries where the lack of such resources imposes a constraint on the well-being for the entire population. The relatives of expatriated doctors or nurses might be better off, but the well-being of the whole population might be much lower than if these doctors were still at work in their destination countries, offering their medical expertise. Remittances could help if they were reinvested in medical, nursing or other healthcare training, but very little or no evidence seems to support this possibility (Goldfarb and Havrylyshyn, 1984; Connell and Brown, 2004). Next, the issue with emigration as a motivation for human capital formation is that the empirical evidence is mixed.[24]

Mountford's (1997) broader seminal theoretical work presents a discussion of whether emigration could have beneficial effects (i.e., economic growth) for the source country, and shows that, the prospects of emigration can raise the expected return for human capital and promote further investment in education in the source country.

One aspect of this idea, by Stark and Wang (2002), envisions migration as a type of "prize" that may motivate human capital development in source countries and, despite the loss of a limited number of workers, raise the overall quality and level of training in those countries.

While there is some appeal to the theoretical possibility of emigration that is "beneficial" to the source country, empirical research is mixed. Kangasniemia, Winters, and Commander (2007)

[24] It is also not clear how affordable or accessible (in terms of costs) the educational institutions are (in the sending countries) with curricula geared towards or aligned with educational standards in receiving (mostly developed) countries. For example, how many residents in developing countries can afford to learn German (by attending the Goethe Institute) with the hope of immigrating to Germany, considering the fact that some of these educational institutions which prepare prospective migrants may be too expensive for the average residents in the sending/developing countries.

seek to determine whether the conditions required for immigration to be beneficial exist for a particular set of countries and conclude that they do not – although these authors observe that return migration and/or remittances do have beneficial effects for the sending country. In contrast, looking at national immigrant populations as a whole rather than focusing on health professionals, Beine et al. (2008) find some support for the hypothesis in countries with both low levels of human capital and low emigration rates. It may well be that the beneficial effect turns on being able to control emigration; also, education programs in healthcare typically have excess demand and limited enrollment, and this may differentiate these fields of study. Bhargava, Docquier, and Moullan (2011), using an extremely large dataset of countries from 1991 to 2004 and appropriate panel data techniques, find physician migration indeed induces increased levels of medical education, but the magnitude is too small for a beneficial effect. See Bhargava and Docquier (2007) for an introduction to the useful and interesting dataset employed. However, they also observed that child mortality rates decrease as physician density increases but only when aggregate literacy rates are sufficiently high. They conclude that reducing medical brain drain will only have modest benefits. Clearly, medical workforce availability is only one element of the healthcare system and social structure required for improved health outcomes.

1.5 Conclusion

International immigration of health professionals has substantial externalities for both developed and developing nations. Developing nations are frequently negatively affected by the phenomenon, but for these nations it appears to be but one element of a larger systemic health challenge. Mobility is primarily towards higher-paying, more prestigious, more amenity-rich, areas. Health professionals migrate from rural to urban, from low to middle to high income countries, from developed countries with lower wages to those with higher ones. Less developed countries are most

likely to be net suppliers, and although other developed countries are also net recipients the main receiver appears to be the US. Extensive multinational datasets have recently been developed that can extend the scope of future analyses addressing many of these issues. Shortages of domestically trained health professionals in developed nations are a key driver affecting the human resource losses of developing nations. Since the health workforce supply in wealthy countries is, by one means or another, influenced and/or controlled by governments, many of the perceived shortages driving the observed migration appear to result from planning errors or historical decisions putting substantial weight on short-term concerns and/or relying on immigration. A better understanding of these dynamics could improve planning to alleviate future shortages and thereby assist less developed countries.

Quantifying and better understanding both the stocks and flows of health human resources, especially in developing countries but also in developed ones, seems extremely worthwhile. Much of the research thus far is foundational and primarily descriptive, but a few studies are more analytical, and some seek not just correlations but causal impacts. A few papers looking at the economic integration, and causal impacts resulting from, the arrival of international health professionals have been written – mostly for the US. But the issues of asymmetric information and moral hazard in healthcare delivery that are reflected in health labour markets in the form of, for example, government regulation, licensure and other forms of practice standards have not been yet integrated into the immigration literature to any great degree. To this point it appears that among new immigrants employed in a health profession, economic integration occurs relatively swiftly, and their arrival causes a relatively small or negligible negative impact on the domestic labour force. However, most of these studies tend to focus on immigrants who find employment, ignoring

those unable to work in the profession in which they were trained. In the case of physicians, one study suggests that the opportunity cost of not practicing is enormous, suggesting substantial rents.

Management tools that governments may potentially employ, for example bilateral and multilateral treaties facilitating recognition and occupational integration, also seem particularly interesting and worthy of study both to provide feedback regarding their design and implementation, and as sources of exogenous variation to allow underlying economic parameters to be estimated. In sum, there is enormous scope for future work, both in establishing the basic stylized facts and in understanding and economically modeling the underlying market structures.

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Chapter 2

Regulated Health Professions: Outcomes by place of birth and training

2.1 Introduction

The intersection of two economic and policy issues – occupational regulation and the labour market integration of immigrants – is the focus of this study of health professionals. Occupational regulation is garnering increasing international attention due to the growing number of occupations, and share of the workforce, that face some form of government regulation; see, e.g., Kleiner and Krueger (2013) for the US, and Humphries, Kleiner and Koumenta (2010) for the UK. For Canada, although little direct evidence exists regarding the number of workers that are regulated, the list of regulated occupations expands regularly. Most such regulation derives from provincial legislation and occupations in health are particularly likely to be, and to become newly, regulated.[25] Simultaneously, it is well known that the labour market outcomes of successive cohorts of new immigrants to Canada have been declining for at least four decades as discussed by Aydemir and Skuterud (2005), and Picot and Sweetman (2012). At the juncture of these two issues is an increasing perception that the cost of credential recognition and occupational re-entry following migration are excessive for regulated professions and this is hindering the labour market integration

[25] For example, in Ontario kinesiologists, pharmacy technicians, and practitioners of traditional Chinese medicine have all recently been regulated.

of new immigrants. Some characterize immigrants' inability to practice in their trained occupation as "brain-waste" (e.g., Bourgeault 2007).[26]

Although immigrant credential recognition is the subject of several federal and provincial initiatives, relatively little economic research has addressed the issue. Federal efforts include Citizenship and Immigration Canada's Foreign Credential Referral Office, Employment and Social Development Canada's Foreign Credential Recognition Program, and Health Canada's Internationally Educated Health Professionals Initiative.[27] Additionally, to address issues of unjustified discrimination in regulatory processes, provincial governments in Ontario, Nova Scotia and Manitoba have recently established Offices of what are sometimes known as Fairness Commissioners, and Quebec has had a longstanding commissioner overseeing regulated professions. Although the mandates vary somewhat, these Offices seek to ensure transparency, openness and natural justice in licensure processes. Some of these issues have been broadly observed by Esses et al. (2007) who report that visible minorities are likely to experience discrimination/prejudice in gaining employment and that discrimination is specifically due to their visible minority status and the ambiguity associated with the value of foreign credentials, and suggest the use of credential evaluation services providing information on the equivalency of foreign acquired qualifications. Even further, for the medical profession in Ontario, Thompson and Cohl (2011) were commissioned to undertake an independent review of the selection of international medical graduates for post-graduate programs, which is the key hurdle for many MD graduates on the route to licensure.

[26] While some definitions are all-encompassing, it could be argued that if an individual chooses not to work in his/her trained occupation then "brain waste" is not occurring, which means individual preferences are important in the debate.

[27] See http://www.cic.gc.ca/english/department/fcro/, http://www.esdc.gc.ca/eng/jobs/credential_recognition/foreign/index.shtml and http://www.hc-sc.gc.ca/hcs-sss/hhr-rhs/strateg/init-prof-educ/index-eng.php respectively; accessed June 9, 2014.

At its best, occupational regulation reflects an optimal balance between, on the one hand, the benefits derived from protecting the public by ensuring occupational competence and, on the other, the deleterious effects of establishing access limiting monopolies that extract rents (excess profits) from that same public. Also, although there are differences across jurisdictions, in general regulation is not homogeneous and there are degrees or stages of occupational regulation ranging from simple registration to full licensure as discussed by Kleiner (2013). Regulation can increase demand by minimizing consumer uncertainty over the quality of services arising from asymmetric information between patients and practitioners who possess expert knowledge (Shapiro 1986; Bourgeault and Grignon 2013). However, it can also limit supply and within the U.S. context researchers have found that licensure restricts labour supply, and consequently both increases the prices of the services provided and the earnings of those practitioners since they benefit from the economic rents (e.g., Kleiner 2006, 2013; Kugler and Sauer 2005; Timmons and Thornton 2008; Bryson and Kleiner 2010; Pagliero 2011; Kleiner and Krueger 2013). [28]

Licensure's requirements, in Canada, are normally determined and adjudicated by self-governing regulatory colleges and include assessments (frequently conducted by third parties) of language skills, occupational knowledge and skills, contextual judgment and ethics. Foreign-trained professionals are also assessed for credential equivalencies to Canadian standards.[29] Girard and Smith (2013), and Zietma (2010) report that, in general, those trained outside of Canada are less likely to work in a regulated occupation compared to both Canadian-born professionals and immigrants who are Canadian-trained. Many foreign-trained health professionals (FTHPs) do not practice in their fields in Canada.

[28] Economic rents (excess profits) stem from exclusive rights accorded to groups such as regulatory colleges and unions whereby they enjoy some form of monopoly power.

[29] In the context of this study, the term "foreign-trained" denotes individuals trained in an institution outside of Canada and the United States (US), which includes both immigrants and native-born Canadians.

It has been observed that domestically trained graduates in health professions perform better than foreign-trained graduates on licensure examinations (e.g., Gerrow et al. 1997; Medical Council of Canada, 2012; Canadian Nurses Association, 2012). Additionally, the likelihood of foreign-trained graduates entering into regulated practice also depends upon other aspects of the accreditation process, including opportunities for bridging programs that remediate gaps in skills/knowledge. However, there has been controversy regarding the appropriateness, format, timing, costs and goals of the licensing process as undertaken by the various regulatory colleges, which has motivated, for example, establishing the aforementioned Fairness Commissioners.

In this primarily descriptive study, we contrast the outcomes of both those who do and do not work in their trained health field, and we separate the population into four distinct population subgroups based on the interaction of place of birth (foreign/domestic) and training (foreign/domestic).[30] While we do not address the welfare loss question regarding regulation, this study provides foundational evidence for a discussion of policy regarding foreign credential recognition among regulated health professions. For each of the four population subgroups, we document the likelihood of employment and level of earnings across eight of the largest regulated health professions: dentists, medical laboratory technologists, medical radiation technologists, pharmacists, physiotherapists, psychologists, physicians and registered nurses.[31] We ask the following guiding research questions: (1) What proportions of foreign-trained and Canadian/US-trained graduates are working as health professionals? (2) What proportions of those not employed in their trained health occupations are either foreign-trained or Canadian/US-trained persons? The

[30] Of the four population sub-groups, the Canadian-born foreign-trained group is sometimes too small to permit analysis. Also, as mentioned, for the purposes of training/education credentials, both Canada and the US are interpreted as domestic given the highly integrated nature of accreditation in many health occupations across these two countries.

[31] Medical laboratory technologists are licensed in all provinces except British Columbia, and medical radiation technologists are not regulated in British Columbia, Manitoba, Prince Edward Island, and Newfoundland (although at least two of these latter provinces are currently considering regulation for medical radiation technologists).

next set of questions pertains to access into working in a regulated health occupation and earnings conditional on access. (3) Are foreign-trained persons less likely to work in their trained occupations than Canadian/US-trained ones? (4) Are there differences in labour market outcomes of practicing foreign- and Canadian/US-trained health professionals?

One significant contribution of this paper stems from being able to identify the four "place of birth/education" groups in the 2006 census data that we use. However, an associated limitation is our inability to identify where individuals obtain academic degrees other than their highest. Physicians might, for example, obtain an MD degree outside of Canada, but subsequently undertake a postgraduate residency in Canada. Those who reported their postgraduate residency as their highest level of education would therefore be (mis-)classified as Canadian trained by the norms of the medical profession. More generally, respondents may have obtained their relevant professional degree outside of Canada and subsequently completed, for example, an MBA or advanced research degree in Canada and report the latter as their highest degree. As well, while there are large health services literatures that study internationally educated physicians and nurses there is relatively little research looking at other regulated health professions.

The study's primary findings suggest that location of training is a statistically and economically significant determinant of the likelihood of working in one's trained profession. In contrast, place of birth has no effect for most occupations and mixed results across the few occupations where its relationship is statistically significant. For those working in their trained profession the findings for earnings are even more mixed. We find that the visible minority foreign-born foreign-trained persons have poorer outcomes in half of the professions among those working in their field. For those not working in their field the foreign-born foreign-trained persons have poorer outcomes in half of the professions relative to their Canadian-born Canadian/US-trained

ones. Also, while overall foreign-born and foreign-trained health professionals are less likely to work in a regulated health occupation, we observe that, where the earnings gaps are positive or insignificant, foreign-trained professionals are more likely to be employed suggesting that common factors are driving the employment and earnings processes.

The rest of this study is organized as follows. The remainder of this section presents relevant institutional background. Section 2.2 presents the data and methods employed in the analyses. Section 2.3 explains the results from descriptive and multivariate analyses. Section 2.4 discusses the results of one's likelihood of working in a trained health occupation and the potential relationship between labour market outcomes for eight selected health professionals and across place of birth and highest training. Section 2.5 concludes and highlights potential policy implications.

2.1.2 Background

Healthcare in Canada falls primarily under provincial jurisdiction. For medically necessary services, physicians and healthcare workers employed in hospitals are paid out of tax revenue as part of Medicare. For this portion of healthcare each provincial government is the "single payer" (insurer) and costs are funded through tax revenue (Ostry 2006). Even those health occupations not funded through Medicare are almost ubiquitously subsidized either directly by provincial governments, or indirectly through federal and provincial tax expenditures (although the tax subsidy is less in Québec). Governments have limited control over costs since they have no direct influence on the quantity of healthcare services supplied. And patients, facing zero or subsidized costs and a government ban on price competition for Medicare-covered healthcare services, have little or no ability or incentive to control costs. Governments' primary levers for cost containment on the human resources side involve negotiating wages and prices, managing the degree of subsidy

outside of Medicare, encouraging productive efficiency, and influencing the number of healthcare workers, especially physicians, offering services. In this context normal market mechanisms do not operate and both over and undersupply can be serious problems. Foreign-trained health professionals (FTHPs) can sometimes be an important source of skilled workers for quickly recovering from shortages. Overall, beyond issues intrinsic to healthcare, governments' diverse and sometimes conflicting roles imply that occupational regulation in healthcare is substantially more complex than that in most other industries.

Additional complexity arises from the immigrant selection and location choice process. Outside of Québec, the selection of economic immigrants is primarily a federal undertaking. Given the heterogeneity in health occupations in demand across (and within) provinces, and Canadian citizens' and permanent residents' constitutional rights regarding geographic mobility, there is no clear-cut method to ensure a match between the skills of arriving immigrants in a local labour market and the employment needs of that same location. While, in many situations FTHPs alleviate the maldistribution of health professionals and meet needs in rural and remote areas, McDonald and Worswick (2012) observe for physicians that residency in underserviced areas tends to be of short duration followed by mobility to Canada's most urbanized regions, which can contribute to oversupply there. Although it is not a large issue in our data from 2006, an anticipated issue for some occupations is (potential) contributions to oversupply attributable to returning Canadian citizens trained abroad. One consequence of unaccredited and/or incomparable credentials is downward occupational mobility for some FTHPs.

Turning to the evaluation processes, foreign-trained graduates have lower licensure examinations pass rates than Canadian-trained graduates as seen in Table 2.1. Overall, appreciable gaps exist between regulatory expectations, be they appropriate or not, and the ability of

immigrants to meet those expectations in all occupations. Of course, these results reflect only those who pursue the accreditation process as far as the exam stage. For physicians, where there is more research on which to draw than for other occupations, a non-random survey by Sharieff and Zakus (2006) of 21 foreign-trained medical graduates who self-assessed as being fluent in English found the following. While 100 percent passed the Test of English as a Foreign Language (TOEFL) some took up to four attempts to do so, and of the 18 who attempted the Test of Spoken English (TSE) only 15 passed with some taking up to three attempts.[32]

Clearly, the technical competency exams presented in Table 2.1 reflect only one stage of the process and, consistent with the more general findings of Goldmann, Sweetman, Warman (2011), for some individuals English/French language deficits may prevent the utilization of technical skills in the Canadian labour market. The Canadian Alliance of Physiotherapy Regulators (2010, 24) takes a similar broad view and beyond technical skills sees factors influencing pass rates including "language of education and language of clinical practice, years since graduation, and practice patterns in the country of education" in addition to the format of the examination.

[32] For comparison with table 2.1, all 21 of this sample passed the MCCEE which precedes the MCCQE. All challenged the MCCQE part 1 (with some taking it up to 6 times) with 17 passing, and 13 took the MCCQE part 1 (up to two attempts) with 12 passing.

Table 2.1: Licensure examinations pass rates for first time takers in selected years (%)

	Canadian-trained	Foreign-trained
Physicians, 2012		
MCCQE Part 1	98.0	68.0
MCCQE Part 2	96.0	48.0
Registered Nurses, 2011		
CRNE	86.8	48.4
Pharmacists, 2002-2006		
Part I: MCE	94.0	44.0
Part II: OSPE	96.0	36.0
Physiotherapists, 2012		
Part I: MCQ written	94.0	44.0
Part II: Clinical Practical Exam (OSCE)	88.0	44.0
Medical Radiation Technologists, 2013		
CAMRT certification examination	88.4	26.6
Optometrists, 2011-2012		
CACO	97.2	75.8
Dentists, 1994-1996		
NDEB written exam scores	93.0-100.0	47.0-68.0

Notes: Exams and abbreviations. Physicians: Medical Council of Canada Qualifying Examination (MCCQE), Parts 1 and 2. Nurses: Canadian Registered Nurse Examination (CRNE). Pharmacists: multiple choice exams (MCE) and the Objective Structured Clinical and Performance Examinations (OSPE). Physiotherapists: written exam is the multiple choice question (MCQ) and the Clinical Practical Exam is Objective Structured Clinical Exam, (OSCE). Medical radiation technologists: Canadian Association of Medical Radiation Technologists (CAMRT). Optometrists: Canadian Assessment of Competence in Optometry (CACO). Dentists: National Dental Examination Board of Canada (NDEB); NDEB pass rates (%) presented were for a mixture of candidates, those who may have had several attempts and for first time takers.

Sources: Authors' compilation from Medical Council of Canada (2012); Canadian Nurses Association, Professional Practice and Regulation Division (2012); Pharmacy Examining Board of Canada (2002-2006) cited in Canadian Pharmacists Association (2008); Canadian Alliance of Physiotherapy Regulators (2012); Canadian Association of Medical Radiation Technologists (2013); Canadian Examiners in Optometry (2013); and Gerrow et al. (1997) for the NDEB scores

2.2 Data and Methods

2.2.1 Data

Canada's 2006 Census 20 percent file was accessed through the Statistics Canada's Research Data Centre at McMaster University. Unlike earlier censuses, this one has the advantage of capturing respondents' location of highest education in addition to other relevant variables including field of highest education, current main occupation and other labour market and demographic variables. Our sample is limited to individuals aged 25-64 holding a post-secondary degree. Temporary

residents are excluded, as are immigrants who landed in 2005 or 2006 because earnings are reported for the calendar year 2005. Aside from a few comparisons to the broad workforce, for the main body of the analysis we further focus on those who self-report either their main occupation or their highest field of education as one of the eight health professions under study. Each of the eight occupations has a very specific educational credential that may be observed in the census data as long as it is the "highest" credential obtained. In the same vein, individuals working at multiple occupations only report the one where they worked the most hours. Therefore, for example, an individual with an undergraduate degree in pharmacy and also an MBA, and also not working as a pharmacist in her/his main job, would not be in our health professional sample. Of course, this applies to all four of our population sub-groups.

A variety of descriptive statistics are provided for each of the eight occupations contrasting between four population sub-groups based on location of birth and location of education/training: Canadian-born, Canadian-trained (CBCT); Canadian-born, foreign-trained (CBFT); foreign-born, Canadian-trained (FBCT); and foreign-born, foreign-trained (FBFT). In all cases, Canadian educated/trained should be read as being educated in either Canada or the US given the highly (and for some formally) integrated nature of the two nations' health training systems. Additionally, we separately examine those working, and not working, in their field of training. Some categorizations, for example, by age at immigration or according to industry for those not working in their field of training, are also explored.

2.2.2 Regression Specifications

One key dependent variable, $Practicing_i$, is set to one when "the occupation of employment matches the healthcare occupation of training", and zero otherwise. For each of the eight occupations a logistic regression of the form:

$$Practicing_i = \beta_0 + \beta_{\mathrm{BT}}\mathrm{BornTrained}_i + \beta_{\mathrm{V}}VM_i + \beta_{BV}(\mathrm{BornTrained}_i * VM_i) + \beta_X X_i + \varepsilon_i \qquad (1)$$

is estimated. The vector *BornTrained* comprises three variables reflecting the four Canadian-/foreign-born Canadian-/foreign-trained groups (CBCT being omitted). *VM* is an indicator variable for visible minority status. In practice, the sample size for the interaction of the *VM* variable with the CBFT group is too small to be disclosed, so for the interaction component it is merged with the CBCT one.[33] Other regressors are included in the *X* vector. The β's are coefficients to be estimated and the error term, ε, is appropriate for the logistic regression.

Earnings is the other dependent variable, and ordinary least squares regressions of a very similar form are estimated

$$lnY_i = \alpha_0 + \alpha_{\mathrm{BT}}\mathrm{BornTrained}_i + \alpha_{\mathrm{V}}VM_i + \alpha_{BV}(\mathrm{BornTrained}_i * VM_i) + \alpha_X X_i + u_i \qquad (2)$$

where *lnY* is the natural logarithm of earnings, the α's are coefficients to be estimated, and u is an error term. For both specifications, independent variables of interest are: an indicator for visible minority status; years of potential Canadian work experience (the smaller of years since imputed graduation, or years since migration); and years of potential foreign work experience for adult immigrants (age at immigration - years of schooling - six). Independent variables of less interest are indicators for age, sex, place of residence (urban/rural), marital status (married/not married), mother tongue (English/French/other), level of educational status (below bachelor/bachelor-medical or dentistry degree/above bachelor/masters/PhD) and age of youngest child in a census family (those with no children/children less than 5 years/children 6 years and above). Two endogenous right hand side control variables are also employed: number of hours worked in the reference week and number of weeks worked in 2005. Clearly, their coefficients are not of direct interest and they are

[33] The interactions are products of VM and FBFT and VM and FBCT. E.g. VM*FBFT is one (1) if both conditions are true, otherwise coded as zero (0). The interaction effect tells how much the effect of visible minority differs between the FBFT/FBCT persons and CBCT persons but it does so in multiplicative terms for the logistic regression, the difference is the estimate on the interaction term itself (we cannot add the odds ratios as in OLS). However, for the OLS, the interaction term is the difference in effect of visible minority between FBFT and CBCT (we add the coefficients on the interaction term and the VM variable to get the estimate for the VM who are FBFT).

only included to assist in interpreting the coefficients of primary interest. In additional regressions not presented, we estimated various versions of our models starting with a minimalist specification and sequentially including subsets of the regressors discussed here (See the appendix for the short-form and long-form regressions). In all cases the coefficients on the central independent variables changed in magnitude only very modestly across specifications.

2.3 Results

2.3.1 Descriptive Statistics

Table 2.2 presents the distribution of those successfully working in each of our eight occupations across the four immigration and credential receipt categories, and displays relevant larger categories of the Canadian workforce in the bottom three rows for comparison. Several insights are contained in panels A and B. First, there is noticeable variation in immigrant representation across occupations with the relatively low share of immigrants in nursing, which is the largest group of health professionals, being a key factor associated with the underrepresentation of the foreign-born among the health workforce relative to the national average. In contrast, the foreign-born are overrepresented among dentists, pharmacists and physicians compared to the share of immigrants in the national workforce. Second, for both the Canadian and foreign-born, Canadian and US trained immigrants represent much larger proportions of each occupation than do foreign trained immigrants. Of course, the location of training refers only to their highest level of education.

Panel B of Table 2.2 focuses on the foreign-born, stratifying by age at immigration. Across all occupations, and the broader labour force, the vast majority of the foreign born-foreign trained immigrated older than age 25. Substantially greater dispersion is observed among the FBCT, but for almost all occupations the majority arrived younger than 18 years of age. The latter implies that a

substantial share of the FBCT obtained more than a final year or two of their education/training at Canadian institutions.

Table 2.3 complements table 2.2 by focusing on the share of those reporting an occupation-appropriate educational credential (regardless of labour market status) but who are not working in that occupation as their main job. Overall, panel A reveals a substantial stock not practicing in their trained fields across all four population subgroups, with the percentages universally higher among the FBFT. Interestingly, although the FBCT exhibit slightly higher percentages not working in their trained fields, the numbers are quite similar to those of the CBCT with the exception of pharmacists. In contrast, substantially higher shares of the FBFT are not working in their trained field. The CBFT for the most part fall somewhere between the CBCT and the FBFT. Among all four groups some of this undoubtedly characterizes "brain waste", some likely reflects gaps in skills relative to professional norms, and some likely also reflects the normal operation of the labour market whereby individuals move out of their initial field of training over the life course. Of concern is that some of it may also reflect discrimination against the FBFT, however, while more analysis is required, table 2.3 suggests that it is foreign training rather than foreign birth alone that is central to this gap.

Table 2.2: Distribution of each regulated occupation across immigration or credential receipt categories

		Panel A: Location of highest training				Panel B: Age at immigration					
						Foreign-born			Foreign-born		
Row %		Canadian-born		Foreign-born		Cdn/US-td			Foreign-td		
	Number	Cdn/US-td	Foreign-td	Cdn/US-td	Foreign-td	<18ys	19-24ys	25+ ys	<18ys	19-24ys	25+ys
Dentist	16,190	67.1	--	24.1	8.7	61.7	14.4	23.9	3.9	8.5	87.6
Medical Laboratory Technologist	18,560	78.2	--	11.7	10.1	51.3	23.0	25.7	1.9	17.0	81.1
Medical Radiation Technologist	14,335	84.4	0.4	8.6	6.5	68.4	13.8	17.8	--	--	100.0
Pharmacist	23,715	71.1	0.2	16.5	12.2	65.9	15.0	19.1	2.3	9.4	88.4
Physician	62,260	66.7	0.7	19.9	12.7	54.4	11.7	33.9	3.5	5.8	90.7
Physiotherapist	14,590	81	1.2	10.7	7.2	56.9	15.1	28.0	1.9	25.4	72.7
Psychologist	14,840	82	1.3	14.0	2.7	35.9	21.7	42.4	5.1	3.8	91.1
Registered Nurse	243,295	80.9	0.3	11.3	7.6	48.9	21.3	29.8	2.5	19.7	77.8
Health workforce	906,075	77.6	0.4	13.1	9.0	48.7	19.1	32.2	2.4	13.8	83.7
Non-health workforce	7,257,270	72.5	0.5	13.6	13.4	51.7	19.4	28.9	2.5	13.3	84.2
Total workforce	8,163,350	73.1	0.5	13.5	12.9	51.4	19.4	29.2	2.5	13.3	84.1

Notes: 1) -- denotes suppressed data due to small cell count. 2) Restrictions applied to all 8 regulated occupations include those aged 25-64 and exclude all immigrants since 2005; Dentists includes general practitioners and dental specialists; Physicians include general practitioners, family physicians and specialist physicians; Registered nurses exclude head nurses and supervisors and licensed practical nurses. 3) Canadian workforce aged 25-64 is restricted to only those with a post-secondary education and also excludes all recent immigrants since 2005. 4) Canadian health workforce is defined as those working in health related occupations based on census occupation variable "nochrd" and it includes persons who worked prior to January 1st 2005 or never worked. We include nurse aides, orderlies and patient service associates, other assisting occupations in support of health services, social workers, psychologists, family, marriage and other related counselors, community and social service workers; and visiting homemakers, housekeepers and related occupations (who perform similar tasks as personal support workers, PSWs), but excluding veterinarians.
Cdn/US-td denotes Canadian/US-trained, Foreign-td denotes foreign-trained.

Source: Authors' calculations based on 2006 Canadian Census Master File.

Table 2.3: Percent reporting a qualification but not practicing in their field

		Panel A: location of highest training				Panel B: Age at immigration (Row %)					
	# Total	Canadian-born		Foreign-born		Foreign-born Cdn/US-td			Foreign-born Foreign-td		
	Trained	Cdn/US-td	Foreign-td	Cdn/US-td	Foreign-td	<18ys	19-24ys	25+ys	<18ys	19-24ys	25+ys
Dentist	21,815	14.5	--	14.5	68.7	52.6	12.8	34.6	1.8	7.9	90.3
Medical Laboratory Technologist	42,895	51.3	--	58.3	76.1	42.4	27.6	29.9	1.1	18.9	80.0
Medical Radiation Technologist	23,690	36.7	42.9	38.4	62.1	52.3	14.2	33.5	1.6	17.9	80.5
Pharmacist	33,470	18.2	45.0	30.2	59.6	51.5	16.9	31.7	1.5	11.5	87.0
Physician	80,830	10.6	38.3	12.9	59.3	44.8	16.0	39.1	2.4	4.2	93.3
Physiotherapist	19,105	19.4	18.6	23.4	52.4	43.6	25.5	30.9	3.0	17.4	79.6
Psychologist	40,915	61.3	67.7	66.3	85.4	42.0	18.5	39.5	3.2	8.0	88.8
Registered Nurse	393,920	36.3	47.3	35.6	55.4	43.6	23.4	33.0	3.2	19.4	77.4

Notes: -- denotes suppressed data due to small cell count. Trained individuals who are "not practicing" are identified by their highest field of study. Total trained refers to both practicing and not practicing trained individuals. To get the total number of those "not practicing" subtract column 2 of Table 2.2 from column 2 of Table 2.3. Cdn/US-td denotes Canadian/US-trained and Foreign-td denotes foreign-trained. See the appendix for a list of highest education as reported by respondents across occupations.

Source: Authors' calculations based on 2006 Canadian Census Master File

Communication skills are frequently seen to be key success in one's occupation (Ferrer, Green and Riddell 2006; Goldmann, Sweetman, Warman 2011). Therefore, we compare the relationship between having neither English nor French as a mother tongue and working in one's trained field in Table 2.4. Overall, the foreign-born have higher proportions of those who speak a foreign language as a mother tongue than do the Canadian born, but the gaps between those practicing and not practicing in their field is modest by comparison. Interestingly, the CBFT are less likely to have English/French as a mother tongue than the CBCT. Also, the difference in the probability of having a foreign mother tongue between those practicing and not practicing is quite different for the FBCT and FBFT. For the FBCT, having a mother tongue other than English or French is not associated with a lower probability of practicing across these occupations. In contrast, the FBFT who are not practicing have a similar or higher probability of having a foreign mother tongue, although again there is substantial heterogeneity across occupations. Overall, it's not obvious from this simple tabulation that mother tongue plays a strong and consistent role in predicting the probability of working in one's field of study within these four groups. Perhaps mother tongue is too poor a predictor of language ability at the time of licensure.

Table 2.5 explores the highly aggregated industry groupings for three of the four populations of interest (the CBFT is too small to permit this tabulation), and also, for comparison, displays similar statistics for the Canadian population. A notable observation is that, of those who are not working in their highest trained health fields, between 27 percent and 29 percent have not been employed for at least five years, which is far above similar numbers for the Canadian population. However, it's notable that there is effectively no difference between the CBCT and the two foreign-born groups, which is quite unexpected. Of course, as seen in table

2.3, the probability of not working in the trained field is much higher for the FBFT. Interestingly, of those who are employed, the distribution across industries is quite different than that of the Canadian population. Between 32.5 percent and 40 percent of these work in the same broad industry of their training – healthcare, social services, and education services – compared to between 15 percent and 26 percent in that industry across the national population. This implies that their industry-specific human capital is finding some use.

Table 2.4: Percent trained persons, speaking a foreign language as a mother tongue and licensed health occupations

	Practicing in fields				Non practicing in fields			
	Canadian-born		Foreign-born		Canadian-born		Foreign-born	
Professions	Cdn/US-td	Foreign-td	Cdn/US-td	Foreign-td	Cdn/US-td	Foreign-td	Cdn/US-td	Foreign-td
Dentist	9.8	--	73.1	84.0	11.9	--	65.4	91.1
Medical Laboratory Technologist	5.1	0.0	65.7	85.6	5.5	--	62.7	86.3
Medical Radiation Technologist	4.2	--	68.8	63.1	4.4	0.0	55.8	79.5
Pharmacist	8.8	--	80.2	89.1	12.1	--	79.3	87.8
Physician	7.0	20.7	57.9	64.0	7.4	29.8	67.6	91.9
Physiotherapist	5.8	14.3	48.9	61.2	3.3	--	53.7	84.7
Psychologist	3.6	0.0	39.9	72.2	5.2	5.9	40.0	80.0
Registered Nurse	4.0	8.1	50.8	76.1	4.1	12.4	48.9	78.4
Canadian health workforce	5.2	10.7	55.9	80.4	5.2	10.7	55.9	80.4
Canadian non-health workforce	6.1	11.8	60.7	83.1	6.1	11.8	60.7	83.1
Canadian population workforce	6.0	11.7	60.2	82.9	6.0	11.7	60.2	82.9

Source: Authors' calculations based on 2006 Canadian Census Master File

Table 2.5: Major industries of non practicing individuals across location of highest study

	Have credentials in the eight health professions			Canadian population		
	Cdn-born	Foreign-born		Cdn-born	Foreign-born	
Major Industries	Cdn/US-td	Cdn/US-td	Foreign-td	Cdn/US-td	Cdn/US-td	Foreign-td
No work since 2000	29.1	26.8	27.2	9.3	10.3	15.7
Agriculture, forestry, fishery	1.5	0.7	0.8	1.5	0.5	0.8
Mining, oil, gas, utilities, construction & manufacturing	3.7	3.9	8.4	12.6	12.0	16.9
Wholesale, retail trade, transport, warehousing	7.2	7.8	11.5	11.8	13.1	16.6
Info, culture, finance, real estate, scientific service, waste mgt	9.8	11.5	11.1	21.9	27.3	23.2
Healthcare & social assistance, educational service	39.4	40.6	32.5	26.8	23.1	15.0
Arts, entertainment, recreation, accommodation & food service	2.3	2.6	3.6	4.0	4.2	5.8
Public administration & other serv.	6.9	6.1	5.0	12.0	9.5	6.0
N	166,950	27,575	52,180	5,967,590	1,104,405	1,050,680

Notes: Canadian-born and foreign-born represents the percent of all non-immigrants and immigrants with trained health credentials but not employed in their trained occupations. Some are in the labour force across different industries and others are out of the labour force.

Source: Authors' calculations based on 2006 Canadian Census Master File

In Table 2.6 we examine the distribution of labour market outcomes, focusing on annual earnings, weeks worked and weekly hours of work among those working in their trained occupations with non-zero earnings and positive weeks worked in 2005. We exclude those with zero earnings because the majority of those who self-report zero earnings are either out of the labour force or unemployed, some work and have operating expenses in excess of their gross receipts. However, we see that the percentage of those who had zero earnings is the lowest among the CBCT than any other group.

A general pattern is difficult to discern although the FBFT usually have lower earnings than the other three. But even here there is an exception since FBFT nurses earn more than both Canadian trained groups. In terms of hours the CBCT tend to work the same or less than the lowest of the other three on the regulated health professions, although this is not true for the Canadian workforce as a whole. In terms of weeks the CBCT seem to work almost the same number of weeks as the FBCT and the FBFT. Generally those working in their trained health fields work longer weeks than the general Canadian population.

Interestingly, if we combine the data in table 2.6 with that in table 2.2 we observe a positive correlation (with p-value) between the percentage foreign-born in an occupation and that occupation's average earnings as seen in Figure 2.1. The correlation coefficients between the percentage of foreign-born and average earnings of the CBCT, the CBFT, the FBCT and the FBFT are 0.919 (p=0.0005), 0.740 (p=0.0699), [34] 0.869 (p=0.003) and 0.879 (p=0.002), respectively. There are higher proportions of immigrants relative to the national average in health professions that require the highest education and are high-paying; especially physicians, dentists, and pharmacists. The source of this correlation is not clear. It might be partly

[34] This is imprecisely estimated for the CBFT subgroup which has a smaller sample size than the other correlations.

attributable to immigration policy favouring highly educated immigrants, but it might also be attributed to government education policy. Moreover, for young immigrants this positive relationship may imply the success of the educational system they have been exposed to in Canada. Also there is no obvious discrimination preventing immigrants from entering the most prestigious (highest paying) regulated health occupations relative to those that pay less. Similar graphs are presented in Figures 2.2 and 2.3 that show more insights about the correlations.

In Figure 2.2, the correlation coefficients between the percentage of foreign-trained in an occupation and that occupation's average earnings for the CBCT, the CBFT, the FBCT and the FBFT are 0.583 (p=0.117), 0.077 (p=0.882), 0.605 (p=0.100) and 0.701 (p=0.043), respectively. While not as large of correlations as the previous table, with the exception of CBFT these correlations are statistically significant or marginally significant, with marginal statistical significance at conventional levels still being an important indicator given the small sample of data points. On the upward direction, one plausible explanation is that it may be worth the effort for foreign-trained health professionals to get into the high paying fields (perhaps the economic rents are attractive). In any event, there is no evidence of any unusual discrimination against foreign-trained persons in the high paying occupations.

Similar to the positive correlations shown in Figure 2.1, in Figure 2.3 the correlations between the percent of those with credentials who are employed in their trained fields/occupations and that occupation's 2005 average earnings for the CBCT, the CBFT, the FBCT and the FBFT are 0.583 (p=0.116), 0.350 (p=0.483), 0.563 (p=0.134) and 0.580 (p=0.119), respectively. Except for that on CBFT, these correlations are marginally above traditional threshold, but statistically significant. This speaks to the fact that working in one's trained occupation is associated with higher earnings than not working in the trained occupation,

particularly for the CBCT, the FBCT and the FBFT (having almost the same magnitudes of "r"). There is a positive relationship between outcomes and working in the area for which respondents report having a credential. Figure 2.3 also suggests that there is no evidence of any unusual discrimination against the foreign-trained persons in the high paying fields.

Figure 2.1: Correlation between percent foreign-born and 2005 average earnings

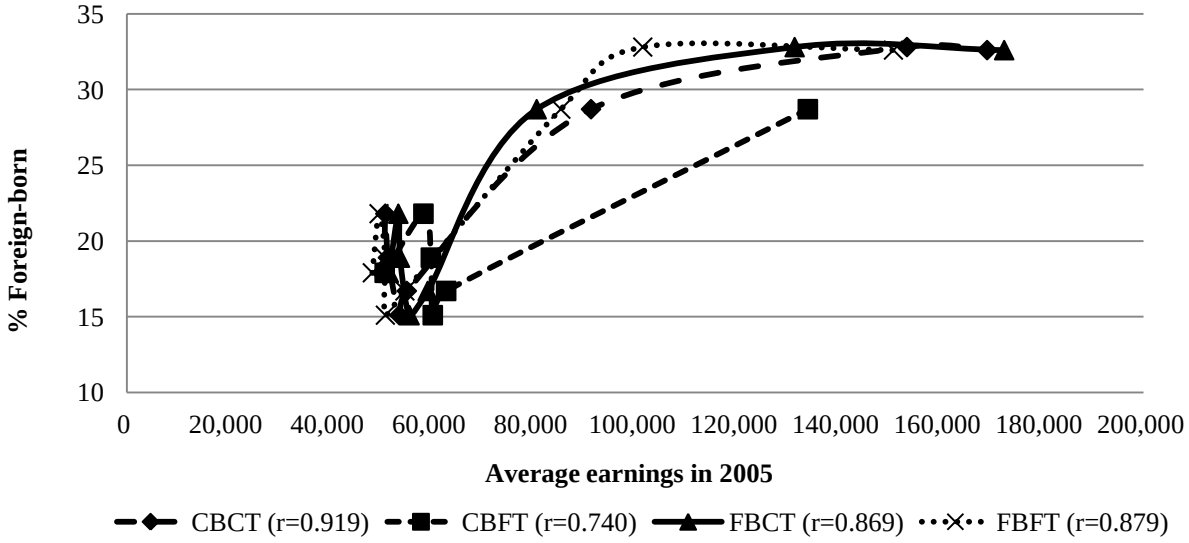


Figure 2.2: Correlation between percent foreign-trained and 2005 average earnings

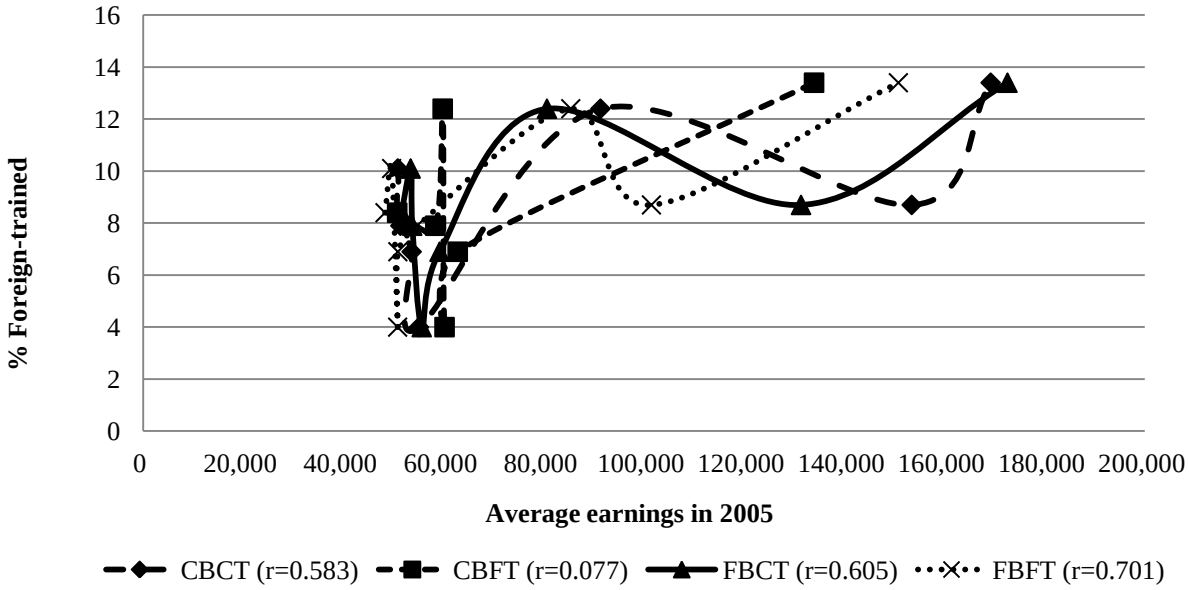
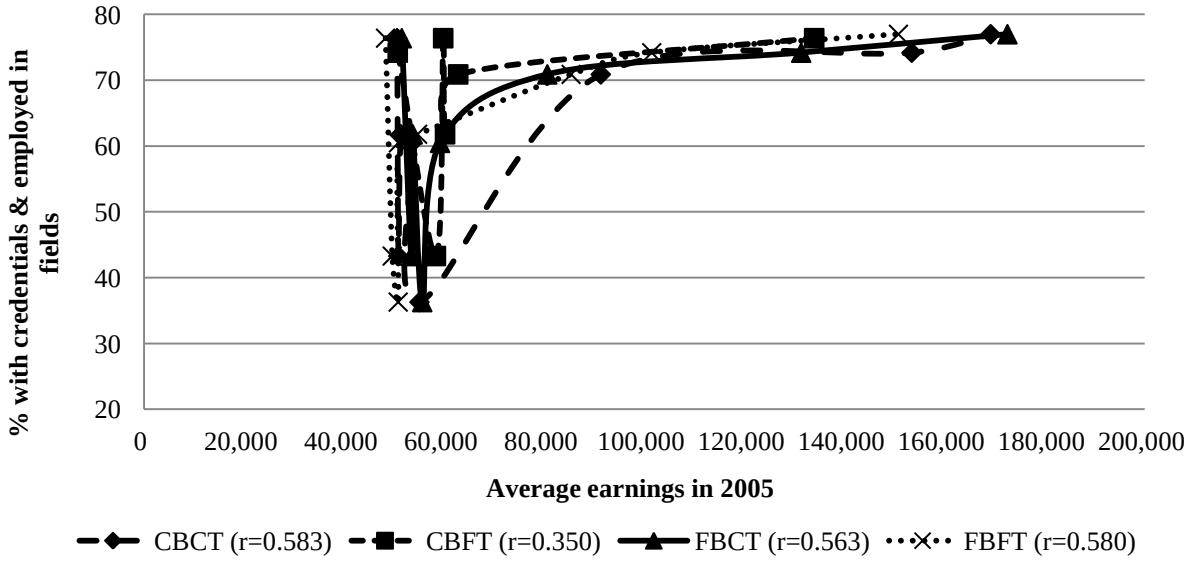


Figure 2.3: Correlation between percent of those with credentials who are employed in fields and 2005 average earnings



Complementing the previous one, Table 2.7 shows earnings, weeks and hours worked of those who self-report having health credentials, but are not working in their trained field, again restricting to only those who had non-zero earnings and positive weeks worked in 2005. Conversely, we see overall that, the percentage of those who had zero earnings (likely to be unemployed or out of the labour force) is slightly higher in some occupations among foreign-born than the Canadian-born ones.

By comparing the earnings of those licensed to practice (in Table 2.6) with those here, it is obvious that the former have substantially higher annual earnings, and work longer weeks in 2005 and work more hours in the census reference week. Of course, entry effects or lost work experience during the immigration transition process of those taking up permanent residence (e.g. attending language or bridging programs) in the host country affect the initial earnings potential of immigrants and/or foreign-trained persons. Tables 2.6 and 2.7 are simple averages

and do not take into account the well-known "entry" and "economic integration" effects experienced by new immigrants as discussed in the Canadian context by, for example, Picot and Sweetman (2012). On average, on arrival immigrants have markedly lower earnings than comparable Canadian born workers but over time their rate of earnings growth exceeds that of the Canadian born and the size of the gap is reduced.

Using a similar approach to the previous tables, but suppressing the CBFT group since the sample sizes are too small, Tables 2.8 and 2.9 document the relationship between potential Canadian work experience and annual earnings. Here too we restrict the sample to only those who had non-zero earnings and positive weeks worked in 2005. Of course, in a single cross-section of data such as that available for this study it is not possible to estimate entry and integration effects on earnings independently of arrival cohort specific effects. So what is observed in these two tables (i.e. Tables 2.8 and 2.9) reflects a combination of these factors. Moreover, in some cases cohort effects clearly play an important role if for no other reason than government policy changes. For example, for international medical graduates not only has entry to practice access shifted as a function of perceived physician shortages and surpluses, but so has access to specialty as opposed to family practice positions. Clearly, the earnings of various entry cohorts likely fluctuate as a function of these factors and as a result some of the observed trends with potential Canadian work experience are not as smooth as might be expected.

Table 2.6: Average earnings, weeks and hours across location of highest education among selected health professionals working in trained occupations

	Canadian-born								Foreign-born							
	Canada/US-trained				Foreign-trained				Canada/US-trained				Foreign-trained			
	$	Hrs	Wks	% with $0	$	Hrs	Wks	% with $0	$	Hrs	Wks	% with $0	$	Hrs	Wks	% with $0
Dentist	153,475	36.6	46.6	4.3	--	--	--	--	131,380	38.9	47.1	4.5	101,500	38.3	46.0	2.5
Medical Laboratory Technologist	50,855	32.4	48.6	1.3	--	--	--	--	53,420	34.0	47.6	2.3	49,625	33.0	46.6	1.9
Medical Radiation Technologist	53,615	32.0	47.7	1.4	62,820	35.2	51.5	--	59,190	37.2	48.7	3.6	50,865	33.1	45.8	4.8
Pharmacist	91,325	34.5	48.5	1.3	59,820	27.5	49.0	--	80,635	36.8	48.2	2.3	85,390	38.7	47.7	3.1
Physician	169,245	48.7	47.5	1.6	133,975	51.3	46.5	6.5	172,600	50.0	47.8	3.1	150,815	49.1	47.2	6.6
Physiotherapist	50,610	31.9	47.0	3.0	50,735	37.2	46.6	--	51,550	34.0	47.5	6.4	48,300	31.6	44.6	5.3
Psychologist	55,090	33.2	46.9	3.2	60,195	32.8	48.2	17.5	55,635	34.9	47.1	4.1	50,825	28.9	46.7	6.3
Registered Nurse	51,370	31.1	47.1	1.7	58,360	33.4	46.8	3.7	53,735	33.5	46.4	2.8	54,715	33.3	45.2	3.7
Health workforce	53,640	32.9	46.7	2.7	60,400	36.0	45.9	6.2	61,420	35.6	46.2	4.1	52,895	34.9	45.0	5.1
Non-health workforce	54,180	36.1	46.5	11.9	66,025	37.3	45.3	14.3	53,180	36.1	46.1	14.1	40,085	35.6	44.8	19.6
Total workforce	54,110	35.7	46.6	10.8	65,535	37.1	45.4	13.7	54,175	36.1	46.1	13.0	41,285	35.6	44.8	18.4

Notes: -- denotes suppressed data due to small cell count. The health professionals here are restricted to only those with non-zero earnings and positive weeks of work in 2005. Average earnings are those of 2005 earnings and hrs represent hours worked in census reference week preceding May 16, 2006. Weeks worked in 2005 refer "to the number of weeks in 2005 during which persons worked for pay or in self-employment at all jobs held, even if only for a few hours. It includes weeks of paid vacation, weeks on sick leave with pay, and all weeks in which training was paid for by the employer"(Statistic Canada, 2006) The columns of % with zero earnings show those who reported zero earnings in 2005. Health workforce, Non-health workforce and Total workforce all include only those with non-zero earnings and positive weeks of work in 2005.

Source: Authors' calculations based on 2006 Canadian Census Master File

Table 2.7: Average earnings, weeks and hours worked by individuals not working in their trained health fields

	Canadian-born								Foreign-born							
	Canada/US-trained				Foreign-trained				Canada/US-trained				Foreign-trained			
				% with				% with				% with				% with
	$	Hrs	Wks	$0	$	Hrs	Wks	$0	$	Hrs	Wks	$0	$	Hrs	Wks	$0
Dentist	117,965	31.9	42.6	33.9	--	--	--	--	82,155	34.4	44.8	34.8	29,270	28.8	38.6	27.2
Medical Laboratory Technologist	40,425	31.2	46.9	20.7	--	--	--	--	37,415	32.6	45.2	21.4	34,915	34.0	45.8	19.5
Medical Radiation Technologist	47,425	31.0	46.8	26.7	--	--	--	--	63,155	29.9	44.1	24.0	31,625	32.5	44.8	16.6
Pharmacist	78,525	34.4	46.1	16.2	54,775	35.9	42.0	--	84,115	37.2	46.5	21.0	36,305	32.6	43.4	24.8
Physician	113,915	39.2	46.0	25.6	79,470	32.1	37.7	40.4	113,350	43.1	47.1	32.1	39,070	31.3	42.2	31.6
Physiotherapist	49,435	29.6	44.7	18.8	36,460	29.3	39.8	--	53,865	32.3	45.0	26.3	28,585	31.5	42.9	18.7
Psychologist	57,875	34.1	46.2	11.9	56,390	35.9	45.1	19.0	60,955	34.3	45.2	17.7	42,185	34.2	43.5	17.9
Registered Nurse	43,355	30.4	45.6	30.5	50,410	32.1	46.9	13.2	40,455	31.5	45.3	28.9	29,175	31.1	43.9	29.1
Health workforce	53,640	32.9	46.7	2.7	60,400	36.0	45.9	6.2	61,420	35.6	46.2	4.1	52,895	34.9	45.0	5.1
Non-health workforce	54,180	36.1	46.5	11.9	66,025	37.3	45.3	14.3	53,180	36.1	46.1	14.1	40,085	35.6	44.8	19.6
Total workforce	54,110	35.7	46.6	10.8	65,535	37.1	45.4	13.7	54,175	36.1	46.1	13.0	41,285	35.6	44.8	18.4

Notes: -- denotes suppressed data due to small cell count. Those trained in the eight health occupations here are restricted to only those with non-zero earnings and positive weeks of work in 2005. Average earnings are those of 2005 earnings and hrs represent hours worked in census reference week preceding May 16, 2006. Weeks worked in 2005 refer "to the number of weeks in 2005 during which persons worked for pay or in self-employment at all jobs held, even if only for a few hours. It includes weeks of paid vacation, weeks on sick leave with pay, and all weeks in which training was paid for by the employer" (Statistic Canada, 2006). The columns of % with zero earnings show those who reported zero earnings in 2005. Health workforce, Non-health workforce and Total workforce all include only those with non-zero earnings and positive weeks of work in 2005.

Source: Authors' calculations based on 2006 Canadian Census Master File.

Across all the occupations in Table 2.8, it is clear that physicians work the most hours 48-51 hours per week and they have the highest earnings. In looking at the long run outcomes (in the case of those with 20+ years) across occupations in Table 2.8, overall, FBCT and CBCT have quite close earnings except for dentists and pharmacists. The exception for dentists may partly be due to the fact that dentists are free to charge patients their own fees, unlike physicians who are paid according to scheduled fees negotiated between each provincial government and the respective medical association in that province. For pharmacists, the higher earnings of experienced/older FBFT pharmacists in excess of CBCT ones may be related to many foreign-trained pharmacists investing in their own pharmacies rather than becoming employees during the 1980s and 1990s. Successful owners can, of course, earn more than staff pharmacists, but these earnings reflect the returns on both human and financial capital. [35] The exception to the older FBFT pharmacists described here can be seen as an example of cohort effects as previously discussed. Further data analysis revealed that foreign-trained pharmacists are more likely to be self-employed or business owners than Canadian/US-trained pharmacists. They are more likely to be older, work full-time and more hours, and have a higher proportion of males than Canadian/US-trained pharmacists. Also across all health professions, those trained in Canada or the US had earnings in excess of the foreign-born foreign-trained persons (except for pharmacists) without controlling for demographic factors and cohort effects.

As we observed in Table 2.8, we find similar observations in Table 2.9, but a notable observation is that across potential Canadian work experience those not practicing in their fields work fewer hours and earn less than those working as licensed health professionals in Table 2.8. We observe an increase in earnings as a function of increased Canadian work experience for only

[35] We thank Jim Bowen (Programs for Assessment of Technology in Health, PATH - Hamilton) and Dr. Zubin Austin (Univ. of Toronto) for this insight.

those with credentials in dentistry, pharmacy, medicine and psychology. These are the high-paying fields if those with credentials are able to get licensed. The earnings as a function of Canadian work experience show mix results for those with credentials in medical laboratory technology, medical radiation technology, physiotherapy and nursing. Looking at the short-run (<10years) outcomes across location of training, FBCT and CBCT had earnings in excess of FBFT persons across all occupations. A similar finding is observed for long-run (20+years) outcomes (except for medical laboratory technologists).

Overall, it is clear that higher average earnings and more Canadian practical experience are associated with working in one's trained occupation than not working in one's trained health occupation. Those not working in their trained field could "cautiously" be classified as underutilized health human resource since some of them may very well be pursing alternative careers other than their trained fields. For example, a trained dentist/physician might be teaching in a post-secondary school (university) as opposed to practicing dentistry or medicine. There might also be issues of downward mobility where a foreign-trained physician may be working as a physician assistant or as a nurse. However, there are some plausible reasons related to access to entry of field including some foreign credentials being unequal to the Canadian standards and the cost of recertification serving as disincentives to retraining.

Table 2.8: 2005 average earnings ($), hours and years of potential Canadian work experience among those practicing in their health fields

	Potential Canadian work experience					
	<10 years		11-19 years		20+ years	
	$	Hrs	$	Hrs	$	Hrs
Dentist						
CBCT	103,595	35.9	162,365	38.5	173,050	36.0
FBCT	99,145	37.0	138,270	41.0	163,145	39.3
FBFT	74,900	36.9	112,110	41.0	115,990	34.6
Medical Laboratory Technologist						
CBCT	38,730	32.5	50,335	32.3	53,520	32.5
FBCT	41,120	33.3	53,045	37.8	57,600	32.7
FBFT	43,450	33.7	53,800	33.3	55,895	31.5
Medical Radiation Technologist						
CBCT	44,545	31.9	56,155	31.3	55,555	32.4
FBCT	56,755	40.2	58,475	36.8	61,500	35.5
FBFT	42,210	33.8	64,930	35.9	58,535	28.4
Pharmacist						
CBCT	69,450	34.1	90,685	34.3	104,890	34.9
FBCT	71,265	35.3	81,205	37.2	87,725	37.7
FBFT	68,160	37.2	77,775	40.0	145,140	39.8
Physician						
CBCT	110,935	50.4	191,645	48.0	193,945	48.0
FBCT	118,955	50.8	187,985	50.5	198,760	49.2
FBFT	111,805	47.9	165,245	50.6	175,740	49.3
Physiotherapist						
CBCT	44,535	32.4	49,860	31.4	57,325	31.9
FBCT	48,380	37.0	51,475	33.7	54,075	32.1
FBFT	40,930	34.3	53,865	31.7	53,820	26.9
Psychologist						
CBCT	44,855	31.2	61,535	34.7	57,275	33.6
FBCT	45,935	32.8	54,275	37.1	59,640	34.6
FBFT	42,825	29.0	66,275	30.1	43,455	26.1
Registered Nurse						
CBCT	42,875	30.9	48,545	30.8	54,210	31.2
FBCT	45,840	33.6	53,695	33.9	56,830	33.1
FBFT	47,510	33.5	58,325	35.3	60,075	31.8

Notes: -- denotes suppressed data due to small cell count. Labour force activity data (average earnings and hours worked) for the week preceding Census Day, May 16, 2006, also known as 'census reference week'. Canadian-born Canadian/US trained (CBCT); Foreign-born Canadian/US trained (FBCT); Foreign-born foreign-trained (FBFT). The health professionals here are restricted to only those with non-zero earnings and positive weeks of work in 2005.

Table 2.9: 2005 average earnings ($), hours and years of potential Canadian work experience among those not practicing in their health fields

	Potential Canadian work experience					
	<10 years		11-19 years		20+ years	
	$	hrs	$	hrs	$	hrs
Dentist						
CBCT	57,365	29.2	216,905	29.8	119,415	35.6
FBCT	52,610	29.3	79,975	42.3	114,005	34.6
FBFT	24,090	27.3	41,145	29.8	43,890	37.9
Medical Laboratory Technologist						
CBCT	33,440	31.3	40,055	32.5	41,320	30.9
FBCT	25,350	32.9	37,890	33.5	42,305	31.8
FBFT	31,495	34.2	34,620	34.8	41,365	32.8
Medical Radiation Technologist						
CBCT	46,175	28.8	50,470	35.6	46,875	30.3
FBCT	58,935	20.9	87,700	34.2	53,690	31.0
FBFT	26,230	31.6	35,595	35.1	39,730	31.6
Pharmacist						
CBCT	49,895	31.3	84,975	37.1	92,665	34.9
FBCT	45,005	34.7	75,570	38.6	136,675	38.6
FBFT	29,600	31.0	52,115	37.4	55,045	34.3
Physician						
CBCT	52,355	32.4	150,170	40.1	136,385	42.8
FBCT	51,305	38.5	146,355	50.1	152,285	43.3
FBFT	31,110	29.2	50,085	35.7	68,080	35.7
Physiotherapist						
CBCT	31,455	20.0	54,940	34.1	54,460	31.6
FBCT	47,685	30.6	51,760	36.8	59,580	30.7
FBFT	21,220	30.2	42,945	35.6	50,295	33.1
Psychologist						
CBCT	37,475	29.1	57,840	36.0	66,675	35.5
FBCT	41,355	29.5	56,225	36.7	72,340	35.7
FBFT	33,385	31.9	49,780	39.6	57,480	32.8
Registered Nurse						
CBCT	31,200	27.2	43,840	32.1	44,485	30.4
FBCT	26,235	27.5	43,000	32.8	43,875	32.1
FBFT	22,900	29.9	30,025	33.0	36,155	30.5

Notes: -- denotes suppressed data due to small cell count. Labour force activity data (average earnings and hours worked) for the week preceding Census Day, May 16, 2006, also known as 'census reference week'. Canadian-born Canadian/US trained (CBCT); Foreign-born Canadian/US trained (FBCT); Foreign-born Foreign-trained (FBFT). Those trained in the eight health occupations here are restricted to only those with non-zero earnings and positive weeks of work in 2005.

Source: Authors' calculations based on 2006 Canadian Census Master File

2.3.2 Results of Multivariate Analyses [36]

Multivariate analysis is employed to look at two related but distinct questions. First, what is the likelihood of an individual working in his/her trained field as a function of place of birth and training conditional on relevant characteristics observed in the census? It may well be that access to the trained occupation is the fundamental hurdle faced by immigrant and/or internationally trained health professionals. Second, we look at how earnings vary as a function of place of birth and education among those who successfully find employment in their trained occupation. This is akin to the well-known two-part model commonly employed in health economics.[37]

The likelihood of working in regulated health occupations

Table 2.10 shows the logistic regressions for estimates (odds ratios) of the likelihood of working in one's trained health occupation restricted to only those in the labour force (both employed and unemployed). Overall, after controlling for human capital and socio-demographic factors, FBFT health professionals are less likely to work in regulated health professions than their CBCT counterparts. Also see the short form regressions for all the occupations in Tables 2.A25-2.A32.

A white/non-visible minority FBFT person with dentistry credentials in the labour force is estimated to be 0.162 times as likely to work as a dentist or 0.246 times as likely to work as a physician as the white/non-visible minority CBCT person controlling for demographic and human capital factors. A visible minority FBFT person with dentistry credentials in the labour

[36] The descriptive statistics of the variables used in the regressions are presented in Table 2.A13 in the Appendix.

[37] The well-known two-part model employed in health economics reflects a two-stage decision making or allocation process. The first stage is a binary (or more rarely a multiple discrete) choice model that is estimated for the probability of participation/treatment. Then the second stage is restricted to the subset of the population that participates and models the determinants of the extent or level of a second outcome variable conditional on participation. For example, in this context we model first the likelihood of working in one's trained field, and then earnings conditional on working (and not working) in that field. In other contexts a first decision might be made regarding whether or not to visit a doctor's office, then conditional on the first visit, how many subsequent visits follow might be modelled in a second step using a count data model controlling for the same or different explanatory variables. Note that this is not the same as, for example, Heckman's model of sample selection where the second stage is adjusted using output from the first in order to estimate an average treatment effect for the population. No such causal or population average claims can be made in the context of a two-part model.

force is estimated to be [(0.446*0.955)=] 0.443 times as likely to work as a dentist or [(0.381*1.632)=] 0.621 times as likely to work as a physician as the visible minority CBCT person accounting for demographic and human capital factors.[38] These two regulated health professions (dentistry and medicine), which are also the highest-paying occupations, seem to be the ones that are extremely hard (or perhaps require more effort than the other occupations) for FBFT individuals to gain entry to become licensed health practitioners. The results show that white/non-visible minority FBFT professionals have higher odds/likelihood of working as a licensed registered nurse (OR=0.542; p=0.001) or a physiotherapist (OR=0.503, p=0.001) relative to the remaining health professions controlling for demographic and human capital factors.[39]

In comparing across the regulated health professions, generally, the visible minority foreign-trained persons, within this sample, particularly those trained in medicine, dentistry, medical laboratory technology and physiotherapy are less likely to work in their trained health occupation than the visible minority CBCT ones. Clearly, this is in line with the broader literature on the foreign credential recognition difficulties experienced by foreign-trained health professionals, particularly in a regulated health profession (Bourgeault 2007; Girard and Smith 2013). This pattern is not observed with the non-visible minority/white FBCT group with the exception of those holding credentials in pharmacy and psychology. Out of eight occupations,

[38] An example of the interpretation using dentist is as follows: The odds ratio for FBFT with dental credentials in the labour force is 0.162, which means the odds of working as a dentist is 0.162 times higher for a FBFT person. But there is an interaction effect between the FBFT and visible minority, so this effect of working as a dentist refers to the white/non-visible minority FBFT persons. The effect of working as a dentist for the visible minority FBFT is 0.443 times what it would be if not working as a dentists compared to the visible minority CBCT ones. In other words, white/non-visible minority FBFT individuals are less likely to work as dentists compared to the white/non-visible minority CBCT ones. The interpretation is similar for the FBCT but the odds ratios are not statistically significantly different than one. The visible minority FBFT odds ratio of 0.446 is also interpreted as the difference between visible minority FBFT persons and visible minority CBCT persons (and the CBFT visible minority since the two groups are merged).

[39] We conduct an F-test to test whether or not the collective contribution or main effect of the visible minority variable and its interactions is significant. For dentists [chi2 (3) = 21.61; Prob > chi2 = 0.0001] and for physicians [chi2 (3) = 36.97; Prob > chi2 = 0.0000] both showing significant collective contribution or main effect.

the visible minority FBCT are only less likely to work as medical laboratory technologists [OR is 0.522*1.102= 0.575] than the visible minority CBCT professionals.[40] Obviously, domestic human capital (possessed by the FBCT) has more value than foreign human capital consistent with the general immigration literature (Baker and Benjamin 1994; Schaafsma and Sweetman 2001). The CBFT are a small subsample and, therefore, we cannot make any meaningful inferences. The Canadian-born visible minority persons are less likely to work as psychologists (OR=0.331; p=0.001).

Moreover, years of potential Canadian work experience and its square are included to separate its effects on the two groups of immigrants in the cross sectional data: those immigrating as children and those immigrating as adults. A general pattern observed across all the regulated health professions is that Canadian work experience potentially garnered by professionals who immigrated as children increases their likelihood of employment in a regulated occupation, as foreign-born individuals trained in Canada/US may have country-specific human capital skills and information in the form of language proficiency or occupational language skills, possibly acquired through further formal training programs, workplace training or working under the supervision of an experienced professional. Speaking a foreign language as a mother tongue reduces the likelihood of working in four regulated professions. Other controls include gender, degree of education, place of residence, marital status and family composition (see appendix Table 2.A10).

We ran other two regressions (see Table 2.A14 and Table 2.A15) controlling for human capital and socio-demographic factors, they are in the Thesis Chapter 2 Appendix, and the results

[40] Recall that the visible minority FBCT odds ratio of 0.979 is also interpreted as the difference between visible minority FBCT persons and visible minority CBCT persons (and CBFT since the two groups are merged). So for physicians, we see that the visible minority FBCT persons are likely to work as physicians because OR is [0.577*1.632=] 0.941 which is almost one, and greater than that of the case for MLTs which is 0.575.

look remarkably similar. We find that the negative effect of holding foreign credentials on one's likelihood to work in a regulated health profession persists when we expand the sample relative to the previous one to include only the employed individuals, regardless of whether they are employed in their health fields or not (see Table 2.A14). A similar trend is observed in Table 2.A15 when the sample is further expanded to include those employed, unemployed and those out of the labour force.

We also look at the likelihood of a trained person to enter the labour force as an extreme measure of hardship (see appendix Table 2.A16). Overall, it is clear that white/non-visible minority FBFT persons with credentials in high paying occupations such as dentistry, pharmacy, medicine and nursing are less likely to enter the labour force than the CBCT ones accounting for demographic and human capital factors, consistent which earlier observations made in Table 2.10. The results are mixed with visible minority sub population.

It appears that the visible minority FBCT persons (having OR=0.465*1.614=0.751) and the visible minority FBFT persons (having OR=0.500*1.614=0.807) with medical laboratory technology credentials are less likely to enter the labour force than the visible minority CBCT persons. An F-test (it is p-value) on the collective contribution of the effect of visible minority variable and its interactions among those with laboratory technology credentials showed a marginal significance (5.83; p=0.117). The visible minority CBCT persons with credentials in medicine, psychology and nursing are less likely to enter the labour force than the FBCT and FBFT visible minority ones controlling for demographic and human capital factors.[41] However, the visible minority FBCT persons with credentials in medicine are more likely to enter the labour force than visible minority CBCT. Also white/non-visible minority FBCT with dentistry

[41] E.g. for VM FBCT with medical credentials their OR is 1.816*0.669=1.214 which is greater than OR=0.669 for VM CBCT.

credentials are likely to enter the labour force. Another interesting observation is the fact that both the visible minority FBFT (showing OR=1.245*0.868=1.081) and the visible minority FBCT (showing OR=1.224*0.868=1.062) health professionals with nursing credentials are likely to get into the labour force (perhaps) this relates to the high population of nurses emigrating from the Philippines and other Asian countries. We conduct several F-tests on the collective contribution of visible minority for the following groups of persons with credentials in medicine (27.64; p= 0.000), nursing (6.32; p=0.097), and psychology (11.01; p=0.0116).

The joint effect of location of training and place of birth on log earnings across the regulated health professionals

We turn to Table 2.11 which presents OLS regression models of log earnings controlling for human capital factors, socio-demographic factors, and labour market activities (hours and weeks worked) in a set of multivariate analyses across the selected regulated health professions. The models explain the gap in log earnings among those who work as licensed health professionals, to test whether immigration status or location of highest training explains the observed difference in log earnings. The short form of the regressions, where we limit the number of regressors and sequentially include subsets of the regressors discussed here, can be seen in the appendix.

We observe that conditional on working, FBCT persons perform better than FBFT individuals relative to their CBCT counterparts controlling for labour market activities, demographic and human capital factors. The joint effect of being a white/non-visible minority, FBFT professional presents mixed results. On average, we find that white/non-visible minority FBFT individuals working as medical radiation technologists (MRTs) and pharmacists are associated with a [(exp(0.292)-1)*100%=] 33.9 percent and 12.7 percent increase in earnings,

respectively, relative to the white/non-visible minority CBCT group accounting for labour market activities, demographic and human capital factors. Also, each of the coefficient for MRTs and pharmacists represent the average percentage difference in the log earnings between white/non-visible minority FBFT persons and white/non-visible minority, CBCT persons, where positive coefficient means that white/non-visible minority FBFT persons have higher log earnings, on average, than the white/non-visible minority, CBCT ones. Those working as dentists and physicians, on average, are associated with 19.6 percent and 14.2 percent lower earnings, respectively, compared to the white/non-visible minority CBCT group controlling for human capital factors, socio-demographic factors, and labour market activities.

The interaction between visible minority and both FBFT persons and FBCT persons present similar trends. We find that visible minority, FBCT professionals perform better than the visible minority, FBFT professionals. In other words, location of highest training affects the earnings of regulated health professionals, not immigration status per se. The negative effect of foreign training (Li 2001) may also reflect the lost work experience or an entry effect (e.g., due to re-skilling, language training, or settlement issues) during the immigration transition process of those taking up permanent residence in the host country (consistent with Chiswick 1978; Waslander 2002), and could be a reflection of differences in education quality and compatibility with the labour market in the host nation (Li and Sweetman 2014; Friedberg 2000).

The effect of being a FBFT professional is also mixed across the regulated occupations and visible minority status.[42] Generally there is a significant main effect of visible minority status across the occupation except MLTs. Since the coefficient of the interaction term

[42] We perform an F-test on the collective contribution or main effect of visible minority status on dentists (5.06, p=0.0017), medical laboratory technologists (1.35, p=0.2567), MRTs (2.74, p=0.0422), pharmacists (3.69, p-value=0.0114), physicians (6.42, p=0.0002), physiotherapist (1.76, p=0.1533), psychologists (1.94, p=0.1211), and RNs (3.27, p=0.0201).

(VM*FBFT) is statistically significant it cannot be ignored, but rather interpreted as the difference in effect of visible minority between FBFT and CBCT (plus visible minority CBFT). The coefficient of visible minority is no longer a general (main) effect, but the effect of visible minority for the CBCT (i.e. when the condition, VM*FBFT=0). Therefore, the marginal effect for the visible minority FBFT person is estimated to be VM + (VM*FBFT). For dentists, it is (-0.251) + 0.349=0.098, for psychologists it is (-0.279) + 0.627=0.348 and for registered nurses it is (-0.027) + 0.118=0.091. Thus, on average, the visible minority, FBFT professionals are associated with [(exp(0.098)-1)*100%=] 10.29 percent, 41.62 percent and 9.5 percent higher earnings working as dentists, psychologists and registered nurses respectively, compared to visible minority CBCT professionals controlling for human capital factors, socio-demographic factors, and labour market activities.

Conversely, visible minority FBFT persons experience 14.02 percent, 20.78 percent, 17.14 percent and 21.65 percent lower earnings working as MRTs, pharmacists, physicians and physiotherapists, respectively, compared to visible minority CBCT persons. [43] FBFT visible minority persons are the most disadvantaged group of health professionals, with the exception of those working as dentists, medical laboratory technologists (MLTs), psychologists and RNs.

The results show that years of potential foreign work experience that reflects adult immigrants' foreign experience is marginally negatively correlated with earnings of health professionals (except for physicians and registered nurses, although not statistically significant for registered nurses). Also, the coefficient of years of foreign work experience can be interpreted as the average rate of growth in log earnings for a change in years of foreign work experience. For example, among dentists, the estimate of -0.023, will be interpreted either as the

[43] We estimate VM who are FBFT working as MRTs: (-0.388) + 0.237= (-0.151), thus (exp(-0.151)-1)*100%= 14.02%. We perform similar calculations for those working as pharmacists, physicians and physiotherapists, respectively.

proportionate rate of change in log earnings per unit of change in years of potential foreign work experience for dentists who immigrated as adults or 2.3 [(0.023*100)*10] percentage decrease in log earnings for 10 years increase in potential foreign work experience for dentists who immigrated as adults. The exception for the physicians and registered nurses may reflect the fact that they could have acquired country-specific skills needed to transfer their foreign human capital in the host country consistent with the general immigration literature (Ferrer, Green and Riddell, 2006; Goldmann, Sweetman and Warman, 2011). However, potential Canadian experience positively correlates with earnings across all regulated professions.

The findings illustrated in Table 2.11 also account for potential effects of language as seen in the previous literature. Poor English language skills may become a significant barrier for health workers to realize their earnings potential, because most licensed health professions demand high level of English/French literacy skills and occupational language skills. In the US context, Chiswick and Miller (2010) find that earnings increase with English language requirements of an occupation. Those with poor English language skills do relatively well when they are employed in jobs that require low English language competency, but perform poorly when employed in jobs that require high English language competency (as observed by Chiswick and Miller, 2010). In the Canadian context, Ferrer, Green and Riddell (2006) find that a lack of English/French skills or literacy deficiencies affect immigrants' earnings, more so among highly educated immigrants. However, in this context concerning licensed health professionals, although we find negative point estimates, speaking a foreign language as a mother tongue has no significant disadvantage to earnings across the regulated health occupations, except for MRTs. Probably those who acquire a license to work have the language skills to be successful.

See Table 2.A11 in the appendix for other control variables including gender, degree of education, place of residence, marital status and family composition.

In Table 2.12 we expand the sample to only those who are working (but not in their field of training) and their log earnings in order to test the effects of location of training and place of birth. A similar pattern to Table 2.11 appears, but the magnitudes of the negative signs are greater than among the licensed health practitioners: as was the case in Table 2.11, the location of highest education and foreign education explain most of the earnings gaps and not immigration status itself. Although all point estimates for being FBFT are negative, not all are significantly different than zero. We find that white/non-visible minority FBFT holding dental, medical, psychology and nursing credentials suffer significant earnings deficits. Those holding dentistry and medical credentials are disadvantaged in the labor market showing, on average, a 59.8 percent and 32.4 percent lower earnings, respectively, relative to the white/non-visible minority CBCT ones.[44] We find that visible minority FBFT with dentistry or medical laboratory technology credentials but not working as dentists or as MLTs experience 1.92 percent or 3.15 percent higher earnings, respectively than their visible minority CBCT counterparts.[45] Finally, we find more significant negative effects of being a visible minority person among licensed health professionals than among individuals employed but not in their field of training.

In sum, a comparison of the labour market outputs of those employed and not employed as licensed health professionals show a significant relationship between market outcomes and working in one's trained occupation.

[44] We use (exp (-0.912)-1)*100%=(-59.8) % for white/non-visible minority FBFT with dentistry but not working as dentists.
[45] We estimate the VM who are FBFT not working as dentists: (-0.573) + 0.592= 0.019), thus (exp (0.019)-1)*100%= 1.92%. We perform similar calculations for those not working as MLTs.

2.4 Discussion

The evidence from the descriptive and multivariate regressions suggests that foreign-born individuals, educated outside of Canada/US, are less likely to work in regulated health occupations than Canadian-trained ones, which is consistent with the general literature. However, we do find some evidence that those not working in their trained fields are likely to be working in health related industries. Overall, the location of highest education is the main determinant of whether or not one is likely to work in a regulated health profession. The location of highest education and not immigration status per se, also explains most of the differences in earnings of those holding foreign credentials.

We find some evidence (in Table 2.1) that suggests heterogeneity in the quality of education among test takers across location of education. The fact that Canadian-trained graduates out-perform foreign-trained graduates in the licensure examinations (in terms of pass rates) suggests differences in quality of education.[46] This has a direct bearing on foreign credential recognition. These regulatory hurdles are particularly severe in dentistry and medicine (also perhaps related to the limited funding for re-training spots/residency positions). As mentioned in the occupational licensing literature, the regulations may be viewed in part as a measure to ensure the balance between public welfare and the minimum quality of medical services extended for public consumption by competent licensed practitioners (Kleiner 2013). On the one hand, it may very well be that the credentialing system has some deficiencies that include discrimination against foreign credentials (hence the institution of the Office of the Fairness Commissioner), but on the other hand, someone not working in their regulated health field may

[46] Li and Sweetman (2014) argue that the average quality of human capital as measured by test scores (or, put differently, the quantity of test score) for a given quantity of schooling (e.g., a high school degree of 12 years of education) varies across immigration source countries. They show that nominally identical human capital is not actually the same and such differences are recognized and rewarded in the labour market.

not be a failure of credential recognition, but a success of credential recognition with the credentialing system recognizing that a particular credential is ill suited to the required work.

Although the FBFT may be less likely to enter some regulated health occupations, for example, in the fields of medicine and dentistry, than others such as physiotherapy or nursing (seen in Table 2.10), we do find some evidence from the simple correlations between percentage of foreign-born and average earnings that suggests no obvious discrimination preventing immigrants from entering the most prestigious (highest paying) regulated health occupations relative to those that pay less.

The FBFT persons (who are more likely to be older than CBCT) may need to re-train to gain Canadian standards to enter a regulated health occupation; however, age affects the return on investment in obtaining re-accreditation. Immigrating at a young age affords individuals easy acculturation in the job market since they may have acquired all their education in Canada, comparable to the native-born counterparts (e.g., see Schaafsma and Sweetman, 2001). Thus, consistent with the literature, we do find that potential Canadian experience is positively associated with the likelihood of being employed as a licensed health professional in one's designated trained field.

Concerning visible minority status, even though in the literature Esses et al. (2007) report the role of prejudice against visible minorities and the ambiguity surrounding the value of foreign credentials, in this context, our results are mixed in that, some estimates of the visible minority FBFTs' odds ratios (likelihood of working in their trained occupation) are less than one and others are not statistically significant (as in Table 2.10). Concerning the log earnings, likewise, we find estimated coefficients that are either negative or positive (with some being statistically insignificant) for the visible minority FBFT persons across the health occupations (as

in Tables 2.11 and 2.12). Thus, our evidence here (somewhat) contrasts with the broad observation in Esses et al (2007). However, we note visible minority status encompasses other characteristics linked with source country, school quality, language, etc., that are challenging to disentangle in these data. Thus, future studies might be warranted in this field.

Turning to earnings conditional on working (and not working) in one's defined trained field, we find increase in earnings as a function of increased Canadian work experience for those working, or not, as licensed health professionals. We note that we do not estimate entry and integration effects on earnings independently of arrival cohort specific effects. Although in some cases (e.g., pharmacy) cohort effects clearly play an important role. Further, for the earnings differentials, we find that conditional on holding licenses to work as health professionals (i.e. with access granted), Canadian/US human capital is of greater value than foreign human capital after accounting for socio-demographic factors, labour market activities and family compositions. Potential years of foreign experience are negatively associated with earnings. The CBCT professionals earned the highest, followed by FBCT professionals and subsequently the FBFT persons. This is supported in the literature (see, for example, Baker and Benjamin 1994; Schaafsma and Sweetman 2001; Buzdugan and Halli 2009). The FBCT professionals either show no significant earnings gaps relative to CBCT professionals, or show about a range of three to eight percent earnings (surplus) differential relative to the CBCT. This might reflect the fact that these foreign-born health professionals have acquired the country-specific skills necessary to translate previously acquired human capital in the host labour market (as observed by Park 1999).

Further, Chiswick (1999) reports that migrant self-selection traits such as motivation and entrepreneurial skills may work in favour of foreign-born individuals. Thus, some foreign-born

persons with such traits might have strong incentives to further acquire the domestic human capital, which is commonly seen in all the regulated health occupations, where trained individuals must pass regulatory tests in the areas of skills, knowledge and clinical judgements to ensure the minimum quality of standards are adhered to for public safety before the issuance of occupational licenses. Also, foreign-born individuals may have migrated while young and most likely have obtained almost all of their education in Canadian/US, therefore show no significant difference in earnings relative to their native-born counterparts.

2.5 Conclusion and Policy Implications

2.5.1 Summary and Conclusion

At the onset of this investigation, we ask research questions: (1) What proportions of foreign-trained and Canadian/US-trained graduates are working as health professionals? (2) What proportions of those not employed in their trained health occupations are either foreign-trained or Canadian/US-trained persons?

In summary, from the descriptive results, we find substantial heterogeneity of foreign-born persons across the regulated health occupations. Foreign-trained immigrants and Canadian/US-trained individuals are differentially represented in the health occupations relative to the national average of 22 percent. A high proportion of immigrants working as health professionals received their highest training in Canada/US. Those trained in Canada/US earn higher than foreign-trained professionals. There is a significant stock of trained individuals (across all the eight regulated professions) not working in their trained regulated fields. High proportions of them are foreign-trained immigrants. This group potentially represents underutilized health human resources. We make two notable observations. High proportions (32-

40 percent) of those not practicing in their healthcare fields are still found utilizing their human capital in the healthcare industry in related occupations, and between 26 percent and 29 percent are out of the labour force and thereby represent a loss of human capital. Interestingly, the regulated occupations (e.g., RN) within which FBFT individuals are more likely to work revealed no significant differences in average earnings relative to the Canadian/US-trained group. The basic pattern observed concerning foreign-trained individuals after conducting descriptive cross-tabulations also persists in the multivariate regressions accounting for labour market activity levels, family compositions and socio-demographics factors.

More importantly, this study also focuses on the intersection of occupational regulation that governs access into a regulated occupation and the labour market integration (conditional on access) of foreign-trained and/or immigrant health professionals across eight regulated health occupations. Therefore, we set up the multivariate regression analysis that is analogous to the famous two-part model in health economics. We ask questions pertaining to access into working in a regulated health occupation and earnings conditional on access. Are foreign-trained persons less likely to work in their trained occupations than Canadian/US-trained ones? Are there differences in labour market outcomes of practicing foreign- and Canadian/US-trained health professionals? There are gaps in access (likelihood of working in a regulated health profession) and gaps in earnings conditional on access.

The gaps in access refer to the differential likelihood of working in a regulated health occupation among the 4 population subgroups (the CBCT, the CBFT, the FBCT and the FBFT). Moreover, there are different occupational regulations across all eight professions that determine access (entry) into the profession by different regulatory authorities. The regulatory bodies determine the licensure requirements that include assessments of language skills, occupational

knowledge and skills, contextual judgment and ethics. The odds ratio estimates (showing the likelihood of entry) for FBFT persons are lower among the high paying professions that also require higher education such as medicine, dentistry and pharmacy relative to the remaining professions. Even as an extreme measure of just entering the labour force, we still find the same pattern that those with credentials in the high paying occupations have lower odds ratio estimates compared to those with credentials in the remaining health occupations to gain access into the labour force.

Further, the gaps in earnings conditional on access refer to the earnings differentials again among the CBCT, the CBFT, the FBCT and the FBFT across the regulated occupations. We find mixed results. We find estimated coefficients that are either negative or positive (with some being statistically insignificant) for the visible minority FBFT persons across the health occupations. Also the FBFT have poorer outcomes in half of the professions among those not working in their field. Moreover, while overall FBFT health professionals are less likely to work in a regulated health occupation, we observe that, where the earnings gaps are positive or insignificant, foreign-trained professionals are more likely to be employed suggesting that common factors are driving the employment and earnings processes (e.g., registered nurses are unionized regardless of where one received his/her training). Simple correlations we perform suggest that there is no evidence of any unusual discrimination against the foreign-trained persons in the high paying fields, which is contrary to the observation by Esses et al. (2007). Additionally, in some occupations (Den, Psy & RN) visible minority FBFT professionals perform better in earnings than visible minority CBCT ones.

Overall, from the multivariate analyses, the evidence suggests that the location of foreign credentials hinders the economic integration of foreign-trained persons. We find that

immigration status does not exclusively affect an individual's likelihood of working in his/her field of health training; rather his/her location of highest education is the primary factor affecting their field of employment. Foreign-trained professionals, particularly visible minorities, experience earnings deficits in half of the occupations (MRT, Pharm, Physio & MD) relative to CBCT professionals. Taken together, these findings have policy implications worthy of highlighting.

2.5.2 Policy Implications

Occupational regulation should reflect an optimal balance between the benefits derived from protecting the public by ensuring occupational competence and the consequences of establishing limited access that allows occupational "insiders" to extract rents (monopoly profits) from the same public. However, there is an increasing perception that the cost of credential recognition and occupational entry following migration are excessive for regulated professions, and that this is particularly pronounced for the labour market integration of new immigrants and/or foreign-trained health professionals.

Many credential holders seek to work in a regulated occupation. Some of these individuals undoubtedly experience discrimination and problems with recognition for credentials that meet the minimum threshold (used to determine eligibility to write the competency exam, which in turn tests the person's skills, knowledge, and clinical judgement), whereas others with credentials have skills below the minimum threshold and the credentialing system is working appropriately to keep them from practicing (i.e., the "protecting the public" side of occupational regulation). However, in our data it is not possible to sort out the degree to which each of those two is happening. Our analysis answers a fairly narrow set of questions (pertaining to the proportions of credential holders working and not working in trained fields, the likelihood of the

credential holders working in their trained fields (i.e. access), and the examination of any gaps in earnings conditional on access) that are part of the larger discussion on foreign credentials. Therefore, parts of the policy discussions in this section go beyond (although with some references) the analysis in this chapter and we make note of that in the following.

Considering foreign and domestic human capital as close substitutes might be misleading due to the wide differences in quality and the relevance of education received (for the Canadian context) in foreign educational institutions (Friedberg 2000). It is for this reason conducting certification tests is necessary such as those reported in Table 2.1.

From the evidence presented in this chapter, therefore, two streams of policy implications emerge relating to first, access and second, earnings conditional on access. The policy implications for gaps in access are different than that of gaps in earnings. The first pertains to the likelihood of working (entry) in a trained, regulated health occupation (as presented in Table 2.10), which is in the jurisdiction of provincial/territorial regulatory bodies in Canada. The second stream deals with settlement and integration of immigrants who are licensed to work as health professionals and those who are trained, but not working in their fields occupation (as shown in Tables 2.11 & 2.12).

Under the first stream (access) policies directed towards, for example, the cost of re-training, lack of information to navigate through the healthcare system and to understand the licensure processes, (occupational) language training programs and bridging programs (in cases of skill deficiencies) that enable the achievement of Canadian standards may enable foreign-born and/or foreign-trained individuals to utilize their human capital (as discussed by Bourgeault 2007). Obviously, it is important that pre-arrival information in the intended field of practice is made available to foreign-trained health professionals (FTHPs) before immigrating to Canada (as

discussed by Albaugh and Seidle (2013) more broadly i.e. not specific to health occupations). Although, some these policies go beyond the evidence presented, they are partly related to the likelihood of being employed as a licensed health professional in one's trained field.

The second stream of policies might enhance the settlement of recent health professionals into Canada to advance their integration in the labour force, focusing on provincial settlement and integration agencies, and in collaboration with federal Citizenship and Immigration Canada. The widest earnings disparity is between individuals who are trained, but are not working in their trained fields and those who are successfully working in their trained fields.

Moreover, earnings disparities controlling for labour market activities, demographic and human capital factors could be related to different work-related policies, such as lack of unionization (see Hart 2002; Card, Lemieux and Riddell 2003 for more discussions) in certain health professions, except for registered nurses where there is no significant difference across the CBCT, the CBFT, the FBCT and the FBFT persons partly due to their unionized environment. Some may also argue against unionization, in that, unions are monopolists that serve to keep "outsiders" out. Consequently, while they may (or may not) help the FTHPs/immigrants who gain access, they may also prevent others from entering the profession.

Physicians (most notably self-employed, private providers) bill according to a fee schedule negotiated and agreed upon by the professional medical associations (which act somewhat like unions) and provincial governments since there is a government ban on price competition for Medicare-covered healthcare services. However, other health professionals, such as dentists and psychologists are free to set their own prices or fees. Pharmacists, physiotherapists, medical radiation technologist and medical laboratory technologists who are

mostly salaried workers (with some being self-employed) belong to professional associations, but are not unionized.

Alongside the evidence presented in this chapter, we highlight some of the initiatives already implemented across some provinces, and, in some cases, in collaboration with the federal government in an effort to mitigate some of the hurdles confronting foreign-trained health professionals invested in working in their trained occupations. Federal government efforts include: Citizenship and Immigration Canada's Foreign Credential Referral Office, Employment and Social Development Canada's Foreign Credential Recognition Program, and Health Canada's Internationally Educated Health Professionals Initiative. On the provincial governments' side, Offices of the Fairness Commissioner have been established in Ontario, Nova Scotia, Quebec and Manitoba, with legislative backing to review and investigate institutional procedures and barriers in the form of unfair practices towards foreign-trained persons. Collaborative work between provincial and federal governments has led to the creation of the Provincial Nominee Program, where provinces are able to recruit skilled immigrants who fit their local needs and who are thus better able to use their foreign training in the respective provinces (Picot and Sweetman 2012; Albaugh and Seidle 2013).

Moreover, the issue of devaluation of foreign credentials (Li 2001) is a concern because possessing foreign education is part of the criteria of the Canadian immigration "points system" policy,[47] a system that is biased towards highly educated prospective immigrants. This represents a disconnect between immigration policies (at the national level) that select for highly trained professionals who, on arrival, are confronted with limited resources (at the provincial and health regulatory body level) to enable them to practice in their trained field that originally qualified

[47] See http://www.cic.gc.ca/english/immigrate/skilled/apply-who.asp. Although, other criteria include language ability, adaptability, age and work experience. Each criterion has different points.

them to immigrate. Of course, to some extent the Provincial Nominee Program, the Canadian Experience Class (directed towards temporary foreign worker or a foreign student with skilled work experience in Canada) [48] and some recent changes to the Federal Skilled Worker Program are examples of initiatives undertaken to address some these issues.[49] Whether the onus should be placed on the governments and regulatory health authorities or the foreign-trained graduates to address this disconnect has been the subject of policy discussion in Canada. However, foreign-trained persons, particularly those in licensed occupations, should not assume that being granted a permanent residence status guarantees success in the labour market.

Finally, another key message of this research (or chapter 2) in relation to chapter 1 (on the literature on the migration of highly skilled individuals) is that an earnings gap exists between foreign-trained health professionals (FTHPs) and domestic-trained ones in general, (as seen in Tables 2.6 and 2.11) and dentists in particular, that is not a spurious effect of the composition (i.e., the fact that FTHPs are more likely to have characteristics that earn less than their domestic-trained counterparts), but seems to be linked to being a foreign trained professional in itself. Therefore, the true earnings difference that prospective FTHPs have to consider to inform their decision to emigrate is the difference between what a FTHP from the source country can earn in the host country versus what they can earn if they remained in their country of training, rather than just use the difference in average earnings between the origin and host countries as a key motivation for emigration from the source country.

[48] See http://www.cic.gc.ca/EnGLish/immigrate/cec/index.asp

[49] Some of the changes to the Federal Skilled Worker Program include the presentation of results from a language test by an agency approved by Citizenship and Immigration Canada (CIC) and results of an Educational Credential Assessment (ECA) by an agency approved by CIC to show it is equivalent to a completed Canadian secondary or post-secondary educational credential. See http://www.cic.gc.ca/english/immigrate/skilled/apply-who.asp

Table 2.10: Logistic regressions for estimated likelihood of working in one's trained health occupation for those in the labour force

Variables of interest	Dentist	MLT	MRT	Pharm	MD	Physio	Psy	RN
Canadian-born foreign-trained	**0.192+**	1.470	0.418	0.583	**0.253*** **	1.278	0.730	**0.531*** **
	(0.177)	(1.674)	(0.254)	(0.303)	(0.076)	(0.695)	(0.170)	(0.085)
Foreign-born CdnUS-trained	0.924	0.945	0.920	**0.590****	**1.390***	1.048	**0.724*** **	**1.126***
	(0.234)	(0.136)	(0.205)	(0.115)	(0.196)	(0.240)	(0.068)	(0.055)
Foreign-born foreign-trained	**0.162*** **	**0.387*** **	**0.396*** **	**0.353*** **	**0.246*** **	**0.503****	**0.364*** **	**0.542*** **
	(0.035)	(0.075)	(0.105)	(0.067)	(0.024)	(0.112)	(0.075)	(0.034)
Visible min*foreign born CdnUS-trained	0.979	**0.522***	1.747	1.205	**0.577***	1.249	**2.955*** **	0.930
	(0.371)	(0.132)	(0.727)	(0.319)	(0.129)	(0.534)	(0.828)	(0.099)
Visible min*foreign-born foreign-trained	**0.446***	**0.534***	1.053	0.835	**0.381*** **	**0.509+**	1.291	1.072
	(0.147)	(0.140)	(0.412)	(0.202)	(0.068)	(0.198)	(0.488)	(0.114)
Visible min	0.955	1.102	0.868	0.942	**1.632****	0.809	**0.331*** **	1.001
	(0.267)	(0.212)	(0.267)	(0.176)	(0.262)	(0.249)	(0.076)	(0.088)
Controls								
Potential foreign experience (in years)	**0.933*** **	**0.959*** **	**0.948****	**0.959*** **	**0.967*** **	**0.958****	**1.021+**	**0.959*** **
	(0.015)	(0.009)	(0.017)	(0.009)	(0.007)	(0.016)	(0.012)	(0.003)
Potential Canadian experience (in years)	**1.163*** **	**1.042****	**0.964***	**1.092*** **	**1.083*** **	**1.044***	1.004	1.000
	(0.023)	(0.013)	(0.018)	(0.015)	(0.012)	(0.023)	(0.011)	(0.004)
Potential Canadian experience sq	**0.996*** **	**0.999*** **	**1.000**	**0.998*** **	**0.998*** **	**0.998*** **	**1.000**	**0.999*** **
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Speak other mother tongue than Eng/Fren	1.091	0.878	**0.684***	0.909	**0.501*** **	**0.740***	0.917	**0.846*** **
	(0.172)	(0.088)	(0.101)	(0.110)	(0.039)	(0.111)	(0.090)	(0.030)
Pseudo R-Sq	0.276	0.074	0.070	0.127	0.247	0.082	0.034	0.035
Chi Sq	611.3***	469.0***	331.8***	607.2***	2017.3***	215.8***	244.1***	2091.770***
Log-Likeli	-6855.4	-23008.1	-11432.2	-14537.8	-25635.7	-7699.8	-23429.5	-188576.3
BIC	13884	46220	23055	29275	51482	15587	47037	377407
Number	3854	7011	4009	5919	14430	3424	7181	64587

Notes: 1) *Other control variables include gender, degree of education, place of residence, marital status and family composition (see appendix Table A10). 2) Exponentiated coefficients reported are significantly different from one (1). 3) P-values for level of significance + p<.10, * p<.05, ** p<0.01, *** p<0.001. 4) Omitted reference for variable of interest is Canadian-born Canadian/US-trained. 5) MLT = medical laboratory technologists; MRT = medical radiation technologists; Pharm=Pharmacists; MD=Physicians; Physio=physiotherapists; Psy=psychologists, and RN=registered nurses. Sample weights are used in all regressions. For visible minorities, we follow the definition of the Canadian Employment Equity Act of 1995, which defines visible minorities as "persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in colour". When we include the Aboriginals in the visible minority variable the results do not change.

Table 2.11: OLS regressions estimates of location of highest training effects on log earnings of health professionals working in their trained fields

Variables of interest	Dentist	MLT	MRT	Pharm	MD	Physio	Psy	RN
Canadian-born foreign-trained	0.175	-0.340	**0.187***	-0.187	**-0.336*****	0.038	-0.335	0.046
	(0.415)	(0.443)	(0.085)	(0.128)	(0.095)	(0.083)	(0.255)	(0.055)
Foreign-born CdnUS-trained	-0.077	**0.081***	0.043	-0.049	-0.043	-0.019	-0.093	**0.035***
	(0.068)	(0.037)	(0.074)	(0.060)	(0.032)	(0.064)	(0.058)	(0.015)
Foreign-born foreign-trained	**-0.219***	0.039	**0.292*****	**0.120+**	**-0.153*****	0.116	-0.166	0.021
	(0.086)	(0.056)	(0.076)	(0.067)	(0.040)	(0.089)	(0.157)	(0.031)
Visible min*foreign-born CdnUS-trained	0.093	-0.049	-0.119	-0.012	0.046	0.042	0.150	0.031
	(0.105)	(0.071)	(0.115)	(0.071)	(0.050)	(0.105)	(0.204)	(0.034)
Visible min*foreign-born foreign-trained	**0.349****	0.073	**-0.388****	**-0.230****	**-0.140***	**-0.318***	**0.627***	**0.118****
	(0.115)	(0.076)	(0.120)	(0.079)	(0.059)	(0.154)	(0.269)	(0.042)
Visible min	**-0.251*****	0.048	**0.237****	-0.003	-0.048	0.074	-0.279	-0.027
	(0.072)	(0.048)	(0.085)	(0.041)	(0.033)	(0.072)	(0.174)	(0.028)
*Controls**								
Potential foreign experience	**-0.023****	-0.001	**-0.009+**	**-0.009+**	**0.018*****	-0.007	-0.008	0.001
	(0.008)	(0.003)	(0.005)	(0.005)	(0.003)	(0.008)	(0.007)	(0.001)
Potential Canadian experience	**0.030*****	**0.042*****	**0.043*****	**0.032*****	**0.106*****	**0.022****	**0.039*****	**0.029*****
	(0.008)	(0.004)	(0.006)	(0.005)	(0.003)	(0.007)	(0.007)	(0.002)
Potential Canadian experience sq	**-0.001****	**-0.001*****	**-0.001*****	**-0.001*****	**-0.002*****	**-0.0001***	**-0.001*****	**-0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Speak other mother tongue than Eng/Fren	-0.042	-0.038	**-0.078+**	0.025	-0.025	-0.039	0.003	-0.008
	(0.048)	(0.030)	(0.040)	(0.033)	(0.024)	(0.041)	(0.059)	(0.013)
Constant	**9.278*****	**8.589*****	**8.846*****	**9.091*****	**9.294*****	**8.480*****	**7.951*****	**8.664*****
	(0.148)	(0.096)	(0.112)	(0.100)	(0.081)	(0.160)	(0.145)	(0.036)
Adj R-Sq	0.232***	0.365***	0.328***	0.258***	0.267***	0.303***	0.354***	0.304***
BIC	7669.2	4818.2	4666.2	9581.0	28144.0	5794.7	6435.5	88222.4
Number	3044	3551	2759	4559	11834	2767	2857	46816

Notes: 1) *Other control variables include gender, degree of education, place of residence, marital status and family composition (see appendix Table A11. 2) Sample is restricted to aged 25-64years and only those with positive non-zero earnings in 2005. 3) P-values for level of significance + p<.10, * p<.05, ** p<0.01, *** p<0.001. 4) Omitted reference for variable of interest is Canadian-born Canada-US trained. 5) MLT = medical laboratory technologists; MRT = medical radiation technologists; Pharm=pharmacists; MD=physicians; Physio=physiotherapists; Psy=psychologist, and RN=registered nurses. Sample weights are used in all regressions. For visible minorities, we follow the definition of the Canadian Employment Equity Act of 1995, which defines visible minorities as "persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in colour". When we include the Aboriginals in the visible minority variable the results do not change.

Table 2.12: OLS regressions estimates of location of highest training effects on log earnings of individuals not employed in their trained health fields

Variables of interest	Dentist	MLT	MRT	Pharm	MD	Physio	Psy	RN
Canadian-born foreign-trained	-0.681	0.000	-0.039	-0.740	0.068	-0.201	-0.095	-0.056
	(0.540)	(.)	(0.247)	(0.860)	(0.257)	(0.282)	(0.126)	(0.107)
Foreign-born CdnUS-trained	-0.062	0.059	0.222	0.212	-0.063	-0.076	-0.039	-0.006
	(0.193)	(0.079)	(0.141)	(0.134)	(0.134)	(0.186)	(0.047)	(0.036)
Foreign-born foreign-trained	**-0.912*** **	0.031	-0.245	-0.081	**-0.391*** **	-0.149	**-0.309***	**-0.164*** **
	(0.195)	(0.086)	(0.152)	(0.125)	(0.108)	(0.175)	(0.129)	(0.041)
Visible min*foreign born CdnUS-trained	0.157	**-0.379** **	0.072	-0.235	0.381	-0.185	-0.016	0.036
	(0.363)	(0.124)	(0.327)	(0.234)	(0.233)	(0.334)	(0.127)	(0.089)
Visible min*foreign-born foreign-trained	**0.592+**	**-0.202+**	0.293	-0.196	0.134	-0.252	0.045	0.017
	(0.336)	(0.112)	(0.291)	(0.213)	(0.193)	(0.243)	(0.163)	(0.085)
Visible min	**-0.573+**	**0.233** **	**-0.422+**	-0.065	-0.263	0.180	0.015	-0.017
	(0.313)	(0.082)	(0.253)	(0.192)	(0.185)	(0.215)	(0.095)	(0.077)
*Controls**								
Potential foreign experience (in years)	**-0.023** **	**-0.011***	-0.009	**-0.015** **	0.001	-0.003	0.006	**-0.006** **
	(0.009)	(0.005)	(0.009)	(0.006)	(0.004)	(0.008)	(0.006)	(0.002)
Potential Canadian experience (in years)	**0.074*** **	**0.039*** **	**0.047*** **	**0.061*** **	**0.071*** **	**0.092*** **	**0.057*** **	**0.055*** **
	(0.016)	(0.007)	(0.012)	(0.012)	(0.009)	(0.017)	(0.006)	(0.004)
Potential Canadian experience sq	**-0.002*** **	**-0.001*** **	**-0.001*** **	**-0.001*** **	**-0.001*** **	**-0.002*** **	**-0.001*** **	**-0.001*** **
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Speak other mother tongue than Eng/Fren	0.190	-0.078	-0.065	-0.131	**-0.201***	-0.049	-0.080	-0.029
	(0.134)	(0.059)	(0.097)	(0.085)	(0.081)	(0.125)	(0.052)	(0.026)
Constant	**8.858*** **	**8.051*** **	**8.040*** **	**8.071*** **	**8.278*** **	**7.561*** **	**7.733*** **	**7.641*** **
	(0.397)	(0.168)	(0.242)	(0.252)	(0.186)	(0.307)	(0.121)	(0.074)
Adj R-Sq	0.455***	0.215***	0.306***	0.360***	0.405***	0.404***	0.366***	0.284***
BIC	1720.6	7616.0	3032.2	3591.8	5867.4	1474.4	9394.8	43515.6
Number	601	3253	1193	1261	2047	568	3934	17030

Notes: 1) *Other control variables include gender, degree of education, place of residence, marital status and family composition (see appendix Table A12. 2) Sample is restricted to aged 25-64years and only those with positive non-zero earnings in 2005. 3) P-values for level of significance + p<.10, * p<.05, ** p<0.01, *** p<0.001. 4) Omitted reference for variable of interest is Canadian-born Canada-US trained. 5) MLT = medical laboratory technologists; MRT = medical radiation technologists; Pharm=pharmacists; MD=physicians; Physio=physiotherapists; Psy=psychologist, and RN=registered nurses. Sample weights are used in all regressions. For visible minorities, we follow the definition of the Canadian Employment Equity Act of 1995, which defines visible minorities as "persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in colour". When we include the Aboriginals in the visible minority variable the results do not change.

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Chapter 3

Decomposing the Earnings Gap between Canadian/US- and Foreign-Trained Dentists: Evidence from the 2006 Canadian Census

3.1 Introduction

Integrating foreign-trained health professionals into practice in destination countries is at the forefront of current policy discussions regarding health human resources. This study focuses on the earnings of dentists in Canada, and endeavours to account for the earnings gap between foreign- and Canadian/US-trained dentists. The average foreign-trained dentist practicing in Canada earn approximately 30% less than the average locally (i.e., Canadian/US) trained one. What explains such an earnings gap? We ask whether it is related to a composition effect (i.e. foreign-trained dentists have different characteristics on average, for e.g., are more likely to be older) or to the fact that for the same characteristics (for e.g., age, gender) foreign-trained dentists are rewarded differently as they need to adjust culturally and professionally to a different environment?

We are interested in understanding this gap across location of highest training for dentists because dentists in Canada are free to set their fees and salaried dentists are not unionised. As a result, an earnings gap does not reveal only differences in productive capacity or labour supply, but also signal differences in how much a dentist can charge his/her patients, which reflects (perceived) quality of what they provide.

Dentistry is chosen among health professions because, contrary to physicians in most countries, and in Canada in particular,[50] (as previously mentioned) dentists have some freedom in setting their fee level and are guided (not mandated) by a suggested fee published by provincial dental associations. Dentists bill the provincial government according to a mandated fee schedule only for the services provided to individuals within provincially funded dental programs (although a small population).[51] The perception by patients that some dentists provide better services than others could be influenced by reputed superior quality and experience, marketing techniques, or subjective aspects (patients' preferences) of services provided.

Regardless of where they received their training, all practicing dentists have to be licensed, which includes passing third-party assessments to guarantee minimum competency and thereby promote patient safety (Kleiner 2011).[52] If we observe a gap in earnings across training locations, (following the questions stated above) it can stem from different factors: (a) A composition effect i.e., if the foreign-trained dentists differ in age, gender, occupational status (salaried or self-employed), language ability, or years of Canadian work experience from the domestic-trained dentists. Dentists who received their training abroad are likely to set up practice in Canada later in life than the domestic-trained ones, as they may immigrate later in life to Canada, or spend time out of practice due to an immigration transition period or attendance at a bridging program to obtain local skills. (b) A difference in rates of return for the same

[50] Physicians bill according to a fee schedule negotiated and agreed upon by the professional medical associations and provincial governments.

[51] In Canada, public coverage for dental care represents less than 6% of total dental expenditures and these programs are narrowly targeted. For example, in Ontario, government-funded dental programs include the Children in Need of Treatment (CINOT), etc. For example, see CINOT: http://www.mhp.gov.on.ca/en/healthy-communities/dental/

[52] Crossing the hurdles of licensure exams does not necessarily imply homogeneity of all dentists since the licensure exams are only minimum competencies and there are rates of return to skills above the minimum. Having said that, a recent small study compares the graduating grades, NDEB results and OSCE results from 1999 to 2009 of foreign-trained dentists who completed a two-year structured program at the University of Western Ontario, to domestic-trained dental students who completed a four-year program at the same institution, and finds equivalent overall academic performance across both groups (Kogon, Banting and Sandhu, 2012).

characteristics i.e., how much of the gap is the result of a foreign-trained dentist making less than a dentist with similar characteristics who received their training in Canada or the US. The difference in rates of return could reflect differences in the quality of dental education programs, or in the language skills required to deliver services, or, lastly, in consumer preferences or discrimination.[53]

To examine the contributions of the composition effects and rates of return for characteristics to the gap, we need to identify and control for the factors linked to the earnings differential i.e., factors such as hours per week and weeks per year of work, potential Canadian work experience, gender, geographic location, and other individual characteristics that might differ across individuals trained in different locations, and correlate with earnings. We follow the Oaxaca-Blinder decomposition to compare earnings according to whether the dentists received their training in Canada or the US, or abroad. Using this technique attributes the earnings gap to differences in characteristics versus rates of return for characteristics (the latter including differences in the constant terms for each sub-population, which is a reflection of the effect of unobservable characteristics on earnings). Also this technique helps to understand a counterfactual question: what would earnings gap be if foreign-trained dentists' characteristics were adjusted to the levels of Canadian/US-trained dentists?

In this analysis the focus is on location of training rather than location of birth. Immigration and location of training do not overlap perfectly: some Canadian-born dentists receive their highest degree abroad (this is a negligible population, though), and, more importantly, some foreign-born dentists immigrate to Canada before receiving their highest

[53] An illustration of labour market discrimination is when individuals with identical productive characteristics are treated differently because they belong to different demographic groups.

degree. However, since foreign-born dentists in Canada are trained in both Canada or the US, and internationally, we will also test whether the effect of location of training on earnings differs from that of location of birth.

There are two key issues that differentiate the study from the existing immigration literature and health economics literature. First, our study is unique in that it focuses on a highly-regulated health occupation (dentistry), which has not been well documented as much as other health professions such as physicians, and explores the possibility that location of education is a better predictor of a gap in earnings than immigration status per se. Second, we are able to identify place of highest education, place of birth, visible minority status, and are further able to distinguish between immigrants who arrived in Canada as children from those who arrived as adults.

A preview of the main results shows substantial earnings differentials between Canadian/US-trained and foreign-trained working dentists: foreign-trained dentists earn, on average, approximately 30% less than Canadian/US-trained dentists. By decomposing the earnings gap, we find that 61% is attributed to a difference in average observable characteristics between Canadian/US-trained and foreign-trained dentists while 39% of the gap is attributed to difference in rates of return for individual characteristics and difference in unobserved characteristics reflected in the constants. The 39% gap is mainly related to difference in constants across locations of training. Decomposing the earnings gap between the Canadian/US-trained dentists who immigrated as children and Canadian-born, Canadian/US-trained dentists underscores the compelling evidence of the influence of location of training and not location of birth per se as the key determinant in the earnings gap.

The rest of the paper is organized as follows. Section 3.2 briefly discusses the previous literature and the institutional setting in which dentists work and are paid in Canada. Section 3.3 presents, data and descriptive statistics. In section 3.4 we present specification and estimation, results and interpretations. Section 3.5 presents the discussions and section 3.6 concludes.

3.2 Previous Literature and Institutional Setting of Dentistry in Canada

3.2.1 Previous Literature

The literature in the economics of dental services focuses on aspects of dental practice delivery and dentists' characteristics including scale, costs and service utilization, types of procedures performed and their prices, productivity and technical efficiency (Sintonen and Linnosmaa, 2000), number of dentists in the area (Birch, 1998), payment schemes (Chalkley and Tilley, 2006, Tickle *et al.*. 2011), or occupational regulations (Wing and Marier, 2014; Maurizi, 1974; Shepard, 1978); and characteristics such as gender (Adams, 2005), and self-employment status (Chalkley *et al.*, 2010; Chalkley and Tilley, 2006).

Price or service rate variations among dentists are influenced by three main factors: dentist-, practice- and patient-level factors. Brennan and Spencer (2005) compare these factors for Australian dentists and find that all play a role, including dentists' practice styles and beliefs, dentists' preferences, and dentist-patient interactions. However, location of training or immigration has not previously been studied in that literature.

There is, of course, a vast literature on the role of immigration status and/or place of birth on earnings in labour economics (e.g., see survey articles by Borjas, 1999; and Constant, Notymeyer and Zimmermann, 2013). A smaller health economics literature focuses on the effect of location of education; for example, analyzing the economic integration of international

medical graduates (IMGs) or internationally educated nurses (IENs) in a destination country (Schumacher, 2011; see Grignon, Owusu and Sweetman, 2013, for more examples).

Overall, only one study of which we are aware has examined the role of location of training in influencing the earnings of dentists. We want to compare the role of location of training in earnings of dentists in Canada to what Wang, Chalkley, and Tilley (2012) observe in the context of the Scottish National Health Service (NHS). The NHS General Dental Services (GDS) provides the majority of primary care dental services in Scotland. The cost of GDS treatment is paid, in part, out of public funds, but unlike other healthcare services delivered by the NHS there is a substantial patient-cost sharing component..."unless exempt from charges, the patient pays 80% of the NHS fees for their treatment up to a cash limit" (p. 228).

The authors investigate variation in treatment delivery patterns between dentists trained in the United Kingdom (UK) and elsewhere using Scottish administrative data from 2006 to 2008. After accounting for patient characteristics and unobserved heterogeneity across dentists using multivariate fixed effects regression models, they find a difference in practice style, with foreign (non-UK)-trained delivering more services per patient. However, within two years following professional dental practice entry, this difference dissipates and their treatment (billing) patterns converge.

Unlike Canada, where dentists are free to set their own fees, the situation in Scotland is slightly different. Scottish GDS dentists are mostly non-salaried and are paid a GDS fee for each service they provide and as a result, a key source of variation in earnings across dentists is the quantity and composition of services they provide. There are salaried GDS dentists who are generally recruited to areas with limited GDS services. Also GDS dentists are able to render services privately but not much is known about the private sector dental services in Scotland.

Thus with fees set in Scotland, it is worth undertaking the study in the Canadian context since fees are not mandated and therefore the earnings gap in Canada can tell us more about perceived quality of service across location of training.

3.2.2 Institutional Setting in Canada: Licensing and Payment

To practice general dentistry, graduates of dental programs must obtain a National Dental Examining Board of Canada (NDEB) certificate and then seek a provincial license of registration from the provincial college of dentists (i.e., the regulatory bodies). Graduates from accredited programs in Canada and the US are allowed to write the NDEB written exam and the Objective Structured Clinical Examination (OSCE) directly while those from non-accredited programs located in other countries must complete either an accredited two-year Qualifying/Degree Completion Program in a Canadian university or the NDEB Equivalency Process before being allowed to take the NDEB written exam and the OSCE (NDEB, 2014).[54, 55] We note that not all foreign-trained graduates undertake a bridging program.[56] Some progress through the NDEB

[54] Foreign-trained graduates are required to complete a university-based qualifying program accredited by the Commission on Dental Accreditation of Canada (CDAC) and available in several universities: since 1999 at Univ. of Toronto, 1997 at Univ. of Western Ontario (but accredited not until 1999), 2000 at Univ. of Alberta, 2003 at Univ of Manitoba, 2002 at McGill Univ., 2000 at Univ. of British Columbia and 1998 at Dalhousie Univ. (NDEB, 2014). A total of 79, 80 and 91 were admitted into Qualifying or Degree completion programs at Canadian Faculties of Dentistry in 2011, 2012 and 2013, respectively (NDEB, 2014). Quebec has separate certification requirements for dental school graduates outside Quebec that include obtaining assessments from the Examination and Accreditation Committee of the Ordre des dentistes du Québec (ODQ) for recognition of dental diploma and training equivalence, demonstrating a working knowledge of French in agreement with the Charter of the French Language, and passing the NDEB Part I and II exam (Boorberg, Schönwetter and Swain, 2009). See also http://www.odq.qc.ca/

[55] Since we use 2006 census data, some of the most recent certification process changes are not relevant for our sample. For e.g., Accredited general dentistry programs recognized by the CDAC now include programs also taken in Australia (for those who graduated on or after March 2010), New Zealand (for those who graduated on or after December 14, 2011) and Ireland (for those who graduated on or after December 5, 2012). See NDEB (2014).

[56] The re-training programs became necessary because a 1994-1996 study of NDEB written exam scores revealed that Canadian-US graduates from accredited dental programs achieved an average pass rate of 93-100% while foreign-trained dental graduates received an average pass rate of 47-68% (Gerrow et al., 1997). Although the pass rate for foreign-trained dental graduates is lower than that of the domestic-trained dental graduates, it still indicates that some foreign-trained dentists are able to obtain licensure without going through the bridging program. The Canadian Faculties of Dentistry also use results of select Assessments, under the NDEB Equivalency Process, in the admission process for Qualifying and Degree Completion Programs or bridging programs (NDEB, 2014), in addition to other entry requirements such as English language proficiency, immigration/citizenship status etc. For e.g., the University of Western Ontario admits only 20 foreign-trained graduates yearly. See http://www.schulich.uwo.ca/dentistry/itd/.

exams and start practice quickly and they may well be the most skilled foreign graduates. However we do not have that information and cannot distinguish between foreign-trained dentists who took re-training and those who did not need it.

In this study, we compare the earnings of working foreign-trained and domestic-trained dentists after they have successfully passed certification and licensing hurdles. The foreign-trained dentists practicing in Canada have to show a minimum level of skills deemed necessary by the regulatory bodies. Also, the foreign-trained dentists working in Canada may have been re-trained to some extent and can be expected to be familiar with what is expected from domestic-trained dentists.

Payment of dentists

Dental care is predominantly privately funded in Canada. Private insurance pays 52% of total dental care costs (62% of Canadians are covered, mostly through their workplace with employer paid health insurance premiums being tax exempt), 42% is paid out-of-pocket by patients at the time of use, leaving 6% of dental care publicly funded (Canadian Institute for Health Information, 2011; Health Canada, 2010). This is important because it implies that, contrary to physicians in Canada, whose fees are set by collective agreements with single-payer public authorities or to nurses, whose hourly wage is normally set by collective bargaining, dentists can adjust their fee level to the level of demand for their services. Their earnings reflect not only their productivity but also their perceived quality and expertise. Dental associations publish suggested fee guides, but they are not mandatory and are only intended to serve as a reference.

The earnings potential of dentists is also influenced by their occupational status (self-employed or employee), and being a general practitioner or a specialist (in for e.g., orthodontics) and this could be a factor explaining the earnings gap across location of training (for e.g., if

foreign-trained dentists are over-represented in a lower paying category).[57] It is also important to distinguish between self-employed dentists and employees because the treatment of benefits in reported earnings may differ across employees and self-employed. Employees' earnings are exclusive of benefits, but the self-employed receive dividends or retained earnings.

About 54% of dentists in Canada work in solo private practices, 19% are in partnerships, and another 19% are either dental associates or employees of private practices. One percent are employed in public health institutions, another 1% in the military, 2% in an academic setting, and 3% are retired or in other settings (Canadian Dental Association, 2010).[58]

Employee dentists are paid a market (equilibrium) wage/salary since they are not unionized and can negotiate their wage/salary on an individual basis with their employers. Self-employed dentists (practice owners) earn fees for services they provide their patients or if incorporated pay themselves a salary as well as receive dividends. Also, dentists can combine fees (or salary from their practice) with a salary paid by a major health organization to provide services. Newly licensed dentists, in the early stages of their career, may work as a dentist associate (employee) or join a partnership as an employee, leading to an ownership of a dental practice (see Adams 2005). Other dentists may be remunerated through the fee-for-service agreement schedules between provincial dental associations and the provincial governments. The provincials' fee-for-service financing systems for dental treatments exist for patients who are eligible for government-funded insurance coverage (which covers only 6% of the total dental expenditure in Canada), particularly for children or those receiving social assistance.

[57] We find that both the foreign-trained and Canadian/US-trained dentists' subgroups have equal proportions (i.e. 12%) of specialists in our sample. Unlike physicians, there are no perceived shortages of dentists in Canada rather an issue of maldistribution of dentists exists in the rural and the remote areas of Canada.
[58] Due to rounding, the sum of the percentages is 99%.

3.3 Empirical Analysis

3.3.1 Data

Given that dentists are a small population, we need a large dataset to obtain an appropriate sample. Accordingly, we use the 2006 Canadian Census long form involving a sample of 20% of all households in Canada (i.e. one in every five private households since the unit of sampling is the household not the individual) accessed through Statistics Canada's Research Data Centre at McMaster University. The master file resulted in a total of 6,470,472 respondents in these households i.e. 20% of the total population of 31.6 million in 2006.

The sample extracted from the census for this study is restricted to individuals who self-report their main occupation as dentists and are aged 25 to 64, because they are considered the active working age group. Individuals working in multiple occupations only report their main occupation; therefore, we do not identify respondents working as dentists if it is their secondary occupation. It is not much of a concern as we are confident of the number of respondents captured under the occupation variable.[59] Temporary residents and permanent residents who arrived after 2004 are excluded from the sample.[60] After the exclusions and inclusions criteria the data consist of a sample of 3,164 individuals representing 16,190 dentists (Statistics Canada provides weights allowing the sample to represent the population).

Next, earnings used in the analyses are defined for the 2005 calendar year as gross wages and salaries, plus positive net self-employment income (i.e., gross receipts minus expenses of

[59] The Canadian Institute for Health Information's Health Personnel Database (HPDB) with primary source being the Canadian Dental Association, reported 18,313 registered (licensed) dentists in 2004 without any exclusions. With no exclusions, the occupation variable captures a weighted 19,075 persons self-reported as dentists in the 2006 census, this reduces to 18,035 when we drop those without undergraduate degrees.

[60] The reason why recent arrivals are excluded is that earnings are reported for the calendar year 2005 and we do not observed the full year of earnings for those who arrive later than December 2004. It is necessary to state that the foreign-trained dental graduates who progress through the licensure exams, without going through bridging programs and start practice quickly may very well be the most skilled. While those foreign-trained dental graduates who need to take time to improve their language skills and/or fail an exam and need to re-write may take longer and not be in our data by the 2004 cut-off.

operation such as wages, rents and depreciation). Therefore, we also exclude individuals in the population who self-reported zero or non-positive total earnings in 2005 resulting in 3,044 observations (or a weighted sample of the 15,510) practicing dentists, with 2,769 being Canadian/US-trained and 275 foreign-trained. The exclusion of the zero or non-positive total earnings in 2005 improves the quality of the analysis, because we want to decompose earnings gaps of dentists who actually work – if foreign-trained dentists are more likely not to work even though they are licensed, this would render the decomposition spurious. An issue with this exclusion is that, even though the majority of those who self-report zero and/or non-positive earnings are either out of the labour force or unemployed, some work and have operating expenses in excess of their gross receipts.[61] However, our sample indicates that the approximately 4% who have non-positive earnings also have zero weeks worked in 2005, suggesting that a very small number of dentists who work report non-positive earnings. Excluding them should not affect our findings.

Moreover, a key variable of interest used in the analyses is the location of one's highest training, which is a reasonable proxy for location of training. One key feature of the 2006 census (but not of earlier ones) is its identification of the location of highest education. We use the location of highest education to identify individuals trained as dentists and distinguish the foreign-trained persons from the Canadian/US-trained ones. Some caveats are that the highest level of education identified in the census is self-reported and is likely to be one's post-graduate degree (for e.g., a PhD), so we are ignorant of where a dentist obtained his/her undergraduate dentistry degree if they pursued post-graduate studies. Also, some respondents may report their

[61] Self-employed dentists, who employ receptionists, nurses and other assistants, and incur capital expenditures, may also pay out into retirement investments.

completion of a university based two-year dentistry bridging program in Canada as their highest education.[62]

Another particularly relevant explanatory variable (especially for foreign-trained dentists) in this context is the potential Canadian labour market experience. In general, the immigration literature suggests that in recent decades pre-migration (or foreign) labour market experience has a zero (or even negative) rate of return in the Canadian labour market. Moreover, the declining wage returns to foreign labour market experience is a key factor of deteriorating entry earnings of Canadian immigrants more among men originating from non-traditional source countries (for e.g., Asian countries) than the traditional European-based source countries (Aydemir and Skuterud, 2005). We infer potential labour market experience based on age, age-at-immigration and years of schooling.

We calculate years of potential Canadian work experience for Canadian-born persons and those who immigrated as children [age minus years of schooling minus 6] and for those who immigrated as adults [age minus age at immigration if age at immigration > (years of schooling plus 6) and age at immigration is not missing]. If the conditions are not satisfied, we set the variable as zero.

[62] We use a policy change in the certification process as a point of identification. In 2000, the NDEB examinations designed for graduates of non-accredited dental programs were discontinued. The foreign-trained dental graduates were required to take the same exam as the Canadian/US-trained graduates. The NDEB placed emphasis on bridging programs or the NDEB Equivalency Process (which was implemented in 2010) to prepare the foreign-trained dental graduates for the NDEB written exam and an Objective Structured Clinical Exam. Several universities implemented accredited bridging programs around 2000. Thus, we use 2000 as a point of identification and present the distribution of our sample across the change in certification process policy: We find that the majority (i.e. 92%) of foreign-trained/born dentists in our sample became landed residents before 2000 when most of the bridging programs were being implemented and those who landed in Canada after 2000 (8% of them are foreign-trained persons). Therefore, it may very well be that we have very high skilled immigrant dentists (the 92%) in our sample, who, perhaps quickly went through the re-accreditation process or may have re-written the certification exams once or twice prior to the implementation of the bridging programs. The NDEB policy allows three examination attempts.
Further, we are able to distinguish between the two groups of immigrants in the population, i.e., those who came to Canada as children (<18 years), who would have received almost all their education in Canada, from those who arrived as adults (25+years) in our robustness checks (see models 2.2 and 2.3 in Table 3.4). By doing this, we are confident that those who may have reported, for example, a bridging program as the highest education in Canada will be removed from the immigrants trained in Canada in the decomposition analysis between Cdn-born Canadian/US-trained and foreign-born Canadian/US-trained.
See the Chapter 3 appendix for further discussions on location of highest study and Table 3.A5.

Other variables of interest are current occupation, self-employed versus employee status, weeks of work in the calendar year and hours in the census week, immigration status (and age at immigration for immigrants),[63] geographic information and standard socio-demographic factors (gender, education, age, visible minority, marital status, and age of children).

3.3.2 Descriptive Statistics

Table 3.1 displays a profile of the distribution of dentists across place of birth and location of credential receipt. Panel 1 shows the labour market outcomes and panel 2 shows characteristics in percentages.

A substantial earnings differential ($46,225 or approximately 30%) exists between Canadian/US-trained (group 2) and foreign-trained (group 1) dentists; moreover, the similarities in the average number of hours and weeks worked in 2005 across the groups (see Columns 2 and 3 of Table 3.1) suggest that differences in work hours (which could be viewed as the time dentists spend with their patients, administrative tasks and other activities) are not the obvious links to these differences.

Table 3.1 also indicates that foreign-trained dentists are more likely to be foreign-born, female, married with children, and to live in Ontario and British Columbia, particularly in urban areas such as Toronto and Vancouver. They also have, on average, lower potential Canadian work experience than Canadian/US-trained counterparts and we need to control for these differences in characteristics before concluding how foreign training affects the earnings of dentists.[64]

[63] Age at immigration is only included here because in a sensitivity analysis, we use the variable to identify and distinguish between those who immigrated into Canada as children from those who immigrated as adults.

[64] Both the foreign-trained and Canadian/US-trained dentists are equally likely to be specialists (12%). The proportion of Canadian/US-trained dentists in speciality residency programs is (13%) and that of foreign-trained dentists is 10%.

Columns 4-6 of Table 3.1 indicate that, on average, without controlling for any observable factors, the highest level of average earnings in 2005 is achieved by Canadian-born dentists who trained in the US or Canada, which is also depicted in Figure 3.1. The higher earnings for Canadian/US-trained compared to foreign-trained dentists may reflect dissimilarities in the training programs.[65] The Canadian-born, Canadian/US-trained dentists earn more but work fewer hours than foreign-born, Canadian/US-trained dentists, who in turn earn more than the foreign-born, foreign-trained dentists. The foreign-born, Canadian/US-trained dentists work as many hours as the foreign-born, foreign-trained dentists. The large earnings differential is partly related to lost years of experience due to the immigration or transition process (e.g. attending a language skills program) of adapting to the host nation.

We check that the difference in the average earnings gap of $46,225 or approximately 30% is not related to some large earners among Canadian/US-trained dentists or low earners among foreign-trained dentists along the whole distribution. We use a kernel density plot, Figure 3.1, which depicts the distribution in the log earnings of three categories of dentists. Figure 3.1 shows that all three distributions are very similar in shape, the average (and mode) for Canadian-born, Canadian/US-trained being to the right of that of foreign-born, Canadian/US-trained dentists, which is in turn to the right of that of foreign-born, foreign-trained dentists. It is also reassuring in that, the approximate normality of the density curves justifies the execution of the decomposition analysis at the mean.[66] We do not show the Canadian-born foreign-trained group since they are too small to draw any meaningful inferences.

[65] This is consistent with the general immigration literature that, among immigrants with pre-immigration education, the quality of educational outcomes affects labour market outcomes (Li and Sweetman, 2014).

[66] Further, "when the distributions one is comparing are unimodal and symmetric and have similar variances, the Oaxaca-Blinder approach comes quite close to being a "sufficient statistic" for the effect of changes in structure of wages" (Butcher and Dinardo,

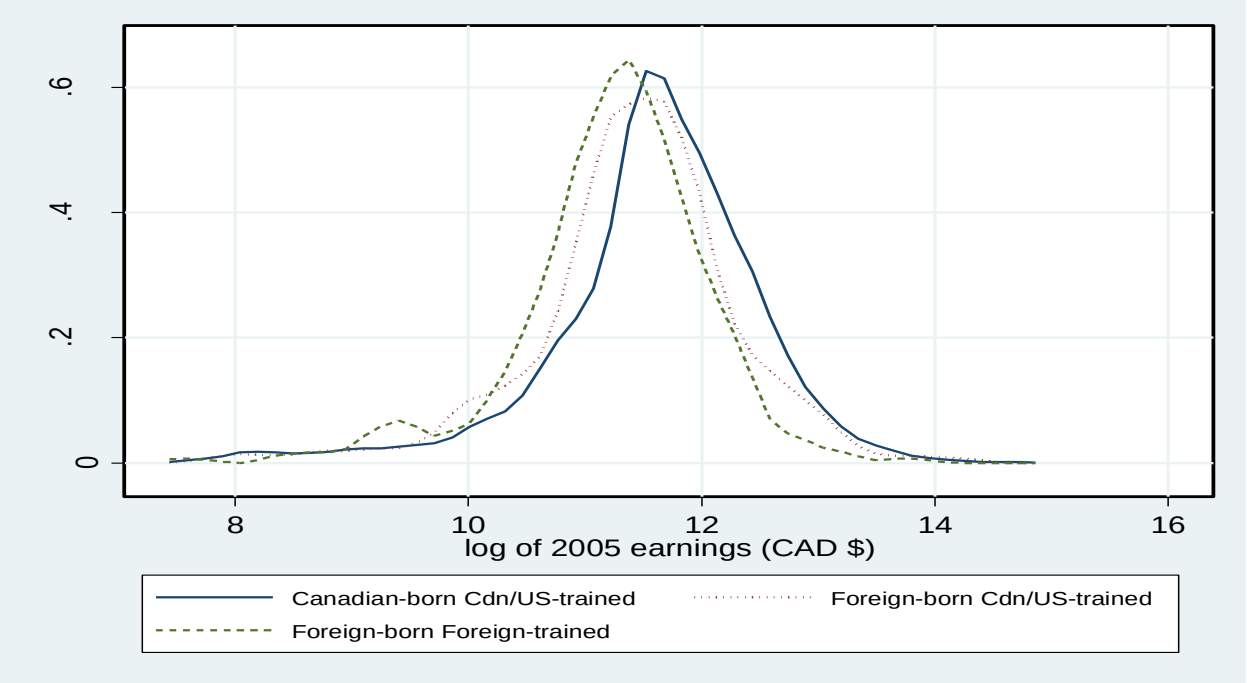
Table 3.1: Individuals who self-reported working as dentists and location of their highest study

	For Decomposition Analyses				
Working as dentists	Group 1 Foreign	Group 2 Canadian/US	Canadian-born Canadian/US-	Foreign-born Canadian/US-	Foreign-born Foreign
Panel 1: Labour Market Outcomes	Trained	trained	Trained	Trained	Trained
Mean earnings in 2005	101,305	147,530	153,315	131,350	101,500
Mean hours worked in reference week	38.2	37.2	36.6	38.9	38.2
Mean weeks worked in 2005	45.8	46.8	46.6	47.1	46.0
Panel 2: Controls					
Mean Age	47.0	44.0	44.7	42.1	46.9
Potential Canadian work experience	15.5	17.9	18.7	15.6	15.4
Percentages (%)	%	%	%	%	%
Employed in reference week	96.8	97.8	97.5	98.9	96.7
Self-employed	72.2	78.9	78.7	79.6	72.7
Bachelor degree/Dentistry degree	87.4	86.8	86.9	86.4	87.2
Professional degrees (Masters and PhD)	12.6	13.2	13.1	13.6	12.8
Female	49.1	28.2	26.8	32.3	49.3
Visible minority	49.8	24.4	10.3	64.1	50.4
Married	84.1	71.2	69.8	75.1	84.7
Have no children	19.8	25.7	26.8	22.6	19.8
Speak foreign mother tongue	83.4	26.4	9.8	72.7	84.3
Residents of Toronto and Vancouver	53.8	29.6	23.8	45.9	54.0
Residents of other Census Metro. Areas	41.2	60.8	64.4	50.9	41.6
Atlantic	3.6	5.8	7.5	0.9	3.6
Prairies	11.6	15.9	17.3	12.2	11.7
Quebec	12.6	24.4	26.0	19.9	12.8
British Columbia	23.8	14.4	12.7	19.2	23.4
Ontario	48.4	39.4	36.3	47.8	48.5
Immigrants	98.9	26.3	na	100	100
Age-at-immigration (<18 years)	3.6	61.7	na	61.6	3.7
Age-at-immigration (19-24 years)	8.8	14.2	na	14.3	8.5
Age-at-immigration (> 25 years)	87.6	24.1	na	24.1	87.8
Number	1,385 (9%)	14,125 (91%)	10,400 (67%)	3,720 (24%)	1,370 (9%)

Notes: Data on residents of the Territories are suppressed due to low cell counts; na= not applicable. Earnings are weighted and rounded to base 5 as per disclosure rules. The Canadian-born foreign-trained dentists are suppressed due to low cell counts. There may be some weighting and rounding to base 5 issues that affect the number of populations. Number reflects the estimated population count derived from an underlying 20% sample.

2002, pp. 107). It is interesting to note in Figure 3.1 that the "within-group" variation massively dominates the "between-group" variation.

Figure 3.1: Kernel density of log 2005 earnings for Canadian-born, Canadian/US-trained, foreign-born, Canadian/US-trained, and foreign-born, foreign-trained dentists



3.3.3 Examining the Earnings Variable

Since the majority of the dentists are self-employed we use self-reported total earned income (pre-tax earnings) in 2005 (defined as positive self-employment income plus wages and salaries) that may include investments in pensions, and other registered retirement plans, less operation expenses like wages for their employees, e.g., dental assistants. Thus, we transform the pre-tax earnings into the log of pre-tax net earnings (see Figure 3.1, the kernel density graphical diagnostic test showing the normality of the distribution in log earnings, which is the goal of the transformation since the natural earnings are skewed and would perform more poorly in the decomposition) to be the dependent variable in the decomposition analyses.

The net earnings have important implications for the specification of the regression when we consider, for example, the implications of age at immigration for self-employed dentists because the deductions for plant and equipment, etc., from gross earnings will make a difference

on net earnings for dentists at various stages in their careers (less experienced dentists are still paying more out of their gross earnings to reimburse the initial set up costs). If it is costly to start-up a dental practice considering the capital equipment needed, then one could envisage that deductions from the gross earnings would not be the same for self-employed dentists with different timing of start-ups and levels of Canadian practical experience.

One could envision dentists with the same gross earnings having net earnings that increase with years of practicing due to depreciation of the initial fixed capital costs. Thus, if Canadian/US-trained dentists started their dental practices and incur fixed capital costs at a younger age than foreign-trained dentists, then, on average, in cross-sectional data and holding age constant, we would expect foreign-trained dentists' earnings to be lower than those trained in Canada or the US simply because of the timing of their start-up.

It is worth mentioning that the treatment of benefits in reported earnings may differ across employees and self-employed. For employees the earnings are exclusive of benefits, but for the self-employed they need be at least partly inclusive of benefits. Table 3.2 shows that self-employment earnings constitute about half of the earnings of self-reported employees except for Canadian-born, Canadian/US-trained persons. One could envision the possibility for a self-employed (or employee) dentist to also earn wages (or self-employment income) from other health institutions, or their own practice.[67]

Self-employed dentists in incorporated[68] practices have slightly lower earnings than those who are self-employed in unincorporated businesses; this slight difference in earnings may be

[67] A self-employed dentist may start as an unincorporated professional practice but switch to incorporated status during the year and therefore report in the census both salary and self-employment income during the same calendar year. A self-employed dentist can also work for a major (public) health institution and receive salary as well. A dental associate (employee) in a partnership contract/agreement leading to ownership of a practice could be promoted to become a partner and receive shares and other benefits as self-employment income and also report both salary and self-employment income in the census.

[68] Benefits for incorporation: a) Limited liability: potential loss limited to amount invested in the corporation. b) Perpetual existence: corporation continues on after the death of the individual. c) Tax advantages: accountants will recommend

linked to the fact that the self-employment earnings variable does not capture factors such as retained earnings and own-firm dividends. Self-employed dentists with paid help in their practices (e.g. dental hygienists, receptionists, etc.) have more earnings than those without paid help. Most of the dentists have earnings from both salaries and self-employment income; however, a substantial proportion of the earnings for self-employed, unincorporated owners are exclusively from self-employment earnings.

While owners of professional incorporated dental practices may receive salaries and/or dividends, the varied sources that constitute the investment income variable make it impossible to disentangle the specific dividend derived from owners' shares of incorporated dental practices. As a result, we limit the analysis to only self-employment income and wages and salaries, we note that self-employed dentists, particularly foreign-trained dentists in incorporated practices earn more investment income than those in unincorporated practices.

We find that 78% of dentists (from the three categorization of dentists in Table 3.2) are self-employed (with 30% in incorporated practices and 48% in unincorporated practices), while only 22% of dentists work for salaries as their primary earnings. It is likely that incorporated practices are partnerships and that unincorporated practices are sole-proprietorships. The Canadian/US-trained dentists (79%) are slightly more likely to be self-employed than foreign-trained dentists (73%). Possibly, foreign-trained dentists find more job security in working for wages and salaries than in starting their own dental practice. [69]

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incorporation once revenues reach a certain point. d) Raising capital: corporate form of business organization make it easier to raise capital through the sale of shares. Source: Industry Canada http://www.ic.gc.ca/eic/site/cd-dgc.nsf/eng/cs02194.html [December 13 2013].

[69] We use the NDEB examination board major policy change in 2000 (stated in footnote 61) as a point of identification and present the distribution of our sample across the change in certification process policy: We find that the majority (i.e. 92%) of foreign-trained dentists in our sample became landed residents before 2000 and are all self-employed persons and those who landed in Canada after 2000 (8%) are all employee dentists, this, in part, shows the importance of duration of stay and time for adaptation in a host country.

Table 3.2: Occupational status, location of highest training and earnings (2005)

	Occupational status					
Location of highest training	Self-employed without paid help incorporated	Self-employed with paid help incorporated	Self-employed without paid help, not incorporated	Self-employed with paid help, not incorporated	Working for wages & salaries	Total
Canadian-born						
Canadian/US-trained	**2%**	**29%**	**7%**	**41%**	**21%**	**10,400**
Mean self-employed income	24,020	57,240	116,965	164,625	45,045	101,685
Mean wages & salaries	82,840	108,895	4,565	8,590	67,345	51,635
*Mean investment income	14,385	23,195	5,375	7,580	13,520	13,390
Foreign-born						
Canadian/US-trained	**2%**	**28%**	**11%**	**39%**	**20%**	**3,720**
Mean self-employed income	53,650	45,275	111,810	137,645	49,595	88,995
Mean wages & salaries	56,715	94,900	4,385	10,865	47,715	42,355
*Mean investment income	10,040	22,995	2,985	4,930	6,475	10,230
Foreign-born						
Foreign-trained	**4%**	**26%**	**6%**	**36%**	**28%**	**1,370**
Mean self-employed income	2,080	35,780	92,650	123,160	39,085	70,110
Mean wages & salaries	69,240	64,095	3,165	1,990	39,145	31,390
*Mean investment income	32,040	24,465	485	2,895	2,455	9,465

Notes: Self-employed with or without paid help, incorporated means that self-employed dentists with paid assistance (e.g. dental hygienists, receptionists) in (not)incorporated professional dental practices. Those working as employee dentists receive wages and salaries. *Mean investment income "Refers to interest received in calendar year 2005 from deposits in banks, trust companies, co-operatives, credit unions, caisses populaires, etc., as well as interest on savings certificates, bonds and debentures and all dividends from both Canadian and foreign stocks..." (Statistics Canada definition, see Chapter 3 appendix).

3.4 Specification and Estimation

3.4.1 Decomposition Model

We undertake an Oaxaca (1973)-Blinder (1973) decomposition of mean log earnings to identify sources that contribute to the location of highest education earnings differentials. A basic assumption of the decomposition analysis (which follows an additive linearity assumption so that the earnings specification is assumed to be log-linear) is that the gap is separable in observable and unobservable characteristics (Fortin, Lemieux and Firpo, 2011). We consider two earnings

equations, one for Canadian/US-trained and one for foreign-trained dentists and control for variables thought to reflect individual-level differences in productivity or preferences, as follows:

$$\ln Y_i^{CUST} = \beta_0^{CUST} + \beta^{CUST} X_i^{CUST} + \varepsilon_i^{CUST} \quad (1)$$

$$\ln Y_i^{FT} = \beta_0^{FT} + \beta^{FT} X_i^{FT} + \varepsilon_i^{FT} \quad (2)$$

where

$\ln Y_i$ =log of positive earnings of the i-th dentist. Ln(Y) follows a normal density, but Y is skewed and would perform much more poorly in the Oaxaca-Blinder decomposition; superscript CUST = Canadian/US-trained dentist; superscript FT = Foreign-trained dentist; ε_i = a disturbance (error) term, the error term which has a conditional mean of zero drops out of the decomposition. It is also assumed to be conditionally independent of X_i.[70] Moreover, the outcome variable, Y, is assumed to be linearly related to the covariates. X_i is a vector of control characteristics (potential Canadian work experience or PCE, gender, visible minority status, geographic information, level of education, maternal language, marital status and family composition) and endogenous labour market variables such as hours in the reference week and weeks of work.[71] Though we cannot give any meaningful interpretation to the coefficients of endogenous labour market variables since they are jointly determined with earnings as determinants of earnings,[72] they are included as regressors because we are interested in differences in log earnings gaps conditional on work duration in the decomposition models.

[70] The conditional distribution of the error term has to be the same for the two groups, implying that there are three reasons why the earnings distribution can differ between the Canadian/US-trained dentists and the foreign-trained ones. The three reasons lead us to decompose into the three components, see Fortin, Lemieux and Firpo (2011).

[71] Reference week is the week (Sunday to Saturday) prior to the Census day, May 16, 2006.We note that despite the fact that work duration is jointly set with earnings and therefore endogeneity issues are present, the inclusion of hours and weeks on the right-hand side (RHS) still allows the researcher to characterize the rate of return on hours and weeks across location of training, but also to test whether foreign-trained dentists work longer or shorter hours and weeks than Canadian/US-trained dentists.

[72] Gravelle, Hole and Santos, (2011) test for and correct potential endogeneity bias using two stage least squares rather than OLS. Since we do not have credible instrumental variables, we follow similar procedures executed by Theurl and Winner (2011) and O'Neill and O'Neill (2005). Regressors hold constant factors that, if neglected, could lead the point estimates of interest to suffer from omitted variable bias. If ethnic discrimination is working through hours and weeks of work, then when we control for these regressors (i.e. hours and weeks) we indirectly control for discrimination.

We mean deviate all the continuous variables (hours, weeks worked and PCE and its squared) for all observations.[73] An algebraic manipulation is carried out by adding and subtracting $\hat{\beta}^{\mathrm{CUST}}\overline{\mathrm{X}}^{\mathrm{FT}}$, which can be interpreted as the counterfactual situation, and asks what the earnings would be for foreign-trained dentists with average individual characteristics, in the case that a foreign-trained dentist is rewarded for his/her characteristics in the same way as the average Canadian/US-trained dentist. The resulting equation is as follows:[74]

$$\overline{\ln \mathrm{Y}^{\mathrm{CUST}}} - \overline{\ln \mathrm{Y}^{\mathrm{FT}}} = \underbrace{\underbrace{\left(\hat{\beta}_0^{\mathrm{CUST}} - \hat{\beta}_0^{\mathrm{FT}}\right)}_{\text{Difference in constants}} + \underbrace{\left(\hat{\beta}^{\mathrm{CUST}} - \hat{\beta}^{\mathrm{FT}}\right)\overline{\mathrm{X}}^{\mathrm{FT}}}_{\text{Difference in rates of return}}}_{\text{Unexplained component}} + \underbrace{\hat{\beta}^{\mathrm{CUST}}\left(\overline{\mathrm{X}}^{\mathrm{CUST}} - \overline{\mathrm{X}}^{\mathrm{FT}}\right)}_{\text{Difference in characteristics}} \quad (3)$$

The difference in mean log earnings is decomposed into two components. The first component (unexplained) on the right-hand side of equation 3 estimates the earnings foreign-trained dentists would gain if their characteristics were adjusted to the levels of Canadian/US-trained dentists. Unlike Theurl and Winner (2011), this first component is further split in two sub-components. First, the difference in the regression constants, $(\hat{\beta}_0^{\mathrm{CUST}} - \hat{\beta}_0^{\mathrm{FT}})$, captures differences in the rates of return times levels in the unobservable variables, such as cognitive skills or adaptation skills, work ethics, and motivation, i.e. it captures slopes and quantities or intercept value. The difference in regression constants are also the group membership coefficients, e.g. Canadian/US-trained or foreign-trained status. In this context, we compare two groups of practicing licensed dentists with respect to their location of training who, however, receive different rates of return for their observed characteristics. The second sub-component of

[73] The regression constants are not meaningful (econometrically) when the explanatory continuous variables are zero, since all working dentists have some potential Canadian work experience (PCE) and have actual hours and weeks worked, so, to give meaning to the constants, we mean deviated all the continuous variables (hours and weeks worked and PCE and its squared). For example, hours – mean hours; weeks – mean weeks; PCE – mean PCE; PCE^2 – mean PCE^2

[74] See Chapter 3 appendix for the scenario where foreign-trained coefficients are used as reference coefficients in a similar equation for the sensitivity tests of the decomposition results.

this counterfactual statement, or the differences in rates of return for individuals' characteristics, $(\hat{\beta}^{\mathrm{CUST}} - \hat{\beta}^{\mathrm{FT}})\overline{\mathrm{X}}^{\mathrm{FT}}$, possibly reflects differences in the quality of schooling systems individuals are exposed to and the origin of highest education. The differences in rates of return to education may reflect differences in language skills where language skills serve as a mediating variable in making educational capital relevant to the domestic labour market, which could be seen as a productivity gap. The different rates of return also partly reflect differences in costs involved in starting dental practices between foreign-trained and Canadian/US trained dentists as well as firm seniority for employees and expertise. This unexplained component also raises the question of whether patients prefer to pay more to be treated by locally trained dentists.

The second component on the right-hand side $\hat{\beta}^{\mathrm{CUST}}(\overline{\mathrm{X}}^{\mathrm{CUST}} - \overline{\mathrm{X}}^{\mathrm{FT}})$, is attributed to the differences in measurable average characteristics between Canadian/US-trained and foreign-trained dentists. It is entered to identify the value of the differences in observable characteristics between the two groups, which in turn attributes the portion of the earnings gap stemming from the composition effect.

3.4.2 Results & Interpretations of the Decomposition Estimations

We present two models of the decompositions in Table 3.3. See Table 3.A7 in the appendix for a similar table showing four models including the sensitivity of the decomposition results to the reference coefficients used. Panel 1 of Table 3.3 identifies the detailed contributions of the individual predictors to the difference in characteristics (explained) and difference in rates of return for characteristics and unobservables (unexplained) parts of the earnings differential and panel 2 presents the share of characteristics and two sub-components of the unexplained part of the earnings gap. There is a statistically significant log earnings differential of -0.306 between

Canadian/US-trained and foreign-trained dentists. Models 1.1 and 1.2 use Canadian/US-trained dentists' coefficients as reference coefficients. [75]

Model 1.1 shows that, without controlling for hours and weeks worked, observed characteristics account for 41% (or -0.125) of the log earnings gap, which is statistically significantly different than zero.[76] The significant contributors to the earnings gap are visible minority status, potential Canadian experience, female gender and marital status.

The 59% difference in earnings that is unexplained by differences in characteristics is the result of two sub-component (opposite) effects: the foreign-trained dentists benefit from better rates of return for characteristics influencing earnings (for e.g. visible minorities) but they lose a lot from the fact of being trained abroad (this is the effect of the difference in constant terms). This unexplained difference is by far the largest effect of the two sub-components. When we control for duration of work in model 1.2, however, there is much less left unexplained in hourly earnings than in total earnings, hence labour supply is a significant contributor to unexplained differences in yearly earnings, but they do not explain it all. However, the truth is that the difference in constant terms (being trained abroad) remains a key factor in the decomposition.

In model 1.2, we observe a marked difference from model 1.1 after controlling for the special set of endogenous regressors (hours and weeks worked in 2005): the proportion attributable to characteristics increases from 41% to a statistically significant 61% (or -0.187 of the -0.306 log earnings gap). The contributors to the characteristics component are: being a

[75] The study sample of practicing dentists is a highly educated group of health professionals, but with different locations of highest education. Two main sets of decomposition regressions are executed because the sensitivity of the decomposition depends on the coefficients being used in the Oaxaca-Blinder decomposition procedure. Hence we use the coefficients of both the Canadian/US-trained dentists and the foreign-trained dentists as the reference coefficients in separate sets of decompositions to understand the changes that occur with the occupational earnings structure attributed to location of highest education.

[76] Since the results are presented in log earnings, it is reasonable to re-express the logs back to the original scale (Canadian dollars, CDN$) using the "oaxaca eform" option command in STATA as proposed by Jann (2008). The logs are transformed using the geometric mean (exp(b)) of the earnings. These are presented in panel 2 of Table 3.3.

visible minority, being female, potential Canadian work experience, province of residence, and being married. Moreover, speaking a language other than English or French as a mother tongue contributes to the earnings differential.[77] Taking these in turn, we interpret these contributors as follows.

Speaking a language other than English/French as a mother tongue is the largest contributor (36%) to the earnings gap. The language (or occupational language) proficiency skills required to deliver dental services may be correlated with speaking a foreign language as a mother tongue and therefore (perhaps in part) affect that difference in characteristics. One can think of English or French proficiency as part of the productive human capital of foreign-born dentists in the Canadian labour market, where language mediates returns to education which is consistent with previous studies of immigrants to Canada (not specifically dentists, such as Goldman, Sweetman and Warman, 2011). Moreover, it has been suggested in the general immigration literature that, being a native English speaker considerably enhances integration into the labour market, especially for those who immigrate or arrive at an older age (Schaafsma and Sweetman, 2001).

Potential Canadian work experience is the second largest contributor (34%, with a negative sign) to the earnings gap. Canadian work experience is a determinant of earnings; foreign-trained dentists incur an initial fixed cost involved in the timing of starting dental practices at different ages and at relatively lower levels of experience compared to the Canadian/US-trained dentists. Moreover, an increase in net earnings associated with a rise in years of potential Canadian work experience may, in part, reflect a decrease in the depreciation

[77] We re-executed the decomposition regressions and included several interactions: female*marital status, female*no children and female*children. These were all statistically insignificant and did not change the general results of the coefficients.

costs (being a fixed cost in a particular year) as they get paid off. [78]Additionally, foreign-trained dentists lose years of experience[79] in their immigration process and on-the-job training, which has negative implications on their earnings similar to Waslander's (2002) observation. Foreign-trained dentists may be able to increase their productivity through re-skilling in the form of internships, residencies in dental schools, or working under the tutelage of an experienced practitioner; these formal re-skilling initiatives are also often supplemented by learning new skills and improving old ones while on the job. However, re-skilling comes at a cost to foreign-trained dentists, hence they may receive lower earnings initially, but it is likely that their earnings will increase at later ages having acquired more Canadian practical experience, which is consistent with Becker's (1993) human capital theory and earnings.

Visible minority status is the third largest contributor (with a negative sign) to the log earnings gap (27% of -0.187). Of course, visible minority may proxy for other unobserved characteristics, including language ability. However, visible minority dentists (more likely to be foreign-trained dentists and older than domestic-trained ones) working as employees starting at different ages perhaps face issues surrounding firm seniority in a dental practice, thereby affecting their earnings potential. Employees' earnings (partly linked to occupational status effect) are exclusive of benefits but the self-employed receive dividends or retained earnings. Visible minority dentists may face discrimination from two sides: the supply-side and demand-

[78] We cross-tabulated a categorical potential Canadian work experience across earnings and found that those with more potential Canadian experience earn more than those with less experience.

[79] Although in 1997 Qualifying or Degree Completion Program (bridging program) became available as a preparation route to become eligible to write the NDEB certification exams for foreign-trained dental graduates, most of the accredited university-based bridging programs became operational around 1999/2000 (Boorberg, Schönwetter and Swain, 2009). Thus, it is likely that some (if not most) of the immigrant dentists (in our sample) would have passed the NDEB exams without going through the bridging program route by virtue of fact that we use the 2006 census, and only 8% of the foreign-trained dental graduates came to Canada after 2000. Prior to the bridging programs (and perhaps after that), some foreign-trained dental graduates may have had several attempts at the NDEB exams (and in the process also lose work experience) before becoming successful, while there are some who successfully progress through the NDEB exams and start practice quickly. Also, losing Canadian work experience can be related to attending language skill improvement programs as well.

side. A newly licensed visible minority dentist may experience employer discrimination at a group practice (supply-side) from owners or senior partners.[80] Or patients' preferences (demand-side issues) could negatively affect visible minorities.[81] Even so, we are hesitant to interpret this estimate as an indication of ethnic discrimination since ethnicity is one of a bundle of characteristics (associated with source country, which includes difference in language skills, difference the quality of schooling systems, etc.) that are hard to disentangle in these data.

Turning to gender, the results show that the female coefficient is negative and is a statistically significant contributing factor. The foreign-trained dentists are more likely to be female. Perhaps female foreign-trained dentists are less likely to work as specialist dentists in areas such as orthodontics, prosthodontics, etc., than the Canadian/US-trained dentists. The female foreign-trained dentists perhaps offer less costly services, charge lower fees or may have fewer patients (affecting their total output per unit of input/capital) than their Canadian-trained male counterparts.

We also find that female dentists are more likely to be employees (possibly as dental associates) than the predominantly self-employed male dentists in our dataset (and also, see a discussion of female dentists in Ontario by Adams, 2005). While women may sometimes prefer to work part-time, and thereby sacrifice higher earnings, to accommodate family

[80] We cautiously say that foreseeable employer discrimination might be exercised, for example, against new dentist entrants working for salary for an established group of dentists. Further, since dentistry is a male-dominated profession and foreign-trained dentists are more likely to be female, female dentists may possibly experience forms of discrimination from their male colleagues who may be owners of the professional practices.

[81] We re-execute the decomposition, dropping all employees, and found similar results; thus, it is mostly patient-driven preferences for something that dentists trained in Canada or the US have which foreign-trained dentists do not have. (See model 2.5 in Table 3.4 for decomposition on only self-employed dentists). "...Self-employment income could reflect customer discrimination" (O'Neill and O'Neill, 2005, footnote, pp. 10).

responsibilities[82] they could also face workplace prejudice as indicated in the physicians' gender earnings gaps literature (see, e.g., Theurl and Winner, 2011).

Finally, living in major census metropolitan areas (CMAs) such as Toronto and Vancouver (combined estimated difference as -0.036), or living in Ontario and British Columbia also contribute to the earnings gap. These places are the largest recipients of foreign-trained dentists with the highest concentration of immigrants in Canada. They also have higher competition for patients among dentists relative to other CMAs, suburban and rural areas.

Next, we turn to the observed sharp reduction of the unobservables and differences in rates of return or the effect of location of highest education from a statistically significant 59% (in model 1) to a significant 39%. We separate the differences in the unobservables from the differences in rates of return and find that the unobservables have a higher magnitude than the rates of return for the characteristics (and work in opposite directions: rates of return are higher for the foreign-trained dentists than for the Canadian/US-trained dentists).

The unobservables possibly reflect patients' preferences to see a Canadian/US-trained dentist over a foreign-trained one. Other unobserved factors, which could be supply-side factors include, the number of employees of a practice and its organizational structure, as well as a dentist's motivation, work ethic, differences in the quality of dental programs, differences in practice pattern and treatment delivery standards and differences in language skills. All these speculative differences would only apply if such differences existed. Foreign-trained dentists (who are more likely to be immigrants) may have less access to credit/financing and/or smaller networks and therefore set up smaller practices with, for example, fewer dental assistants; such

[82] A cross tabulation (not shown here) of labour market activity reveals that female dentists work fewer hours than male dentists. Adams (2005) discusses how female and male dentists may have different practice styles, for example, male dentists were more likely to work in solo and partner practices than female and female dentists are more likely to work as dental associates, especially when younger, married and just establishing their careers. Adams also reported that in the U.S. context, on average, female dentists may see fewer patients, but spend more time per patient than their male counterparts.

smaller practices are less productive and less remunerative, which could also cause them to become employees for income security reasons.

The different rates of return for characteristics are positive for the foreign-trained dentists and this may be correlated with productivity (which is the value of the output produced per hour worked). The share of the differences in the rates of return gap attributable to visible minority status is also positive and relatively large, implying that the effect of being a visible minority is lower among foreign-trained dentists and that is reflected in the +0.177 difference in rates of return on this variable between the foreign-trained and the domestic-trained. This means that, for a visible minority, being a domestic-trained dentist will decrease earnings by 0.177 relative to being a foreign-trained dentist. [83]

To ascertain the higher rates of return for characteristics for foreign-trained visible minorities (more likely to be foreign-born), we conduct further data analysis of the labour market activities of all visible minorities. We find that Canadian-born visible minority dentists (of Aboriginal, Chinese, South Asian, Black, Japanese descent), on average, work fewer hours and weeks than foreign-born visible minorities (who are mainly of Asian and Chinese origins). Canadian-born visible minorities have higher proportions of female and part-time dentists than foreign-born visible minority dentists. Furthermore, foreign-trained visible minority dentists (most likely to be immigrants) may be economic migrants, who tend to be self-selected for labour market success, and migrate mainly because of economic opportunities. This is consistent with Chiswick's (1999) observation that, on average, immigrants tend "to be ambitious,

[83] A plausible interpretation is that visible minority dentists are penalized anyway (independent of their location of training), and visible minority dentists who trained in Canada are seen by patients as foreign-trained dentists. As a result, they suffer from some of the "unobservable" difference between foreign-trained and Canadian/US-trained, the portion that is linked to discrimination (by patients)

aggressive, entrepreneurial, or otherwise more favorably selected than similar individuals who choose to remain in their place of origin" (p. 181).

For sensitivity checks on the decomposition results we use foreign-trained dentists' coefficients as reference coefficients to weight the differences in mean value of each characteristic between the Canadian/US-trained and foreign-trained dentists as seen in Models 1.3 and 1.4 of Table 3.A7 in the appendix. We find the entire earnings differential relates to differences in the rates of return sub-component and some unobserved characteristics.

In sum, we choose results using the Canadian/US-trained dentists' coefficients as base coefficients over foreign-trained dentists' coefficients because the results are more representative of the effects of personal, market characteristics and location of training on earnings, unlike using the foreign-trained dentists' coefficients that appear to relate all the earnings gap to the unobservables. We estimate that adjusting the levels of foreign-trained dentists' characteristics to those trained in Canada or the US would reduce the earnings gap of about 30% to about 12.2%.[84] The following section reinforces the evidence of the role of one's highest education in the log earnings gap.

3.4.3 Is it the Location of Training that Matters Among Three Categories of Dentists?

For robustness check purposes, we execute a series of additional decompositions to test one of our main findings, particularly the significant unexplained earnings gap across location of

[84] According to the decomposition, 61% (in model 1.2 i.e. [(-0.187/-0.306)*100)=61%] of the difference can be attributed to characteristics, and, therefore, if the foreign-trained dentists were exactly identical to the domestic-trained dentists, their earnings would be: $101,305 + ($147,530 -$101,305)*0.61 = $129,502. The approximation here is that the calculation leading to 61% of the earnings difference attributable to characteristics is calculated on log earnings [ln(Y)], not on natural earnings. The increase from $101,305 to $129,502 results in an earnings differential that is $18,028 down from $46,225, meaning that the earnings gap of about 30% reduces to about 12.2% when the foreign-trained dentists' levels of characteristics are adjusted to that of domestic-trained dentists. Alternatively, following Jann (2008) and using the geometric mean from the transformed log earnings: (($103,254-$76,058)/($76,058))= 35.76%; the characteristics contribution is ((-0.187/-0.306)*100)=61%, in model 1.2 of Table 3.3, where the Canada-US coefficients are used, so 61% * 35.76% = 21.8 % which implies that the foreign-trained dentists' earnings would increase by 21.8% if their characteristics were adjusted to the levels of the Canadian-trained ones.

training, mainly due to differences in constants (see models 2.1 to 2.5 in Table 3.4).[85] We impose a common support assumption (see appendix) on the observable and unobservable variables, which simply implies that only explanatory variables common to both Canadian-born and foreign-born dentists [i.e., the Canadian-born, Canada/US-trained (CBCT); the foreign-born, Canada/US-trained (FBCT), and the foreign-born, foreign-trained dentists (FBFT)] are included in the models.[86] In all cases, Canadian educated/trained should be read as being educated in either Canada or the US given the highly (and for some formally) integrated nature of the two nations' health training systems.

We find positive rates of return for characteristics for the foreign-trained dentists across models 2.1 to 2.5, but higher magnitudes of the difference in constants. The difference in constants across the models clearly depicts a negative association of being trained abroad with log earnings, after controlling for the observable characteristics. Note that model 2.1 is the base model (and same as panel 2 of model 1.2 in Table 3.3) in the comparisons. In the following, we present models 2.2 to 2.5 in turns.

Holding the place of birth constant, the first is a decomposition of the earnings gap between FBCT dentists who landed as children and CBCT dentists, as shown in model 2.2. Foreign-born dentists who immigrated as children are most likely to have obtained all their human capital in Canada, and thus, alongside native-born, domestic-trained dentists, they have

[85] If individuals undertake a bridging program in Canada, they may well report that their highest level of education is in Canada even though their basic dentistry degree is foreign. Bridging programs make the identification of foreign versus Canadian trained difficult. Therefore, we separate individuals who immigrated as children from adults to clearly distinguish between those dentists who obviously would have received their post-secondary education in Canada and adult foreign-born foreign-trained dentists.

[86] The case of an earnings gap between foreign-born foreign-trained dentists and Canadian-born Canadian/US-trained counterparts illustrates a clear example, where the X vector of covariates may be different for the two groups of dentists. For instance, the earnings of foreign-born foreign-trained may depend on their country of origin and their age at arrival, two variables that are not defined for native-born Canadian/US-trained dentists.

narrower log earnings gap of approximately 17% (see Figure 3.1 and Table 3.1) than the foreign-born dentists who immigrated as adults.

We decompose the earnings gap between CBCT dentists as the base group and FBCT dentists who immigrated as children (which we define as 18 years of age and younger) (see model 2.2 in Table 3.4). When we control for hours and weeks worked, remarkable results emerge: individual characteristics contribute 86% of the earnings differential whereas the rates of return for characteristics and unobservable characteristics contribute 14%, but statistically insignificant at 10% and at any reasonable threshold (with a p-value of 0.722). This implies that the difference in earnings gap between these two groups of dentists stems mainly from observable characteristics. These results clearly show the advantages of acquiring generic human capital and dentistry training in the host nation since the immigrants who arrived young and the native-born persons have similar rates of return for characteristics and no unobservable differences. Cautiously, the results could also suggest that ethnic discrimination based on place of birth is not the main determining factor to the log earnings gap.

Second, we restrict the sample to, and decompose the earnings gap between FBFT dentists who immigrated as adults (25 years and above) and CBCT dentists (see model 2.3 in Table 3.4). This model shows the highest log earnings gap of 37%. The foreign-trained dentists here may have written the certification examination once or twice, and/or would have acquired some language training and Canadian education through the two year-bridging dentistry program. They would not have had the opportunity to take the route of the NDEB Equivalency process since that was only implemented in 2010 and they are from our 2006 dataset. We find results similar to those presented in model 1.2 of Table 3.3. The total characteristics contribute 57% of the log earnings differential and unobservables and rates of return account for 43% when

labour market activities are controlled for. The unobservables or difference in constants account for most of the 43% gap, implying that the location of training (i.e. being trained abroad in itself) affects the earnings of foreign-born foreign-trained dentists. Consistent with previous literature, where the country of origin of foreign education has been found to have related effects on earnings due to variations of attributes across different source country educational systems (see, e.g., Friedberg, 2000; Bratsberg and Terrell, 2002; Buzdugan and Halli, 2009), our analysis suggests that pre-immigration foreign training in dentistry has a lower rate of return in the host nation.

Overall, holding the place of birth constant (in models 2.2 and 2.3), the training location effects between CBCT and FBCT dentists was statistically insignificant, but it was significant between the CBCT dentists and FBFT dentists. Thus, the results from these two models alone underscore the compelling evidence of the influence of location of training and not location of birth per se in log earnings gap.

Third, model 2.4 restricts the sample to, and decomposes the earnings gap between, Canadian/US-trained dentists and foreign-trained dentists who only trained in Organization of Economic Co-operation Development (OECD) countries, and therefore depicts the importance of location of study. It is important to note that the top five countries where foreign-trained dentists obtained their highest education are the UK, Poland, Philippines, India and Iran. Of these countries, only the UK and Poland are OECD countries. Based on prior knowledge of educational systems, we make a plausible assumption that those trained in an OECD country received training similar to Canada/US training. As expected, we find a smaller earnings gap (26.9%) but it is of interest that this gap is far from being negligible. Even for dentists coming from an OECD country, where technical quality can be seen as similar and culture is close to the

dominant culture of Canada, being trained outside of Canada and the US still generates a gap, mostly explained by a difference in constants (unobservables).

Finally, we restrict the sample to, and decompose the earnings gap between only self-employed Canadian/US-trained dentists and self-employed foreign-trained dentists (see model 2.5 in Table 3.4). We find a log earnings gap of 27% compared to the 30% among the whole population of employee and self-employed dentists in model 2.1. This is the model with the largest difference in constant terms but also a significant rate of returns for characteristics. Although we have seen in models 2.2 and 2.3 that ethnic discrimination based on place of birth does not explain much of the log earnings gap at least from our decompositions, one could cautiously infer that if there is any discrimination, it is more from perceived patients' preferences than employers, where patients may allow foreign-trained dentists' accent or lack of fluency in English/French language to deliver services and differences in cultural interactions with patients, to influence their perception of quality of service.

Other plausible unobservable effects likely to contribute to the earnings gap of the self-employed dentists are that, the patient-mix may be different for the foreign-trained dentists and the Canadian/US-trained dentists. The foreign-trained dentists may charge (their patients) less than their Canadian/US-trained counterparts. The foreign-trained dentists may treat patients from their own immigrant communities some of whom may be less well-off and without private dental insurance.[87]

[87] A large potential of the earnings gap could arise from care delegated to other professionals (for e.g., dental hygienists), as a result dentists that employ more dental hygienists will likely have higher practice earnings than those who do not employ other professionals as indicated earlier in this chapter when we examined the earnings variable.

3.5 Discussion of Results

In summary, we find that there is a large earnings gap ($46,225 or approx. 30%) between Canadian/US-trained and foreign-trained dentists on average, and that 40% ($18,537.06) of this gap still persists after controlling for characteristics such as mother tongue, potential Canadian work experience, visible minority, gender and geographical location. This 40% gap is the result of unobservable differences (location of training effects) rather than rates of return for characteristics.

The location of training effect is larger for the foreign-born foreign-trained dentists than for the OECD-trained dentists or for the foreign-born Canadian/US-trained ones who experience statistically insignificant (beyond any reasonable threshold) training location effects (or no penalty), suggesting that training location plays a key role in the earnings gap. Last, the location of training effect (or penalty) for the self-employed foreign-trained dentists is larger than the training location effect observed on the whole sample (self-employed and salaried dentists together), suggesting that if discrimination were to exist, then perhaps patient-based preferences rather than employer-based discrimination might be related to the unexplained earnings differential. Note, however, that, in the case of the self-employed dentists the difference in rates of return for characteristics is statistically significant (favouring the foreign-trained dentists).

How can we explain this location of training effect (or penalty) for unobservable characteristics of the foreign-trained dentists? The location of highest education could be a proxy of the schooling experience (or quality of dentistry programs) with access to physical facilities, language fluency (beyond mother tongue, i.e., the type of language of instruction used in schools), etc. It could also be a proxy for learning environments in different geographical locations embodied with socio-cultural reinforcements as part of the learning process (as

discussed by Behrman and Birdsall, 1983). For example, dental education in India and Japan show disparities as both countries have no nationwide licensure examinations, as highlighted by Komabayashi *et al.* (2005).

The portability of foreign-born human capital into earnings potential depends on quality and compatibility (in terms of skill requirements of the host nation) of education received abroad and the national origin of an individual's education (Friedberg, 2000). Some factors that may influence the compatibility of skill requirements between destination and source countries include institutional settings, industrial and occupational structures, and levels of economic development. The more these factors are similar in both destination and source countries the more likely one's foreign education and work experience will be valued in the destination country (Friedberg, 2000).

In a context where dentists are free to charge their own fees, our study expands the literature on the effects of foreign human capital on the earnings of foreign-trained dentists, which directly relates to the policy issues surrounding labour market integration of foreign-trained dentists. We clearly identify those who received their educational credentials outside of Canada/US, an important distinction that is not apparent in other studies. Our findings are consistent with previous research in the immigration literature.

3.6 Conclusions and policy implications

The main research question posed at the outset of this paper is what can explain the approximately 30% earnings differential observed between Canadian/US-trained and foreign-trained dentists: is it related to the location of highest training effect? We also ask whether it is related to a composition effect (i.e. foreign-trained dentists are different) or to the fact that for the same characteristics foreign-trained dentists are rewarded differently as they need to adjust

culturally and professionally to a different environment? We test whether or not the effect of location of training on earnings differs from the effect of location of birth.

In the Canadian context, where dentists are not mandated to follow any scheduled fees they charge their patients, we find that location of training and, not location of birth exclusively, is the key determinant of dentists' earnings potential in the labour market. We find that 61% (approximately $28,200) of the earnings gap is attributed to differences in average observable characteristics between Canadian/US-trained and foreign-trained dentists (composition effect). However, 39% of the gap (approximately $18,000) is attributed to differences in rates of return for individual characteristics and differences in unobserved characteristics. Most of this 39% gap has to do with the mere fact of being a trained abroad in itself (i.e. differences in constants) while the rates of returns for characteristics do not tell us much, except for the fact that visible minority foreign-trained dentists perform better than visible minority domestic-trained dentists.

We see that the effect of training location is much larger among self-employed dentists perhaps, in part, reflects learned cultural/professional practices, cultural differences in interactions with patients, the number of patients, motivation or even unobserved differences in technical quality among those who passed the licensure exams successfully. Also the location of highest training partly reflects the perceived quality of education received, and the language skills, among other factors. The location of training effect is larger for the foreign-born foreign-trained dentists than for the OECD-trained dentists.

We hold location of birth constant in two models and further test the hypothesis about the location of training effect, by first decomposing the log earnings gap between the foreign-born Canadian/US-trained dentists who immigrated as children and Canadian-born, Canadian/US-trained dentists. Second, we also decompose the earnings gap between Canadian-born,

Canadian/US-trained dentists and foreign-born, foreign-trained dentists who immigrated as adults. The results from these two models alone underscore the compelling evidence of the influence of location of training and not location of birth per se in log earnings gap.

Finally, we also pose an experimental counterfactual question and our simulations show that adjusting foreign-trained dentists' characteristics levels to the levels of the Canadian/US-trained reduces the earnings gap from about 30% posed at the outset of this research to approximately 12.2% .

Further research and policy implications

On further research and policy implications, we observe that the differences in unobservables have a higher magnitude of effect on the log earnings gap than differences in rates of return for characteristics.

Future research could try to disentangle language effects, schooling quality, gender and visible minority status effects on log earnings of dentists. The combination of gender, visible minority and being foreign-trained suggests that female foreign-trained dentists are particularly disadvantaged compared to their male counterparts. Although we did not specifically explore this issue, the role of gender and policy implications for foreign-trained dentists would be important to study in the future.

Care is warranted in interpreting the negative sign of the estimated difference of visible minority predictor variable in the analysis to mean the presence of ethnic discrimination. Unfortunately, we do not have adequate data on immigrant dentists to explore this issue in detail. Therefore, future work with a larger sample size of immigrant dentists than in this study could compare the outcomes of immigrants who arrived as adults and as children within ethnic groups. The argument would be that immigrants that arrived as young children have Canadian

credentials, language, culture and the like, and any gap is ethnic discrimination. It may be that foreign-trained dentists who are also visible minorities (perhaps) face some form of patients' preferences, related to differences in English or French fluency.

The labour market outcomes evidence suggests that solving the foreign credential recognition problem does not eliminate the earnings inequalities that exist in the labour market. Given that those who received their highest training in Canada perform better than those trained abroad, policies could be directed to increase the number of re-training positions for foreign-trained graduates of non-accredited dental programs and, create programs to improve communication and (occupation-specific) language skills of foreign-trained dentists. Moreover, given the increasing diversity of Canadian society,[88] policies are needed that focus on settlement, multiculturalism and integration, and the acculturation of foreign-trained health workers to local professional practice.

[88] Citizenship and Immigration Canada Consultations Annual Report 2010-2011. Available http://www.cic.gc.ca/english/pdf/pub/cons-ann-report-2011.pdf

Table 3.3: Canadian/US- vs. Foreign-trained practicing dentists' earnings differential: Detailed Oaxaca-Blinder decomposition results with sensitivity tests of reference coefficients

	Canadian/US- vs. Foreign-trained Gap			
	Using group 2: Canadian/US-trained coefficients			
Panel 1	Model 1.1		Model 1.2	
Log earnings gap attributable to:	Charac-teristics	Rates of Return	Charac teristics	Rates of Return
Visible minority population	-0.050**	0.174**	-0.050**	0.177**
	(0.016)	(0.060)	(0.015)	(0.055)
Female	-0.057***	0.090	-0.042***	0.081
	(0.013)	(0.061)	(0.011)	(0.054)
MD potential Cdn wk experience	-0.133***	-0.040	-0.064**	-0.029
	(0.039)	(0.046)	(0.025)	(0.034)
MD potential Cdn wk experience sqd	0.147***	-0.082+	0.059*	-0.056
	(0.038)	(0.049)	(0.026)	(0.043)
Toronto/Vancouver	-0.021	0.079	-0.036*	0.110
	(0.017)	(0.160)	(0.017)	(0.161)
British Columbia	-0.018*	0.068	-0.011	0.037
	(0.009)	(0.053)	(0.007)	(0.050)
Ontario	0.017*	0.091	0.018*	0.046
	(0.009)	(0.090)	(0.009)	(0.092)
Speak foreign mother tongue	-0.049	0.133	-0.068*	-0.010
	(0.031)	(0.170)	(0.029)	(0.138)
Married	0.027**	-0.050	0.020**	-0.077
	(0.009)	(0.122)	(0.007)	(0.116)
MD Weeks worked in 2005			-0.035	0.002
			(0.024)	(0.006)
MD Hours in reference week			0.008	0.005
			(0.010)	(0.007)
Constant		-0.717*		-0.500
		(0.345)		(0.351)
Panel 2				
Overall differential	Model 1.1	exp(b)	Model 1.2	exp(b)
Group 1: Foreign-trained	11.239***	76,058.1***	11.239***	76,058.10
	(0.056)	(4,266.9)	(0.058)	(4,385.7)
Group 2: Canadian/US-trained	11.545***	103,254.6***	11.545***	103,254.60
	(0.020)	(2,105.6)	(0.020)	(2,075.9)
Log earnings gap	-0.306***		-0.306***	
	(0.060)		(0.061)	
Total characteristics (explained)	-0.125***	41%	-0.187***	61%
	(0.035)		(0.044)	
Rates of return & unobservables (unexplained)	-0.181**	59%	-0.119*	39%
	(0.064)		(0.059)	
Breakdown of unexplained				
Differences in rates of return	0.536		0.381	
	(0.351)		(0.352)	
Differences in constants	-0.717*		-0.500	
	(0.345)		(0.351)	
R^2- subgroup regressions	CdnUS= 0.137	Foreign= 0.186	CdnUS= 0.249	Foreign= 0.358

Notes: We show that the decomposition results are sensitive to reference coefficients being used see Table 3.A7 in the appendix. Therefore, we use the coefficients of the Canadian/US-trained dentists in models 1.1 & 1.2 and the coefficients of the foreign-trained dentists as the reference coefficients in models 1.3 & 1.4 in Table 3.A7, to understand the changes that occur with the occupational earnings structure attributed to the location of highest education, consistent with discussions in O'Neill and O' Neill (2005). We control for statistically insignificant Masters and PhD (dentistry as reference), Other CMAs; Atlantic, Prairies, Territories, (with Quebec as the reference region), and Children under 5 years (children 6 + years as the reference). We run four decompositions with and without the mean deviated weeks and hours worked. We also mean deviated (MD) potential work experience and its squared. The robust standard errors are in the parenthesis. + Significant at 10%; * significant at 5%; **significant at 1%; ***significant at 0.1%. Number of observations for group 1 is 275 and number of observations for group 2 is 2,769. To transform the logs back to the original scale, the geometric mean [exp(b)] of earnings is presented in columns next to the log earnings point estimates in panel 2 of the table. The geometric mean is used to calculate the counter-factual question: what would earnings be if foreign-trained dentists' characteristics were adjusted to the levels of Canadian/US-trained dentists in footnote 28 above, consistent with Jann (2008).

Table 3.4: Oaxaca-Blinder decompositions, robustness check, and groups of working dentists

	CdnUS-trained vs. Foreign-trained		Cdn-born, CdnUS-trained vs. Foreign-born CdnUS-trained (<18yrs)		Cdn-born, CdnUS-trained vs. Foreign-born, Foreign-rained (>25yrs)		CdnUS-trained vs. Foreign-trained (only trained in OECD countries excl CdnUS)		CdnUS-trained vs. Foreign-trained (only self-employed)	
	Model 2.1	%	Model 2.2	%	Model 2.3	%	Model 2.4	%	Model 2.5	%
Group 1:	11.239***		11.418***		11.223***		11.276***		11.367***	
	(0.058)		(0.059)		(0.061)		(0.094)		(0.055)	
Group 2:	11.545***		11.596***		11.596***		11.545***		11.643***	
	(0.020)		(0.023)		(0.023)		(0.094)		(0.021)	
Log earnings gap	-0.306***		-0.178**		-0.372***		-0.269**		-0.276***	
	(0.061)		(0.063)		(0.065)		(0.096)		(0.059)	
Diff in characteristics	-0.187***	61	-0.152**	86	-0.212***	57	-0.129*	48	-0.164***	59
(explained)	(0.044)		(0.050)		(0.063)		(0.053)		(0.039)	
Unexplained: Rate of returns	-0.119*	39	-0.026	14	-0.161*	43	-0.139	52	-0.113+	41
(ROR) & Unobservables	(0.059)		(0.072)		(0.071)		(0.086)		(0.063)	
Sub-components of unexplained										
Diff. in ROR for characteristics	0.381		0.267		0.348		0.189		0.769*	
	(0.352)		(0.316)		(0.391)		(0.439)		(0.379)	
Difference in constants	-0.500		-0.292		-0.509		-0.328		-0.881*	
	(0.351)		(0.305)		(0.391)		(0.425)		(0.379)	

Notes: We present what Groups 1 and 2 represent and the number of observations (obs) of working dentists in each group. In **model 2.1—**Group 1= the foreign-trained (275 obs) vs. Group 2= the Canadian/US-trained (2769 obs); **model 2.2—** Group 1= the foreign-born Canadian/US-trained (who immigrated as children <18 years; 447 obs) vs. Group 2= the Canadian-born Canadian/US-trained (2062 obs); in **model 2.3—**Group 1=the foreign-born foreign-trained (who immigrated as adults >25 years; 240 obs) vs. Group 2= the Canadian-born Canadian/US-trained; 2062 obs); in **model 2.4 —** Group 1=the foreign-trained (in OECD countries without Canada and US; 103 obs) vs. Group 2 = the Canadian/US-trained (2769 obs)**;** and in **model 2.5 —**Group 1=the foreign-trained self-employed dentists (200 obs)vs. group 2=the Canadian/US-trained self-employed dentists (2151 obs).

We use the coefficients of Canadian/US-trained dentists as the reference weights in all the models. We account for potential Canadian work experience, gender, visible minority status, geographic information, level of education, maternal language, marital status, family composition, hours in census reference week and weeks worked in 2005. We mean deviated all the continuous variables. Model 2.1 (a simplified version of the detailed model 1.2 in Table 3.3) is the base model for comparison with models 2.2-2.5. In model 2.5, foreign-trained persons refer to those trained in OECD countries excluding Canada and the US. Cdn-born= Canadian-born; and CdnUS=Canadian/US-trained. ROR=rates of return. The robust standard errors are in the parenthesis. + Significant at 10%; * significant at 5%; **significant at 1%; and ***significant at 0.1%.

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Conclusion

In this thesis I investigate the international migration and occupational integration of healthcare professionals from an economic perspective. I address the three main overarching questions, set at the onset of the thesis, in the introduction.

First, I ask why international health professionals migrate and some of the motivations driving this observed migration. In summary, there is evidence that a key driver of the international migration of health professionals is the shortage of skilled health professionals in developed countries. When foreign-trained health professionals (FTHPs) settle in host nations, with Canada as an example, they face institutional challenges in the health labour market. The emigration of FTHPs leaves a detrimental effect on the healthcare systems of the source countries, the majority of which are resource-strapped developing countries. The large earnings differential between developed and developing countries has an influence on the migration of FTHPs. FTHPs who work in a regulated health occupation enjoy economic rents as there are large opportunity costs associated with not working in one's trained field, as found in the literature for physicians.

Economic analysis of asymmetric information in the form of government regulations, licensure and other forms of practice standards has not yet been integrated into the immigration and health literature. Standardized or comparable data availability has also hindered research in cross-national research of migration issues; however, international organizations such as WHO, World Bank and OECD are making progress in data compilation for such analyses. Managed

migration, in bilateral and multilateral agreements, is one of the policy options for developing countries to adopt in an effort to curtail the relatively high emigration rates. For developed countries, self-sufficiency (and utilization of already existent skilled health workers in host nations) in the production and supply of health professionals is an option that is advocated. A persistent issue that arises is whether FTHPs already residing in host nations possess equivalent credentials comparable to those of the host countries.

Next, I ask if the empirical evidence shows whether the possession of foreign credentials indeed affects the likelihood of employment and earnings of FTHPs. A substantial proportion of FTHPs are unable to practice in their regulated health occupations (representing a loss of human capital) partly related to deficiencies in technical skills, language skills, rigorous re-certification and licensure processes, coupled with the disincentive effects of age and the costs of re-skilling programs. Although host governments, third party assessors, certification boards, and regulatory authorities impose stringent institutional hurdles for FTHPs, these barriers are also in place to maintain competency standards, protect consumers, and control the supply of licensed health practitioners.

By examining three categories of regulated health professionals (i.e., Canadian-born Canada/US-trained, foreign-born, Canada/US-trained and foreign-born, foreign-trained persons) within the eight selected regulated professions, it is observed that foreign-born, foreign-trained health professionals are the least likely group of individuals to work in their trained occupations. Even though substantial barriers exist in the health labour market, once those hurdles are crossed, we find mixed results and substantial higher earnings associated with those working in their trained field relative to those not working in their fields.

In terms of policy initiatives, some Canadian provinces, in collaboration with educational institutions and regulatory bodies, have taken the steps of creating bridging programs and financing accreditation programs (on a pilot basis) for FTHPs to attain Canadian equivalency. As the number of regulated health occupations keeps growing (at the provincial level), one can expect that FTHPs who are less likely to work in regulated occupations may experience even more challenges to gain access into their trained regulated health occupations.

Finally, I ask whether the location of highest post-secondary training (foreign or domestic training) affects the labour market outcomes of practicing licensed FTHPs. Crossing the hurdle of foreign credential recognition is only the tip of the iceberg in the prevalent inequalities in the labour market that FTHPs face. Using licensed dentists, who are also free to set their own fees, as a case study, the evidence demonstrates that the location of training and, notably, not immigration status exclusively, has a major role in determining the earnings of regulated health professionals. Even after obtaining their licenses to practice in Canada, FTHPs experience a significant earnings differential relative to domestic-trained health professionals, suggesting that there are still problems in the health labour market that are beyond licensure. However, this earnings gap reduces if foreign-born professionals obtained their highest education in the host country.

A comparison between foreign-born, Canada/US-trained dentists and Canadian-born Canada/US trained dentists unveiled that the earnings differential was solely attributable to personal and market characteristics such as potential Canadian work experience, visible minority status, gender and location of residence. However, a comparison between Canadian-born, Canada/US-trained dentists and foreign-born, foreign-trained dentists depicted a contrasting situation where 57% of the earnings gap was related to personal and market characteristics, but a

statistically significant 43% was linked to the location of training i.e. the differences in rates of return for characteristics, e.g., value of years of schooling and differences in constants, i.e. unobservable characteristics (for e.g., motivation and variables not available in the dataset).

Given that those who received their highest training in Canada perform better than those trained abroad, policies could be directed to increase the number of re-training positions for foreign-trained graduates of non-accredited dental programs and, create programs to improve communication and (occupation-specific) language skills of foreign-trained dentists. Furthermore, policies could aim at improving settlement and integration programs directed toward network (social) establishment for recent FTHPs. Some of these programs include, for example, the Immigrant Settlement and Adaption Program, the Host program, and the Resettlement Assistance Program. [89]

One key message of this research is that generally an earnings gap exists between FTHPs and domestic-trained ones, but particularly in the case of dentists that is not a spurious effect of the composition (i.e. the fact that FTHPs are more likely to have characteristics that earn less than their domestic-trained counterparts), but seems to be linked to location of training for FTHPs. That being the case, then the literature on international migration of health professionals should be cognizant of this and should not use the difference in average earnings between the origin and host countries as a key motivation (independent variable) in models explaining the decision to emigrate to a richer country, but, rather use, difference between what a FTHP from the source country can earn in the host country and what they can earn if they stayed in their country of training, in order to reflect what the FTHPs would actually make if they were to make the decision to emigrate.

[89] Citizenship and Immigration Canada (2003-2004) Evaluation of the Immigrant Settlement and Adaptation Program. Retrieved from http://www.cic.gc.ca/english/resources/evaluation/isap/intro.asp (accessed June 28, 2013)

Overall, the thesis provides empirical evidence of economic integration of FTHPs in a host country. A recap of some novel areas of research, as stated in the study, include the limited study on the causal impacts of programs intended to address underserviced areas of facing shortages of health professionals; the limited examination of the causal effects of language skills/literacy on earnings and employment outcomes of international immigrant health professionals; and, finally, the limited study on the emergence of native-born professionals who received their professional training abroad and return home for practice. Some other future areas for research using administrative claims data could explore the different treatment patterns between foreign-trained physicians and domestic-trained physicians. Future research could also try to disentangle language effects, schooling quality, gender and visible minority status effects on log earnings of dentists with a larger sample size across different ethnic groups.

A limitation in using the census is that the location of highest education variable is likely to be post-graduate education since the locations of undergraduate medical degrees are unknown in the census. Moreover, the census respondents self-report their highest level of education and primary occupation, which lead us to eliminate individuals who self-report as being health professions such as dentists, pharmacists, psychologists and physiotherapists but who also contrarily self reported their highest degree to be below an undergraduate degree. Another limitation is that we work on the 2006 long-form census (which is mandatory for respondents) since the 2011 census is not available (although the 2011 is voluntary for respondents). However, a major strength of the 2006 long-form census is the variable that clearly identifies one's location of highest study which is non-existent in the earlier censuses.

Appendix

Thesis Chapter 2 Appendix

Detailed Definitions of Variables from the 2006 Canadian Census data- Statistics Canada (2006)[90]

For sensitivity tests on the occupation variable used, Nochrd, we compare the 'Nochrd' to other historical occupation variables, the National Occupational Classification for Statistics 2006 (NOC-S 2006) and the Standard Occupational Classification (SOC) 1991, to ensure accuracy and consistency of the sample data. The number of pharmacists identified is the same for NOC-S 2006 but slightly different from SOC91 by 5 counts.

Labour market outcome variables: We create an earned income variable by adding total self-employment income to wages and salaries. Where there is a negative self-employment income we replace it with a zero. Total self employment income (sempi) is defined by Statistics Canada as total income received during calendar year 2005 as net income from farm and/or non-farm self-employment. Wages and salaries is defined by Statistics Canada as the gross wages and salaries before deductions for such items as income tax, pensions, employment insurance, etc., as well as all types of casual earnings in the 2005 calendar year. Hour variable (hours) refers to an individual's actual number of hours worked for pay or in self-employment at all jobs (with or without pay in an own or family business) held in the week (Sunday to Saturday) prior to Census Day. Weeks worked in 2005 variable (weeks) refers to a respondent's number of weeks worked in 2005 for pay or in self-employment at all jobs held, even if only for a few hours. It includes weeks of paid vacation, sick leave with pay, and even weeks in which training was paid for by the employer. We recode weeks with negative one as missing values. A negative one indicates weeks worked in 2006 instead of 2005.

Control variables: Visible minority variable (dvismin) refers to the visible minority group to which the individuals belong, who are persons, other than Aboriginal peoples, and are non-Caucasian in race or non-white in colour. Place of birth variable (pob_cntry) refers to the country of birth of the respondent.

Language variable (mtndr) is a derived variable that refers to the mother tongue of the individual at the time of the census. Sex refers to the gender of the respondents, either male or female. Residential variable (cma) refers to the census metropolitan area (CMA) or census agglomeration (CA) where current residence is located (2006).

Education level variable (HCDD) is a derived variable from the question that requires respondents to report all certificates, diplomas and degrees. It refers to the respondent's most advanced certificate, diploma or degree. Although there are respondents with lower educational credentials, the health professions we examine require high education, so, for the context of our study, we include respondents with diplomas including College, CEGEP or other non-university certificate or diploma from a program of 1 year to 2 years; College, CEGEP or other non-university certificate or diploma from a program of more than 2 years; University certificate or

[90] Statistics Canada (2006). Census 2006 definitions of variables. Available: http://www12.statcan.ca/census-recensement/2006/ref/dict/overview-apercu/pop5-eng.cfm (accessed June 10, 2010).

diploma below bachelor level; Bachelor's degree; University certificate or diploma above bachelor level; Degree in medicine, dentistry, veterinary medicine or optometry; Master's degree; Earned doctorate degree.

For those in the field of medicine we also use Education: Degree in medicine, dentistry, veterinary medicine or optometry MEDDIP "Refers to the possession of a degree in medicine, dentistry, veterinary medicine or optometry, regardless of whether higher educational qualifications (i.e. master's or earned doctorate degrees) were held or not. There are four categories to this variable used only in the regressions concerning physicians: Degree in medicine, dentistry, veterinary medicine or optometry without master's and without earned doctorate degrees; Degree in medicine, dentistry, veterinary medicine or optometry with master's degrees; Degree in medicine, dentistry, veterinary medicine or optometry with earned doctorate degrees; Degree in medicine, dentistry, veterinary medicine or optometry with master's and with earned doctorate degrees

Year of immigration variable (yrim) indicates the year in which the respondent first obtained landed immigrant status (a person who has been granted the right to live in Canada permanently) including immigrants who landed prior to Census day. We recode the variable so that non-permanent residents coded as (-4) and non-immigrants and institutional residents coded as (-3) are coded as zero. We then look at the differences in the cohorts of immigrants to Canada. Statistics Canada defines a non-immigrant as a Canadian citizen by birth (born in Canada or born Foreign to Canadian parents). Age at immigration (Age_Imm_Revised) refers to the age at which the respondent first obtained landed immigrant status. A landed immigrant is a person who has been granted the right to live in Canada permanently by immigration authorities. Immigrants who landed in Canada prior to Census Day, May 16, 2006, are included.

The age of youngest child in census family (KidAge) is categorized into 3 groups. Group 1 constitutes those with no children, group 2 denotes those with children aged below 5 years and group 3 represents census families with children aged 6 years and above.

For those who are not working as pharmacists: industry sector variable (naicsecf) refers to the general nature of the business carried out in the establishment where the person worked. If an individual did not have a job in the reference week prior to Census day, then the data relate to the long duration of a job held since January 1, 2005. Those with two or more jobs report the information for the job at which they worked the most hours.

Notes for Table 2.3

We use the CIPCODE to identify those trained in any of the eight health professions. Next, we use the HCDD and MEDDIP as a "check" to drop those reporting work to have been trained for e.g., as a pharmacist but do not have an undergraduate degree. This helps to reduce measurement errors.

Highest education in dentistry: **Dentistry** (DDS, DMD), Dental Clinical Sciences, General (MSc, PhD), Oral Biology and Oral Pathology, (MSc, PhD), Dental Public Health and Education, (Cert., MSc, MPH, PhD, DPH), Endodontics/Endodontology (Cert., MSc, PhD), Oral/Maxillofacial Surgery (Cert., MSc, PhD), Orthodontics/Orthodontology (Cert., MSc, PhD), Pediatric Dentistry/Pedodontics (Cert., MSc, PhD), Periodontics/Periodontology (Cert.,MSc,

PhD), Prosthodontics/Prosthodontology (Cert., MSc, PhD), Advanced/Graduate Dentistry and Oral Sciences (Cert., MSc, PhD), and all those reporting Dental Specialty Residency Programs. We exclude those without an undergraduate dental degree.

Highest education in medical laboratory technology: Clinical Laboratory Science/Medical Technology/Technologist. We exclude all those below College, CEGEP or other non-university certificate or diploma from a program of 1 year to 2 years.

Highest education in radiation technology: Radiologic technology/science, radiographer, medical radiologic technology/science, radiation therapist, and nuclear medical technology/technologist. We exclude all those with diplomas below a College, CEGEP or other non-university certificate or diploma from a program of 1 year to 2 years.

Highest education in pharmacy: Pharmacy (PharmD [USA], PharmD or BSc/BPharm [Canada]), Pharmacy Administration and Pharmacy Policy and Regulatory Affairs (MSc, PhD), Pharmaceutics and Drug Design (MSc, PhD), Medicinal and Pharmaceutical, Chemistry (MSc, PhD), Natural Products Chemistry and Pharmacognosy (MSc, PhD), Clinical and Industrial Drug Development (MSc, PhD), Clinical, Hospital and Managed Care Pharmacy (MSc, PhD), Industrial and Physical Pharmacy and Cosmetic Sciences (MSc, PhD), Pharmacy, Pharmaceutical Sciences and Administration, and Pharmacoeconomics/Pharmaceutical Economics (MSc, PhD). We exclude those without a bachelor degree.

Highest education in medicine: Medicine (MD), medical scientist (MSc, PhD) and all medical residency programs e.g. allergies and immunology residency programs, orthopedic surgery of the spine. We exclude those without a medical degree. **Highest education in physiotherapy:** Physical Therapy/Therapist. We exclude those without a bachelor degree. **Highest education in psychology**: Psychology-general, clinical psychology, cognitive psychology and psycholinguistics, community psychology, counselling psychology, developmental and child psychology, experimental psychology, industrial and organizational, psychology, personality psychology, physiological psychology/psychobiology, social psychology, school psychology, educational psychology, psychometrics and quantitative psychology, clinical child psychology, environmental psychology, geropsychology, health/medical psychology, psychopharmacology, family psychology, forensic psychology, psychology-other, psychoanalysis and psychotherapy. The minimum requirement needed to practice is a master's degree. So we drop all those with BSC and below bachelor as their highest degree.

Highest education in nursing: Nursing/registered nurse (RN, ASN, BScN, MScN), nursing administration (MScN, MSc, PhD), adult health nurse/nursing; Nurse Anesthetist, Family Practice Nurse/Nurse Practitioner, Maternal/Child Health and Neonatal Nurse/Nursing, nursing science (MSc, PhD); pediatric nurse/nursing; psychiatric/mental health nurse/nursing; public health/community nurse/nursing; perioperative/operating room and surgical nurse/nursing, clinical nurse specialist; critical care nursing, nursing-Other. We exclude all those below College, CEGEP or other non-university.

In the main analysis as depicted in Tables 2.10 to 2.12, gender, degree of education, place of residence, marital status, family composition and gender interactions are not shown since they are not the primary interest of this chapter. However, the following Appendix Tables 2.A10 to 2.A16 show estimations accounting for all the variables and interactions: gender-marital status and gender-children.

Table 2.A10: Logistic regressions for estimated likelihood of working in one's trained health occupation for those in the labour force

Variables of interest	Dentist	MLT	MRT	Pharm	Physician	Physio	Psy	RN
Canadian-born foreign-trained	**0.192+**	1.470	0.418	0.583	**0.253*** **	1.278	0.730	**0.531*** **
	(0.177)	(1.674)	(0.254)	(0.303)	(0.076)	(0.695)	(0.170)	(0.085)
Foreign-born CdnUS-trained	0.924	0.945	0.920	**0.590** **	**1.390***	1.048	**0.724*** **	**1.126***
	(0.234)	(0.136)	(0.205)	(0.115)	(0.196)	(0.240)	(0.068)	(0.055)
Foreign-born foreign-trained	**0.162*** **	**0.387*** **	**0.396*** **	**0.353*** **	**0.246*** **	**0.503** **	**0.364*** **	**0.542*** **
	(0.035)	(0.075)	(0.105)	(0.067)	(0.024)	(0.112)	(0.075)	(0.034)
Visible min*foreign-born CdnUS-trained	0.979	**0.522***	1.747	1.205	**0.577***	1.249	**2.955*** **	0.930
	(0.371)	(0.132)	(0.727)	(0.319)	(0.129)	(0.534)	(0.828)	(0.099)
Visible min*foreign-born foreign-trained	**0.446***	**0.534***	1.053	0.835	**0.381*** **	**0.509+**	1.291	1.072
	(0.147)	(0.140)	(0.412)	(0.202)	(0.068)	(0.198)	(0.488)	(0.114)
Visible min	0.955	1.102	0.868	0.942	**1.632** **	0.809	**0.331*** **	1.001
	(0.267)	(0.212)	(0.267)	(0.176)	(0.262)	(0.249)	(0.076)	(0.088)
Controls								
Potential foreign experience (in years)	**0.933*** **	**0.959*** **	**0.948** **	**0.959*** **	**0.967*** **	**0.958** **	**1.021+**	**0.959*** **
	(0.015)	(0.009)	(0.017)	(0.009)	(0.007)	(0.016)	(0.012)	(0.003)
Potential Canadian experience (in years)	**1.163*** **	**1.042** **	**0.964***	**1.092*** **	**1.083*** **	**1.044***	1.004	1.000
	(0.023)	(0.013)	(0.018)	(0.015)	(0.012)	(0.023)	(0.011)	(0.004)
Potential Canadian experience sqd	**0.996*** **	**0.999*** **	**1.000**	**0.998*** **	**0.998*** **	**0.998*** **	**1.000**	**0.999*** **
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Female	0.982	1.000	1.202	0.999	0.958	1.326	**1.294** **	**1.266*** **
	(0.206)	(0.130)	(0.221)	(0.139)	(0.103)	(0.296)	(0.125)	(0.083)
Bachelor		**2.564*** **	**2.590*** **					**1.229*** **
		(0.212)	(0.412)					(0.030)
Above Bachelor		**2.228*** **	1.353	**0.702** **		1.260		0.957
		(0.398)	(0.383)	(0.084)		(0.222)		(0.060)
MD, DMD/DDS, OD, VET				**0.631** **		0.920		
				(0.106)		(0.330)		
Masters/(MD & Masters* only for physicians)	**0.400*** **	**5.202*** **	0.909	**0.534*** **	**0.838+**	1.171		**0.675*** **

	(0.077)	(1.031)	(0.317)	(0.063)	(0.087)	(0.199)		(0.037)
PhD/(MD & PhD* only for physicians)	**0.483*** **	**2.295***	**0.282****	**0.295*** **	**1.765*** **	**0.476+**	**1.847*** **	**0.353*** **
	(0.095)	(0.847)	(0.113)	(0.054)	(0.224)	(0.193)	(0.116)	(0.065)
MD & Masters & PhD only for physicians					0.672			
					(0.168)			
Urban residence	0.806	**1.299****	0.976	0.790	**0.433*** **	1.059	0.877	**1.158*** **
	(0.226)	(0.107)	(0.107)	(0.119)	(0.068)	(0.195)	(0.085)	(0.031)
Speak other mother tongue than Eng/Fren	1.091	0.878	**0.684***	0.909	**0.501*** **	**0.740***	0.917	**0.846*** **
	(0.172)	(0.088)	(0.101)	(0.110)	(0.039)	(0.111)	(0.090)	(0.030)
Married	**1.935*** **	1.148	0.874	1.181	**1.822*** **	0.823	0.941	**1.204***
	(0.327)	(0.171)	(0.172)	(0.171)	(0.180)	(0.202)	(0.097)	(0.099)
Have no children	1.029	1.067	1.194	0.936	1.038	**1.728+**	0.933	0.858
	(0.181)	(0.182)	(0.264)	(0.144)	(0.109)	(0.489)	(0.103)	(0.081)
Children under 5 years	0.919	0.905	**0.580***	0.928	0.992	**1.799***	1.071	**0.810+**
	(0.199)	(0.181)	(0.129)	(0.156)	(0.110)	(0.504)	(0.175)	(0.089)
Female*Married	**0.475****	0.992	1.091	**0.750+**	**0.457*** **	0.881	1.026	**0.770****
	(0.119)	(0.159)	(0.238)	(0.128)	(0.059)	(0.245)	(0.127)	(0.065)
Female*Have no children	1.268	0.835	0.741	1.217	1.241	0.687	1.155	1.085
	(0.340)	(0.154)	(0.180)	(0.235)	(0.184)	(0.218)	(0.155)	(0.106)
Female*Children under 5 years	1.365	0.990	**1.545+**	1.112	**1.547****	0.763	1.206	**1.311***
	(0.398)	(0.215)	(0.397)	(0.224)	(0.231)	(0.250)	(0.226)	(0.149)
Pseudo-R Sq	0.277	0.074	0.070	0.127	0.247	0.082	0.034	0.035
Chi Sq	611.301***	469.054***	331.782***	607.203***	2017.314***	215.777***	244.085***	2091.770***
Log-Likelihood	-6855.4	-23008.1	-11432.2	-14537.8	-25635.7	-7699.8	-23429.5	-188576.3
BIC	13884	46220	23055	29275	51482	15587	47037	377407
Number	3854	7011	4009	5919	14430	3424	7181	64587

Notes: 1) Exponentiated coefficients are reported, are the estimates significantly different from zero. 2) P-values for level of significance + p<.10, * p<.05, ** p<0.01, *** p<0.001. 3) Sample is restricted to aged 25-64years and only those with positive non-zero earnings in 2005. 4) for omitted reference variable for education for all health professions: for dentists is DDS/DMD/dental degree, medical laboratory technologists (MLTs) is below bachelor, medical radiation technologists (MRTs) is below bachelor, pharmacists (pharm) is bachelor, physicians is MD, physiotherapists (physio) is bachelor, psychologist (psy) is masters degree, registered nurses (RNs) is below bachelor. 5) The omitted reference for children in census family is children above 6 years. 6) Omitted reference for variable of interest is Canadian-born Canada-US trained. 7) Mean is estimated with its standard errors are reported in parenthesis. 8) Sample weights are used in all regressions.

Table 2.A11: OLS regressions estimates of location of training effects on log earnings of health professionals working in their trained fields

Variables of interest	Dentist	MLT	MRT	Pharm	MD	Physio	Psy	RN
Canadian-born foreign-trained	0.175	-0.340	0.187*	-0.187	-0.336***	0.038	-0.335	0.046
	(0.415)	(0.443)	(0.085)	(0.128)	(0.095)	(0.083)	(0.255)	(0.055)
Foreign-born CdnUS-trained	-0.077	**0.081***	0.043	-0.049	-0.043	-0.019	-0.093	**0.035***
	(0.068)	(0.037)	(0.074)	(0.060)	(0.032)	(0.064)	(0.058)	(0.015)
Foreign-born foreign-trained	**-0.219***	0.039	**0.292*****	**0.120+**	**-0.153*****	0.116	-0.166	0.021
	(0.086)	(0.056)	(0.076)	(0.067)	(0.040)	(0.089)	(0.157)	(0.031)
Visible min*foreign-born CdnUS-trained	0.093	-0.049	-0.119	-0.012	0.046	0.042	0.150	0.031
	(0.105)	(0.071)	(0.115)	(0.071)	(0.050)	(0.105)	(0.204)	(0.034)
Visible min*foreign-born foreign-trained	**0.349****	0.073	**-0.388****	**-0.230****	**-0.140***	**-0.318***	**0.627***	**0.118****
	(0.115)	(0.076)	(0.120)	(0.079)	(0.059)	(0.154)	(0.269)	(0.042)
Visible min	**-0.251*****	0.048	**0.237****	-0.003	-0.048	0.074	-0.279	-0.027
	(0.072)	(0.048)	(0.085)	(0.041)	(0.033)	(0.072)	(0.174)	(0.028)
Controls								
Potential foreign experience	-0.023**	-0.001	**-0.009+**	**-0.009+**	**0.018*****	-0.007	-0.008	0.001
	(0.008)	(0.003)	(0.005)	(0.005)	(0.003)	(0.008)	(0.007)	(0.001)
Potential Canadian experience	0.030***	0.042***	0.043***	0.032***	0.106***	0.022**	0.039***	0.029***
	(0.008)	(0.004)	(0.006)	(0.005)	(0.003)	(0.007)	(0.007)	(0.002)
Potential Canadian experience sqd	-0.001**	-0.001***	-0.001***	-0.001***	-0.002***	-0.0001*	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.262***	0.003	-0.118*	-0.120**	-0.111***	0.097	-0.061	0.003
	(0.072)	(0.034)	(0.054)	(0.041)	(0.030)	(0.067)	(0.049)	(0.020)
Bachelor		0.023	-0.054					0.093***
		(0.022)	(0.043)					(0.008)
Above Bachelor		0.070	0.082	0.009		-0.002		0.122***
		(0.055)	(0.079)	(0.041)		(0.041)		(0.022)
MD, DMD/DDS, OD, VET				-0.058		0.057		
				(0.068)		(0.094)		
Masters/(MD & Masters* only for physicians)	0.018	0.036	-0.243*	-0.010	-0.166***	-0.083+		0.150***
	(0.071)	(0.056)	(0.107)	(0.035)	(0.027)	(0.046)		(0.022)
PhD/(MD & PhD* only for physicians)	0.054	0.509**	0.626***	0.081	0.124***	-0.176	0.283***	-0.052

	(0.061)	(0.161)	(0.163)	(0.066)	(0.030)	(0.228)	(0.032)	(0.078)
MD & Masters & PhD only for physicians					-0.054			
					(0.090)			
Urban residence	-0.005	0.008	0.008	0.005	0.086**	-0.042	0.038	0.012
	(0.049)	(0.032)	(0.032)	(0.037)	(0.033)	(0.047)	(0.051)	(0.009)
Weeks worked in 2005	0.036***	0.029***	0.028***	0.032***	0.023***	0.033***	0.037***	0.030***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
Hours in reference week	0.009***	0.006***	0.007***	0.008***	0.006***	0.010***	0.016***	0.008***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)	(0.001)	(0.000)
Speak other mother tongue than Eng/Fren	-0.042	-0.038	**-0.078+**	0.025	-0.025	-0.039	0.003	-0.008
	(0.048)	(0.030)	(0.040)	(0.033)	(0.024)	(0.041)	(0.059)	(0.013)
Married	0.123*	0.076+	0.125*	0.016	0.081**	0.227***	0.035	0.123***
	(0.055)	(0.045)	(0.063)	(0.046)	(0.027)	(0.068)	(0.050)	(0.028)
Have no children	-0.055	0.023	0.014	0.007	-0.016	0.010	-0.012	0.025
	(0.054)	(0.058)	(0.064)	(0.050)	(0.028)	(0.074)	(0.060)	(0.029)
Children under 5 years	0.101+	0.055	-0.012	0.054	0.194***	0.027	0.106+	-0.001
	(0.057)	(0.047)	(0.065)	(0.062)	(0.030)	(0.076)	(0.059)	(0.034)
Female*Married	0.057	-0.114*	-0.125+	-0.074	-0.189***	-0.193**	-0.055	-0.129***
	(0.080)	(0.049)	(0.067)	(0.052)	(0.036)	(0.074)	(0.062)	(0.029)
Female*Have no children	0.096	0.015	0.055	0.088	0.033	-0.010	-0.028	-0.014
	(0.084)	(0.062)	(0.070)	(0.058)	(0.043)	(0.081)	(0.071)	(0.030)
Female*Children under 5 years	0.042	-0.041	-0.029	-0.064	0.035	-0.029	0.143+	-0.063+
	(0.089)	(0.057)	(0.074)	(0.070)	(0.042)	(0.092)	(0.075)	(0.035)
Constant	9.278***	8.589***	8.846***	9.091***	9.294***	8.480***	7.951***	8.664***
	(0.148)	(0.096)	(0.112)	(0.100)	(0.081)	(0.160)	(0.145)	(0.036)
Adj R-Sq	0.232***	0.365***	0.328***	0.258***	0.267***	0.303***	0.354***	0.304***
BIC	7669.2	4818.2	4666.2	9581.0	28144.0	5794.7	6435.5	88222.4
Number	3044	3551	2759	4559	11834	2767	2857	46816

Notes: 1) Sample weights are used in all regressions. 2) P-values for level of significance + p<.10, * p<.05, ** p<0.01, *** p<0.001. 3) Sample is restricted to aged 25-64years and only those with positive non-zero earnings in 2005. 4) for omitted reference variable for education for all health professions: for dentists is DDS/DMD/dental degree, medical laboratory technologists (MLTs) is below bachelor, medical radiation technologists (MRTs) is below bachelor, pharmacist (pharm)s is bachelor, physicians is MD, physiotherapists (physio) is bachelor, psychologist (psy) is masters degree, registered nurses (RNs) is below bachelor. 5) The omitted reference for children in census family is children above 6 years. 6) Omitted reference for variable of interest is Canadian-born Canada-US trained. 7) Mean is estimated with its standard errors are reported in parenthesis.

Table 2.A12: OLS regressions estimates of location of training effects on earnings of individuals not employed in their trained health fields

Variables of interest	Dentist	MLT	MRT	Pharm	MD	Physio	Psy	RN
Canadian-born foreign-trained	-0.681	0.000	-0.039	-0.740	0.068	-0.201	-0.095	-0.056
	(0.540)	(.)	(0.247)	(0.860)	(0.257)	(0.282)	(0.126)	(0.107)
Foreign-born CdnUS-trained	-0.062	0.059	0.222	0.212	-0.063	-0.076	-0.039	-0.006
	(0.193)	(0.079)	(0.141)	(0.134)	(0.134)	(0.186)	(0.047)	(0.036)
Foreign-born foreign-trained	**-0.912*** **	0.031	-0.245	-0.081	**-0.391*** **	-0.149	**-0.309***	**-0.164*** **
	(0.195)	(0.086)	(0.152)	(0.125)	(0.108)	(0.175)	(0.129)	(0.041)
Visible min*foreign born CdnUS-trained	0.157	**-0.379** **	0.072	-0.235	0.381	-0.185	-0.016	0.036
	(0.363)	(0.124)	(0.327)	(0.234)	(0.233)	(0.334)	(0.127)	(0.089)
Visible min*foreign-born foreign-trained	**0.592**+	**-0.202**+	0.293	-0.196	0.134	-0.252	0.045	0.017
	(0.336)	(0.112)	(0.291)	(0.213)	(0.193)	(0.243)	(0.163)	(0.085)
Visible min	**-0.573**+	**0.233** **	**-0.422**+	-0.065	-0.263	0.180	0.015	-0.017
	(0.313)	(0.082)	(0.253)	(0.192)	(0.185)	(0.215)	(0.095)	(0.077)
Controls								
Potential foreign experience (in years)	**-0.023** **	**-0.011***	-0.009	**-0.015** **	0.001	-0.003	0.006	**-0.006** **
	(0.009)	(0.005)	(0.009)	(0.006)	(0.004)	(0.008)	(0.006)	(0.002)
Potential Canadian experience (in years)	**0.074*** **	**0.039*** **	**0.047*** **	**0.061*** **	**0.071*** **	**0.092*** **	**0.057*** **	**0.055*** **
	(0.016)	(0.007)	(0.012)	(0.012)	(0.009)	(0.017)	(0.006)	(0.004)
Potential Canadian experience sq	**-0.002*** **	**-0.001*** **	**-0.001*** **	**0.001*** **	**-0.001*** **	**0.002*** **	**0.001*** **	**-0.001*** **
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Speak other mother tongue than Eng/Fren	0.190	-0.078	-0.065	-0.131	**-0.201***	-0.049	-0.080	-0.029
	(0.134)	(0.059)	(0.097)	(0.085)	(0.081)	(0.125)	(0.052)	(0.026)
Female	0.047	-0.008	-0.068	0.082	0.084	0.116	-0.046	-0.068
	(0.154)	(0.081)	(0.099)	(0.122)	(0.089)	(0.162)	(0.047)	(0.046)
Bachelor		**0.081**+	0.104					**0.339*** **
		(0.048)	(0.122)					(0.018)
Above Bachelor		-0.089	**0.360***	0.023		-0.103		**0.273*** **
		(0.103)	(0.151)	(0.097)		(0.157)		(0.043)
MD, DMD/DDS		0.016		-0.070		0.423+		**0.608*** **
		(0.105)		(0.134)		(0.227)		(0.026)
Masters/(MD & Masters* only for physicians)	0.049	**0.396***	**0.792*** **	0.086	**0.156***	-0.169		**0.679*** **

	(0.133)	(0.198)	(0.221)	(0.084)	(0.070)	(0.130)		(0.087)
PhD/(MD & PhD* only for physicians)	**-0.204+**		**0.851*** **	**0.262***	0.156	**0.572****	**0.275*** **	
	(0.116)		(0.163)	(0.111)	(0.121)	(0.220)	(0.035)	
MD & Masters & PhD only for physicians					0.182			
					(0.197)			
Urban residence	-0.317	0.169***	0.195*	0.003	-0.014	0.190	0.088	0.151***
	(0.310)	(0.048)	(0.076)	(0.125)	(0.123)	(0.116)	(0.056)	(0.021)
Weeks worked in 2005	**0.029*** **	**0.031*** **	**0.032*** **	**0.036*** **	**0.033*** **	**0.032*** **	**0.035*** **	**0.033*** **
	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.005)	(0.002)	(0.001)
Hours in reference week	**0.014*** **	**0.009*** **	**0.011*** **	**0.014*** **	**0.014*** **	**0.011*** **	**0.015*** **	**0.012*** **
	(0.003)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.001)	(0.001)
Speak other mother tongue than Eng/Fren	0.190	-0.078	-0.065	-0.131	**-0.201***	-0.049	-0.080	-0.029
	(0.134)	(0.059)	(0.097)	(0.085)	(0.081)	(0.125)	(0.052)	(0.026)
Married	**0.271+**	**0.170***	0.158	0.097	**0.167***	**0.371***	**0.102+**	**0.148****
	(0.143)	(0.085)	(0.105)	(0.127)	(0.083)	(0.169)	(0.054)	(0.054)
Have no children	0.046	-0.022	0.039	0.009	0.031	-0.078	-0.018	-0.027
	(0.162)	(0.094)	(0.149)	(0.149)	(0.104)	(0.218)	(0.058)	(0.071)
Children under 5 years	0.204	0.117	0.113	**0.222***	0.033	0.043	0.080	**0.102+**
	(0.163)	(0.083)	(0.109)	(0.103)	(0.107)	(0.155)	(0.073)	(0.059)
Female*Married	-0.212	**-0.175***	-0.162	-0.164	**-0.284****	**-0.548****	-0.073	**-0.133***
	(0.190)	(0.089)	(0.123)	(0.147)	(0.108)	(0.191)	(0.062)	(0.057)
Female*Have no children	-0.149	0.111	-0.046	0.076	-0.118	0.060	0.076	0.079
	(0.225)	(0.102)	(0.167)	(0.173)	(0.136)	(0.259)	(0.068)	(0.073)
Female*Children under 5 years	-0.289	-0.154	-0.187	**-0.402****	0.154	0.025	0.028	**-0.124+**
	(0.201)	(0.098)	(0.151)	(0.154)	(0.146)	(0.176)	(0.091)	(0.066)
Constant	**8.858*** **	**8.051*** **	**8.040*** **	**8.071*** **	**8.278*** **	**7.561*** **	**7.733*** **	**7.641*** **
	(0.397)	(0.168)	(0.242)	(0.252)	(0.186)	(0.307)	(0.121)	(0.074)
Adj R-Sq	**0.455*** **	**0.215*** **	**0.306*** **	**0.360*** **	**0.405*** **	**0.404*** **	**0.366*** **	**0.284*** **
BIC	1720.6	7616.0	3032.2	3591.8	5867.4	1474.4	9394.8	43515.6
Number	601	3253	1193	1261	2047	568	3934	17030

Notes: 1) Sample weights are used in all regressions. 2) P-values for level of significance + p<.10, * p<.05, ** p<0.01, *** p<0.001. 3) Sample is restricted to aged 25-64years and only those with positive non-zero earnings in 2005. 4) for omitted reference variable for education for all health professions: for dentists is DDS/DMD/dental degree, medical laboratory technologists (MLTs) is below bachelor, medical radiation technologists (MRTs) is below bachelor, pharmacist (pharm)s is bachelor, physicians is MD, physiotherapists (physio) is bachelor, psychologist (psy) is masters degree, registered nurses (RNs) is below bachelor. 5) The omitted reference for children in census family is children above 6 years. 6) Omitted reference for variable of interest is Canadian-born Canada-US trained. 7) Mean is estimated with its standard errors are reported in parenthesis.

Table 2.A13: Descriptive statistics of regression variables

Variables	Dentist	MLT	MRT	Pharm	MD	Physio	Psy	RN
	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)
Log earnings (2005 $)	11.518 (0.019)	10.724 (0.011)	10.727 (0.014)	11.138 (0.013)	11.705 (0.009)	10.637 (0.017)	10.649 (0.018)	10.695 (0.004)
Earnings (2005 $)	$143,502.4 (2811.9)	$51,015.3 (436.5)	$53,955.3 (904.1)	$88,784.7 (1687.2)	$167,421.5 (1662.2)	$50,545.8 (601.1)	$55,113.4 (731.1)	$51,899.6 (118.3)
Weeks worked in 2005	46.667 (0.165)	48.303 (0.173)	47.653 (0.203)	48.326 (0.144)	47.511 (0.075)	46.833 (0.212)	46.931 (0.191)	46.894 (0.054)
Hours in census reference week	37.299 (0.268)	32.663 (0.273)	32.522 (0.324)	35.337 (0.258)	49.019 (0.207)	32.150 (0.323)	33.324 (0.314)	31.501 (0.084)
Canadian-born CdnUS-trained	0.670 (0.009)	0.783 (0.008)	0.849 (0.008)	0.713 (0.007)	0.674 (0.005)	0.813 (0.008)	0.824 (0.008)	0.812 (0.002)
Canadian-born foreign-trained	0.001 (0.001)	0.002 (0.001)	0.004 (0.001)	0.002 (0.001)	0.007 (0.001)	0.012 (0.002)	0.011 (0.002)	0.003 (0.000)
Foreign-born CdnUS-trained	0.240 (0.009)	0.115 (0.006)	0.084 (0.006)	0.164 (0.006)	0.198 (0.004)	0.104 (0.007)	0.139 (0.007)	0.111 (0.002)
Foreign-born foreign-trained	0.089 (0.006)	0.100 (0.006)	0.063 (0.005)	0.120 (0.005)	0.122 (0.003)	0.070 (0.005)	0.026 (0.003)	0.074 (0.001)
Visible min*foreign born CdnUS-trained	0.154 (0.007)	0.068 (0.005)	0.053 (0.005)	0.131 (0.006)	0.106 (0.003)	0.050 (0.005)	0.030 (0.004)	0.061 (0.001)
Visible min*foreign-born foreign-trained	0.045 (0.004)	0.076 (0.005)	0.040 (0.004)	0.092 (0.005)	0.055 (0.002)	0.027 (0.003)	0.008 (0.002)	0.052 (0.001)
Visible min	0.263 (0.009)	0.172 (0.007)	0.118 (0.007)	0.289 (0.007)	0.215 (0.004)	0.109 (0.007)	0.047 (0.004)	0.131 (0.002)
Potential foreign experience (in years)	0.720 (0.050)	1.143 (0.069)	0.764 (0.069)	1.273 (0.061)	1.172 (0.038)	0.623 (0.049)	0.559 (0.055)	1.000 (0.018)
Female	0.300 (0.009)	0.822 (0.007)	0.808 (0.008)	0.600 (0.008)	0.387 (0.005)	0.791 (0.008)	0.695 (0.010)	0.939 (0.001)
Potential Canadian experience (in years)	17.636 (0.199)	22.487 (0.196)	20.781 (0.223)	17.720 (0.167)	17.690 (0.105)	16.155 (0.197)	19.861 (0.212)	22.644 (0.054)
Potential Canadian experience sq	410.975 (7.646)	614.002 (8.572)	547.329 (9.873)	420.282 (6.741)	419.882 (3.933)	349.759 (7.575)	501.954 (8.420)	625.968 (2.446)
Below Bachelor		0.682 (0.009)	0.799 (0.008)			0.768 (0.009)		0.650 (0.002)

Bachelor		0.229	0.147			0.098		0.289
		(0.008)	(0.007)			(0.006)		(0.002)
Above Bachelor		0.030	0.019	0.086		0.098		0.026
		(0.003)	(0.003)	(0.005)		(0.006)		(0.001)
MD, DMD/DDS, OD, VET	0.868			0.033	0.827			
	(0.007)			(0.003)	(0.004)			
Masters/ (MD & Masters* only for physicians)	0.066	0.039	0.012	0.081	0.086	0.110	0.665	0.030
	(0.005)	(0.004)	(0.002)	(0.004)	(0.003)	(0.007)	(0.010)	(0.001)
PhD/ (MD & PhD* only for physicians)	0.066	0.009	0.006	0.024	0.074	0.007	0.335	0.002
	(0.005)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.010)	(0.000)
MD & Masters & PhD only for physicians					0.013			
					(0.001)			
Urban residence	0.908	0.879	0.844	0.877	0.918	0.901	0.912	0.839
	(0.006)	(0.006)	(0.008)	(0.005)	(0.003)	(0.006)	(0.006)	(0.002)
Speak foreign language as mother tongue	0.315	0.203	0.132	0.302	0.239	0.142	0.103	0.146
	(0.009)	(0.008)	(0.007)	(0.008)	(0.004)	(0.007)	(0.006)	(0.002)
Married	0.724	0.632	0.622	0.646	0.702	0.602	0.523	0.620
	(0.009)	(0.009)	(0.010)	(0.008)	(0.005)	(0.010)	(0.010)	(0.002)
Have no children	0.223	0.216	0.226	0.224	0.227	0.222	0.281	0.224
	(0.008)	(0.008)	(0.009)	(0.007)	(0.004)	(0.009)	(0.009)	(0.002)
Children under 5 years	0.219	0.144	0.193	0.221	0.210	0.263	0.165	0.156
	(0.008)	(0.007)	(0.008)	(0.007)	(0.004)	(0.009)	(0.008)	(0.002)
Children 6 years and above	0.445	0.479	0.431	0.414	0.426	0.349	0.339	0.474
	(0.010)	(0.009)	(0.010)	(0.008)	(0.005)	(0.010)	(0.010)	(0.003)
Female*Married	0.187	0.518	0.505	0.369	0.234	0.475	0.337	0.586
	(0.008)	(0.009)	(0.010)	(0.008)	(0.004)	(0.011)	(0.010)	(0.003)
Female*Have no children	0.064	0.174	0.186	0.130	0.082	0.170	0.190	0.210
	(0.005)	(0.007)	(0.008)	(0.005)	(0.003)	(0.008)	(0.008)	(0.002)
Female*Children under 5 years	0.085	0.117	0.151	0.139	0.093	0.199	0.125	0.145
	(0.006)	(0.006)	(0.008)	(0.006)	(0.003)	(0.008)	(0.007)	(0.002)
Number	3044	3551	2759	4559	11834	2767	2857	46816

Notes: 1) Estimated mean and its standard errors are reported in parenthesis

Table 2.A14: Logistic regressions for estimated likelihood of working in one's trained health occupation for those employed only

V*ariables of interest*	Dentist	MLT	MRT	Pharm	MD	Physio	Psy	RN
Canadian-born foreign-trained	**0.167+**	1.912	0.437	0.583	0.285***	1.208	0.751	0.533***
	(0.159)	(2.485)	(0.289)	(0.299)	(0.096)	(0.665)	(0.181)	(0.087)
Foreign-born CdnUS-trained	0.817	0.952	0.903	**0.561****	**1.369***	1.013	**0.728*****	**1.120***
	(0.207)	(0.138)	(0.202)	(0.110)	(0.195)	(0.232)	(0.069)	(0.056)
Foreign-born foreign-trained	**0.149*****	**0.405*****	**0.417****	**0.371*****	**0.256*****	**0.462*****	**0.358*****	**0.533*****
	(0.034)	(0.080)	(0.112)	(0.072)	(0.026)	(0.104)	(0.075)	(0.034)
Visible min*foreign-born CdnUS-trained	0.975	**0.530***	**1.989+**	1.255	**0.597***	1.056	**3.319*****	0.944
	(0.390)	(0.136)	(0.830)	(0.335)	(0.140)	(0.484)	(0.954)	(0.104)
Visible min*foreign-born foreign-trained	**0.381****	**0.515***	1.055	0.784	**0.385*****	**0.418***	1.427	1.071
	(0.134)	(0.138)	(0.418)	(0.192)	(0.073)	(0.176)	(0.547)	(0.118)
Visible min	1.026	1.105	0.828	0.959	**1.681****	1.003	**0.326*****	1.022
	(0.315)	(0.217)	(0.257)	(0.181)	(0.289)	(0.349)	(0.077)	(0.093)
Controls								
Potential foreign experience (in years)	**0.937*****	**0.959*****	**0.944****	**0.959*****	**0.965*****	**0.966***	1.020	**0.959*****
	(0.016)	(0.009)	(0.018)	(0.009)	(0.007)	(0.017)	(0.012)	(0.003)
Potential Canadian experience (in years)	**1.147*****	**1.040****	**0.960***	**1.081*****	**1.069*****	**1.041+**	1.001	0.997
	(0.023)	(0.013)	(0.018)	(0.015)	(0.012)	(0.023)	(0.011)	(0.004)
Potential Canadian experience sqd	**0.996*****	**0.999*****	**1.000**	**0.998*****	**0.999*****	**0.998****	1.000	**0.999*****
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Female	0.918	0.992	1.060	0.992	0.912	1.289	**1.286****	**1.251*****
	(0.204)	(0.131)	(0.202)	(0.140)	(0.102)	(0.300)	(0.126)	(0.083)
Bachelor		**2.511*****	**2.756*****					**1.215*****
		(0.210)	(0.456)					(0.031)
Above Bachelor		**2.181*****	1.446	**0.714****		1.270		0.941
		(0.398)	(0.408)	(0.088)		(0.227)		(0.060)
MD, DMD/DDS, OD, VET				**0.604****		0.947		
				(0.103)		(0.350)		
Masters/ (MD &Masters*only for physicians)	**0.392*****	**5.291*****	**0.810**	**0.510*****	0.902	1.203		**0.658*****
	(0.079)	(1.073)	(0.284)	(0.061)	(0.097)	(0.211)		(0.036)
PhD/ (MD & PhD* only for physicians)	**0.448*****	**2.034+**	**0.266****	**0.282*****	**1.715*****	**0.440***	**1.806*****	**0.329*****
	(0.090)	(0.766)	(0.108)	(0.052)	(0.222)	(0.181)	(0.115)	(0.061)

MD & Masters & PhD only for physicians					0.620+			
					(0.154)			
Urban residence	0.832	**1.260****	0.961	**0.747***	**0.444*****	1.049	0.855	**1.158*****
	(0.238)	(0.106)	(0.107)	(0.111)	(0.069)	(0.197)	(0.083)	(0.031)
Speak other mother tongue than Eng/Fren	1.188	0.882	**0.698***	0.947	**0.495*****	**0.727***	0.922	**0.857*****
	(0.197)	(0.089)	(0.105)	(0.117)	(0.039)	(0.110)	(0.092)	(0.031)
Married	**1.853*****	1.153	0.761	1.132	**1.715*****	0.773	0.915	**1.178***
	(0.322)	(0.174)	(0.151)	(0.167)	(0.174)	(0.194)	(0.095)	(0.098)
Have no children	0.988	1.043	1.183	0.915	1.053	**1.691+**	0.933	0.857
	(0.178)	(0.179)	(0.269)	(0.142)	(0.113)	(0.490)	(0.104)	(0.083)
Children under 5 years	0.890	0.891	**0.588***	0.898	0.975	**1.717+**	1.068	**0.794***
	(0.200)	(0.181)	(0.130)	(0.153)	(0.111)	(0.480)	(0.175)	(0.089)
Female*Married	**0.495****	0.997	1.227	0.754	**0.479*****	0.922	1.034	**0.772****
	(0.128)	(0.162)	(0.269)	(0.130)	(0.064)	(0.262)	(0.129)	(0.067)
Female*Have no children	1.292	0.853	0.721	1.248	1.202	0.679	1.165	1.082
	(0.356)	(0.159)	(0.179)	(0.244)	(0.183)	(0.220)	(0.158)	(0.108)
Female*Children under 5 years	1.411	1.032	**1.535+**	1.141	**1.632****	0.779	1.188	**1.354****
	(0.422)	(0.228)	(0.395)	(0.234)	(0.254)	(0.256)	(0.224)	(0.157)
Pseudo-R Sq	0.272	0.072	0.092	0.121	0.231	0.083	0.032	0.035
Chi Sq	598.600***	443.868***	320.395***	559.788***	1839.734***	212.538***	227.467***	2050.282***
Log-Likelihood	-6446.9	-22445.3	-11116.3	-14005.1	-24441.6	-7471.0	-22904.5	-182562.7
BIC	13067	45094	22423	28210	49093	15129	45986	365380
Number	3761	6815	3927	5786	14126	3368	6974	63110

Notes: 1) Exponentiated coefficients are reported, are the estimates significantly different from one (1). 2) P-values for level of significance + p<.10, * p<.05, ** p<0.01, *** p<0.001. 3) For omitted reference variable for education for all health professions: for dentists is DDS/DMD/dental degree, medical laboratory technologists (MLTs) is below bachelor, medical radiation technologists (MRTs) is below bachelor, pharmacists is bachelor, physicians is MD, physiotherapists (physio) is bachelor, psychologist (psy) is masters degree, registered nurses (RNs) is below bachelor. 4) The omitted reference for children in census family is children above 6 years. 5) Omitted reference for variable of interest is Canadian-born Canada-US trained

Table 2.A15: Logistic regressions for estimated likelihood of working in one's trained health occupation for those in and out of labour force

Variables of interest	Dentist	MLT	MRT	Pharm	MD	Physio	Psy	RN
Canadian-born foreign-trained	**0.219+**	1.162	**0.354***	0.477	**0.231*****	0.985	0.706	**0.644****
	(0.181)	(0.981)	(0.184)	(0.230)	(0.053)	(0.449)	(0.158)	(0.100)
Foreign-born CdnUS-trained	1.141	0.926	0.840	**0.528*****	**1.251+**	0.998	**0.760****	**1.090***
	(0.244)	(0.121)	(0.168)	(0.095)	(0.149)	(0.199)	(0.068)	(0.046)
Foreign-born foreign-trained	**0.189*****	**0.433*****	**0.485****	**0.296*****	**0.243*****	**0.482*****	**0.381*****	**0.574*****
	(0.037)	(0.080)	(0.116)	(0.050)	(0.022)	(0.100)	(0.076)	(0.032)
Visible min*foreign born CdnUS-trained	1.134	**0.540***	1.867	1.279	0.800	1.182	**2.542*****	0.980
	(0.349)	(0.130)	(0.734)	(0.309)	(0.142)	(0.446)	(0.679)	(0.092)
Visible min*foreign-born foreign-trained	**0.534***	**0.555***	0.980	0.866	**0.464*****	**0.529+**	1.245	1.096
	(0.147)	(0.140)	(0.365)	(0.188)	(0.065)	(0.182)	(0.442)	(0.103)
Visible min	0.804	1.092	0.738	0.891	**1.248+**	0.866	**0.369*****	1.000
	(0.178)	(0.205)	(0.221)	(0.147)	(0.148)	(0.232)	(0.081)	(0.077)
Controls								
Potential foreign experience (in years)	**0.936*****	**0.949*****	**0.941*****	**0.958*****	**0.963*****	**0.958****	1.011	**0.946*****
	(0.012)	(0.008)	(0.015)	(0.008)	(0.006)	(0.015)	(0.011)	(0.003)
Potential Canadian experience (in years)	**1.227*****	**1.075*****	1.001	**1.132*****	**1.145*****	**1.107*****	**1.035*****	**1.046*****
	(0.021)	(0.012)	(0.016)	(0.014)	(0.011)	(0.021)	(0.011)	(0.004)
Potential Canadian experience sq	**0.994*****	**0.998*****	**0.999*****	**0.997*****	**0.997*****	**0.997*****	**0.999*****	**0.998*****
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female	0.865	1.088	1.187	0.856	0.955	1.104	**1.290****	**1.278*****
	(0.153)	(0.134)	(0.211)	(0.110)	(0.087)	(0.222)	(0.119)	(0.078)
Bachelor		**2.383*****	**2.725*****					**1.263*****
		(0.179)	(0.392)					(0.027)
Above Bachelor		**1.892*****	1.260	**0.690*****		1.252		0.962
		(0.312)	(0.333)	(0.077)		(0.191)		(0.053)
MD, DMD/DDS, OD, VET				**0.667****		0.854		
				(0.102)		(0.247)		
Masters/ (MD & Masters*only for physicians)	**0.435*****	**5.074*****	1.144	**0.573*****	**0.815***	1.045		**0.817*****
	(0.073)	(0.963)	(0.369)	(0.064)	(0.076)	(0.156)		(0.042)
PhD/ (MD & PhD* only for physicians)	**0.518*****	**2.449****	**0.335****	**0.340*****	**1.961*****	**0.495+**	**1.815*****	**0.381*****
	(0.096)	(0.813)	(0.127)	(0.063)	(0.229)	(0.193)	(0.109)	(0.063)
MD & Masters & PhD only for physicians					0.788			

					(0.195)			
Urban residence	1.345	**1.305*** **	0.987	**0.803+**	**0.516*** **	1.014	0.909	**1.104*** **
	(0.255)	(0.101)	(0.096)	(0.104)	(0.073)	(0.163)	(0.084)	(0.026)
Speak other mother tongue than Eng/Fren	0.925	0.864	**0.686** **	0.943	**0.519*** **	**0.771+**	0.865	**0.840*** **
	(0.128)	(0.080)	(0.095)	(0.103)	(0.035)	(0.107)	(0.081)	(0.027)
Married	**1.801*** **	**1.308+**	0.936	**1.272+**	**2.169*** **	0.898	1.014	**1.336*** **
	(0.261)	(0.185)	(0.176)	(0.172)	(0.190)	(0.210)	(0.101)	(0.102)
Have no children	0.971	1.034	1.089	0.938	1.003	**1.645+**	0.919	**0.847+**
	(0.144)	(0.159)	(0.216)	(0.133)	(0.092)	(0.439)	(0.098)	(0.074)
Children under 5 years	1.110	0.871	**0.594***	0.894	1.051	**1.762***	1.028	**0.786***
	(0.220)	(0.171)	(0.129)	(0.149)	(0.109)	(0.482)	(0.164)	(0.083)
Female*Married	**0.501** **	0.819	0.980	**0.657** **	**0.407*** **	0.842	0.924	**0.668*** **
	(0.109)	(0.125)	(0.203)	(0.104)	(0.046)	(0.217)	(0.110)	(0.053)
Female*Have no children	**1.589***	0.797	0.741	1.210	**1.431** **	0.774	1.175	1.028
	(0.373)	(0.133)	(0.160)	(0.208)	(0.186)	(0.229)	(0.151)	(0.092)
Female*Children under 5 years	1.122	0.940	1.306	1.166	1.390*	0.696	1.188	1.110
	(0.294)	(0.199)	(0.323)	(0.225)	(0.185)	(0.214)	(0.215)	(0.120)
Pseudo- R Sq	0.282	0.129	0.091	0.145	0.272	0.098	0.037	0.075
Chi Sq	768.636***	716.730***	582.409***	792.341***	2577.279***	302.057***	286.513***	5817.610***
Log-Likelihood	-8935.5	-26714.7	-13841.4	-17259.3	-31721.4	-9424.8	-25860.5	-242526.3
BIC	18047	53637	27877	34721	63655	19039	51901	485312
Number	4313	8421	4713	6549	15785	3780	8187	78736

Notes: 1) Exponentiated coefficients are reported, are the estimates significantly different from zero. 2) P-values for level of significance + p<.10, * p<.05, ** p<0.01, *** p<0.001. 3) Sample is restricted to aged 25-64years and only those with positive non-zero earnings in 2005. 4) for omitted reference variable for education for all health professions: for dentists is DDS/DMD/dental degree, medical laboratory technologists (MLTs) is below bachelor, medical radiation technologists (MRTs) is below bachelor, pharmacists (pharm) is bachelor, physicians is MD, physiotherapists (physio) is bachelor, psychologist (psy) is masters degree, registered nurses (RNs) is below bachelor. 5) The omitted reference for children in census family is children above 6 years. 6) Omitted reference for variable of interest is Canadian-born Canada-US trained. 7) Mean is estimated with its standard errors are reported in parenthesis. 8) Sample weights are used in all regressions.

Table 2.A 16: Logistic regressions for estimated likelihood of individuals with health credentials and their likelihood to be in the labour force

Variable of interest	Dentist	MLT	MRT	Pharm	MDs	Physio	Psy	RN
Canadian-born foreign trained	0.449	0.593	0.303	0.390	**0.268*** **	0.491	0.693	1.243
	(0.473)	(0.382)	(0.255)	(0.323)	(0.065)	(0.248)	(0.249)	(0.284)
Foreign-born Canada-US trained	**2.272***	0.895	0.775	0.801	0.844	0.744	1.116	0.949
	(0.771)	(0.144)	(0.200)	(0.230)	(0.141)	(0.198)	(0.145)	(0.050)
Foreign-born foreign trained	**0.493***	0.860	0.793	**0.438****	**0.390*****	0.662	1.085	**0.758*****
	(0.137)	(0.167)	(0.230)	(0.112)	(0.052)	(0.194)	(0.253)	(0.050)
Visible minority*foreign born Can-US trained	0.847	**0.465***	1.533	1.149	**1.816***	0.906	1.171	**1.224***
	(0.374)	(0.165)	(0.843)	(0.425)	(0.431)	(0.510)	(0.394)	(0.122)
Visible minority*foreign-born foreign trained	0.922	**0.500***	1.448	1.218	0.946	0.723	0.781	**1.245***
	(0.314)	(0.172)	(0.743)	(0.377)	(0.163)	(0.362)	(0.273)	(0.119)
Visible minority population	0.779	**1.614+**	0.628	0.759	**0.669****	1.307	**0.647+**	**0.868***
	(0.216)	(0.468)	(0.264)	(0.177)	(0.094)	(0.503)	(0.154)	(0.060)
Controls								
Potential foreign experience (in years)	0.961*	0.954***	0.949**	0.977+	0.959***	0.971	0.958***	0.932***
	(0.016)	(0.009)	(0.015)	(0.012)	(0.007)	(0.022)	(0.012)	(0.003)
Potential Canadian experience (in years)	1.287***	1.147***	1.139***	1.186***	1.254***	1.295***	1.186***	1.121***
	(0.028)	(0.018)	(0.024)	(0.022)	(0.016)	(0.034)	(0.020)	(0.006)
Potential Canadian experience sqd	0.993***	0.995***	0.996***	0.995***	0.994***	0.993***	0.995***	0.996***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Female	0.874	1.536*	0.717	0.679+	0.998	1.058	1.058	1.060
	(0.206)	(0.293)	(0.227)	(0.150)	(0.121)	(0.309)	(0.155)	(0.099)
Bachelor		1.031	0.935					1.086**
		(0.108)	(0.189)					(0.032)
Above Bachelor		0.771	1.185	0.933		1.032		0.933
		(0.154)	(0.517)	(0.161)		(0.221)		(0.067)
MD, DMD/DDS, OD, VET				1.003		0.584		
				(0.219)		(0.227)		
Masters/ (MD+Masters* only for physicians)	0.627*	1.110	0.845	1.156	0.990	1.105		1.207*
	(0.136)	(0.298)	(0.453)	(0.205)	(0.128)	(0.234)		(0.089)
PhD/ (MD+PhD* only for physicians)	0.596*	0.672	0.844	1.845*	1.712**	0.786	1.138	0.513**
	(0.139)	(0.281)	(0.450)	(0.568)	(0.287)	(0.421)	(0.117)	(0.108)
MD+Masters+PhD only for physicians					1.076			
					(0.385)			

Urban residence	2.081***	1.052	1.138	0.678*	0.876	0.856	1.081	1.003
	(0.422)	(0.115)	(0.148)	(0.127)	(0.154)	(0.188)	(0.149)	(0.030)
Speak other mother tongue than Eng/Fren	0.793	0.833	0.892	0.997	0.773**	1.325	0.694**	0.990
	(0.152)	(0.108)	(0.164)	(0.169)	(0.075)	(0.305)	(0.087)	(0.041)
Married	1.278	1.723**	1.136	1.364	2.580***	2.386*	1.426*	1.414**
	(0.252)	(0.339)	(0.348)	(0.288)	(0.294)	(0.947)	(0.210)	(0.159)
Have no children	0.852	0.749	0.430**	0.864	0.834	1.603	0.735*	0.791+
	(0.159)	(0.141)	(0.118)	(0.179)	(0.104)	(0.797)	(0.107)	(0.096)
Children under 5 years	1.567	1.478	1.412	1.686	1.448*	2.201	1.528	1.052
	(0.499)	(0.557)	(0.641)	(0.556)	(0.249)	(1.247)	(0.554)	(0.198)
Female*Married	0.846	0.435***	0.749	0.523**	0.450***	0.325**	0.505***	0.624***
	(0.231)	(0.093)	(0.248)	(0.129)	(0.066)	(0.140)	(0.091)	(0.072)
Female*Have no children	1.510	0.989	1.660+	1.339	1.276	0.968	1.486*	0.965
	(0.447)	(0.201)	(0.491)	(0.330)	(0.219)	(0.510)	(0.275)	(0.120)
Female*Children under 5 years	0.423*	0.294**	0.321*	0.482*	0.449***	0.259*	0.339**	0.358***
	(0.159)	(0.115)	(0.155)	(0.170)	(0.090)	(0.153)	(0.130)	(0.068)
Pseudo R Sq	0.166	0.154	0.183	0.104	0.181	0.115	0.104	0.15
Chi sq	374.3***	807.6***	565.6***	310.7***	1160.9***	233.8***	537.4***	7627.0***
Log-likelihood	-6065.8	-16257.8	-8221.0	-9687.1	-19085.4	-5163.5	-13526.3	-157007.9
Number	4313	8421	4713	6549	15785	3780	8187	78736

Notes: 1) Exponentiated coefficients are reported, are the estimates significantly different from zero. 2) P-values for level of significance + p<.10, * p<.05, ** p<0.01, *** p<0.001. 3) Sample is restricted to aged 25-64years and only those with positive non-zero earnings in 2005. 4) for omitted reference variable for education for all health professions: for dentists is DDS/DMD/dental degree, medical laboratory technologists (MLTs) is below bachelor, medical radiation technologists (MRTs) is below bachelor, pharmacists (pharm) is bachelor, physicians is MD, physiotherapists (physio) is bachelor, psychologist (psy) is masters degree, registered nurses (RNs) is below bachelor. 5) The omitted reference for children in census family is children above 6 years. 6) Omitted reference for variable of interest is Canadian-born Canada-US trained. 7) Mean is estimated with its standard errors are reported in parenthesis. 8) Sample weights are used in all regressions.

Appendix -Chapter Two continue:

Short and long forms of Logistic and Ordinary Least Squares regressions

Six versions of regressions are presented

1. Tables 2.A17-2.A24: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for **employed individuals**

2. Tables 2.A25-2.A32: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those in the **labour force (i.e. both employed and unemployed)**

3. Tables 2.A33-2.A40: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those **in and out of the labour force (population)**

4. Tables 2.A41-2.A48: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **working in their trained fields**

5. Tables 2.A49-2.A56: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **NOT working in their trained fields**

6. Tables 2.A57-2.A64: Short and long forms of logistic regressions for estimated likelihood (odds ratios) of individuals with health credentials and their likelihood to be in **the labour force**

Table 2.A17: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for **employed individuals** (with dentistry credentials)

Dentists

Dependent variable: wrkden	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.163*	0.154*	0.176*	0.167+
	(0.136)	(0.136)	(0.155)	(0.159)
Foreign-born Canada-US trained	0.840	0.860	0.801	0.817
	(0.131)	(0.135)	(0.150)	(0.207)
Foreign-born foreign trained	0.070***	0.066***	0.061***	0.149***
	(0.009)	(0.009)	(0.011)	(0.034)
Female	0.691**	0.698**	0.699**	0.918
	(0.087)	(0.087)	(0.087)	(0.204)
Potential Canadian experience (in years)	1.160***	1.157***	1.162***	1.147***
	(0.021)	(0.021)	(0.023)	(0.023)
Potential Canadian experience sqd	0.996***	0.996***	0.996***	0.996***
	(0.000)	(0.000)	(0.001)	(0.001)
Masters		0.364***	0.365***	0.392***
		(0.073)	(0.074)	(0.079)
PhD		0.451***	0.462***	0.448***
		(0.092)	(0.093)	(0.090)
Urban		0.816	0.805	0.832
		(0.236)	(0.235)	(0.238)
Speak other mother tongue than Eng/Fren			1.100	1.188
			(0.180)	(0.197)
Married			1.180	1.853***
			(0.166)	(0.322)
Have no children			1.252	0.988
			(0.179)	(0.178)
Children under 5 years			1.213	0.890
			(0.192)	(0.200)
Visible minority*foreign born Can-US trained				0.975
				(0.390)
Visible minority*foreign-born foreign trained				0.381**
				(0.134)
Visible minority population				1.026
				(0.315)
Potential foreign experience (in years)				0.937***
				(0.016)
Female*Married				0.495**
				(0.128)
Female*Have no children				1.292
				(0.356)
Female*Children under 5 years				1.411
				(0.422)
Pseudo-R Sq	0.2397	0.2537	0.2560	0.2721
Chi Sq	623.127***	609.491***	623.365***	598.600***
Log-Likeli	-6733.4	-6609.3	-6588.8	-6446.9
BIC	13524	13301	13293	13067
Number	3761	3761	3761	3761

Table 2.A18: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for employed individuals (with laboratory technology credentials)

Medical laboratory Technologists

Dependent variable: wrkmlt	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	3.317	2.107	2.065	1.912
	(3.690)	(2.714)	(2.648)	(2.485)
Foreign-born Canada-US trained	0.706***	0.586***	0.654***	0.952
	(0.061)	(0.052)	(0.068)	(0.138)
Foreign-born foreign trained	0.269***	0.179***	0.205***	0.405***
	(0.024)	(0.018)	(0.025)	(0.080)
Female	0.874+	0.996	0.997	0.992
	(0.064)	(0.076)	(0.076)	(0.131)
Potential Canadian experience (in years)	1.034**	1.059***	1.053***	1.040**
	(0.012)	(0.013)	(0.013)	(0.013)
Potential Canadian experience sqd	0.999***	0.999***	0.999***	0.999***
	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		2.425***	2.443***	2.511***
		(0.195)	(0.197)	(0.210)
Above Bachelor		2.138***	2.155***	2.181***
		(0.386)	(0.388)	(0.398)
Masters		5.403***	5.450***	5.291***
		(1.066)	(1.073)	(1.073)
PhD		2.237*	2.266*	2.034+
		(0.859)	(0.880)	(0.766)
Urban		1.230*	1.250**	1.260**
		(0.103)	(0.105)	(0.106)
Speak other mother tongue than Eng/Fren			0.801*	0.882
			(0.079)	(0.089)
Married			1.113+	1.153
			(0.069)	(0.174)
Have no children			0.944	1.043
			(0.067)	(0.179)
Children under 5 years			0.990	0.891
			(0.090)	(0.181)
Visible minority*foreign born Can-US trained				0.530*
				(0.136)
Visible minority*foreign-born foreign trained				0.515*
				(0.138)
Visible minority population				1.105
				(0.217)
Potential foreign experience (in years)				0.959***
				(0.009)
Female*Married				0.997
				(0.162)
Female*Have no children				0.853
				(0.159)
Female*Children under 5 years				1.032
				(0.228)
Pseudo- R Sq	0.0413	0.0658	0.0667	0.0724
Chi Sq	267.421***	396.687***	401.171***	443.868***
Log-Likeli	-23195.2	-22604.3	-22580.5	-22445.3
BIC	46452	45315	45302	45094
Number	6815	6815	6815	6815

Table 2. A19: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for **employed** individuals (with radiation technology credentials)

Medical Radiation Technologist

Dependent variable: wrkmrt	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.773	0.399	0.409	0.437
	(0.497)	(0.256)	(0.264)	(0.289)
Foreign-born Canada-US trained	0.857	0.806	1.011	0.903
	(0.126)	(0.123)	(0.183)	(0.202)
Foreign-born foreign trained	0.179***	0.173***	0.227***	0.417**
	(0.026)	(0.026)	(0.041)	(0.112)
Female	1.315**	1.293*	1.270*	1.060
	(0.128)	(0.131)	(0.129)	(0.202)
Potential Canadian experience (in years)	0.968*	0.979	0.975	0.960*
	(0.015)	(0.016)	(0.017)	(0.018)
Potential Canadian experience sqd	1.000	1.000	1.000	1.000
	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		2.788***	2.818***	2.756***
		(0.459)	(0.461)	(0.456)
Above Bachelor		1.620+	1.649+	1.446
		(0.447)	(0.457)	(0.408)
Masters		0.853	0.846	0.810
		(0.310)	(0.312)	(0.284)
PhD		0.297**	0.287**	0.266**
		(0.111)	(0.111)	(0.108)
Urban		0.960	0.959	0.961
		(0.106)	(0.107)	(0.107)
Speak other mother tongue than Eng/Fren			0.673**	0.698*
			(0.099)	(0.105)
Married			0.869	0.761
			(0.079)	(0.151)
Have no children			0.933	1.183
			(0.097)	(0.269)
Children under 5 years			0.842	0.588*
			(0.104)	(0.130)
Visible minority*foreign born Can-US trained				1.989+
				(0.830)
Visible minority*foreign-born foreign trained				1.055
				(0.418)
Visible minority population				0.828
				(0.257)
Potential foreign experience (in years)				0.944**
				(0.018)
Female*Married				1.227
				(0.269)
Female*Have no children				0.721
				(0.179)
Female*Children under 5 years				1.535+
				(0.395)
Pseudo R-Sq	0.0674	0.0827	0.0860	0.0926
Chi Sq	237.478***	270.535***	290.286***	320.395***
Log-Likeli	-11419.3	-11232.0	-11191.8	-11116.3
BIC	22897	22563	22516	22423
Number	3927	3927	3927	3927

Table 2.A20: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for **employed individuals** (with pharmacy credentials)

Pharmacist

Dependent variable: wrkpharm	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.305*	0.550	0.546	0.583
	(0.172)	(0.288)	(0.294)	(0.299)
Foreign-born Canada-US trained	0.516***	0.572***	0.614***	0.561**
	(0.050)	(0.058)	(0.080)	(0.110)
Foreign-born foreign trained	0.182***	0.193***	0.215***	0.371***
	(0.016)	(0.018)	(0.028)	(0.072)
Female	0.941	0.920	0.915	0.992
	(0.072)	(0.072)	(0.071)	(0.140)
Potential Canadian experience (in years)	1.096***	1.081***	1.088***	1.081***
	(0.014)	(0.014)	(0.015)	(0.015)
Potential Canadian experience sqd	0.998***	0.998***	0.998***	0.998***
	(0.000)	(0.000)	(0.000)	(0.000)
Above Bachelor		0.722**	0.722**	0.714**
		(0.087)	(0.087)	(0.088)
MD, DMD/DDS, OD, VET		0.656*	0.664*	0.604**
		(0.112)	(0.114)	(0.103)
Masters		0.517***	0.515***	0.510***
		(0.061)	(0.061)	(0.061)
PhD		0.300***	0.302***	0.282***
		(0.056)	(0.056)	(0.052)
Urban		0.744*	0.749+	0.747*
		(0.110)	(0.111)	(0.111)
Speak other mother tongue than Eng/Fren			0.930	0.947
			(0.107)	(0.117)
Married			0.880	1.132
			(0.080)	(0.167)
Have no children			1.105	0.915
			(0.112)	(0.142)
Children under 5 years			1.082	0.898
			(0.113)	(0.153)
Visible minority*foreign born Can-US trained				1.255
				(0.335)
Visible minority*foreign-born foreign trained				0.784
				(0.192)
Visible minority population				0.959
				(0.181)
Potential foreign experience (in years)				0.959***
				(0.009)
Female*Married				0.754
				(0.130)
Female*Have no children				1.248
				(0.244)
Female*Children under 5 years				1.141
				(0.234)
Pseudo R-Sq	0.0993	0.1152	0.1158	0.1210
Chi sq	491.626***	523.386***	527.284***	559.788***
Log-Likeli	-14349.9	-14096.6	-14087.4	-14005.1
BIC	28760	28297	28313	28210
Number	5786	5786	5786	5786

Table 2.A21: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for **employed individuals** (with medical credentials)

Physician

Dependent variable: wrkphys	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.279***	0.284***	0.319***	0.285***
	(0.090)	(0.094)	(0.110)	(0.096)
Foreign-born Canada-US trained	0.784**	0.812*	1.244*	1.369*
	(0.071)	(0.073)	(0.127)	(0.195)
Foreign-born foreign trained	0.092***	0.091***	0.152***	0.256***
	(0.006)	(0.006)	(0.012)	(0.026)
Female	0.609***	0.619***	0.640***	0.912
	(0.036)	(0.037)	(0.039)	(0.102)
Potential Canadian experience (in years)	1.070***	1.072***	1.067***	1.069***
	(0.011)	(0.011)	(0.012)	(0.012)
Potential Canadian experience sqd	0.999***	0.999***	0.999***	0.999***
	(0.000)	(0.000)	(0.000)	(0.000)
Masters/ (MD+Masters* only for physicians)		0.837+	0.844	0.902
		(0.085)	(0.087)	(0.097)
PhD/ (MD+PhD* only for physicians)		1.856***	1.778***	1.715***
		(0.239)	(0.228)	(0.222)
MD+Masters+PhD only for physicians		0.671	0.649+	0.620+
		(0.172)	(0.164)	(0.154)
Urban		0.394***	0.440***	0.444***
		(0.059)	(0.067)	(0.069)
Speak other mother tongue than Eng/Fren			0.475***	0.495***
			(0.035)	(0.039)
Married			1.083	1.715***
			(0.078)	(0.174)
Have no children			1.190*	1.053
			(0.093)	(0.113)
Children under 5 years			1.345***	0.975
			(0.109)	(0.111)
Visible minority*foreign born Can-US trained				0.597*
				(0.140)
Visible minority*foreign-born foreign trained				0.385***
				(0.073)
Visible minority population				1.681**
				(0.289)
Potential foreign experience (in years)				0.965***
				(0.007)
Female*Married				0.479***
				(0.064)
Female*Have no children				1.202
				(0.183)
Female*Children under 5 years				1.632**
				(0.254)
Pseudo R Sq	0.2030	0.2112	0.2224	0.2313
Chi Sq	1773.397***	1779.887***	1833.079***	1839.734***
Log-Likeli	-25355.7	-25093.6	-24736.6	-24441.6
BIC	50778	50292	49617	49093
Number	14126	14126	14126	14126

Table 2.A22: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for **employed individuals** (with physiotherapy credentials)

Physiotherapist

Dependent variable: wrkphysio	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	1.228	1.206	1.268	1.208
	(0.667)	(0.662)	(0.693)	(0.665)
Foreign-born Canada-US trained	0.820	0.807	1.010	1.013
	(0.136)	(0.134)	(0.180)	(0.232)
Foreign-born foreign trained	0.195***	0.191***	0.267***	0.462***
	(0.027)	(0.027)	(0.042)	(0.104)
Female	1.080	1.072	1.062	1.289
	(0.136)	(0.134)	(0.135)	(0.300)
Potential Canadian experience (in years)	1.046*	1.045*	1.060**	1.041+
	(0.021)	(0.021)	(0.023)	(0.023)
Potential Canadian experience sqd	0.998***	0.998***	0.998***	0.998**
	(0.000)	(0.000)	(0.001)	(0.001)
Above Bachelor		1.303	1.302	1.270
		(0.231)	(0.230)	(0.227)
MD, DMD/DDS, OD, VET		0.860	1.000	0.947
		(0.309)	(0.363)	(0.350)
Masters		1.227	1.254	1.203
		(0.211)	(0.216)	(0.211)
PhD		0.421*	0.454+	0.440*
		(0.185)	(0.197)	(0.181)
Urban		0.980	1.025	1.049
		(0.187)	(0.194)	(0.197)
Speak other mother tongue than Eng/Fren			0.654**	0.727*
			(0.091)	(0.110)
Married			0.706**	0.773
			(0.090)	(0.194)
Have no children			1.295+	1.691+
			(0.179)	(0.490)
Children under 5 years			1.465*	1.717+
			(0.230)	(0.480)
Visible minority*foreign born Can-US trained				1.056
				(0.484)
Visible minority*foreign-born foreign trained				0.418*
				(0.176)
Visible minority population				1.003
				(0.349)
Potential foreign experience (in years)				0.966*
				(0.017)
Female*Married				0.922
				(0.262)
Female*Have no children				0.679
				(0.220)
Female*Children under 5 years				0.779
				(0.256)
Pseudo R Sq	0.0665	0.0696	0.0773	0.0834
Chi Sq	174.725***	180.394***	192.935***	212.538***
Log-Likeli	-7607.6	-7582.4	-7519.7	-7471.0
BIC	15272	15262	15169	15129
Number	3368	3368	3368	3368

Table 2.A23: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for **employed individuals** (with psychology credentials)

Psychologist

Dependent variable: wrkpsycho	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.811	0.731	0.723	0.751
	(0.189)	(0.174)	(0.175)	(0.181)
Foreign-born Canada-US trained	0.842*	0.764***	0.806**	0.728***
	(0.064)	(0.059)	(0.067)	(0.069)
Foreign-born foreign trained	0.284***	0.292***	0.328***	0.358***
	(0.043)	(0.044)	(0.054)	(0.075)
Female	1.266***	1.400***	1.395***	1.286**
	(0.075)	(0.085)	(0.085)	(0.126)
Potential Canadian experience (in years)	1.009	1.003	1.007	1.001
	(0.011)	(0.011)	(0.011)	(0.011)
Potential Canadian experience sqd	1.000	1.000	1.000	1.000
	(0.000)	(0.000)	(0.000)	(0.000)
PhD		1.788***	1.797***	1.806***
		(0.112)	(0.113)	(0.115)
Urban		0.830+	0.839+	0.855
		(0.081)	(0.082)	(0.083)
Speak other mother tongue than Eng/Fren			0.881	0.922
			(0.086)	(0.092)
Married			0.938	0.915
			(0.056)	(0.095)
Have no children			1.047	0.933
			(0.068)	(0.104)
Children under 5 years			1.207*	1.068
			(0.108)	(0.175)
Visible minority*foreign born Can-US trained				3.319***
				(0.954)
Visible minority*foreign-born foreign trained				1.427
				(0.547)
Visible minority population				0.326***
				(0.077)
Potential foreign experience (in years)				1.020
				(0.012)
Female*Married				1.034
				(0.129)
Female*Have no children				1.165
				(0.158)
Female*Children under 5 years				1.188
				(0.224)
Pseudo R Sq	0.0145	0.0258	0.0267	0.0322
Chi Sq	91.292***	179.172***	187.225***	227.467***
Log-Likeli	-23297.4	-23029.5	-23009.2	-22904.5
BIC	46657	46139	46133	45986
Number	6974	6974	6974	6974

Table 2.A24: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for **employed individuals** (with nursing credentials)

Registered Nurse

Dependent variable: wrknurs	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.496***	0.528***	0.536***	0.533***
	(0.080)	(0.086)	(0.087)	(0.087)
Foreign-born Canada-US trained	0.903**	0.896**	1.095*	1.120*
	(0.030)	(0.030)	(0.043)	(0.056)
Foreign-born foreign trained	0.354***	0.349***	0.564***	0.533***
	(0.012)	(0.012)	(0.029)	(0.034)
Female	1.149***	1.147***	1.158***	1.251***
	(0.047)	(0.047)	(0.048)	(0.083)
Potential Canadian experience (in years)	1.000	1.006	0.996	0.997
	(0.004)	(0.004)	(0.004)	(0.004)
Potential Canadian experience sqd	0.999***	0.999***	0.999***	0.999***
	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		1.251***	1.220***	1.215***
		(0.031)	(0.031)	(0.031)
Above Bachelor		0.969	0.943	0.941
		(0.062)	(0.060)	(0.060)
Masters		0.665***	0.659***	0.658***
		(0.036)	(0.036)	(0.036)
PhD		0.349***	0.331***	0.329***
		(0.067)	(0.062)	(0.061)
Urban		1.170***	1.158***	1.158***
		(0.031)	(0.031)	(0.031)
Potential foreign experience (in years)			0.959***	0.959***
			(0.003)	(0.003)
Speak other mother tongue than Eng/Fren			0.864***	0.857***
			(0.031)	(0.031)
Married			0.925***	1.178*
			(0.021)	(0.098)
Have no children			0.920***	0.857
			(0.023)	(0.083)
Children under 5 years			1.050	0.794*
			(0.038)	(0.089)
Visible minority*foreign born Can-US trained				0.944
				(0.104)
Visible minority*foreign-born foreign trained				1.071
				(0.118)
Visible minority population				1.022
				(0.093)
Female*Married				0.772**
				(0.067)
Female*Have no children				1.082
				(0.108)
Female*Children under 5 years				1.354**
				(0.157)
Pseudo R-Sq	0.0272	0.0310	0.0346	0.0350
Chi Sq	1589.296***	1802.280***	2029.389***	2050.282***
Log-Likeli	-184018.0	-183294.9	-182611.9	-182562.7
BIC	368113	366722	365412	365380
Number	63110	63110	63110	63110

Table 2.A25: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those in the **labour force (i.e. both employed and unemployed)** (with dentistry credentials)

Dentists

Dependent variable: wrkden	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.181*	0.171*	0.200+	0.192+
	(0.148)	(0.147)	(0.172)	(0.177)
Foreign-born Canada-US trained	0.873	0.894	0.863	0.924
	(0.131)	(0.135)	(0.156)	(0.234)
Foreign-born foreign trained	0.074***	0.070***	0.067***	0.162***
	(0.009)	(0.009)	(0.012)	(0.035)
Female	0.713**	0.721**	0.723**	0.982
	(0.086)	(0.087)	(0.087)	(0.206)
Potential Canadian experience (in years)	1.176***	1.174***	1.178***	1.163***
	(0.021)	(0.021)	(0.023)	(0.023)
Potential Canadian experience sqd	0.996***	0.996***	0.996***	0.996***
	(0.000)	(0.000)	(0.001)	(0.001)
Masters		0.370***	0.370***	0.400***
		(0.071)	(0.072)	(0.077)
PhD		0.485***	0.498***	0.483***
		(0.097)	(0.098)	(0.095)
Urban		0.782	0.782	0.806
		(0.221)	(0.223)	(0.226)
Speak other mother tongue than Eng/Fren			1.020	1.091
			(0.159)	(0.172)
Married			1.219	1.935***
			(0.167)	(0.327)
Have no children			1.295+	1.029
			(0.181)	(0.181)
Children under 5 years			1.241	0.919
			(0.191)	(0.199)
Visible minority*foreign born Can-US trained				0.979
				(0.371)
Visible minority*foreign-born foreign trained				0.446*
				(0.147)
Visible minority population				0.955
				(0.267)
Potential foreign experience (in years)				0.933***
				(0.015)
Female*Married				0.475**
				(0.119)
Female*Have no children				1.268
				(0.340)
Female*Children under 5 years				1.365
				(0.398)
Pseudo R-Sq	0.2455	0.2584	0.2614	0.2766
Chi Sq	649.351***	638.236***	652.613***	611.301***
Log-Likeli	-7150.1	-7027.8	-6998.8	-6855.4
BIC	14358	14138	14113	13884
Number	3854	3854	3854	3854

Table 2.A26: Short and long forms logistic regressions for estimated likelihood of working in one's trained health occupation for those in the **labour force (i.e. both employed and unemployed)** (with laboratory technology credentials)

Medical Laboratory Technologists

Dependent variable: wrkmlt	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	2.724	1.613	1.580	1.470
	(2.589)	(1.826)	(1.779)	(1.674)
Foreign-born Canada-US trained	0.695***	0.572***	0.639***	0.945
	(0.059)	(0.050)	(0.065)	(0.136)
Foreign-born foreign trained	0.267***	0.174***	0.200***	0.387***
	(0.023)	(0.017)	(0.024)	(0.075)
Female	0.869+	0.995	0.995	1.000
	(0.063)	(0.075)	(0.075)	(0.130)
Potential Canadian experience (in years)	1.035**	1.061***	1.055***	1.042**
	(0.012)	(0.012)	(0.013)	(0.013)
Potential Canadian experience sqd	0.999***	0.998***	0.999***	0.999***
	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		2.478***	2.498***	2.564***
		(0.197)	(0.200)	(0.212)
Above Bachelor		2.196***	2.209***	2.228***
		(0.389)	(0.390)	(0.398)
Masters		5.319***	5.363***	5.202***
		(1.029)	(1.035)	(1.031)
PhD		2.531*	2.564*	2.295*
		(0.951)	(0.974)	(0.847)
Urban		1.268**	1.288**	1.299**
		(0.105)	(0.106)	(0.107)
Speak other mother tongue than Eng/Fren			0.798*	0.878
			(0.078)	(0.088)
Married			1.103	1.148
			(0.067)	(0.171)
Have no children			0.948	1.067
			(0.067)	(0.182)
Children under 5 years			0.975	0.905
			(0.087)	(0.181)
Visible minority*foreign born Can-US trained				0.522*
				(0.132)
Visible minority*foreign-born foreign trained				0.534*
				(0.140)
Visible minority population				1.102
				(0.212)
Potential foreign experience (in years)				0.959***
				(0.009)
Female*Married				0.992
				(0.159)
Female*Have no children				0.835
				(0.154)
Female*Children under 5 years				0.990
				(0.215)
Pseudo R-Sq	0.0422	0.0677	0.0686	0.0743
Chi sq	280.684***	420.172***	424.358***	469.054***
Log-likeli	-23803.8	-23169.6	-23146.6	-23008.1
BIC	47670	46446	46435	46220
Number	7011	7011	7011	7011

Table 2.A27: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those in the **labour force (i.e. both employed and unemployed)** (with radiation technology credentials)

Medical Radiation Technologist

Dependent variable: wrkmrt	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.740	0.393	0.396	0.418
	(0.434)	(0.233)	(0.236)	(0.254)
Foreign-born Canada-US trained	0.842	0.790	0.998	0.920
	(0.124)	(0.120)	(0.178)	(0.205)
Foreign-born foreign trained	0.181***	0.174***	0.229***	0.396***
	(0.026)	(0.026)	(0.041)	(0.105)
Female	1.379***	1.360**	1.337**	1.202
	(0.132)	(0.135)	(0.133)	(0.221)
Potential Canadian experience (in years)	0.971+	0.982	0.978	0.964*
	(0.015)	(0.016)	(0.017)	(0.018)
Potential Canadian experience sqd	1.000	0.999+	0.999	1.000
	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		2.624***	2.658***	2.590***
		(0.417)	(0.420)	(0.412)
Above Bachelor		1.502	1.528	1.353
		(0.420)	(0.425)	(0.383)
Masters		0.944	0.947	0.909
		(0.337)	(0.343)	(0.317)
PhD		0.310**	0.301**	0.282**
		(0.116)	(0.116)	(0.113)
Urban		0.974	0.976	0.976
		(0.106)	(0.106)	(0.107)
Speak other mother tongue than Eng/Fren			0.665**	0.684*
			(0.096)	(0.101)
Married			0.910	0.874
			(0.082)	(0.172)
Have no children			0.960	1.194
			(0.099)	(0.264)
Children under 5 years			0.836	0.580*
			(0.101)	(0.129)
Visible minority*foreign born Can-US trained				1.747
				(0.727)
Visible minority*foreign-born foreign trained				1.053
				(0.412)
Visible minority population				0.868
				(0.267)
Potential foreign experience (in years)				0.948**
				(0.017)
Female*Married				1.091
				(0.238)
Female*Have no children				0.741
				(0.180)
Female*Children under 5 years				1.545+
				(0.397)
Pseudo R-Sq	0.0703	0.0841	0.0870	0.0926
Chi sq	255.238***	283.709***	301.427***	331.782***
Log-likeli	-11707.8	-11535.0	-11498.0	-11432.2
BIC	23474	23170	23129	23055
Number	4009	4009	4009	4009

Table 2.A28: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those in the **labour force (i.e. both employed and unemployed)** (with pharmacy credentials)

Pharmacists

Dependent variable: wrkpharm	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.316*	0.554	0.547	0.583
	(0.180)	(0.295)	(0.299)	(0.303)
Foreign-born Canada-US trained	0.513***	0.562***	0.620***	0.590**
	(0.049)	(0.056)	(0.080)	(0.115)
Foreign-born foreign trained	0.177***	0.188***	0.214***	0.353***
	(0.015)	(0.017)	(0.028)	(0.067)
Female	0.934	0.911	0.909	0.999
	(0.070)	(0.070)	(0.070)	(0.139)
Potential Canadian experience (in years)	1.107***	1.094***	1.100***	1.092***
	(0.014)	(0.014)	(0.015)	(0.015)
Potential Canadian experience sqd	0.998***	0.998***	0.998***	0.998***
	(0.000)	(0.000)	(0.000)	(0.000)
Above Bachelor		0.711**	0.709**	0.702**
		(0.084)	(0.084)	(0.084)
MD, DMD/DDS, OD, VET		0.679*	0.688*	0.631**
		(0.113)	(0.115)	(0.106)
Masters		0.542***	0.539***	0.534***
		(0.064)	(0.063)	(0.063)
PhD		0.315***	0.314***	0.295***
		(0.059)	(0.059)	(0.054)
Urban		0.783	0.792	0.790
		(0.117)	(0.119)	(0.119)
Speak other mother tongue than Eng/Fren			0.892	0.909
			(0.103)	(0.110)
Married			0.913	1.181
			(0.082)	(0.171)
Have no children			1.118	0.936
			(0.111)	(0.144)
Children under 5 years			1.105	0.928
			(0.113)	(0.156)
Visible minority*foreign born Can-US trained				1.205
				(0.319)
Visible minority*foreign-born foreign trained				0.835
				(0.202)
Visible minority population				0.942
				(0.176)
Potential foreign experience (in years)				0.959***
				(0.009)
Female*Married				0.750+
				(0.128)
Female*Have no children				1.217
				(0.235)
Female*Children under 5 years				1.112
				(0.224)
Pseudo R-Sq	0.1077	0.1217	0.1224	0.1273
Chi sq	551.459***	570.502***	575.803***	607.203***
Log-likeli	-14862.1	-14629.0	-14618.7	-14537.8
BIC	29785	29362	29376	29275
Number	5919	5919	5919	5919

Table 2.A29: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those in the **labour force (i.e. both employed and unemployed)** (with medical credentials)

Physician

Dependent variable: wrkphys	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.246***	0.251***	0.281***	0.253***
	(0.071)	(0.074)	(0.087)	(0.076)
Foreign-born Canada-US trained	0.772**	0.803*	1.224*	1.390*
	(0.068)	(0.070)	(0.122)	(0.196)
Foreign-born foreign trained	0.089***	0.087***	0.145***	0.246***
	(0.005)	(0.005)	(0.011)	(0.024)
Female	0.621***	0.632***	0.654***	0.958
	(0.036)	(0.036)	(0.038)	(0.103)
Potential Canadian experience (in years)	1.085***	1.087***	1.081***	1.083***
	(0.011)	(0.011)	(0.012)	(0.012)
Potential Canadian experience sqd	0.998***	0.998***	0.998***	0.998***
	(0.000)	(0.000)	(0.000)	(0.000)
Masters/ (MD+Masters* only for physicians)		0.781*	0.787*	0.838+
		(0.077)	(0.079)	(0.087)
PhD/ (MD+PhD* only for physicians)		1.923***	1.846***	1.765***
		(0.243)	(0.232)	(0.224)
MD+Masters+PhD only for physicians		0.719	0.696	0.672
		(0.183)	(0.174)	(0.168)
Urban		0.379***	0.425***	0.433***
		(0.057)	(0.065)	(0.068)
Speak other mother tongue than Eng/Fren			0.476***	0.501***
			(0.034)	(0.039)
Married			1.125+	1.822***
			(0.079)	(0.180)
Have no children			1.194*	1.038
			(0.091)	(0.109)
Children under 5 years			1.328***	0.992
			(0.103)	(0.110)
Visible minority*foreign born Can-US trained				0.577*
				(0.129)
Visible minority*foreign-born foreign trained				0.381***
				(0.068)
Visible minority population				1.632**
				(0.262)
Potential foreign experience (in years)				0.967***
				(0.007)
Female*Married				0.457***
				(0.059)
Female*Have no children				1.241
				(0.184)
Female*Children under 5 years				1.547**
				(0.231)
Pseudo R-Sq	0.2179	0.2268	0.2379	0.2471
Chi Sq	1970.319***	1967.079***	2023.081***	2017.314***
Log-Likeli	-26641.3	-26339.4	-25960.7	-25635.7
BIC	53350	52784	52065	51482
Number	14430	14430	14430	14430

Table 2.A30: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those in the **labour force (i.e. both employed and unemployed)** (with physiotherapy credentials)

Physiotherapy

Dependent variable: wrkphysio	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	1.270	1.251	1.318	1.278
	(0.688)	(0.682)	(0.716)	(0.695)
Foreign-born Canada-US trained	0.828	0.816	1.021	1.048
	(0.136)	(0.134)	(0.179)	(0.240)
Foreign-born foreign trained	0.205***	0.201***	0.281***	0.503**
	(0.028)	(0.027)	(0.043)	(0.112)
Female	1.090	1.082	1.074	1.326
	(0.134)	(0.133)	(0.134)	(0.296)
Potential Canadian experience (in years)	1.052**	1.050*	1.065**	1.044*
	(0.020)	(0.020)	(0.022)	(0.023)
Potential Canadian experience sqd	0.998***	0.998***	0.998***	0.998***
	(0.000)	(0.000)	(0.001)	(0.001)
Above Bachelor		1.293	1.292	1.260
		(0.225)	(0.225)	(0.222)
MD, DMD/DDS, OD, VET		0.841	0.978	0.920
		(0.293)	(0.346)	(0.330)
Masters		1.182	1.218	1.171
		(0.196)	(0.203)	(0.199)
PhD		0.452+	0.488+	0.476+
		(0.195)	(0.207)	(0.193)
Urban		0.984	1.032	1.059
		(0.184)	(0.190)	(0.195)
Speak other mother tongue than Eng/Fren			0.654**	0.740*
			(0.090)	(0.111)
Married			0.724**	0.823
			(0.090)	(0.202)
Have no children			1.341*	1.728+
			(0.182)	(0.489)
Children under 5 years			1.530**	1.799*
			(0.237)	(0.504)
Visible minority*foreign born Can-US trained				1.249
				(0.534)
Visible minority*foreign-born foreign trained				0.509+
				(0.198)
Visible minority population				0.809
				(0.249)
Potential foreign experience (in years)				0.958**
				(0.016)
Female*Married				0.881
				(0.245)
Female*Have no children				0.687
				(0.218)
Female*Children under 5 years				0.763
				(0.250)
Pseudo R-Sq	0.0647	0.0673	0.0753	0.0821
Chi sq	174.562***	179.537***	190.796***	215.777***
Log-likeli	-7847.0	-7824.8	-7757.9	-7699.8
BIC	15751	15747	15646	15587
Number	3424	3424	3424	3424

Table 2.A31: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those in the **labour force (i.e. both employed and unemployed)** (with psychology credentials)

Psychologist

Dependent variable: wrkpsycho	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.792	0.712	0.704	0.730
	(0.180)	(0.164)	(0.164)	(0.170)
Foreign-born Canada-US trained	0.823**	0.745***	0.789**	0.724***
	(0.062)	(0.056)	(0.065)	(0.068)
Foreign-born foreign trained	0.285***	0.292***	0.330***	0.364***
	(0.042)	(0.043)	(0.054)	(0.075)
Female	1.260***	1.399***	1.396***	1.294**
	(0.073)	(0.085)	(0.085)	(0.125)
Potential Canadian experience (in years)	1.012	1.006	1.009	1.004
	(0.011)	(0.011)	(0.011)	(0.011)
Potential Canadian experience sqd	1.000	1.000	1.000	1.000
	(0.000)	(0.000)	(0.000)	(0.000)
PhD		1.840***	1.844***	1.847***
		(0.114)	(0.115)	(0.116)
Urban		0.848+	0.859	0.877
		(0.082)	(0.083)	(0.085)
Speak other mother tongue than Eng/Fren			0.866	0.917
			(0.083)	(0.090)
Married			0.960	0.941
			(0.056)	(0.097)
Have no children			1.043	0.933
			(0.068)	(0.103)
Children under 5 years			1.228*	1.071
			(0.108)	(0.175)
Visible minority*foreign born Can-US trained				2.955***
				(0.828)
Visible minority*foreign-born foreign trained				1.291
				(0.488)
Visible minority population				0.331***
				(0.076)
Potential foreign experience (in years)				1.021+
				(0.012)
Female*Married				1.026
				(0.127)
Female*Have no children				1.155
				(0.155)
Female*Children under 5 years				1.206
				(0.226)
Pseudo R-Sq	0.0147	0.0271	0.0281	0.0338
Chi Sq	95.650***	193.132***	202.790***	244.085***
Log-Likeli	-23862.2	-23563.5	-23539.0	-23429.5
BIC	47787	47207	47193	47037
Number	7181	7181	7181	7181

Table 2.A32: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those in **the labour force (i.e. both employed and unemployed)** (with nursing credentials)

Registered Nurse

Dependent variable: wrknurs	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.495***	0.524***	0.528***	0.531***
	(0.078)	(0.084)	(0.084)	(0.085)
Foreign-born Canada-US trained	0.884***	0.878***	0.948	1.126*
	(0.029)	(0.029)	(0.035)	(0.055)
Foreign-born foreign trained	0.352***	0.347***	0.399***	0.542***
	(0.012)	(0.011)	(0.016)	(0.034)
Female	1.160***	1.158***	1.162***	1.266***
	(0.047)	(0.047)	(0.047)	(0.083)
Potential Canadian experience (in years)	1.004	1.010*	1.010*	1.000
	(0.004)	(0.004)	(0.004)	(0.004)
Potential Canadian experience sqd	0.999***	0.999***	0.999***	0.999***
	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		1.265***	1.274***	1.229***
		(0.031)	(0.031)	(0.030)
Above Bachelor		0.985	0.997	0.957
		(0.062)	(0.062)	(0.060)
Masters		0.683***	0.686***	0.675***
		(0.037)	(0.037)	(0.037)
PhD		0.376***	0.381***	0.353***
		(0.071)	(0.072)	(0.065)
Urban		1.166***	1.157***	1.158***
		(0.031)	(0.031)	(0.031)
Potential foreign experience (in years)			0.844***	0.846***
			(0.030)	(0.030)
Speak other mother tongue than Eng/Fren			0.927***	1.204*
			(0.020)	(0.099)
Married			0.932**	0.858
			(0.023)	(0.081)
Have no children			1.126***	0.810+
			(0.039)	(0.089)
Children under 5 years				0.930
				(0.099)
Visible minority*foreign born Can-US trained				1.072
				(0.114)
Visible minority*foreign-born foreign trained				1.001
				(0.088)
Visible minority population				0.959***
				(0.003)
Female*Married				0.770**
				(0.065)
Female*Have no children				1.085
				(0.106)
Female*Children under 5 years				1.311*
				(0.149)
Pseudo R-Sq	0.0270	0.0307	0.0317	0.0348
Chi sq	1623.227***	1835.705***	1889.355***	2091.770***
Log-likeli	-190072.9	-189338.8	-189144.4	-188576.3
BIC	380223	378810	378466	377407
Number	64587	64587	64587	64587

Table 2.A33: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those **in and out of the labour force (population)** (with dentistry credentials)

Dentists

Dependent variable: wrkden	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.193*	0.185*	0.227+	0.219+
	(0.141)	(0.146)	(0.181)	(0.181)
Foreign-born Canada-US trained	1.009	1.009	1.079	1.141
	(0.128)	(0.129)	(0.169)	(0.244)
Foreign-born foreign trained	0.081***	0.075***	0.081***	0.189***
	(0.009)	(0.009)	(0.013)	(0.037)
Female	0.671***	0.674***	0.675***	0.865
	(0.070)	(0.070)	(0.071)	(0.153)
Potential Canadian experience (in years)	1.237***	1.239***	1.241***	1.227***
	(0.019)	(0.019)	(0.021)	(0.021)
Potential Canadian experience sqd	0.994***	0.994***	0.994***	0.994***
	(0.000)	(0.000)	(0.000)	(0.000)
Masters		0.407***	0.406***	0.435***
		(0.067)	(0.068)	(0.073)
PhD		0.521***	0.531***	0.518***
		(0.096)	(0.097)	(0.096)
Urban		1.272	1.308	1.345
		(0.242)	(0.251)	(0.255)
Speak other mother tongue than Eng/Fren			0.854	0.925
			(0.120)	(0.128)
Married			1.204	1.801***
			(0.143)	(0.261)
Have no children			1.282*	0.971
			(0.155)	(0.144)
Children under 5 years			1.302*	1.110
			(0.174)	(0.220)
Visible minority*foreign born Can-US trained				1.134
				(0.349)
Visible minority*foreign-born foreign trained				0.534*
				(0.147)
Visible minority population				0.804
				(0.178)
Potential foreign experience (in years)				0.936***
				(0.012)
Female*Married				0.501**
				(0.109)
Female*Have no children				1.589*
				(0.373)
Female*Children under 5 years				1.122
				(0.294)
Pseudo R-Sq	0.2535	0.2642	0.2680	0.2824
Chi sq	824.253***	827.063***	839.130***	768.636***
Log-likeli	-9297.7	-9163.6	-9116.8	-8935.5
BIC	18654	18411	18351	18047
Number	4313	4313	4313	4313

Table 2.A34: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those **in and out of the labour force (population)** (with laboratory technology credentials)

Medical laboratory Technologists

Dependent variable: wrkmlt	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	1.901	1.260	1.207	1.162
	(1.289)	(1.054)	(1.012)	(0.981)
Foreign-born Canada-US trained	0.669***	0.549***	0.618***	0.926
	(0.053)	(0.046)	(0.059)	(0.121)
Foreign-born foreign trained	0.268***	0.181***	0.210***	0.433***
	(0.022)	(0.016)	(0.024)	(0.080)
Female	0.828**	0.943	0.941	1.088
	(0.056)	(0.066)	(0.066)	(0.134)
Potential Canadian experience (in years)	1.075***	1.100***	1.091***	1.075***
	(0.011)	(0.012)	(0.012)	(0.012)
Potential Canadian experience sqd	0.998***	0.997***	0.998***	0.998***
	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		2.335***	2.356***	2.383***
		(0.169)	(0.172)	(0.179)
Above Bachelor		1.888***	1.902***	1.892***
		(0.309)	(0.311)	(0.312)
Masters		5.229***	5.286***	5.074***
		(0.983)	(0.989)	(0.963)
PhD		2.693**	2.721**	2.449**
		(0.896)	(0.913)	(0.813)
Urban		1.290***	1.298***	1.305***
		(0.099)	(0.100)	(0.101)
Speak other mother tongue than Eng/Fren			0.788**	0.864
			(0.071)	(0.080)
Married			1.061	1.308+
			(0.061)	(0.185)
Have no children			0.878*	1.034
			(0.058)	(0.159)
Children under 5 years			0.923	0.871
			(0.078)	(0.171)
Visible minority*foreign born Can-US trained				0.540*
				(0.130)
Visible minority*foreign-born foreign trained				0.555*
				(0.140)
Visible minority population				1.092
				(0.205)
Potential foreign experience (in years)				0.949***
				(0.008)
Female*Married				0.819
				(0.125)
Female*Have no children				0.797
				(0.133)
Female*Children under 5 years				0.940
				(0.199)
Pseudo R-Sq	0.0594	0.0827	0.0838	0.0907
Chi sq	469.394***	631.371***	640.762***	716.730***
Log-likeli	-27631.1	-26946.0	-26913.6	-26714.7
BIC	55326	54001	53972	53637
Number	8421	8421	8421	8421

Table 2.A35: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those **in and out of the labour force (population)** (with radiation technology credentials)

Medical Radiation Technologist

Dependent variable: wrkmrt	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.539	0.324*	0.334*	0.354*
	(0.272)	(0.163)	(0.169)	(0.184)
Foreign-born Canada-US trained	0.749*	0.690**	0.873	0.840
	(0.099)	(0.095)	(0.138)	(0.168)
Foreign-born foreign trained	0.183***	0.175***	0.233***	0.485**
	(0.025)	(0.025)	(0.039)	(0.116)
Female	1.199*	1.209*	1.183+	1.187
	(0.109)	(0.113)	(0.111)	(0.211)
Potential Canadian experience (in years)	1.013	1.027+	1.018	1.001
	(0.014)	(0.014)	(0.016)	(0.016)
Potential Canadian experience sqd	0.998***	0.998***	0.998***	0.999***
	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		2.764***	2.800***	2.725***
		(0.396)	(0.401)	(0.392)
Above Bachelor		1.387	1.430	1.260
		(0.357)	(0.365)	(0.333)
Masters		1.218	1.198	1.144
		(0.409)	(0.405)	(0.369)
PhD		0.369**	0.356**	0.335**
		(0.133)	(0.132)	(0.127)
Urban		0.995	0.987	0.987
		(0.096)	(0.096)	(0.096)
Speak other mother tongue than Eng/Fren			0.646**	0.686**
			(0.087)	(0.095)
Married			0.890	0.936
			(0.073)	(0.176)
Have no children			0.873	1.089
			(0.079)	(0.216)
Children under 5 years			0.781*	0.594*
			(0.089)	(0.129)
Visible minority*foreign born Can-US trained				1.867
				(0.734)
Visible minority*foreign-born foreign trained				0.980
				(0.365)
Visible minority population				0.738
				(0.221)
Potential foreign experience (in years)				0.941***
				(0.015)
Female*Married				0.980
				(0.203)
Female*Have no children				0.741
				(0.160)
Female*Children under 5 years				1.306
				(0.323)
Pseudo R-Sq	0.1064	0.1195	0.1235	0.1295
Chi sq	477.160***	510.091***	538.015***	582.409***
Log-likeli	-14199.1	-13991.4	-13927.3	-13841.4
BIC	28457	28084	27990	27877
Number	4713	4713	4713	4713

Table 2.A36: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those **in and out of the labour force (population)** (with pharmacy credentials)

Pharmacist

Dependent variable: wrkpharm	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.275*	0.455	0.450	0.477
	(0.143)	(0.224)	(0.227)	(0.230)
Foreign-born Canada-US trained	0.481***	0.520***	0.565***	0.528***
	(0.043)	(0.048)	(0.067)	(0.095)
Foreign-born foreign trained	0.152***	0.159***	0.179***	0.296***
	(0.012)	(0.013)	(0.021)	(0.050)
Female	0.743***	0.723***	0.720***	0.856
	(0.052)	(0.051)	(0.051)	(0.110)
Potential Canadian experience (in years)	1.143***	1.132***	1.140***	1.132***
	(0.013)	(0.013)	(0.014)	(0.014)
Potential Canadian experience sqd	0.996***	0.997***	0.996***	0.997***
	(0.000)	(0.000)	(0.000)	(0.000)
Above Bachelor		0.699**	0.699**	0.690***
		(0.077)	(0.076)	(0.077)
MD, DMD/DDS, OD, VET		0.712*	0.722*	0.667**
		(0.109)	(0.111)	(0.102)
Masters		0.582***	0.579***	0.573***
		(0.065)	(0.064)	(0.064)
PhD		0.363***	0.364***	0.340***
		(0.068)	(0.069)	(0.063)
Urban		0.794+	0.803+	0.803+
		(0.103)	(0.104)	(0.104)
Speak other mother tongue than Eng/Fren			0.914	0.943
			(0.095)	(0.103)
Married			0.894	1.272+
			(0.073)	(0.172)
Have no children			1.122	0.938
			(0.099)	(0.133)
Children under 5 years			1.108	0.894
			(0.105)	(0.149)
Visible minority*foreign born Can-US trained				1.279
				(0.309)
Visible minority*foreign-born foreign trained				0.866
				(0.188)
Visible minority population				0.891
				(0.147)
Potential foreign experience (in years)				0.958***
				(0.008)
Female*Married				0.657**
				(0.104)
Female*Have no children				1.210
				(0.208)
Female*Children under 5 years				1.166
				(0.225)
Pseudo R-Sq	0.1288	0.1391	0.1398	0.1452
Chi sq	749.472***	756.482***	760.250***	792.341***
Log-likeli	-17590.1	-17381.8	-17369.3	-17259.3
BIC	35242	34869	34879	34721
Number	6549	6549	6549	6549

Table 2.A37: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those **in and out of the labour force (population)** (with medical credentials)

Physician

Dependent variable: wrkphys	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.211***	0.215***	0.252***	0.231***
	(0.046)	(0.047)	(0.058)	(0.053)
Foreign-born Canada-US trained	0.764***	0.790**	1.186*	1.251+
	(0.057)	(0.059)	(0.103)	(0.149)
Foreign-born foreign trained	0.089***	0.088***	0.140***	0.243***
	(0.005)	(0.005)	(0.010)	(0.022)
Female	0.598***	0.611***	0.631***	0.955
	(0.031)	(0.031)	(0.033)	(0.087)
Potential Canadian experience (in years)	1.151***	1.153***	1.145***	1.145***
	(0.010)	(0.010)	(0.011)	(0.011)
Potential Canadian experience sqd	0.997***	0.997***	0.997***	0.997***
	(0.000)	(0.000)	(0.000)	(0.000)
Masters/ (MD+Masters* only for physicians)		0.767**	0.769**	0.815*
		(0.068)	(0.069)	(0.076)
PhD/ (MD+PhD* only for physicians)		2.134***	2.067***	1.961***
		(0.246)	(0.238)	(0.229)
MD+Masters+PhD only for physicians		0.841	0.817	0.788
		(0.204)	(0.197)	(0.195)
Urban		0.446***	0.502***	0.516***
		(0.062)	(0.070)	(0.073)
Speak other mother tongue than Eng/Fren			0.480***	0.519***
			(0.031)	(0.035)
Married			1.258***	2.169***
			(0.078)	(0.190)
Have no children			1.241**	1.003
			(0.083)	(0.092)
Children under 5 years			1.349***	1.051
			(0.092)	(0.109)
Visible minority*foreign born Can-US trained				0.800
				(0.142)
Visible minority*foreign-born foreign trained				0.464***
				(0.065)
Visible minority population				1.248+
				(0.148)
Potential foreign experience (in years)				0.963***
				(0.006)
Female*Married				0.407***
				(0.046)
Female*Have no children				1.431**
				(0.186)
Female*Children under 5 years				1.390*
				(0.185)
Pseudo R-Sq	0.2401	0.2482	0.2607	0.2715
Chi sq	2635.237***	2605.524***	2662.072***	2577.279***
Log-likeli	-33092.9	-32739.6	-32198.0	-31721.4
BIC	66254	65586	64541	63655
Number	15785	15785	15785	15785

Table 2.A38: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those **in and out of the labour force (population)** (with physiotherapy credentials)

Physiotherapist

Dependent variable: wrkphysio	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.980	0.994	1.035	0.985
	(0.443)	(0.447)	(0.471)	(0.449)
Foreign-born Canada-US trained	0.813	0.807	0.966	0.998
	(0.118)	(0.117)	(0.152)	(0.199)
Foreign-born foreign trained	0.209***	0.207***	0.276***	0.482***
	(0.026)	(0.026)	(0.040)	(0.100)
Female	0.901	0.888	0.876	1.104
	(0.103)	(0.102)	(0.102)	(0.222)
Potential Canadian experience (in years)	1.108***	1.105***	1.123***	1.107***
	(0.018)	(0.018)	(0.020)	(0.021)
Potential Canadian experience sqd	0.997***	0.997***	0.996***	0.997***
	(0.000)	(0.000)	(0.000)	(0.000)
Above Bachelor		1.277	1.280	1.252
		(0.193)	(0.194)	(0.191)
MD, DMD/DDS, OD, VET		0.789	0.886	0.854
		(0.219)	(0.250)	(0.247)
Masters		1.059	1.085	1.045
		(0.155)	(0.160)	(0.156)
PhD		0.469+	0.499+	0.495+
		(0.188)	(0.201)	(0.193)
Urban		0.959	0.993	1.014
		(0.156)	(0.160)	(0.163)
Speak other mother tongue than Eng/Fren			0.699**	0.771+
			(0.091)	(0.107)
Married			0.765*	0.898
			(0.083)	(0.210)
Have no children			1.388**	1.645+
			(0.166)	(0.439)
Children under 5 years			1.380*	1.762*
			(0.186)	(0.482)
Visible minority*foreign born Can-US trained				1.182
				(0.446)
Visible minority*foreign-born foreign trained				0.529+
				(0.182)
Visible minority population				0.866
				(0.232)
Potential foreign experience (in years)				0.958**
				(0.015)
Female*Married				0.842
				(0.217)
Female*Have no children				0.774
				(0.229)
Female*Children under 5 years				0.696
				(0.214)
Pseudo R-Sq	0.0839	0.0863	0.0921	0.0978
Chi sq	259.980***	264.214***	275.309***	302.057***
Log-likeli	-9570.3	-9546.0	-9485.0	-9424.8
BIC	19198	19191	19102	19039
Number	3780	3780	3780	3780

Table 2.A39: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those **in and out of the labour force (population)** (with psychology credentials)
Psychologist

Dependent variable: wrkpsycho	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.755	0.693+	0.688+	0.706
	(0.168)	(0.154)	(0.154)	(0.158)
Foreign-born Canada-US trained	0.812**	0.738***	0.799**	0.760**
	(0.058)	(0.053)	(0.062)	(0.068)
Foreign-born foreign trained	0.263***	0.272***	0.321***	0.381***
	(0.037)	(0.038)	(0.050)	(0.076)
Female	1.201**	1.327***	1.323***	1.290**
	(0.067)	(0.077)	(0.077)	(0.119)
Potential Canadian experience (in years)	1.044***	1.037***	1.040***	1.035***
	(0.010)	(0.010)	(0.011)	(0.011)
Potential Canadian experience sqd	0.999***	0.999***	0.999***	0.999***
	(0.000)	(0.000)	(0.000)	(0.000)
PhD		1.826***	1.826***	1.815***
		(0.108)	(0.108)	(0.109)
Urban		0.879	0.890	0.909
		(0.081)	(0.082)	(0.084)
Speak other mother tongue than Eng/Fren			0.813*	0.865
			(0.075)	(0.081)
Married			0.962	1.014
			(0.055)	(0.101)
Have no children			1.036	0.919
			(0.065)	(0.098)
Children under 5 years			1.174+	1.028
			(0.098)	(0.164)
Visible minority*foreign born Can-US trained				2.542***
				(0.679)
Visible minority*foreign-born foreign trained				1.245
				(0.442)
Visible minority population				0.369***
				(0.081)
Potential foreign experience (in years)				1.011
				(0.011)
Female*Married				0.924
				(0.110)
Female*Have no children				1.175
				(0.151)
Female*Children under 5 years				1.188
				(0.215)
Pseudo R-Sq	0.0188	0.0305	0.0316	0.0368
Chi sq	140.318***	243.926***	255.939***	286.513***
Log-likeli	-26297.7	-25983.0	-25955.8	-25860.5
BIC	52658	52047	52029	51901
Number	8187	8187	8187	8187

Table 2.A40: Short and long forms of logistic regressions for estimated likelihood of working in one's trained health occupation for those **in and out of the labour force (population)** (with nursing credentials)

Registered Nurse

Dependent variable: wrknurs	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.625**	0.638**	0.648**	0.644**
	(0.095)	(0.098)	(0.100)	(0.100)
Foreign-born Canada-US trained	0.838***	0.834***	1.075*	1.090*
	(0.024)	(0.024)	(0.036)	(0.046)
Foreign-born foreign trained	0.328***	0.327***	0.607***	0.574***
	(0.010)	(0.010)	(0.027)	(0.032)
Female	1.032	1.028	1.042	1.278***
	(0.039)	(0.039)	(0.040)	(0.078)
Potential Canadian experience (in years)	1.059***	1.065***	1.045***	1.046***
	(0.004)	(0.004)	(0.004)	(0.004)
Potential Canadian experience sqd	0.998***	0.998***	0.998***	0.998***
	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		1.315***	1.267***	1.263***
		(0.028)	(0.027)	(0.027)
Above Bachelor		1.009	0.965	0.962
		(0.055)	(0.053)	(0.053)
Masters		0.833***	0.818***	0.817***
		(0.042)	(0.042)	(0.042)
PhD		0.417***	0.384***	0.381***
		(0.072)	(0.063)	(0.063)
Urban		1.122***	1.105***	1.104***
		(0.026)	(0.026)	(0.026)
Potential foreign experience (in years)			0.946***	0.946***
			(0.003)	(0.003)
Speak other mother tongue than Eng/Fren			0.848***	0.840***
			(0.027)	(0.027)
Married			0.915***	1.336***
			(0.018)	(0.102)
Have no children			0.865***	0.847+
			(0.018)	(0.074)
Children under 5 years			0.870***	0.786*
			(0.027)	(0.083)
Visible minority*foreign born Can-US trained				0.980
				(0.092)
Visible minority*foreign-born foreign trained				1.096
				(0.103)
Visible minority population				1.000
				(0.077)
Female*Married				0.668***
				(0.053)
Female*Have no children				1.028
				(0.092)
Female*Children under 5 years				1.110
				(0.120)
Pseudo R-Sq	0.0648	0.0679	0.0741	0.0746
Chi sq	4969.734***	5166.031***	5794.506***	5817.610***
Log-likeli	-245064.9	-244256.5	-242622.1	-242526.3
BIC	490209	488648	485436	485312
Number	78736	78736	78736	78736

Table 2.A41: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals working in their trained fields as dentists

Dentist

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	-0.418	0.133	0.168	0.175	0.175
	(0.313)	(0.406)	(0.411)	(0.425)	(0.415)
Foreign-born Canada-US trained	-0.129**	-0.175***	-0.141**	-0.124*	-0.077
	(0.047)	(0.045)	(0.049)	(0.050)	(0.068)
Foreign-born foreign trained	-0.295***	-0.281***	-0.232***	-0.125	-0.219*
	(0.058)	(0.052)	(0.061)	(0.077)	(0.086)
Female	-0.268***	-0.200***	-0.183***	-0.252***	-0.262***
	(0.040)	(0.038)	(0.038)	(0.072)	(0.072)
Potential Canadian experience (in years)	0.072***	0.041***	0.035***	0.034***	0.030***
	(0.007)	(0.007)	(0.008)	(0.007)	(0.008)
Potential Canadian experience sqd	-0.002***	-0.001***	-0.001**	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Masters		0.003	-0.004	0.010	0.018
		(0.072)	(0.071)	(0.071)	(0.071)
PhD		0.056	0.064	0.066	0.054
		(0.062)	(0.062)	(0.062)	(0.061)
Urban		-0.027	-0.020	-0.018	-0.005
		(0.049)	(0.049)	(0.049)	(0.049)
Weeks worked in 2005		0.036***	0.036***	0.036***	0.036***
		(0.003)	(0.003)	(0.003)	(0.003)
Hours in reference week		0.008***	0.009***	0.009***	0.009***
		(0.002)	(0.002)	(0.002)	(0.002)
Speak other mother tongue than Eng/Fren			-0.082+	-0.081+	-0.042
			(0.046)	(0.046)	(0.048)
Married			0.126**	0.119*	0.123*
			(0.043)	(0.055)	(0.055)
Have no children			-0.021	-0.056	-0.055
			(0.045)	(0.054)	(0.054)
Children under 5 years			0.139**	0.104+	0.101+
			(0.046)	(0.057)	(0.057)
Potential foreign experience (in years)				-0.020*	-0.023**
				(0.008)	(0.008)
Female*Married				0.044	0.057
				(0.081)	(0.080)
Female*Have no children				0.096	0.096
				(0.085)	(0.084)
Female*Children under 5 years				0.056	0.042
				(0.089)	(0.089)
Visible minority*foreign born Can-US trained					0.093
					(0.105)
Visible minority*foreign-born foreign trained					0.349**
					(0.115)
Visible minority population					-0.251***
					(0.072)
Constant	11.021***	9.266***	9.182***	9.208***	9.278***
	(0.063)	(0.147)	(0.144)	(0.146)	(0.148)
Adj R-Sqd	0.096***	0.219***	0.227***	0.228***	0.232***
BIC	8054.9	7646.7	7642.9	7665.5	7669.2
Number	3044	3044	3044	3044	3044

Table 2.A42: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **working in their trained fields as MLTs Medical laboratory Technologists**

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	-0.202	-0.251	-0.334	-0.330	-0.340
	(0.452)	(0.442)	(0.447)	(0.445)	(0.443)
Foreign-born Canada-US trained	0.048	0.038	0.050+	0.071*	0.081*
	(0.032)	(0.032)	(0.028)	(0.033)	(0.037)
Foreign-born foreign trained	0.102**	0.085*	0.087**	0.122**	0.039
	(0.039)	(0.040)	(0.033)	(0.045)	(0.056)
Female	-0.128***	-0.111***	-0.074***	-0.074***	0.003
	(0.025)	(0.024)	(0.020)	(0.020)	(0.034)
Potential Canadian experience (in years)	0.068***	0.069***	0.040***	0.042***	0.042***
	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)
Potential Canadian experience sqd	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		0.034	0.030	0.031	0.023
		(0.026)	(0.021)	(0.021)	(0.022)
Above Bachelor		-0.013	0.074	0.074	0.070
		(0.081)	(0.054)	(0.054)	(0.055)
Masters		0.001	0.033	0.035	0.036
		(0.066)	(0.057)	(0.057)	(0.056)
PhD		0.520**	0.482**	0.489**	0.509**
		(0.160)	(0.159)	(0.157)	(0.161)
Urban		0.025	0.007	0.009	0.008
		(0.037)	(0.032)	(0.032)	(0.032)
Weeks worked in 2005			0.029***	0.029***	0.029***
			(0.002)	(0.002)	(0.002)
Hours in reference week			0.006***	0.006***	0.006***
			(0.001)	(0.001)	(0.001)
Potential foreign experience (in years)				-0.000	-0.001
				(0.003)	(0.003)
Speak other mother tongue than Eng/Fren				-0.027	-0.038
				(0.029)	(0.030)
Married				-0.020	0.076+
				(0.020)	(0.045)
Have no children				0.031	0.023
				(0.022)	(0.058)
Children under 5 years				0.028	0.055
				(0.030)	(0.047)
Visible minority*foreign born Can-US trained					-0.049
					(0.071)
Visible minority*foreign-born foreign trained					0.073
					(0.076)
Visible minority population					0.048
					(0.048)
Female*Married					-0.114*
					(0.049)
Female*Have no children					0.015
					(0.062)
Female*Children under 5 years					-0.041
					(0.057)
Constant	10.089***	10.024***	8.668***	8.641***	8.589***
	(0.058)	(0.066)	(0.092)	(0.095)	(0.096)
Adj R-Sqd	0.098***	0.104***	0.364***	0.363***	0.365***
BIC	5936.0	5948.2	4746.7	4782.7	4818.2
Number	3551	3551	3551	3551	3551

Table 2.A43: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **working in their trained fields as MRTs Medical Radiation Technologist**

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	0.363***	0.349***	0.197*	0.183*	0.187*
	(0.094)	(0.102)	(0.085)	(0.077)	(0.085)
Foreign-born Canada-US trained	0.107*	0.104*	0.042	0.084+	0.043
	(0.043)	(0.045)	(0.040)	(0.048)	(0.074)
Foreign-born foreign trained	0.048	0.049	0.051	0.087	0.292***
	(0.060)	(0.062)	(0.053)	(0.053)	(0.076)
Female	-0.267***	-0.260***	-0.185***	-0.189***	-0.118*
	(0.036)	(0.037)	(0.034)	(0.034)	(0.054)
Potential Canadian experience (in years)	0.064***	0.065***	0.041***	0.042***	0.043***
	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)
Potential Canadian experience sqd	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		-0.060	-0.041	-0.039	-0.054
		(0.049)	(0.043)	(0.043)	(0.043)
Above Bachelor		0.102	0.110	0.103	0.082
		(0.086)	(0.078)	(0.078)	(0.079)
Masters		-0.272	-0.214+	-0.217+	-0.243*
		(0.172)	(0.111)	(0.111)	(0.107)
PhD		0.743***	0.608***	0.616***	0.626***
		(0.143)	(0.171)	(0.168)	(0.163)
Urban		0.051	0.013	0.016	0.008
		(0.035)	(0.032)	(0.032)	(0.032)
Weeks worked in 2005			0.028***	0.028***	0.028***
			(0.002)	(0.002)	(0.002)
Hours in reference week			0.007***	0.007***	0.007***
			(0.001)	(0.001)	(0.001)
Speak other mother tongue than Eng/Fren				-0.065+	-0.078+
				(0.039)	(0.040)
Married				0.020	0.125*
				(0.025)	(0.063)
Have no children				0.056*	0.014
				(0.027)	(0.064)
Children under 5 years				-0.032	-0.012
				(0.036)	(0.065)
Visible minority*foreign born Can-US trained					-0.119
					(0.115)
Visible minority*foreign-born foreign trained					-0.388**
					(0.120)
Visible minority population					0.237**
					(0.085)
Potential foreign experience (in years)					-0.009+
					(0.005)
Female*Married					-0.125+
					(0.067)
Female*Have no children					0.055
					(0.070)
Female*Children under 5 years					-0.029
					(0.074)
Constant	10.310***	10.263***	8.894***	8.890***	8.846***
	(0.069)	(0.080)	(0.099)	(0.108)	(0.112)
Adj R-Sqd	0.089***	0.100***	0.322***	0.323***	0.328***
BIC	5383.1	5385.5	4617.2	4638.6	4666.2
Number	2759	2759	2759	2759	2759

Table 2.A44: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **working in their trained fields as pharmacists**
Pharmacist

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	-0.193	-0.214	-0.202	-0.191	-0.187
	(0.163)	(0.166)	(0.123)	(0.125)	(0.128)
Foreign-born Canada-US trained	-0.052+	-0.054+	-0.063*	-0.049	-0.049
	(0.031)	(0.032)	(0.028)	(0.035)	(0.060)
Foreign-born foreign trained	-0.098**	-0.101**	-0.126***	-0.039	0.120+
	(0.038)	(0.039)	(0.036)	(0.053)	(0.067)
Female	-0.270***	-0.270***	-0.149***	-0.154***	-0.120**
	(0.026)	(0.026)	(0.026)	(0.025)	(0.041)
Potential Canadian experience (in years)	0.056***	0.057***	0.029***	0.033***	0.032***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Potential Canadian experience sqd	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Above Bachelor		0.014	0.008	0.010	0.009
		(0.045)	(0.041)	(0.041)	(0.041)
MD, DMD/DDS, OD, VET		-0.043	-0.058	-0.060	-0.058
		(0.072)	(0.069)	(0.069)	(0.068)
Masters		0.030	-0.006	-0.007	-0.010
		(0.042)	(0.034)	(0.035)	(0.035)
PhD		0.079	0.087	0.083	0.081
		(0.068)	(0.065)	(0.066)	(0.066)
Urban		0.006	0.009	0.009	0.005
		(0.040)	(0.037)	(0.037)	(0.037)
Weeks worked in 2005			0.033***	0.033***	0.032***
			(0.002)	(0.002)	(0.002)
Hours in reference week			0.009***	0.009***	0.008***
			(0.001)	(0.001)	(0.001)
Potential foreign experience (in years)				-0.009*	-0.009+
				(0.005)	(0.005)
Speak other mother tongue than Eng/Fren				0.011	0.025
				(0.030)	(0.033)
Married				-0.032	0.016
				(0.026)	(0.046)
Have no children				0.062*	0.007
				(0.029)	(0.050)
Children under 5 years				0.013	0.054
				(0.035)	(0.062)
Visible minority*foreign born Can-US trained					-0.012
					(0.071)
Visible minority*foreign-born foreign trained					-0.230**
					(0.079)
Visible minority population					-0.003
					(0.041)
Female*Married					-0.074
					(0.052)
Female*Have no children					0.088
					(0.058)
Female*Children under 5 years					-0.064
					(0.070)
Constant	10.826***	10.813***	9.101***	9.082***	9.091***
	(0.046)	(0.061)	(0.094)	(0.099)	(0.100)
Adj R-Sqd	0.072***	0.072***	0.254***	0.256***	0.258***
BIC	10467.0	10506.9	9521.4	9550.2	9581.0
Number	4559	4559	4559	4559	4559

Table 2.A45: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **working in their trained fields** as physicians

Physician

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	-0.350***	-0.350***	-0.337***	-0.329***	-0.336***
	(0.098)	(0.099)	(0.098)	(0.096)	(0.095)
Foreign-born Canada-US trained	-0.013	-0.016	-0.025	-0.033	-0.043
	(0.023)	(0.023)	(0.022)	(0.025)	(0.032)
Foreign-born foreign trained	-0.152***	-0.158***	-0.149***	-0.231***	-0.153***
	(0.028)	(0.028)	(0.027)	(0.034)	(0.040)
Female	-0.338***	-0.337***	-0.240***	-0.219***	-0.111***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.030)
Potential Canadian experience (in years)	0.114***	0.115***	0.107***	0.106***	0.106***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Potential Canadian experience sqd	-0.003***	-0.003***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Masters/ (MD+Masters* only for physicians)		-0.116***	-0.141***	-0.169***	-0.166***
		(0.029)	(0.027)	(0.028)	(0.027)
PhD/ (MD+PhD* only for physicians)		0.133***	0.122***	0.128***	0.124***
		(0.031)	(0.031)	(0.031)	(0.030)
MD+Masters+PhD only for physicians		-0.047	-0.051	-0.047	-0.054
		(0.096)	(0.092)	(0.091)	(0.090)
Urban		0.065+	0.059+	0.076*	0.086**
		(0.034)	(0.033)	(0.033)	(0.033)
Weeks worked in 2005			0.024***	0.024***	0.023***
			(0.001)	(0.001)	(0.001)
Hours in reference week			0.006***	0.006***	0.006***
			(0.000)	(0.000)	(0.000)
Potential foreign experience (in years)				0.019***	0.018***
				(0.003)	(0.003)
Speak other mother tongue than Eng/Fren				-0.047*	-0.025
				(0.023)	(0.024)
Married				-0.004	0.081**
				(0.020)	(0.027)
Have no children				-0.003	-0.016
				(0.022)	(0.028)
Children under 5 years				0.210***	0.194***
				(0.023)	(0.030)
Visible minority*foreign born Can-US trained					0.046
					(0.050)
Visible minority*foreign-born foreign trained					-0.140*
					(0.059)
Visible minority population					-0.048
					(0.033)
Female*Married					-0.189***
					(0.036)
Female*Have no children					0.033
					(0.043)
Female*Children under 5 years					0.035
					(0.042)
Constant	10.913***	10.843***	9.464***	9.333***	9.294***
	(0.027)	(0.042)	(0.078)	(0.080)	(0.081)
Adj R-Sqd	0.194***	0.197***	0.255***	0.264***	0.267***
BIC	29129.8	29119.4	28249.8	28141.3	28144.0
Number	11834	11834	11834	11834	11834

Table 2.A46: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals working in their trained fields as physiotherapists

Physiotherapist

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	0.068	0.091	0.051	0.058	0.038
	(0.095)	(0.104)	(0.081)	(0.081)	(0.083)
Foreign-born Canada-US trained	0.021	0.024	0.013	0.032	-0.019
	(0.049)	(0.049)	(0.044)	(0.049)	(0.064)
Foreign-born foreign trained	-0.103	-0.104	-0.024	0.011	0.116
	(0.072)	(0.071)	(0.062)	(0.093)	(0.089)
Female	-0.228***	-0.229***	-0.031	-0.029	0.097
	(0.038)	(0.038)	(0.037)	(0.037)	(0.067)
Potential Canadian experience (in years)	0.047***	0.045***	0.026***	0.022**	0.022**
	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)
Potential Canadian experience sqd	-0.001***	-0.001***	-0.001**	-0.000*	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Above Bachelor		0.058	0.006	0.003	-0.002
		(0.047)	(0.041)	(0.041)	(0.041)
MD, DMD/DDS, OD, VET		0.069	0.053	0.045	0.057
		(0.120)	(0.093)	(0.094)	(0.094)
Masters		-0.038	-0.086+	-0.081+	-0.083+
		(0.057)	(0.045)	(0.046)	(0.046)
PhD		-0.425+	-0.169	-0.174	-0.176
		(0.235)	(0.233)	(0.231)	(0.228)
Urban		-0.007	-0.049	-0.044	-0.042
		(0.054)	(0.047)	(0.047)	(0.047)
Weeks worked in 2005			0.033***	0.034***	0.033***
			(0.002)	(0.002)	(0.002)
Hours in reference week			0.010***	0.011***	0.010***
			(0.001)	(0.002)	(0.002)
Potential foreign experience (in years)				-0.005	-0.007
				(0.009)	(0.008)
Speak other mother tongue than Eng/Fren				-0.039	-0.039
				(0.042)	(0.041)
Married				0.071*	0.227***
				(0.031)	(0.068)
Have no children				-0.001	0.010
				(0.036)	(0.074)
Children under 5 years				0.014	0.027
				(0.046)	(0.076)
Visible minority*foreign born Can-US trained					0.042
					(0.105)
Visible minority*foreign-born foreign trained					-0.318*
					(0.154)
Visible minority population					0.074
					(0.072)
Female*Married					-0.193**
					(0.074)
Female*Have no children					-0.010
					(0.081)
Female*Children under 5 years					-0.029
					(0.092)
Constant	10.389***	10.411***	8.597***	8.557***	8.480***
	(0.073)	(0.092)	(0.144)	(0.155)	(0.160)
Adj R-Sqd	0.043***	0.045***	0.298***	0.299***	0.303***
BIC	6544.3	6575.6	5735.5	5766.5	5794.7
Number	2767	2767	2767	2767	2767

Table 2.A47: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **working in their trained fields** as psychologists

Psychologist

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	-0.245	-0.334	-0.342	-0.328	-0.335
	(0.287)	(0.288)	(0.254)	(0.255)	(0.255)
Foreign-born Canada-US trained	-0.047	-0.138**	-0.146**	-0.125*	-0.093
	(0.053)	(0.052)	(0.046)	(0.053)	(0.058)
Foreign-born foreign trained	-0.194	-0.211	-0.149	-0.075	-0.166
	(0.145)	(0.146)	(0.113)	(0.140)	(0.157)
Female	-0.311***	-0.264***	-0.093**	-0.083*	-0.061
	(0.039)	(0.038)	(0.032)	(0.032)	(0.049)
Potential Canadian experience (in years)	0.074***	0.072***	0.038***	0.039***	0.039***
	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)
Potential Canadian experience sqd	-0.002***	-0.002***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PhD		0.340***	0.282***	0.287***	0.283***
		(0.038)	(0.032)	(0.032)	(0.032)
Urban		0.088	0.033	0.033	0.038
		(0.067)	(0.051)	(0.051)	(0.051)
Weeks worked in 2005			0.037***	0.037***	0.037***
			(0.002)	(0.002)	(0.002)
Hours in reference week			0.014***	0.015***	0.016***
			(0.001)	(0.001)	(0.001)
Potential foreign experience (in years)				-0.006	-0.008
				(0.007)	(0.007)
Speak other mother tongue than Eng/Fren				0.004	0.003
				(0.058)	(0.059)
Married				-0.004	0.035
				(0.031)	(0.050)
Have no children				-0.030	-0.012
				(0.036)	(0.060)
Children under 5 years				0.218***	0.106+
				(0.048)	(0.059)
Visible minority*foreign born Can-US trained					0.150
					(0.204)
Visible minority*foreign-born foreign trained					0.627*
					(0.269)
Visible minority population					-0.279
					(0.174)
Female*Married					-0.055
					(0.062)
Female*Have no children					-0.028
					(0.071)
Female*Children under 5 years					0.143+
					(0.075)
Constant	10.329***	10.092***	8.104***	7.965***	7.951***
	(0.080)	(0.103)	(0.134)	(0.144)	(0.145)
Adj R-Sqd	0.072***	0.102***	0.346***	0.353***	0.354***
BIC	7365.7	7286.4	6393.8	6400.9	6435.5
Number	2857	2857	2857	2857	2857

Table 2.A48: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **working in their trained fields reg. nurses Registered Nurse**

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	0.084	0.048	0.046	0.047	0.046
	(0.070)	(0.070)	(0.055)	(0.055)	(0.055)
Foreign-born Canada-US trained	0.039**	0.033**	0.037***	0.036**	0.035*
	(0.012)	(0.012)	(0.010)	(0.012)	(0.015)
Foreign-born foreign trained	0.096***	0.088***	0.091***	0.083***	0.021
	(0.017)	(0.017)	(0.014)	(0.022)	(0.031)
Female	-0.153***	-0.157***	-0.083***	-0.084***	0.003
	(0.015)	(0.015)	(0.013)	(0.013)	(0.020)
Potential Canadian experience (in years)	0.057***	0.059***	0.029***	0.029***	0.029***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Potential Canadian experience sqd	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		0.088***	0.095***	0.094***	0.093***
		(0.009)	(0.008)	(0.008)	(0.008)
Above Bachelor		0.128***	0.125***	0.123***	0.122***
		(0.026)	(0.022)	(0.022)	(0.022)
Masters		0.170***	0.151***	0.149***	0.150***
		(0.027)	(0.022)	(0.022)	(0.022)
PhD		-0.059	-0.043	-0.051	-0.052
		(0.109)	(0.080)	(0.080)	(0.078)
Urban		0.031**	0.012	0.012	0.012
		(0.011)	(0.009)	(0.009)	(0.009)
Weeks worked in 2005			0.030***	0.030***	0.030***
			(0.001)	(0.001)	(0.001)
Hours in reference week			0.008***	0.008***	0.008***
			(0.000)	(0.000)	(0.000)
Potential foreign experience (in years)				0.001	0.001
				(0.001)	(0.001)
Speak other mother tongue than Eng/Fren				-0.003	-0.008
				(0.013)	(0.013)
Married				0.002	0.123***
				(0.007)	(0.028)
Have no children				0.011	0.025
				(0.009)	(0.029)
Children under 5 years				-0.056***	-0.001
				(0.011)	(0.034)
Visible minority*foreign born Can-US trained					0.031
					(0.034)
Visible minority*foreign-born foreign trained					0.118**
					(0.042)
Visible minority population					-0.027
					(0.028)
Female*Married					-0.129***
					(0.029)
Female*Have no children					-0.014
					(0.030)
Female*Children under 5 years					-0.063+
					(0.035)
Constant	10.263***	10.172***	8.700***	8.736***	8.664***
	(0.022)	(0.025)	(0.031)	(0.034)	(0.036)
Adj R-Sqd	0.038***	0.043***	0.303***	0.303***	0.304***
BIC	103180.1	103019.5	88205.5	88212.9	88222.4
Number	46816	46816	46816	46816	46816

Table 2.A49: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **NOT working in their trained fields** (with dentistry credentials)

Dentistry

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	-0.515	-0.520	-0.892*	-0.841*	-0.681
	(0.405)	(0.410)	(0.372)	(0.411)	(0.540)
Foreign-born Canada-US trained	-0.123	-0.117	-0.137	-0.229	-0.062
	(0.149)	(0.150)	(0.140)	(0.150)	(0.193)
Foreign-born foreign trained	-0.889***	-0.889***	-0.779***	-0.888***	-0.912***
	(0.121)	(0.127)	(0.121)	(0.150)	(0.195)
Female	-0.381***	-0.382***	-0.171+	-0.176+	0.047
	(0.096)	(0.097)	(0.091)	(0.091)	(0.154)
Potential Canadian experience (in years)	0.106***	0.106***	0.073***	0.076***	0.074***
	(0.016)	(0.016)	(0.015)	(0.015)	(0.016)
Potential Canadian experience sqd	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Masters		-0.057	-0.056	-0.054	0.049
		(0.143)	(0.129)	(0.128)	(0.133)
PhD		-0.020	-0.190	-0.174	-0.204+
		(0.130)	(0.123)	(0.119)	(0.116)
Urban		-0.156	-0.318	-0.302	-0.317
		(0.347)	(0.315)	(0.309)	(0.310)
Weeks worked in 2005			0.029***	0.029***	0.029***
			(0.004)	(0.004)	(0.004)
Hours in reference week			0.014***	0.015***	0.014***
			(0.003)	(0.003)	(0.003)
Speak other mother tongue than Eng/Fren				0.089	0.190
				(0.126)	(0.134)
Married				0.174+	0.271+
				(0.097)	(0.143)
Have no children				0.035	0.046
				(0.118)	(0.162)
Children under 5 years				0.125	0.204
				(0.101)	(0.163)
Visible minority*foreign born Can-US trained					0.157
					(0.363)
Visible minority*foreign-born foreign trained					0.592+
					(0.336)
Visible minority population					-0.573+
					(0.313)
Potential foreign experience (in years)					-0.023**
					(0.009)
Female*Married					-0.212
					(0.190)
Female*Have no children					-0.149
					(0.225)
Female*Children under 5 years					-0.289
					(0.201)
Constant	10.377***	10.542***	8.964***	8.776***	8.858***
	(0.139)	(0.384)	(0.386)	(0.389)	(0.397)
Adj R-Sqd	0.304***	0.301***	0.441***	0.444***	0.455***
BIC	1781.9	1800.3	1677.1	1695.1	1720.6
Number	601	601	601	601	601

Table 2.A50: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **NOT working in their trained fields** (with lab. technology credentials)
Medical laboratory Technologists

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)
Foreign-born Canada-US trained	-0.116*	-0.161**	-0.114*	-0.069	0.059
	(0.054)	(0.054)	(0.051)	(0.057)	(0.079)
Foreign-born foreign trained	-0.042	-0.111*	-0.095*	-0.038	0.031
	(0.040)	(0.045)	(0.043)	(0.066)	(0.086)
Female	-0.219***	-0.203***	-0.115**	-0.111**	-0.008
	(0.045)	(0.045)	(0.041)	(0.041)	(0.081)
Potential Canadian experience (in years)	0.057***	0.060***	0.040***	0.042***	0.039***
	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)
Potential Canadian experience sqd	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		0.117*	0.085+	0.097*	0.081+
		(0.050)	(0.047)	(0.047)	(0.048)
Above Bachelor		-0.051	-0.077	-0.073	-0.089
		(0.121)	(0.103)	(0.104)	(0.103)
Masters		0.149	0.040	0.045	0.016
		(0.098)	(0.108)	(0.108)	(0.105)
PhD		0.571**	0.450*	0.461*	0.396*
		(0.210)	(0.209)	(0.209)	(0.198)
Urban		0.192***	0.164***	0.172***	0.169***
		(0.052)	(0.049)	(0.049)	(0.048)
Weeks worked in 2005			0.031***	0.031***	0.031***
			(0.003)	(0.003)	(0.003)
Hours in reference week			0.009***	0.009***	0.009***
			(0.001)	(0.001)	(0.001)
Speak other mother tongue than Eng/Fren				-0.079	-0.078
				(0.058)	(0.059)
Married				0.015	0.170*
				(0.033)	(0.085)
Have no children				0.074*	-0.022
				(0.034)	(0.094)
Children under 5 years				0.034	0.117
				(0.050)	(0.083)
Visible minority*foreign born Can-US trained					-0.379**
					(0.124)
Visible minority*foreign-born foreign trained					-0.202+
					(0.112)
Visible minority population					0.233**
					(0.082)
Potential foreign experience (in years)					-0.011*
					(0.005)
Female*Married					-0.175*
					(0.089)
Female*Have no children					0.111
					(0.102)
Female*Children under 5 years					-0.154
					(0.098)
Constant	10.001***	9.780***	8.105***	8.068***	8.051***
	(0.076)	(0.092)	(0.150)	(0.151)	(0.168)
Adj R-Sqd	0.038***	0.047***	0.209***	0.210***	0.215***
BIC	8148.1	8151.8	7562.6	7586.3	7616.0
Number	3253	3253	3253	3253	3253

Table 2.A51: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **NOT working in their trained fields** (with rad. technology credentials)
Medical Radiation Technologist

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	0.334**	0.136	0.062	0.035	-0.039
	(0.112)	(0.223)	(0.222)	(0.231)	(0.247)
Foreign-born Canada-US trained	0.101	-0.014	0.030	0.120	0.222
	(0.125)	(0.118)	(0.102)	(0.123)	(0.141)
Foreign-born foreign trained	-0.358***	-0.377***	-0.383***	-0.237*	-0.245
	(0.098)	(0.097)	(0.089)	(0.121)	(0.152)
Female	-0.475***	-0.375***	-0.217***	-0.221***	-0.068
	(0.063)	(0.062)	(0.062)	(0.063)	(0.099)
Potential Canadian experience (in years)	0.067***	0.078***	0.052***	0.048***	0.047***
	(0.013)	(0.012)	(0.011)	(0.011)	(0.012)
Potential Canadian experience sqd	-0.001***	-0.002***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		0.082	0.075	0.066	0.104
		(0.130)	(0.115)	(0.117)	(0.122)
Above Bachelor		0.360+	0.347*	0.312*	0.360*
		(0.198)	(0.148)	(0.149)	(0.151)
Masters		0.782**	0.794***	0.814***	0.792***
		(0.245)	(0.232)	(0.232)	(0.221)
PhD		1.018***	0.875***	0.839***	0.851***
		(0.196)	(0.170)	(0.170)	(0.163)
Urban		0.205*	0.183*	0.187*	0.195*
		(0.080)	(0.076)	(0.076)	(0.076)
Weeks worked in 2005			0.032***	0.032***	0.032***
			(0.004)	(0.004)	(0.004)
Hours in reference week			0.012***	0.012***	0.011***
			(0.002)	(0.002)	(0.002)
Potential foreign experience (in years)				-0.010	-0.009
				(0.009)	(0.009)
Speak other mother tongue than Eng/Fren				-0.101	-0.065
				(0.099)	(0.097)
Married				0.036	0.158
				(0.057)	(0.105)
Have no children				-0.005	0.039
				(0.065)	(0.149)
Children under 5 years				-0.005	0.113
				(0.082)	(0.109)
Visible minority*foreign born Can-US trained					0.072
					(0.327)
Visible minority*foreign-born foreign trained					0.293
					(0.291)
Visible minority population					-0.422+
					(0.253)
Female*Married					-0.162
					(0.123)
Female*Have no children					-0.046
					(0.167)
Female*Children under 5 years					-0.187
					(0.151)
Constant	10.265***	9.828***	8.055***	8.101***	8.040***
	(0.168)	(0.178)	(0.218)	(0.237)	(0.242)
Adj R-Sqd	0.105***	0.143***	0.303***	0.302***	0.306***
BIC	3227.1	3206.4	2971.4	3002.7	3032.2
Number	1193	1193	1193	1193	1193

Table 2.A52 Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **NOT working in their trained fields** (with pharmacy credentials)

Pharmacist

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	-0.874	-1.180	-0.770	-0.792	-0.740
	(0.776)	(0.787)	(0.839)	(0.842)	(0.860)
Foreign-born Canada-US trained	-0.073	-0.105	-0.131	0.019	0.212
	(0.091)	(0.090)	(0.080)	(0.099)	(0.134)
Foreign-born foreign trained	-0.537***	-0.511***	-0.506***	-0.252*	-0.081
	(0.078)	(0.078)	(0.070)	(0.107)	(0.125)
Female	-0.281***	-0.267***	-0.087	-0.097	0.082
	(0.068)	(0.068)	(0.059)	(0.061)	(0.122)
Potential Canadian experience (in years)	0.104***	0.106***	0.062***	0.061***	0.061***
	(0.011)	(0.012)	(0.011)	(0.012)	(0.012)
Potential Canadian experience sqd	-0.002***	-0.002***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Above Bachelor		0.054	0.082	0.071	0.023
		(0.108)	(0.094)	(0.097)	(0.097)
MD, DMD/DDS, OD, VET		0.073	0.002	-0.041	-0.070
		(0.151)	(0.127)	(0.130)	(0.134)
Masters		0.111	0.100	0.110	0.086
		(0.091)	(0.084)	(0.084)	(0.084)
PhD		0.444***	0.314**	0.281*	0.262*
		(0.119)	(0.110)	(0.111)	(0.111)
Urban		-0.082	-0.003	0.008	0.003
		(0.135)	(0.121)	(0.124)	(0.125)
Weeks worked in 2005			0.037***	0.037***	0.036***
			(0.004)	(0.004)	(0.004)
Hours in reference week			0.015***	0.015***	0.014***
			(0.002)	(0.002)	(0.002)
Potential foreign experience (in years)				-0.013*	-0.015**
				(0.006)	(0.006)
Speak other mother tongue than Eng/Fren				-0.169+	-0.131
				(0.091)	(0.085)
Married				-0.011	0.097
				(0.074)	(0.127)
Have no children				0.060	0.009
				(0.083)	(0.149)
Children under 5 years				-0.014	0.222*
				(0.085)	(0.103)
Visible minority*foreign born Can-US trained					-0.235
					(0.234)
Visible minority*foreign-born foreign trained					-0.196
					(0.213)
Visible minority population					-0.065
					(0.192)
Female*Married					-0.164
					(0.147)
Female*Have no children					0.076
					(0.173)
Female*Children under 5 years					-0.402**
					(0.154)
Constant	10.200***	10.175***	8.021***	8.058***	8.071***
	(0.111)	(0.170)	(0.228)	(0.244)	(0.252)
Adj R-Sqd	0.167***	0.173***	0.348***	0.351***	0.360***
BIC	3813.4	3834.2	3547.7	3572.4	3591.8
Number	1261	1261	1261	1261	1261

Table 2.A53: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **NOT working in their trained fields** (with medical credentials)

Physician

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	-0.115	-0.096	-0.060	-0.018	0.068
	(0.292)	(0.284)	(0.280)	(0.273)	(0.257)
Foreign-born Canada-US trained	-0.012	-0.045	-0.092	0.032	-0.063
	(0.095)	(0.096)	(0.089)	(0.096)	(0.134)
Foreign-born foreign trained	-0.720***	-0.726***	-0.595***	-0.433***	-0.391***
	(0.068)	(0.068)	(0.064)	(0.097)	(0.108)
Female	-0.291***	-0.275***	-0.122*	-0.112*	0.084
	(0.053)	(0.053)	(0.048)	(0.048)	(0.089)
Potential Canadian experience (in years)	0.111***	0.111***	0.072***	0.070***	0.071***
	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)
Potential Canadian experience sqd	-0.002***	-0.002***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Masters/ (MD+Masters* only for physicians)		0.251**	0.164*	0.155*	0.156*
		(0.076)	(0.067)	(0.069)	(0.070)
PhD/ (MD+PhD* only for physicians)		0.254+	0.184	0.174	0.156
		(0.133)	(0.123)	(0.123)	(0.121)
MD+Masters+PhD only for physicians		0.348+	0.239	0.218	0.182
		(0.201)	(0.205)	(0.202)	(0.197)
Urban		0.114	-0.042	-0.031	-0.014
		(0.151)	(0.127)	(0.123)	(0.123)
Weeks worked in 2005			0.033***	0.033***	0.033***
			(0.003)	(0.003)	(0.003)
Hours in reference week			0.014***	0.014***	0.014***
			(0.002)	(0.002)	(0.002)
Potential foreign experience (in years)				0.003	0.001
				(0.004)	(0.004)
Speak other mother tongue than Eng/Fren				-0.220**	-0.201*
				(0.081)	(0.081)
Married				0.006	0.167*
				(0.058)	(0.083)
Have no children				-0.033	0.031
				(0.068)	(0.104)
Children under 5 years				0.122	0.033
				(0.079)	(0.107)
Visible minority*foreign born Can-US trained					0.381
					(0.233)
Visible minority*foreign-born foreign trained					0.134
					(0.193)
Visible minority population					-0.263
					(0.185)
Female*Married					-0.284**
					(0.108)
Female*Have no children					-0.118
					(0.136)
Female*Children under 5 years					0.154
					(0.146)
Constant	10.281***	10.124***	8.361***	8.343***	8.278***
	(0.090)	(0.175)	(0.176)	(0.178)	(0.186)
Adj R-Sqd	0.252***	0.256***	0.399***	0.401***	0.405***
BIC	6224.5	6238.0	5816.5	5840.8	5867.4
Number	2047	2047	2047	2047	2047

Table 2.A54: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **NOT working in their trained fields** (with physiotherapy credentials)
Physiotherapist

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	-0.407	-0.456	-0.132	-0.085	-0.201
	(0.385)	(0.529)	(0.186)	(0.201)	(0.282)
Foreign-born Canada-US trained	-0.121	-0.177	-0.151	-0.117	-0.076
	(0.153)	(0.143)	(0.135)	(0.165)	(0.186)
Foreign-born foreign trained	-0.191	-0.160	-0.257**	-0.199	-0.149
	(0.121)	(0.121)	(0.097)	(0.156)	(0.175)
Female	-0.453***	-0.412***	-0.244**	-0.238**	0.116
	(0.096)	(0.094)	(0.084)	(0.088)	(0.162)
Potential Canadian experience (in years)	0.128***	0.136***	0.092***	0.094***	0.092***
	(0.017)	(0.017)	(0.015)	(0.016)	(0.017)
Potential Canadian experience sqd	-0.003***	-0.003***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Above Bachelor		-0.063	-0.095	-0.087	-0.103
		(0.170)	(0.152)	(0.152)	(0.157)
MD, DMD/DDS, OD, VET		0.511*	0.412+	0.440+	0.423+
		(0.258)	(0.231)	(0.235)	(0.227)
Masters		-0.231+	-0.186	-0.178	-0.169
		(0.136)	(0.123)	(0.126)	(0.130)
PhD		0.759***	0.479+	0.505+	0.572**
		(0.216)	(0.255)	(0.259)	(0.220)
Urban		0.187	0.187	0.190	0.190
		(0.147)	(0.118)	(0.117)	(0.116)
Weeks worked in 2005			0.033***	0.033***	0.032***
			(0.005)	(0.005)	(0.005)
Hours in reference week			0.012***	0.012***	0.011***
			(0.003)	(0.003)	(0.003)
Potential foreign experience (in years)				0.000	-0.003
				(0.008)	(0.008)
Speak other mother tongue than Eng/Fren				-0.052	-0.049
				(0.124)	(0.125)
Married				-0.068	0.371*
				(0.079)	(0.169)
Have no children				-0.001	-0.078
				(0.107)	(0.218)
Children under 5 years				0.107	0.043
				(0.086)	(0.155)
Visible minority*foreign born Can-US trained					-0.185
					(0.334)
Visible minority*foreign-born foreign trained					-0.252
					(0.243)
Visible minority population					0.180
					(0.215)
Female*Married					-0.548**
					(0.191)
Female*Have no children					0.060
					(0.259)
Female*Children under 5 years					0.025
					(0.176)
Constant	9.720***	9.453***	7.805***	7.767***	7.561***
	(0.193)	(0.232)	(0.289)	(0.312)	(0.307)
Adj R-Sqd	0.207***	0.226***	0.402***	0.399***	0.404***
BIC	1540.2	1553.6	1417.2	1446.9	1474.4
Number	568	568	568	568	568

Table 2.A55: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **NOT working in their trained fields** (with psychology credentials)

Psychologist

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	-0.039	-0.111	-0.090	-0.099	-0.095
	(0.134)	(0.127)	(0.127)	(0.125)	(0.126)
Foreign-born Canada-US trained	-0.023	-0.081+	-0.045	-0.040	-0.039
	(0.047)	(0.045)	(0.039)	(0.045)	(0.047)
Foreign-born foreign trained	-0.296***	-0.287***	-0.288***	-0.288**	-0.309*
	(0.084)	(0.084)	(0.072)	(0.100)	(0.129)
Female	-0.261***	-0.192***	-0.073*	-0.062*	-0.046
	(0.035)	(0.034)	(0.031)	(0.031)	(0.047)
Potential Canadian experience (in years)	0.091***	0.087***	0.056***	0.056***	0.057***
	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)
Potential Canadian experience sqd	-0.002***	-0.002***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PhD		0.413***	0.282***	0.274***	0.275***
		(0.040)	(0.035)	(0.035)	(0.035)
Urban		0.112+	0.076	0.087	0.088
		(0.063)	(0.056)	(0.056)	(0.056)
Weeks worked in 2005			0.035***	0.035***	0.035***
			(0.002)	(0.002)	(0.002)
Hours in reference week			0.015***	0.015***	0.015***
			(0.001)	(0.001)	(0.001)
Potential foreign experience (in years)				0.006	0.006
				(0.006)	(0.006)
Speak other mother tongue than Eng/Fren				-0.080	-0.080
				(0.051)	(0.052)
Married				0.058*	0.102+
				(0.029)	(0.054)
Have no children				0.025	-0.018
				(0.032)	(0.058)
Children under 5 years				0.096*	0.080
				(0.047)	(0.073)
Visible minority*foreign born Can-US trained					-0.016
					(0.127)
Visible minority*foreign-born foreign trained					0.045
					(0.163)
Visible minority population					0.015
					(0.095)
Female*Married					-0.073
					(0.062)
Female*Have no children					0.076
					(0.068)
Female*Children under 5 years					0.028
					(0.091)
Constant	10.003***	9.781***	7.843***	7.750***	7.733***
	(0.066)	(0.087)	(0.116)	(0.118)	(0.121)
Adj R-Sqd	0.115***	0.146***	0.364***	0.366***	0.366***
BIC	10594.4	10468.9	9326.8	9348.5	9394.8
Number	3934	3934	3934	3934	3934

Table 2.A56: Short and long forms of Ordinary Least Squares (OLS) regressions estimates of the influence of location of highest training on log earnings of health professionals **NOT working in their trained fields** (with nursing credentials)

Registered Nurse

Log earnings	Model 1	Model 2	Model 3	Model 4	Model 5
Canadian-born foreign trained	0.138	-0.032	-0.059	-0.053	-0.056
	(0.117)	(0.105)	(0.107)	(0.108)	(0.107)
Foreign-born Canada-US trained	-0.012	-0.010	-0.027	0.004	-0.006
	(0.027)	(0.027)	(0.025)	(0.028)	(0.036)
Foreign-born foreign trained	-0.238***	-0.216***	-0.230***	-0.166***	-0.164***
	(0.025)	(0.025)	(0.022)	(0.034)	(0.041)
Female	-0.253***	-0.276***	-0.150***	-0.148***	-0.068
	(0.030)	(0.030)	(0.028)	(0.028)	(0.046)
Potential Canadian experience (in years)	0.083***	0.084***	0.056***	0.055***	0.055***
	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)
Potential Canadian experience sqd	-0.002***	-0.002***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		0.381***	0.345***	0.340***	0.339***
		(0.020)	(0.018)	(0.018)	(0.018)
Above Bachelor		0.306***	0.282***	0.275***	0.273***
		(0.050)	(0.043)	(0.043)	(0.043)
Masters		0.735***	0.614***	0.608***	0.608***
		(0.029)	(0.026)	(0.026)	(0.026)
PhD		0.913***	0.696***	0.679***	0.679***
		(0.092)	(0.088)	(0.086)	(0.087)
Urban		0.161***	0.146***	0.152***	0.151***
		(0.023)	(0.021)	(0.021)	(0.021)
Weeks worked in 2005			0.033***	0.033***	0.033***
			(0.001)	(0.001)	(0.001)
Hours in reference week			0.012***	0.012***	0.012***
			(0.001)	(0.001)	(0.001)
Potential foreign experience (in years)				-0.006*	-0.006**
				(0.002)	(0.002)
Speak other mother tongue than Eng/Fren				-0.028	-0.029
				(0.025)	(0.026)
Married				0.025	0.148**
				(0.016)	(0.054)
Have no children				0.045*	-0.027
				(0.018)	(0.071)
Children under 5 years				-0.002	0.102+
				(0.028)	(0.059)
Visible minority*foreign born Can-US trained					0.036
					(0.089)
Visible minority*foreign-born foreign trained					0.017
					(0.085)
Visible minority population					-0.017
					(0.077)
Female*Married					-0.133*
					(0.057)
Female*Have no children					0.079
					(0.073)
Female*Children under 5 years					-0.124+
					(0.066)
Constant	9.767***	9.446***	7.703***	7.702***	7.641***
	(0.049)	(0.052)	(0.063)	(0.068)	(0.074)
Adj R-Sqd	0.059***	0.107***	0.283***	0.283***	0.284***
BIC	48008.7	47165.9	43443.7	43470.5	43515.6
Number	17030	17030	17030	17030	17030

Table 2.A57: Short and long forms of logistic regressions for estimated likelihood (odds ratios) of individuals with health credentials and their likelihood to be in the labour force (with dentistry credentials)

Dentists

Dependent variable: olf	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.412	0.403	0.459	0.449
	(0.415)	(0.439)	(0.483)	(0.473)
Foreign-born Canada-US trained	1.607*	1.540*	1.822*	2.272*
	(0.301)	(0.291)	(0.427)	(0.771)
Foreign-born foreign trained	0.298***	0.275***	0.330***	0.493*
	(0.042)	(0.039)	(0.067)	(0.137)
Female	0.753*	0.747*	0.756*	0.874
	(0.102)	(0.101)	(0.102)	(0.206)
Potential Canadian experience (in years)	1.297***	1.301***	1.302***	1.287***
	(0.026)	(0.026)	(0.028)	(0.028)
Potential Canadian experience sqd	0.993***	0.993***	0.993***	0.993***
	(0.001)	(0.001)	(0.001)	(0.001)
Masters		0.602*	0.602*	0.627*
		(0.130)	(0.130)	(0.136)
PhD		0.610*	0.610*	0.596*
		(0.142)	(0.143)	(0.139)
Urban		2.003***	2.077***	2.081***
		(0.391)	(0.410)	(0.422)
Speak other mother tongue than Eng/Fren			0.749	0.793
			(0.142)	(0.152)
Married			1.080	1.278
			(0.163)	(0.252)
Have no children			1.105	0.852
			(0.166)	(0.159)
Children under 5 years			1.000	1.567
			(0.171)	(0.499)
Visible minority*foreign born Can-US trained				0.847
				(0.374)
Visible minority*foreign-born foreign trained				0.922
				(0.314)
Visible minority population				0.779
				(0.216)
Potential foreign experience (in years)				0.961*
				(0.016)
Female*Married				0.846
				(0.231)
Female*Have no children				1.510
				(0.447)
Female*Children under 5 years				0.423*
				(0.159)
Pseudo R-Sq	0.1459	0.1547	0.1562	0.1661
Chi sq	308.056***	352.660***	352.050***	374.293***
Log-likeli	-6212.5	-6148.5	-6137.7	-6065.8
BIC	12484	12381	12393	12307
Number	4313	4313	4313	4313

Table 2A58: Short and long forms of logistic regressions for estimated likelihood (odds ratios) of individuals with health credentials and their likelihood to be in the labour force (with laboratory technology credentials)

Medical Laboratory Technologists

Dependent variable: olf	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.732	0.706	0.600	0.593
	(0.457)	(0.438)	(0.379)	(0.382)
Foreign-born Canada-US trained	0.630***	0.622***	0.700**	0.895
	(0.068)	(0.068)	(0.089)	(0.144)
Foreign-born foreign trained	0.472***	0.463***	0.550***	0.860
	(0.049)	(0.051)	(0.080)	(0.167)
Female	0.780*	0.786*	0.772**	1.536*
	(0.076)	(0.077)	(0.077)	(0.293)
Potential Canadian experience (in years)	1.186***	1.187***	1.172***	1.147***
	(0.016)	(0.016)	(0.017)	(0.018)
Potential Canadian experience sqd	0.995***	0.995***	0.995***	0.995***
	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		1.055	1.058	1.031
		(0.107)	(0.108)	(0.108)
Above Bachelor		0.832	0.821	0.771
		(0.163)	(0.162)	(0.154)
Masters		1.247	1.235	1.110
		(0.334)	(0.334)	(0.298)
PhD		0.823	0.772	0.672
		(0.350)	(0.320)	(0.281)
Urban		1.097	1.050	1.052
		(0.117)	(0.114)	(0.115)
Speak other mother tongue than Eng/Fren			0.802+	0.833
			(0.101)	(0.108)
Married			0.803**	1.723**
			(0.067)	(0.339)
Have no children			0.750***	0.749
			(0.061)	(0.141)
Children under 5 years			0.636***	1.478
			(0.085)	(0.557)
Visible minority*foreign born Can-US trained				0.465*
				(0.165)
Visible minority*foreign-born foreign trained				0.500*
				(0.172)
Visible minority population				1.614+
				(0.468)
Potential foreign experience (in years)				0.954***
				(0.009)
Female*Married				0.435***
				(0.093)
Female*Have no children				0.989
				(0.201)
Female*Children under 5 years				0.294**
				(0.115)
Pseudo R-Sq	0.1379	0.1384	0.1452	0.1541
Chi sq	737.577***	753.448***	789.675***	807.637***
Log-likeli	-16569.8	-16559.4	-16430.3	-16257.8
BIC	33203	33227	33005	32723
Number	8421	8421	8421	8421

Table 2A59: Short and long forms of logistic regressions for estimated likelihood (odds ratios) of individuals with health credentials and their likelihood to be in the labour force (with radiation technology credentials)

Medical Radiation Technologists

Dependent variable: olf	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.352	0.343	0.388	0.303
	(0.264)	(0.260)	(0.289)	(0.255)
Foreign-born Canada-US trained	0.719+	0.701+	0.751	0.775
	(0.135)	(0.133)	(0.162)	(0.200)
Foreign-born foreign trained	0.513***	0.504***	0.556**	0.793
	(0.092)	(0.091)	(0.114)	(0.230)
Female	0.667**	0.665**	0.643**	0.717
	(0.090)	(0.091)	(0.090)	(0.227)
Potential Canadian experience (in years)	1.175***	1.177***	1.158***	1.139***
	(0.021)	(0.022)	(0.023)	(0.024)
Potential Canadian experience sqd	0.995***	0.995***	0.995***	0.996***
	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		1.020	1.002	0.935
		(0.201)	(0.197)	(0.189)
Above Bachelor		1.155	1.184	1.185
		(0.505)	(0.513)	(0.517)
Masters		0.894	0.862	0.845
		(0.454)	(0.449)	(0.453)
PhD		1.118	1.046	0.844
		(0.597)	(0.561)	(0.450)
Urban		1.181	1.133	1.138
		(0.153)	(0.147)	(0.148)
Speak other mother tongue than Eng/Fren			0.847	0.892
			(0.154)	(0.164)
Married			0.867	1.136
			(0.101)	(0.348)
Have no children			0.676***	0.430**
			(0.078)	(0.118)
Children under 5 years			0.621*	1.412
			(0.116)	(0.641)
Visible minority*foreign born Can-US trained				1.533
				(0.843)
Visible minority*foreign-born foreign trained				1.448
				(0.743)
Visible minority population				0.628
				(0.264)
Potential foreign experience (in years)				0.949**
				(0.015)
Female*Married				0.749
				(0.248)
Female*Have no children				1.660+
				(0.491)
Female*Children under 5 years				0.321*
				(0.155)
Pseudo R-Sq	0.1684	0.1689	0.1759	0.1834
Chi sq	488.860***	493.466***	513.384***	565.615***
Log-likeli	-8371.7	-8366.0	-8296.0	-8221.0
BIC	16803	16834	16727	16636
Number	4713	4713	4713	4713

Table 2.A60: Short and long forms of logistic regressions for estimated likelihood (odds ratios) of individuals with health credentials and their likelihood to be in the labour force (with pharmacy credentials)

Pharmacists

Dependent variable: olf	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.483	0.356	0.362	0.390
	(0.390)	(0.293)	(0.299)	(0.323)
Foreign-born Canada-US trained	0.700*	0.715*	0.757	0.801
	(0.102)	(0.106)	(0.146)	(0.230)
Foreign-born foreign trained	0.326***	0.338***	0.376***	0.438**
	(0.038)	(0.040)	(0.067)	(0.112)
Female	0.426***	0.433***	0.428***	0.679+
	(0.048)	(0.049)	(0.049)	(0.150)
Potential Canadian experience (in years)	1.179***	1.185***	1.194***	1.186***
	(0.019)	(0.019)	(0.022)	(0.022)
Potential Canadian experience sqd	0.995***	0.995***	0.995***	0.995***
	(0.000)	(0.000)	(0.000)	(0.000)
Above Bachelor		0.936	0.936	0.933
		(0.160)	(0.160)	(0.161)
MD, DMD/DDS, OD, VET		1.032	1.040	1.003
		(0.219)	(0.221)	(0.219)
Masters		1.199	1.196	1.156
		(0.213)	(0.213)	(0.205)
PhD		1.914*	1.916*	1.845*
		(0.588)	(0.586)	(0.568)
Urban		0.682*	0.681*	0.678*
		(0.127)	(0.127)	(0.127)
Speak other mother tongue than Eng/Fren			0.957	0.997
			(0.157)	(0.169)
Married			0.816+	1.364
			(0.097)	(0.288)
Have no children			1.103	0.864
			(0.140)	(0.179)
Children under 5 years			0.997	1.686
			(0.138)	(0.556)
Visible minority*foreign born Can-US trained				1.149
				(0.425)
Visible minority*foreign-born foreign trained				1.218
				(0.377)
Visible minority population				0.759
				(0.177)
Potential foreign experience (in years)				0.977+
				(0.012)
Female*Married				0.523**
				(0.129)
Female*Have no children				1.339
				(0.330)
Female*Children under 5 years				0.482*
				(0.170)
Pseudo R-Sq	0.0933	0.0962	0.0973	0.1037
Chi sq	262.652***	275.901***	283.354***	310.724***
Log-likeli	-9799.7	-9767.9	-9756.4	-9687.1
BIC	19661	19641	19653	19576
Number	6549	6549	6549	6549

Table 2A61: Short and long forms of logistic regressions for estimated likelihood (odds ratios) of individuals with health credentials and their likelihood to be in the labour force (with medical credentials)
Physicians

Dependent variable: olf	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.221***	0.224***	0.248***	0.268***
	(0.053)	(0.054)	(0.060)	(0.065)
Foreign-born Canada-US trained	0.846	0.852	1.011	0.844
	(0.094)	(0.095)	(0.129)	(0.141)
Foreign-born foreign trained	0.214***	0.216***	0.249***	0.390***
	(0.015)	(0.016)	(0.025)	(0.052)
Female	0.565***	0.574***	0.594***	0.998
	(0.040)	(0.041)	(0.042)	(0.121)
Potential Canadian experience (in years)	1.273***	1.275***	1.263***	1.254***
	(0.015)	(0.015)	(0.015)	(0.016)
Potential Canadian experience sqd	0.994***	0.994***	0.994***	0.994***
	(0.000)	(0.000)	(0.000)	(0.000)
Masters/ (MD+Masters* only for physicians)		0.930	0.932	0.990
		(0.116)	(0.117)	(0.128)
PhD/ (MD+PhD* only for physicians)		1.819***	1.822***	1.712**
		(0.300)	(0.303)	(0.287)
MD+Masters+PhD only for physicians		1.196	1.158	1.076
		(0.422)	(0.408)	(0.385)
Urban		0.832	0.873	0.876
		(0.140)	(0.148)	(0.154)
Speak other mother tongue than Eng/Fren			0.692***	0.773**
			(0.064)	(0.075)
Married			1.463***	2.580***
			(0.119)	(0.294)
Have no children			1.051	0.834
			(0.093)	(0.104)
Children under 5 years			0.987	1.448*
			(0.089)	(0.249)
Visible minority*foreign born Can-US trained				1.816*
				(0.431)
Visible minority*foreign-born foreign trained				0.946
				(0.163)
Visible minority population				0.669**
				(0.094)
Potential foreign experience (in years)				0.959***
				(0.007)
Female*Married				0.450***
				(0.066)
Female*Have no children				1.276
				(0.219)
Female*Children under 5 years				0.449***
				(0.090)
Pseudo R-Sq	0.1574	0.1598	0.1648	0.1810
Chi sq	1092.396***	1102.582***	1115.800***	1160.897***
Log-likeli	-19634.2	-19579.7	-19463.7	-19085.4
BIC	39336	39266	39072	38383
Number	15785	15785	15785	15785

Table 2A62: Short and long forms of logistic regressions for estimated likelihood (odds ratios) of individuals with health credentials and their likelihood to be in the labour force (with physiotherapy credentials)

Physiotherapist

Dependent variable: olf	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.610	0.599	0.561	0.491
	(0.312)	(0.306)	(0.281)	(0.248)
Foreign-born Canada-US trained	0.830	0.838	0.744	0.744
	(0.172)	(0.175)	(0.171)	(0.198)
Foreign-born foreign trained	0.573**	0.597**	0.541**	0.662
	(0.104)	(0.106)	(0.119)	(0.194)
Female	0.457***	0.448***	0.442***	1.058
	(0.089)	(0.086)	(0.087)	(0.309)
Potential Canadian experience (in years)	1.254***	1.253***	1.295***	1.295***
	(0.029)	(0.028)	(0.033)	(0.034)
Potential Canadian experience sqd	0.994***	0.994***	0.993***	0.993***
	(0.001)	(0.001)	(0.001)	(0.001)
Above Bachelor		1.035	1.043	1.032
		(0.219)	(0.222)	(0.221)
MD, DMD/DDS, OD, VET		0.610	0.579	0.584
		(0.215)	(0.215)	(0.227)
Masters		1.172	1.139	1.105
		(0.243)	(0.241)	(0.234)
PhD		0.678	0.663	0.786
		(0.346)	(0.346)	(0.421)
Urban		0.895	0.859	0.856
		(0.187)	(0.184)	(0.188)
Speak other mother tongue than Eng/Fren			1.369	1.325
			(0.288)	(0.305)
Married			0.886	2.386*
			(0.127)	(0.947)
Have no children			1.563*	1.603
			(0.277)	(0.797)
Children under 5 years			0.690*	2.201
			(0.123)	(1.247)
Visible minority*foreign born Can-US trained				0.906
				(0.510)
Visible minority*foreign-born foreign trained				0.723
				(0.362)
Visible minority population				1.307
				(0.503)
Potential foreign experience (in years)				0.971
				(0.022)
Female*Married				0.325**
				(0.140)
Female*Have no children				0.968
				(0.510)
Female*Children under 5 years				0.259*
				(0.153)
Pseudo R-Sq	0.0917	0.0936	0.1037	0.1146
Chi sq	190.168***	200.112***	211.715***	233.849***
Log-likeli	-5296.8	-5286.0	-5227.1	-5163.5
BIC	10651	10671	10586	10516
Number	3780	3780	3780	3780

Table 2A63: Short and long forms of logistic regressions for estimated likelihood (odds ratios) of individuals with health credentials and their likelihood to be in the labour force (with psychology credentials)

Psychologist

Dependent variable: olf	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	0.728	0.710	0.697	0.693
	(0.255)	(0.249)	(0.248)	(0.249)
Foreign-born Canada-US trained	0.881	0.855	1.013	1.116
	(0.096)	(0.095)	(0.120)	(0.145)
Foreign-born foreign trained	0.392***	0.395***	0.568***	1.085
	(0.056)	(0.056)	(0.092)	(0.253)
Female	0.744***	0.760**	0.740***	1.058
	(0.063)	(0.066)	(0.066)	(0.155)
Potential Canadian experience (in years)	1.196***	1.194***	1.191***	1.186***
	(0.018)	(0.018)	(0.019)	(0.020)
Potential Canadian experience sqd	0.995***	0.995***	0.995***	0.995***
	(0.000)	(0.000)	(0.000)	(0.000)
PhD		1.198+	1.198+	1.138
		(0.121)	(0.123)	(0.117)
Urban		1.089	1.075	1.081
		(0.147)	(0.145)	(0.149)
Speak other mother tongue than Eng/Fren			0.643***	0.694**
			(0.078)	(0.087)
Married			0.867	1.426*
			(0.076)	(0.210)
Have no children			0.954	0.735*
			(0.086)	(0.107)
Children under 5 years			0.647**	1.528
			(0.086)	(0.554)
Visible minority*foreign born Can-US trained				1.171
				(0.394)
Visible minority*foreign-born foreign trained				0.781
				(0.273)
Visible minority population				0.647+
				(0.154)
Potential foreign experience (in years)				0.958***
				(0.012)
Female*Married				0.505***
				(0.091)
Female*Have no children				1.486*
				(0.275)
Female*Children under 5 years				0.339**
				(0.130)
Pseudo R-Sq	0.0848	0.0856	0.0916	0.1037
Chi sq	441.460***	448.275***	481.342***	537.367***
Log-likeli	-13810.6	-13799.0	-13707.7	-13526.3
BIC	27684	27679	27533	27233
Number	8187	8187	8187	8187

Table 2A64: Short and long forms of logistic regressions for estimated likelihood (odds ratios) of individuals with health credentials and their likelihood to be in the labour force (with nursing credentials)

Registered Nurse

Dependent variable: olf	Model 1	Model 2	Model 3	Model 4
Canadian-born foreign trained	1.269	1.246	1.234	1.243
	(0.289)	(0.288)	(0.281)	(0.284)
Foreign-born Canada-US trained	0.811***	0.808***	0.977	0.949
	(0.031)	(0.031)	(0.043)	(0.050)
Foreign-born foreign trained	0.476***	0.477***	0.794***	0.758***
	(0.017)	(0.017)	(0.042)	(0.050)
Female	0.683***	0.681***	0.684***	1.060
	(0.038)	(0.038)	(0.039)	(0.099)
Potential Canadian experience (in years)	1.173***	1.175***	1.122***	1.121***
	(0.005)	(0.005)	(0.006)	(0.006)
Potential Canadian experience sqd	0.995***	0.995***	0.996***	0.996***
	(0.000)	(0.000)	(0.000)	(0.000)
Bachelor		1.170***	1.088**	1.086**
		(0.034)	(0.032)	(0.032)
Above Bachelor		1.026	0.939	0.933
		(0.072)	(0.067)	(0.067)
Masters		1.255**	1.208*	1.207*
		(0.092)	(0.089)	(0.089)
PhD		0.618*	0.514**	0.513**
		(0.133)	(0.107)	(0.108)
Urban		1.051+	1.008	1.003
		(0.031)	(0.030)	(0.030)
Potential foreign experience (in years)			0.933***	0.932***
			(0.003)	(0.003)
Speak other mother tongue than Eng/Fren			0.999	0.990
			(0.040)	(0.041)
Married			0.906***	1.414**
			(0.024)	(0.159)
Have no children			0.759***	0.791+
			(0.020)	(0.096)
Children under 5 years			0.399***	1.052
			(0.018)	(0.198)
Visible minority*foreign born Can-US trained				1.224*
				(0.122)
Visible minority*foreign-born foreign trained				1.245*
				(0.119)
Visible minority population				0.868*
				(0.060)
Female*Married				0.624***
				(0.072)
Female*Have no children				0.965
				(0.120)
Female*Children under 5 years				0.358***
				(0.068)
Pseudo R-Sq	0.1346	0.1354	0.1493	0.1504
Chi sq	7089.705***	7121.113***	7547.085***	7627.033***
Log-likeli	-159922.7	-159779.9	-157207.0	-157007.9
BIC	319924	319695	314606	314275
Number	78736	78736	78736	78736

Thesis Chapter 3 Appendix

Appendix A: **Dental Programs and Certification**

The NDEB certification process has undergone some changes in the past. Prior to 1994, the NDEB administered a written exam and a three-part clinical exam for graduates of foreign and US dental schools, while Canadian graduates of accredited dental programs obtained licensure and certification on the sole basis of graduating from an accredited program by the Commission on Dental Accreditation of Canada (CDAC). Between 1994 and 1996 all (Canadian) graduates of accredited programs were required to complete an NDEB written exam and an Objective Structured Clinical Exam (OSCE) while the graduates of other programs (in US or abroad) still completed the written exam and the three-part clinical exam.

Between 1997 and 1999, all graduates of US and Canadian dental schools accredited by CDAC were required to successfully complete the same NDEB written and OSCE exams. Foreign-trained dentists (or graduates of non-accredited programs) obtained certification by either passing the NDEB written exam and the three-part clinical exam or completing an accredited Advanced Standing program and then passing both the NDEB written and the OSCE (same as the requirement for Canada/US-trained graduates) before being granted a license (Boorberg Schönwetter, and Swain, 2009). All these certification policy changes (prior to 2000) affected 92% of the dentists in our sample.

In 2000, the NDEB written exam and the three-part clinical exam designed for graduates of non-accredited dental programs (foreign-training) were discontinued (Boorberg, Schönwetter and Swain, 2009) and a new policy regime was instituted that affected only 8% of the dentists in our sample. Graduates from accredited programs in Canada and the US are allowed to write the NDEB written exam and the OSCE directly while those from non-accredited programs located in other countries must complete either an accredited two-year Qualifying/Degree Completion Program[91] in a Canadian university or the NDEB Equivalency Process before being allowed to take the NDEB written exam and the OSCE.

"The Equivalency Process provides an alternate route to certification as a dentist in Canada for graduates of non-accredited dental programs and is also integrated with the admission process for the Qualifying and Degree Completion Programs. The Equivalency Process is comprised of three Assessments. Successful completion of the Assessments allows individuals to apply to take the NDEB Written and Objective Structured Clinical Examinations (OSCE). Canadian Faculties of Dentistry will also use results of select Assessments in the

[91] Canadian Faculties of Dentistry also use results of select Assessments, under the NDEB Equivalency Process, in the admission process for Qualifying and Degree Completion Programs or bridging programs (NDEB, 2014), in addition to other entry requirements such as English language proficiency, immigration/citizenship status etc. For example, University of Western Ontario admits only 20 foreign-trained graduates See http://www.schulich.uwo.ca/dentistry/itd/

admission process for Qualifying and Degree Completion Programs". If standards are met then one can proceed to apply to the NDEB certification process. Source: http://www.ndeb.ca/nonaccredited [Feb 15, 2013].

Appendix B: Data -Definition of earnings variable

Definition of earnings variable

Net non-farm self-employment income: "Refers to net income (gross receipts minus expenses of operation such as wages, rents and depreciation) received during calendar year 2005 from the respondent's non-farm unincorporated business or professional practice. In the case of a partnership, only the respondent's share was to be reported" (Statistics Canada Census Codebook 2006).

Wages and salaries: "Refers to gross wages and salaries before deductions for such items as income tax, pensions, employment insurance, etc. Included in this source are military pay and allowances, tips, commissions and cash bonuses, benefits from wage-loss replacement plans, taxable benefits, research grants and royalties, as well as all types of casual earnings in the 2005 calendar year" (Statistics Canada Census Codebook 2006).

Investment income: "Refers to interest received in calendar year 2005 from deposits in banks, trust companies, co-operatives, credit unions, caisses populaires, etc., as well as interest on savings certificates, bonds and debentures and all dividends from both Canadian and foreign stocks. Also included is other investment income from either Canadian or foreign sources such as net rents from real estate, mortgage and loan interest received, regular income from an estate or trust fund, and interest from insurance policies" (Statistics Canada Census Codebook 2006).

We do not use for e.g. hourly wage as the dependent variable widely used in other literature, because it is a challenge to estimate a comparable wage rate for self-employed workers since relevant data on net income, adjusting for capital investment and costs, are not available and the timing of reported hours worked do not coincide (consistent with O'Neill and O'Neill 2005).

Justification for using the location of highest education as a proxy for training location

The following is a justification to support the fact that the location of highest training is still a relevant variable in identifying location of training in the data section despite some caveats, such as the possibility for those who would have taken a bridging program reporting that as their highest education. With the census data, one cannot tell who took a bridging program in Canada.

We looked at the policy change through the National Dental Examination Board (NDEB) certification processes in the past. Those who would possibly not take a (Qualifying or Degree Completion Programs) bridging program are separated from those who are likely to take a bridging program by identifying when the bridging program as a policy was implemented by the NDEB. It was implemented in 1997, but only the University of Western Ontario in 1997 had a small program with 7 students at that time, but was not accredited until 1999. Since the design

and implementation of the bridging program take time, most of the universities where bridging programs had been implemented did so around 2000.

Interestingly in 2000, the NDEB examinations designed only for graduates of non-accredited dental programs were discontinued. The foreign-trained dental graduates were required to take the same exam as the Canadian/US-trained graduates. The NDEB placed emphasis on bridging programs or the NDEB Equivalency Process (which was later implemented in 2011) to prepare the foreign-trained dental graduates for the NDEB written exam and an Objective Structured Clinical Exam.

Thus, we use a policy change in the NDEB certification process as a point of identification. We use year "2000" as a point of identification and present the distribution of our 2006 (census) sample across the change in the NDEB certification process. We find that the majority (i.e. 92%) of foreign-trained dentists in our sample became landed residents before 2000 and those who landed in Canada after 2000 (8% of them are foreign-trained persons). As previously mentioned, in 2000, most of the bridging programs were being implemented by universities across Canada. Therefore, it may very well be that we have very high skilled foreign-trained/immigrant dentists (the 92%) in our sample, who, perhaps quickly went through the re-accreditation process or may have re-written the certification exams once, twice or thrice (in the absence of or) prior to the implementation of the bridging programs. So in the base decomposition model (foreign-trained vs. Canadian/US-trained), 92% of the foreign-trained dentists are likely to have received their licenses by either passing the exams for the first time, or were successful after several attempts before passing the certification exams. The NDEB policy allows three examination attempts.

Additionally, we are able to distinguish between the two groups of immigrants in the population, i.e., those who came to Canada as children (<18 years) from those who arrived as adults (25+years) in our robustness checks (see model 2.2 and 2.3 in Table 3.4). Immigrants who landed as children would have received almost all their education in Canada hence no need for a bridging program, even though they were born outside of Canada. By doing this, we are confident that those who may have reported, for example, a bridging program as the highest education in Canada, will be removed from the Canadian-trained immigrants in the decomposition analysis between the Canadian-born Canadian/US-trained and foreign-born Canadian/US-trained dentists.

Finally, among the 20% reporting a PhD or a residency program in Canada (see Table 3.A5), some might be foreign-trained persons in the sense that they got their undergraduate degree abroad (there is some measurement error). But since the distribution does not vary by location of training, it is reassuring that the measurement error should not be too large (otherwise, there would be more PhDs among the foreign-born Canadian/US-trained than among the foreign-born foreign-trained).

Table 3.A5 Distribution of the highest education for all working dentists across location of training

	In which field did the majority of dentists specialize		
	Cdn-born	Foreign-born	
	Cdn/US-trained	Cdn/US-trained	Foreign-trained
Education, General	0.1	0.0	0.0
Biological and Physical Sciences	0.5	--	0.0
Dentistry (DDS, DMD)	**73.1**	**74.1**	**74.5**
Dental Clinical Sciences, General (MSc, PhD)	**7.8**	**8.1**	**8.8**
Endodontics/Endodontology (Cert., MSc, PhD)	0.3	0.0	0.0
Oral/Maxillofacial Surgery Cert., MSc, PhD)	0.7	0.9	--
Orthodontics/Orthodontology Cert., MSc, PhD)	**1.8**	**1.1**	--
Pediatric Dentistry/Pedodontics (Cert., MSc, PhD)	0.5	0.7	0.0
Periodontics/Periodontology (Cert., MSc, PhD)	0.2	0.4	--
Prosthodontics/Prosthodontology (Cert., MSc, PhD)	0.1	--	0.0
Orthodontics Specialty Residency Programs	**2.2**	**1.2**	--
Periodontics Specialty Residency Programs	0.7	0.8	--
Dental/Oral Surgery Specialty Residency Programs	**9.5**	**9.1**	**9.5**
Other fields (outside of dentistry)	2.4	3.6	7.3

Notes: We do not restrict the foreign-born Cdn/US-trained persons by age-at immigration here. Some of them may have received their undergraduate degrees in abroad.

Examples of differences in international dental programs

Dental education in India and Japan show disparities as both countries have no nationwide licensure examinations as highlighted by Komabayashi *et al..,* (2005). India has a highly competitive dental program entrance examination. Their training requires clinical education and internship, and graduates receive approval for dental license from the state government upon completion of the five-year dental program. However, in Japan, dental graduates are exposed to the use of more complex dental equipment and materials during the clinical phases of the curriculum than in India, but require only a national examination without any clinical examination at the time of graduation. It is only recently that a mandated internship was put in place in Japan. Their study suggests that any international dental bridging program should consider the level of skills, material and device training, and experience, to create a homogenous group (Komabayashi *et al..,* 2005) since the possession of a foreign credential is not a guarantee or does not necessarily predicts one's success in Canada.

Table 3.A6: Descriptive statistics of regression variables in model outputs

	Canadian/US-trained		**Foreign-trained**		**Cdn-born Canadian/US trained**		**Foreign-born Canadian/US trained**		**Foreign-born Foreign-trained**	
Regression variables	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Total earnings (CDN $ in 2005)	147,651.50	3,018.06	101,307.20	5,910.93	153,476.30	3,539.28	131,380.70	5,713.26	101,498.30	5,962.53
Self-employment earnings	98,427.73	2,802.68	69,583.72	6,400.41	101,805.50	3,251.06	88,992.45	5,504.71	70,110.54	6,463.22
Wages & Salaries	49,223.79	2,237.98	31,723.52	3,275.36	51,670.86	2,778.28	42,388.24	3,430.87	31,387.74	3,275.71
Weeks worked in 2005	46.8	0.171	45.8	0.628	46.6	0.209	47.1	0.281	45.9	0.622
Hours worked in ref. Week	37.2	0.274	38.2	1.109	36.6	0.318	38.9	0.530	38.3	1.117
Mean deviated weeks worked in 2005	0.755	0.171	-0.222	0.628	0.630	0.209	1.103	0.281	-0.054	0.622
Mean deviated hours worked in ref. Week	0.214	0.274	1.162	1.109	-0.391	0.318	1.905	0.530	1.251	1.117
Mean deviated pot. Cdn experience (in years)	1.846	0.212	-0.505	0.551	2.810	0.247	-0.846	0.386	-0.670	0.542
Mean deviated pot. Cdn experience squared	165.46	8.125	48.49	20.445	201.80	9.57	63.91	14.34	40.52	19.72
Visible minority population	0.245	0.009	0.499	0.033	0.103	0.007	0.641	0.020	0.504	0.034
Female	0.282	0.010	0.489	0.033	0.267	0.011	0.323	0.020	0.491	0.034
Age (in years)	44.0	0.212	47.0	0.529	44.7	0.247	42.1	0.399	46.9	0.526
Age-squared	2043.5	19.010	2272.1	49.958	2106.4	22.172	1867.8	35.584	2261.0	49.459
Dentistry degree (DMD, DDS)	0.868	0.007	0.873	0.022	0.869	0.008	0.864	0.014	0.872	0.022
Masters	0.066	0.005	0.065	0.017	0.069	0.006	0.058	0.009	0.066	0.017
PhD	0.066	0.005	0.062	0.015	0.062	0.006	0.078	0.011	0.063	0.015
Toronto & Vancouver	0.296	0.010	0.538	0.033	0.238	0.010	0.459	0.021	0.541	0.034
Other CMAs	0.608	0.010	0.412	0.033	0.643	0.012	0.509	0.021	0.414	0.034
Atlantic	0.058	0.005	0.038	0.016	0.075	0.006	0.009	0.003	0.038	0.016
Prairies	0.160	0.008	0.117	0.022	0.173	0.009	0.122	0.014	0.115	0.022
British Columbia	0.144	0.007	0.237	0.028	0.128	0.008	0.192	0.016	0.234	0.028
Ontario	0.393	0.010	0.482	0.033	0.363	0.012	0.478	0.021	0.485	0.034
Territories	0.001	0.000	0.001	0.001	0.002	0.001	0.000		0.001	0.001
Quebec	0.244	0.009	0.125	0.023	0.260	0.011	0.199	0.017	0.127	0.023
Speak mother tongue other than Eng/French	0.264	0.009	0.833	0.026	0.098	0.007	0.727	0.018	0.843	0.025
Married	0.712	0.010	0.841	0.025	0.698	0.011	0.751	0.017	0.847	0.025
Have no children	0.227	0.009	0.185	0.026	0.237	0.010	0.199	0.016	0.188	0.026
Children under 5 years	0.224	0.009	0.166	0.025	0.204	0.010	0.281	0.019	0.168	0.026
Children 6 years and above	0.431	0.011	0.579	0.033	0.442	0.012	0.402	0.020	0.583	0.033
Female*Married	0.167	0.008	0.392	0.033	0.148	0.009	0.222	0.018	0.397	0.033
Female*Have no children	0.062	0.005	0.091	0.019	0.065	0.006	0.051	0.009	0.092	0.019
Female*Children under 5 years	0.084	0.006	0.095	0.021	0.074	0.006	0.113	0.014	0.096	0.021
Number of observations	**2,769**		**275**		**2,062**		**706**		**272**	

Note of types of standard errors (SE): Standard error of the mean indicates the amount by which the estimated mean can be expected to differ from the true mean; standard error of the estimate, seen in regression outputs, indicates the standard deviation of the differences between the actual values of the y-dependent variable and the predicted values; standard error measures the expected amount of deviation of the estimated statistic from the true value of the statistic; standard deviation is the measure of dispersion around the mean. A small dispersion indicates a homogenous group, contrary to a large dispersion which indicates a heterogeneous group.

Table 3.A7: Canadian/US- vs. Foreign-trained practicing dentists' earnings differential: Detailed Oaxaca-Blinder decomposition results with sensitivity tests of reference coefficients

	Canadian/US- vs. Foreign-trained Gap Using group 2: Canadian/US-trained coefficients				Canadian/US- vs. Foreign-trained Gap Using group 1: Foreign-trained coefficients			
Panel 1	Model 1.1		Model 1.2		Model 1.3		Model 1.4	
Log earnings gap attributable to:	Charac-teristics	Rates of Return	Charac-teristics	Rates of Return	Charac-teristics	Rates of Return	Charac-teristics	Rates of Return
Visible minority population	-0.050**	0.174**	-0.050**	0.177**	0.039	0.086**	0.041+	0.087**
	(0.016)	(0.060)	(0.015)	(0.055)	(0.027)	(0.029)	(0.025)	(0.027)
Female	-0.057***	0.090	-0.042***	0.081	-0.019	0.052	-0.008	0.047
	(0.013)	(0.061)	(0.011)	(0.054)	(0.024)	(0.035)	(0.021)	(0.031)
MD potential Cdn wk experience	-0.133***	-0.040	-0.064**	-0.029	-0.320**	0.147**	-0.197*	0.105*
	(0.039)	(0.046)	(0.025)	(0.034)	(0.102)	(0.055)	(0.081)	(0.053)
MD potential Cdn wk experience sqd	0.147***	-0.082+	0.059*	-0.056	0.344***	-0.278*	0.194*	-0.191
	(0.038)	(0.049)	(0.026)	(0.043)	(0.103)	(0.120)	(0.091)	(0.123)
Toronto/Vancouver	-0.021	0.079	-0.036*	0.110	0.014	0.044	0.013	0.060
	(0.017)	(0.160)	(0.017)	(0.161)	(0.070)	(0.088)	(0.070)	(0.088)
British Columbia	-0.018*	0.068	-0.011	0.037	0.008	0.041	0.004	0.023
	(0.009)	(0.053)	(0.007)	(0.050)	(0.019)	(0.032)	(0.019)	(0.031)
Ontario	0.017*	0.091	0.018*	0.046	0.034+	0.074	0.027	0.037
	(0.009)	(0.090)	(0.009)	(0.092)	(0.021)	(0.073)	(0.019)	(0.075)
Speak foreign mother tongue	-0.049	0.133	-0.068*	-0.010	0.042	0.042	-0.075	-0.003
	(0.031)	(0.170)	(0.029)	(0.138)	(0.112)	(0.054)	(0.090)	(0.044)
Married	0.027**	-0.050	0.020**	-0.077	0.020	-0.042	0.008	-0.065
	(0.009)	(0.122)	(0.007)	(0.116)	(0.018)	(0.103)	(0.017)	(0.098)
MD Weeks worked in 2005			-0.035	0.002			-0.026	-0.007
			(0.024)	(0.006)			(0.019)	(0.007)
MD Hours in reference week			0.008	0.005			0.012	0.001
			(0.010)	(0.007)			(0.015)	(0.002)
Constant		-0.717*		-0.500		-0.717*		-0.500
		(0.345)		(0.351)		(0.345)		(0.351)

Panel 2

Overall differential	Model 1.1	exp(b)	Model 1.2	exp(b)	Model 1.3	exp(b)	Model 1.4	exp(b)
Group 1: Foreign-trained	11.239***	76,058.1***	11.239***	76,058.10	11.239***	76,058.1***	11.239***	76,058.10
	(0.056)	4,266.9	(0.058)	(4,385.7)	(0.056)	4,266.916	(0.058)	(4,385.7)
Group 2: Canadian/US-trained	11.545***	103,254.6***	11.545***	103,254.60	11.545***	103,254.6***	11.545***	103,254.60
	(0.020)	2,105.6	(0.020)	(2,075.9)	(0.020)	2,105.6	(0.020)	(2,075.9)
Log earnings gap	-0.306***		-0.306***		-0.306***		-0.306***	
	(0.060)		(0.061)		(0.060)		(0.061)	
Total characteristics (explained)	-0.125***	41%	-0.187***	61%	0.152	50%	-0.030	10%
	(0.035)		(0.044)		(0.109)		(0.092)	
Rates of return & unobservables (unexplained)	-0.181**	59%	-0.119*	39%	-0.458***	150%	-0.276**	90%
	(0.064)		(0.059)		(0.133)		(0.095)	
Breakdown of unexplained								
Differences in rates of return	0.536		0.381		0.260		0.224	
	(0.351)		(0.352)		(0.345)		(0.329)	
Differences in constants	-0.717*		-0.500		-0.717*		-0.500	
	(0.345)		(0.351)		(0.345)		(0.351)	
R^2- subgroup regressions	CdnUS= 0.137	Foreign= 0.186	CdnUS= 0.249	Foreign= 0.358	CdnUS= 0.137	Foreign= 0.186	CdnUS= 0.249	Foreign= 0.358

Notes: We show that the decomposition results are sensitive to reference coefficients being used. Therefore, we use the coefficients of the Canadian/US-trained dentists in models 1.1 & 1.2 and the coefficients of the foreign-trained dentists as the reference coefficients in models 1.3 & 1.4, to understand the changes that occur with the occupational earnings structure attributed to the location of highest education, consistent with discussions in O'Neill and O' Neill (2005). The equation underlying the models 1.3 and 1.4 are found in the appendix. We control for statistically insignificant Masters and PhD (dentistry as reference), Other CMAs; Atlantic, Prairies, Territories, (with Quebec as the reference region), and Children under 5 years (children 6 + years as the reference). We run four decompositions with and without the mean deviated weeks and hours worked. We also mean deviated (MD) potential work experience and its squared. The robust standard errors are in the parenthesis. + Significant at 10%; * significant at 5%; **significant at 1%; ***significant at 0.1%. Number of observations for group 1 is 275 and number of observations for group 2 is 2,769. To transform the logs back to the original scale, the geometric mean [exp(b)] of earnings is presented in columns next to the log earnings point estimates in panel 2 of the table. The geometric mean is used to calculate the counter-factual question: what would earnings be if foreign-trained dentists' characteristics were adjusted to the levels of Canadian/US-trained dentists in footnote 35 above, consistent with Jann (2008).

Appendix C: Decomposition notes

A procedure is said to provide a detailed decomposition when it can apportion the composition effect, X, or the wage structure, S, into components attributable to each explanatory variable (Fortin, Lemieux and Firpo, 2011, pp.25).

The "unexplained component" of Oaxaca decomposition can be interpreted as a "treatment effect," but it must also be made clear that we cannot give causal interpretation to the decomposition results. More closely to what we consider, Kleiner (2000) found that, on average, occupational licensing seems to raise earnings of those employed in high incomes relative to persons in lower income jobs. In this example, Kleiner (2000) described the unexplained component as an effect of licensing, which we describe in our dentists study as an effect of location of highest study. [92] "When the counterfactuals are based on hypothetical alternative wage structures, they can easily be linked to the treatment effects literature. For example: What if group A workers were paid according to the wage structure of group B? What if all workers were paid according to the wage structure of group A? Define the overall average treatment effect (ATE) as the difference between average wages if everybody were paid according to the wage structure of group B and average wages if everybody were paid according to the wage structure of group A. That is ATE=E[YB]-E[YA], where switching a worker of from type A to type B is thought of to be the "treatment" (Fortin, Lemieux and Firpo, 2011, pp.33-35).

Equations for models 1.1 and 1.2 in Table 3.3

The following step by step equations lead to the Oaxaca-Blinder decomposition (i.e. equation 5) underlying Models 1.1 and 1.2. in Table 3.3 showing how coefficients of the **Canadian/US-trained** are used as reference coefficients. The approximate normality of the density curves of the (dependent) log of earnings variable justifies the execution of the decomposition analysis at the mean. We consider two earnings equations, one for Canadian/US-trained and one for foreign-trained dentists and control for variables thought to reflect individual-level differences in productivity or preferences, as follows:

$$\ln Y_i^{CUST} = \beta_0^{CUST} + \beta^{CUST} X_i^{CUST} + \varepsilon_i^{CUST} \quad (1)$$

$$\ln Y_i^{FT} = \beta_0^{FT} + \beta^{FT} X_i^{FT} + \varepsilon_i^{FT} \quad (2)$$

where

$\ln Y_i$ =log of positive earnings of the i-th dentist; superscript CUST = Canadian/US-trained dentist; superscript FT = Foreign-trained dentist; ε_i = a disturbance (error) term, the error term which has a conditional mean of zero drops out of the decomposition. It is also assumed to be conditionally independent of X_i. Moreover, the outcome variable, Y, is assumed to be linearly related to the covariates. X_i is a vector of control characteristics. Estimating both equations with OLS, whereby equation 2 is subtracted from equation 1 yields equation 3

[92] Kleiner MM. 2000. Occupational Licensing. *Journal of Economic Perspectives* **14**(4): 189-202.

$$\overline{\ln Y^{CUST}} - \overline{\ln Y^{FT}} = \left(\hat{\beta}_0^{CUST} - \hat{\beta}_0^{FT}\right) + \hat{\beta}^{CUST}\overline{X}^{CUST} - \hat{\beta}^{FT}\overline{X}^{FT} \quad (3)$$

Where $\overline{\ln Y^{CUST}}$ and $\overline{\ln Y^{FT}}$ = means of the log earnings of Canadian/US-trained and foreign-trained dentists, respectively in equations 1 and 2. An algebraic manipulation is carried out by adding and subtracting $\hat{\beta}^{CUST}\overline{X}^{FT}$, which can be interpreted as the counterfactual situation as in Hugo (2008).

$$\overline{\ln Y^{CUST}} - \overline{\ln Y^{FT}} = \left(\hat{\beta}_0^{CUST} - \hat{\beta}_0^{FT}\right) + \hat{\beta}^{CUST}\overline{X}^{FT} - \hat{\beta}^{FT}\overline{X}^{FT} + \hat{\beta}^{CUST}\overline{X}^{CUST} - \hat{\beta}^{CUST}\overline{X}^{FT} \quad (4)$$

After the simplification our **final** Oaxaca-Blinder type equation is:

$$\overline{\ln Y^{CUST}} - \overline{\ln Y^{FT}} = \underbrace{\left(\hat{\beta}_0^{CUST} - \hat{\beta}_0^{FT}\right)}_{\text{Difference in constants}} + \underbrace{\left(\hat{\beta}^{CUST} - \hat{\beta}^{FT}\right)\overline{X}^{FT}}_{\text{Difference in rates of return}} + \underbrace{\hat{\beta}^{CUST}\left(\overline{X}^{CUST} - \overline{X}^{FT}\right)}_{\text{Difference in characteristics}} \quad (3)$$

Unexplained component

Equations for models 1.3 and 1.4 in Table 3.3 for sensitivity checks

The following (similar to the equations above) is also step by step equations lead to the Oaxaca-Blinder decomposition (i.e. equation 5) underlying Models 1.3 and 1.4. in Table 3.3 showing how coefficients of the **foreign-trained dentists** are used as reference coefficients. We consider two log earnings equations, one for Canadian/US-trained and one for foreign-trained dentists and control for variables thought to reflect individual-level differences in productivity or preferences, as follows:

$$\ln Y_i^{FT} = \beta_0^{FT} + \beta^{FT}X_i^{FT} + \varepsilon_i^{FT} \quad (1)$$

$$\ln Y_i^{CUST} = \beta_0^{CUST} + \beta^{CUST}X_i^{CUST} + \varepsilon_i^{CUST} \quad (2)$$

where

$\ln Y_i$ =log of positive earnings of the i-th dentist; superscript CUST = Canadian/US-trained dentist; superscript FT = Foreign-trained dentist; ε_i = a disturbance (error) term, the error term which has a conditional mean of zero drops out of the decomposition. It is also assumed to be conditionally independent of X_i. Moreover, the outcome variable, Y, is assumed to be linearly related to the covariates. X_i is a vector of control characteristics. Estimating both equations with OLS, whereby equation 2 is subtracted from equation 1 yields equation 3

$$\overline{\ln Y^{FT}} - \overline{\ln Y^{CUST}} = \left(\hat{\beta}_0^{FT} - \hat{\beta}_0^{CUST}\right) + \hat{\beta}^{FT}\overline{X}^{FT} - \hat{\beta}^{CUST}\overline{X}^{CUST} \quad (3)$$

where $\overline{\ln Y^{CUST}}$ and $\overline{\ln Y^{FT}}$ = means of the log earnings of Canada-US trained and foreign-trained dentists, respectively, in equation 3. An algebraic manipulation is carried out by adding and subtracting $\hat{\beta}^{FT}\overline{X}^{CUST}$, which can be interpreted as the counterfactual situation (see for e.g. Nopo (2008).[93] What would the earnings for Canadian/US-trained dentists with average individual characteristics be, in the case that a Canadian/US-trained dentist is rewarded for his/her characteristics in the same way as the average foreign-trained dentist is rewarded? The resulting equation is as follows:

$$\overline{\ln Y^{FT}} - \overline{\ln Y^{CUST}} = \left(\hat{\beta}_0^{FT} - \hat{\beta}_0^{CUST}\right) + \hat{\beta}^{FT}\overline{X}^{CUST} + \hat{\beta}^{FT}\overline{X}^{FT} - \hat{\beta}^{CUST}\overline{X}^{CUST} - \hat{\beta}^{FT}\overline{X}^{CUST} \quad (4)$$

After the simplification our **final** Oaxaca-Blinder type equation is:

$$\overline{\ln Y^{FT}} - \overline{\ln Y^{CUST}} = \underbrace{\left(\hat{\beta}_0^{FT} - \hat{\beta}_0^{CUST}\right)}_{\text{Difference in constants}} + \underbrace{\left(\hat{\beta}^{FT} - \hat{\beta}^{CUST}\right)\overline{X}^{CUST}}_{\text{Difference in rates of return}} + \underbrace{\hat{\beta}^{FT}\left(\overline{X}^{FT} - \overline{X}^{CUST}\right)}_{\text{Difference in characteristics}} \quad (5)$$

Unexplained component

Some important mean decomposition assumptions

For a full review of the methodology see Fortin, Lemieux and Firpo, 2011. However, we note that because of the additive linearity assumption, it is easy to compute the decomposition. "Each element in the sum can be interpreted as the contribution of the difference in the returns to the covariate to the total wage structure effect evaluated at the mean value" (Fortin, Lemieux and Firpo, 2011, pp.33-35). Since the "regression coefficients are based on partial correlations, an Oaxaca-Blinder decomposition that includes all K explanatory variables of interest satisfies the property of path dependence" (sequence or order in which different variables of the detailed decomposition are computed does not affect the results of the decomposition)- (Fortin, Lemieux and Firpo, 2011, pp.39). Other important assumptions are the invariance of conditional distribution, ignorability and overlapping/common support.

The economic rationale of invariance assumption, which is the selection of groups not based on unobservables, is that, the marginal distribution can replace one group and still remain valid. The Canada/US-trained and foreign-trained dentists are all licensed to practice in the field of dentistry, so we query why we see significant differences in their earnings for similar observed characteristics, when both groups have satisfied the minimum (necessary to make this distinction) institutional requirements, in terms of competency and skills, to practice. However, we note that they are not homogenous in terms of expertise (for e.g., a recent licensed dentist vs.

[93] Nopo H. 2008. Matching as a tool to decompose wage gaps. *The Review of Economics and Statistics* 90(2): 290–299.

one with 20 years of work experience). Although, both the foreign-trained dentists and the Canadian/US-trained dentists are licensed, the credential and licensing exams are only minimum practice exams. There are variations in the rate of return to skills above the minimum requirements.

The ignorability or unconfoundedness assumption rules out or makes sure that the effects of manipulations of the distribution of X will not be confounded by changes in the distribution of error term. "The ignorability implies that the joint densities of observables and unobservables for groups A and B [Canada/US- and foreign-trained] have to be similar up to a ratio of conditional probabilities" (Fortin, Lemieux and Firpo, 2011, p. 23). Ignorability assumption considers that there is complete separability of the functional forms of observables and unobservable groups of variables, and no lurking interaction between variables, which could make it difficult to distinguish the contribution of the observable and unobservable variables to the earnings gap (Fortin, Lemieux and Firpo, 2011, pp.17). We must "impose a common support assumption on the observable and unobservable variables to ensure that no single value in a group can serve to identify membership into one of the groups." (Fortin, Lemieux and Firpo, 2011, p. 16)

Common support assumption

A common support assumption is imposed on the observable and unobservable variables to ensure that no single value in a group can serve to identify membership in one of the groups. Although the Canada/US-trained dentists sub-group is not exclusively Canadian-born, but constitute foreign-born dentists as well, we are cognisant of the fact that Canadian-born dentists are more likely to receive their highest education in Canada or the U.S. than the foreign-born persons. Thus, we select the control variables in order not to violate the common support assumption in the decomposition procedure (Fortin *et al..*, 2011; Nopo, 2008; Black *et al..*, 2008). Any violation of the common support assumption will result in the differences in the rate of returns component being "overestimated" (Nopo, 2008; Black *et al..*, 2008).[94, 95] For instance, we do not include years since migration, age at immigration, and origin or region of birth in the linear decomposition models.

Choice of the omitted group

An important issue that confronts decompositions at the mean is the choice of the omitted group if a categorical variable is included in the potential factors to explain the earnings gap under analysis. The problem is that we cannot determine the contribution of the omitted category (reference group) attributed to the true group membership (or differences in rates of return component captured by the difference in intercepts) from the part attributed to the differences in rates of return of the omitted or base category (Fortin, Lemieux and Firpo, 2011, pp. 39-42). The intercepts have different parts of the effects of the omitted group. There is no quick fix to this problem, as it depends on the context of interest, in a continuous variable situation, in which one

[94] Black DA, Haviland AM, Sanders SG, Taylor LJ. 2008. Gender Wage Disparities among the Highly Educated, *Journal of Human Resources* **43 (**3): 630-659.

[95] Nopo H. 2008. Matching As A Tool To Decompose Wage Gaps. *The Review of Economics and Statistics* **90**(2): 290–299.

can omit the category that potentially yields the least or smallest earnings effect, but one should also consider issues of internal logic balanced with comparability of other studies (Fortin, Lemieux and Firpo, 2011, pp.39-42).

Issue of categorical variables

Issue of categorical variables in a detailed decomposition: "for the explained part of the decomposition this may not be critical because the sum of the contributions of the single indicator variables, that is, the total contribution of the categorical variable is unaffected by the choice of the base category. For the differences in rate of returns part of the decomposition, however, there is again a trade-off between the group membership component (difference in the intercepts) and the part attributed to differences in slope coefficients. For the differences in rate of returns part, changing the base category not only alters the results for the singly dummy variables but also changes the contribution of the categorical variable as a whole" (Jann 2008, p. 9). A simpler solution to this issue is to run a series of decompositions in which the categories are used one after another as the base category and then find a simple average of the results (the difference in the constants over all possible choices of reference category) (Yun 2005b as quoted in Jann 2008).[96, 97] Gravelle, Hole and Santos (2011) also follow this procedure. We adopt this solution and use the average of the constants when the base category (in geographic regions, education and age of children in census families) is changed.

Economic framework underlying the analysis

The basic OLS natural logarithm of earnings model was developed around the human capital framework, to investigate the joint effects of place of birth and origin of foreign credentials as extensions of human capital theory (Becker 1993). The theory, with its extensions, states that investments in education, job training, and other forms of knowledge acquisition together with abilities raise one's work productivity (Becker 1993).

Sample selection issues

To show whether those omitted groups are large enough to bias the estimates of the analyses, we present the proportions of the omitted persons with zero earnings as the following: Foreign-trained and Canada/US trained when dropped are about 3% and 4.7% respectively, which does not change the results if they are included. The sample includes only those with positive total earnings and positive weeks worked in 2005. It might not be an issue for the Canada/US-trained persons since they are more likely to work as dentists than the foreign-trained individuals, which is the crux of foreign credential recognition and integration issues discussed in this thesis. Thus, the selection bias issue might be more problematic towards foreign-trained persons since, in essence, only those foreign-trained professionals able to earn positive earnings are selected as

[96] Yun MS. 2005. A simple solution to the identification problem in detailed wage decomposition. Economic Inquiry 43: 766–772

[97] Jann B. 2008. A Stata implementation of the Blinder-Oaxaca decomposition. *The Stata Journal* **8**(4): 453–479.

participants in the labour market. Consequently, foreign-trained dentists with low participation rates are disproportionately highly able dentists who receive high earnings relative to Canada/US-trained dentists but may be incurring initial fixed costs that must be paid off (see Antecol 2001 for a similar discussion).[98]

Self-employment and ethnicity differences

Meyers (1990) explains that cultural differences may account for the disparities in black and white self-employment numbers and earnings since he finds no evidence of net worth, liquidity constraints being the main determinants of becoming a successful self-employed worker (for small businesses, though not for large business establishments), and finds little support for the/a consumer discrimination hypothesis.[99] Moreover, contrary to the disadvantaged theory, Fairlie and Meyer's (1996) findings suggest that challenges in language and discrimination do not necessarily lead to one becoming a self-employed individual; rather, it is the perception of relative high returns to self-employment for many ethnic groups that make self-employment a preferable option to being a paid employee.[100]

[98] Antecol H. 2001. Why is there Interethnic variation in the gender wage gap? The role of cultural factors. *The Journal of Human Resources* **36**(1): 119-143.

[99] Meyer BD. 1990. 'Why Are There So Few Black Entrepreneurs?' National Bureau Economic Research, *NBER, Working Paper* no. 3537, December 1990, Cambridge, Massachusetts.

[100] Fairlie R, Meyer B. 1996. Ethnic and racial self-employment differences and possible explanations. *Journal of Human Resources* **31**(4):757-793.