The Labour Market Integration of Foreign Trained Engineers in Canada: Does Gender Matter?

by
Monica Boyd and Lisa Kaida
University of Toronto

Abstract:
Using the full 2006 Canadian Census of Population, this study focuses on the labour market integration of internationally educated engineers aged 30-54. Two indicators of labour market insertion (or the lack thereof) are analyzed: 1) occupational location for the experienced labour force, including work in engineering occupations; and 2) annual earnings. The analysis shows that compared to the Canadian born, being internationally educated carries a penalty as does being female. Internationally educated immigrant women are more likely than their male counterparts or Canadian-born women and men to hold occupations that are not directly related to the study of engineering, and they have the lowest average earnings of all comparable groups. As well, the earnings penalty or "cost" of not being in occupations related to engineering training is highest for immigrant women. These findings are consistent with the "double negative effect" in which re-accreditation barriers intersect with gender-related barriers.

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Introduction

Globalization and the recent emphasis on the knowledge economy have gone hand in hand with immigration policy changes that increase in-take of the highly-trained in countries such as Canada, Australia, and the United States. Indeed, post-industrial nations are now competing with one another in the race for "the best and the brightest" (Shachar, 2006). Concomitantly, the motives for recruiting such workers have enlarged. Instead of recruiting skilled labour primarily to meet labour demand in specific economic sectors such as the IT industries, the professions, and in multinational enterprises, post-industrial countries appear to increasingly be recruiting and retaining skilled workers for their spillover effects to the overall economy, particularly their stimulative effects on knowledge sectors (Gera and Songsakul, 2007).

Canada is one of the destination countries that has aggressively recruited highly skilled migrants since the early 1990s. In addition to adopting a point system early on through regulations in 1967 that were subsequently enshrined in the Immigration Act 1975, Canada developed immigration management plans during the 1980s that specified numbers likely to be admitted under the core admissibility principles of family reunification, humanitarian considerations, and economic contributions. Annual reports to Parliament by the Minister meant that the balance between these categories could be adjusted; by the early 1990s serious efforts were underway to increase the numbers of immigrants admitted on the basis of economic criteria

compared to family reunification and humanitarian criteria of admissibility. As a result after 1995, those arriving in the economic class (principal applicants and dependents) represented over half of all persons landed for permanent residence. Further, consistent with the externalities accompanying highly skilled in-flows, the link between occupational demand and specific occupational skills was uncoupled in the 1980s with educational level and language skills becoming the desirable generic skills.

International and Canadian specific discussions on highly skills flows and related policy issues (see: OECD, 2002; 2004) are inevitably accompanied by discussions about the labour market integration of highly skilled migrants. Such discussions are particularly prevalent in those countries of permanent residence where highly skilled immigrants are admitted on the basis of generic skills – rather than specific job related skills (Hawthorne, 2008). In these countries, such as Canada and Australia, two factors militate against a direct correspondence between the actual admission of foreign-trained professionals and their subsequent employment in professional occupations. First, immigrant professionals can experience downward mobility associated with their status as new members of a society – a status exacerbated by unfamiliarity with local and national labour markets, the absence of job-search related networks, and the lack of language skills or host society "experience." Second, professionals can face accreditation barriers. Occupations in certain trades, law, engineering, and health areas may require certification and/or licensing, primarily through professional associations, whose origins and mandates rest on government statutes. All recruits to such occupations must be accredited. But whereas those trained in host society institutions have recognized programs of study, validated work experience and high command of the language(s) of employment, immigrants may face difficulty in having

degrees recognized, getting foreign work experience counted, and meeting language requirements.

Gender also may constitute an additional barrier. Professions are highly gendered, with some such as nursing viewed as the domain of women while others such as engineering viewed as appropriate for men. But the impact of gender, particularly when gender scripts are violated, may be most severe when it intersects with immigrant status. Studies of immigrant labour market integration note that foreign born women do less well on any number of indicators than do foreign born men and native born women and men. The terms "double disadvantage," "double jeopardy" or "double negative" frequently are used to describe those outcomes where the negative consequences associated with being female (compared to being male) and of being immigrant or foreign born (compared to native born) combine to make immigrant women the most marginal in the labour market (Boyd, 1984).

This paper assesses combined impacts of the double negative and accreditation criteria on the livelihoods of immigrant professionals in engineering. We focus on the engineering profession in Canada for three reasons. First, of the three largest traditional settlement countries for permanent migrants, Canada (and Australia) ask census respondents to report fields of study; In comparison to United States census based research that lack this information (Espenshade, Usdansky, and Chung, 2001), field of study data permit examining the labour market outcomes of those who actually studied engineering Second, unlike the United States where the inhibiting influence of professional associations is less, engineering in Canada is a highly regulated profession, one that foreign trained immigrants have difficulty penetrating (Boyd, 2001; Boyd and Thomas, 2001, 2002; Rekai, 2002). As a result, Canadian data are more appropriate for the argument that accreditation barriers can dampen the policy impacts of recruiting high skill

immigrant professionals. Third, the field of engineering is highly masculine, both in imagery and in the composition of the workforce (Evetts, 1994; Ranson, 2005; White and White 2006); additionally, task specific technical skills and soft communication skills needed in client interaction may differ from country to country, thereby creating disjunctures in the work settings between origin and destination countries (see: Tang, 1997). These factors may reduce the access and influence the experiences that women and immigrants have with respect to engineering work. Together, the intersection of the two "negatives" implies that immigrant women are the most affected compared to other groups of Canadian-born men and women and foreign-born men. To assess this claim, we examine two indicators of labour market integration (or the lack therein): 1) occupational location for the experienced labour force, including work in engineering occupations; and 2) annual earnings.

Engineering Training and Credential Recognition

While immigration policies govern the admission of those who seek legal entry into a new country, these policies rarely interconnect with other migrant policies targeted at those who actually live in the host society. Very often, the assumption is that immigrants will make their own way, including finding jobs and working in occupations that correspond to their levels of skill and education. However, professionally-trained migrants often experience downward mobility because professions such as medicine, law, accounting, and engineering, to name a few, are self-regulated. This means that licenses or certification from regulatory bodies is required for the practice of the profession. While the purpose of licensing and certification is to assure public health and safety (Mata,1999; McDade, 1988; Wright and McDade, 1992), these practices are also the defining characteristics of occupational internal labour markets which create monopolies on products and/or services by controlling labour supply (Boyd and Thomas, 2001; Girard and

Bauder, 2007). In Canada, where many professions are mandated by provincial governments to regulate licensure, certification requirements are often described as a form of systemic discrimination, in that criteria are created which are universally applied to the Canadian born and foreign born alike, but have disproportionate effects in restricting access to trades or professions among the foreign born (Boleria, 1992; McDade, 1988).

Engineering is the largest regulated profession existing in Canada and has its own "reserve" title. By law, no one may offer engineering services to the public without first obtaining a license from one of the 12 provincial and territorial engineering associations ("ordre"in Quebec) that have been mandated by provincial/territorial law. Although minor differences are observed across jurisdictions, the provincial/territorial engineering associations share the following requirements. An applicant must: 1) be a Canadian citizen or permanent resident; 2) hold a formal Bachelors degree in engineering; 3) have three to four years of engineering work experience, among which one year must be completed in "a Canadian environment" (CCPE, 2003); and 4) pass the Professional Practice and Ethics Examinations.

These requirements are applied to all applicants, including foreign-trained engineers. Of note is the second criterion. Engineering degrees from Canadian institutions are accredited by the Canadian Engineering Accreditation Board (CEAB), while degrees from non-Canadian universities are not automatically deemed equivalent to Canadian ones. In the past two decades, Engineers Canada (formerly called the Canadian Council of Professional Engineers), which is the national-level umbrella association for the provincial/territorial associations, has concluded mutual recognition agreements with select overseas engineering associations. As a result, subsequent to the dates of the agreements, degrees from accredited programs are recognized as equivalent to Canadian ones for those trained in the United States (beginning in 1980), the

United Kingdom(1989), Ireland (1989), Australia (1989), New Zealand (1989), France (2006), South Africa (1993), Hong Kong (1995), and Japan (2005). However, degrees from other overseas countries are not necessarily considered equivalent, and provincial/territorial associations often require additional Confirmatory Examinations depending on the results of their credential assessment. Having language skills is an integral part of these examinations as is the knowledge and application of engineering principles. Upon meeting these requirements, individuals are licensed as professional engineers. Persons may do engineering work without accreditation, but it must be under the direct supervision of licensed professional engineers, who are legally entitled to use the designation "P.Eng." ("ing." in Quebec) after their names.

Unless their degrees are from countries where mutual recognition agreements exist with Canada, immigrants who wish to be licensed as engineers must meet these accreditation requirements, thereby compounding labour market insertion problems faced by all new entrants to the labour force. Further most of the mutual recognitions agreements are quite recent, thereby affecting employment outcomes only for recent arrivals.

Given the tight control over the use of the P.Eng designation and its correspondence to employment as engineers, those immigrating to Canada after receiving engineering training abroad often face three outcome scenarios. First, immigrants with foreign engineering training may be less likely to work in engineering or engineering-related occupations than the Canadian-born or the foreign-born who have received Canadian engineering degrees. Since employment in engineering occupations often is the first rung on a ladder to management (Evetts, 1993; Fernandez, 1998; Tang, 1993b, 1997; Trembly, Wils and Proulx, 2002), this scenario implies that engineers with foreign training will be less likely to be in management. Second, earnings of immigrants who studied engineering should be less than those received by the native born

comparables because employment in non-engineering occupation carries the potential to reduce earnings. Third, with increasing years of residency in the host country, immigrants who trained in engineering should improve their labor market profiles and narrow occupational and earnings gaps between themselves and native born engineers. This third expectation rests on two inputs. The general literature on immigrant adaptations observes that downward mobility and unemployment are not uncommon shortly after arrival, but that improvements in employment and earnings occur over time, in part because duration in the host country is associated with better language skills, improved job-related networks, and increased knowledge of the new society. Moreover, as a profession with accreditation requirements, engineering degrees from most of the overseas non-accredited programs are not considered equivalent to Canadian ones. Thus, immigrants who have obtained engineering education in their home countries are likely to undertake additional examinations to verify their competency in engineering, which may take additional time and expense.

The Impact of Gender and the Double Negative

Studies of internationally educated foreign born male engineers support the above scenarios. In the United States, researchers find that foreign trained immigrant engineers often have higher rates of unemployment, and are less likely to work in their fields; further, when attempting to enter management, they face a glass ceiling (Tang, 1997), defined as unofficial or unacknowledged barriers to upward advancement. In Canada, analysis of the 1996 and 2001 censuses reveals that of those men with bachelor degrees or higher, whose major field of study was engineering, immigrants showed higher rates of not being in the labour force as well as higher unemployment rates, and lower percentages were employed in managerial or engineering

occupations (Boyd, 2001; Boyd and Schellenberg, 2007; Boyd and Thomas, 2000, 2002). Analysis of 2000 earnings also confirm the lower earnings of foreign trained engineers compared to the Canadian born (Boyd and Schellenberg, forthcoming).

Many of these North American studies that include immigrants consider only the experiences of men (but see: Espenshade, Usdansky, and Chung, 2001; Goyette and Xie, 1999 for scientists; Shih, 2006; Tang, 1997). Gender stratification in the labour market suggests that women face additional barriers, and that in male-dominated occupations, they have particular difficulty when their relative numbers are small and when their presence violates implicit norms and actual practices that presume male incumbents (Kanter, 1977; Padavic and Reskin, 1990). Once an exclusively male-dominant profession, engineering now attracts more women. This is a world-wide trend (Hersh, 2000), and Canada is no exception. Institutions such as the Royal Commission of the Status of Women in Canada and the Science Council of Canada have played crucial roles in increasing the representation of women in engineering (Ellis, 1986). In 1980 the percentage of registered professional female engineers in Canada was 0.5 percent, rising to 3.2 percent in 1990, 5.5 percent in 1997 (CCPE, no date), and 9 percent in 2002 (Ekos Research Associates, 2003). The presence of women in engineering with degrees at the university level also is growing. The share of women with a bachelor degree in engineering doubled between 1982 and 1995; women now comprise one-fifth of all university graduates in engineering. However, notwithstanding a rapid increase in the share of women in engineering, few women choose to study engineering at university; only 2.3 percent of all female graduates obtained bachelors' degrees in engineering in 1995, compared to 13 percent of male graduates (Finnie, Lavoie, and Rivard, 2001).

Although more women are participating in the engineering profession, women engineers still face employment disadvantages. Studies suggest that the engineering profession remains gendered in various aspects. For instance, Faulker (2000) identifies four gender patterns in engineering: 1) symbolic representations and images of engineering are masculine; 2) engineering knowledge and practice are gendered symbolically; 3) gendered differences exist in approaches to engineering; and 4) gender differences exist in the engineers' individual subjective experiences and identities. Similarly, Evetts (1993) reports that for advancement women engineers feel pressured to display male work patterns of long hours, relocation and mobility, strategies that are difficult to implement for those with family responsibilities (also see: Ranson, 2005). Maskellpretz and Hopkins (1997) additionally highlight two types of barriers faced by women engineers in the workplace. First, women encounter professional barriers: namely, they have difficulty obtaining hands-on work experience, and accessing mentoring networks or training programs compared to male counterparts. Second, additional barriers, such as sexual harassment or the failure to understand women's family responsibilities, may hinder their career advancement. These barriers keep women engineers in marginalized positions.

American studies focusing specifically on engineering have shown that women engineers face significant penalties in earnings and in promotions to management. Earlier research attributes these penalties to glass ceilings within organizations (Tang, 1997). More recent research suggests that glass-ceiling effects may be cohort-specific. However, there is considerable debate over whether recent cohorts have managed to break through the glass ceiling or if other forms of discrimination besides the glass ceiling need to be considered (Alessio and Andrzejewski, 2000; Morgan, 1998, 2000; Prokos and Padavic, 2005). In the Canadian context, no equivalent empirical research exists to date. But a 1997 survey reports that women

professional engineers have slightly higher unemployment rates; they are more likely to be in part time work for those aged 32-46, and a higher percentage than men are employed in the service sector (CCPE, no date). A 2002 survey found that women professional engineers are not well represented in the management ranks in part because they are, on average, younger, and younger members of CCPE report less management experience. Women also earn less than men, even taking age and experience into account, and they are more likely than men to work on a temporary basis (Ekos Research Associates, 2003; Finnie, Lavoie and Rivard, 2001).

If, compared to their male counterparts, women engineers face barriers with respect to workplace training and mentoring, earn less and are less likely to be promoted to management, immigrant women may be even more at a disadvantage since they face re-accreditation requirements and must obtain host country experience. However, to date, few studies have scrutinized the intersection of gender and immigration with respect to engineers (but see: Goyette and Xie, 1999). In the analysis that follows, we show that both being foreign trained and being female are associated with negative labour market consequences for those whose major field of study was engineering. And the overall combined effect of being foreign trained and female means that immigrant women who received foreign training in engineering are more negatively affected than foreign-born men or Canadian-born men and women.

Data and Methods

Our data come from the full 2006 census database. The data are not publicly available, but are housed in the joint university-SSHRC-Statistics Canada funded Research Data Centres where they can be accessed only by qualified university researchers whose proposals have been adjudicated and approved by Statistics Canada and the Social Sciences and Humanities Research

Council. The RDC 2006 census database rests on the 2B census form which is answered by one in five households in Canada, and which collects extensive demographic and socio-economic information. Along with questions on educational achievements and other social characteristics, the 2B census questionnaire collects information on birthplace, immigration experience and numerous labour market indicators, including main occupation held over the past two years, and wage, salary, and self-employment income in the year preceding the census.

After answering questions on the levels of educational attainments, census respondents are asked, "What was the major field of study of the **highest** degree, certificate or diploma that this person completed?" Bold print appears on the questionnaire. As noted previously, this question on major field of study permits the identification of those with training in engineering fields. For the first time in 2006, respondents also are asked "In what province, territory or country did this person complete his / her **highest** degree, certificate or diploma?" This unique question is not asked in most destination country censuses; it permits distinguishing directly between those who received their final education outside Canada and those who were educated in Canadian institutions. Before 2006, researchers approximated place of education outside Canada by selecting those immigrants who studied engineering and who arrived in Canada after age 27 and assuming that this group received their highest degree outside Canada (Boyd, 2001; Boyd and Schellenberg, 2007, forthcoming; Boyd and Thomas, 2001, 2002).

The population under investigation consists of those who have bachelors degrees and higher and who also declare "engineering" as a major field of study. This selection exists because Canadian engineers now are trained in universities and receive university degrees. While older Canadians and immigrants who arrived in the immediate post-war period may lack university degrees in accordance with past methods of training, the current expectation is that all

new entrants into engineering will have university degrees as well as discipline-related instruction found in Canadian university-based schools of engineering. Using the criterion of holding bachelors' degrees or higher means that the occupational differences observed in this study are conservative estimates; greater differences might be found if the population under scrutiny included those who lacked a university degree but had post-secondary training in engineering.

The population of interest is age 30-54; the period between age 30 and 54 is the core of the productive life for most people, and they are typically well-launched in their careers. Moreover, by focusing on this age group, we remove variation associated with late school completion and selective early retirement. Among the foreign born population, we select only those who were legally admitted as permanent residents at age 25 or later. Because duration or length of time may influence the likelihood of working in engineering or related occupations, the analysis of the foreign born who studied engineering also looks at the labour market integration of immigrants classified by their duration in Canada (duration cannot be treated as a continuous variable because the Canadian born are included in the same statistical analysis and duration then becomes synomous with age).

As a result, the foreign born who are in Canada temporarily are excluded as are those who arrived in Canada as children, adolescents or young adults. Those who are in Canada temporarily are a diverse population, including temporary workers, students and refugee claimants whose cases have not yet been adjudicated. Date of arrival information is not collected for this population. Analyses not presented here confirm that the overwhelming majority of permanent residents who arrived before the age of twenty-five trained in Canada. Including them as part of the foreign born population of interest would both deflect attention away from the

situation of the majority of foreign born workers, who immigrate as adults, and it would affect estimates of the occupational locations and earnings of the foreign born as a group. However, some of the foreign born who immigrated to Canada at age 25 or later did obtain their highest degree in Canada. Some may have entered under student visas and changed their status later and some may have returned to school as part of their re-accreditation efforts. As a result, the adult immigrant population of interest is split into two groups: those who received their highest degrees outside Canada and those who received their highest degrees from a Canadian institution. Our study is unique in that it examines the situation for both the internationally educated and the Canadian educated immigrants who arrive as adults.

The foreign born who immigrated in 2005 and in 2006 are omitted from the analysis. The census asks respondents to report their income, including labour market earnings, in the year preceding the census. However, those arriving in 2005 have prorated earnings reported; for those arriving in 2006, 2005 earnings are coded as zero in the census. These exclusions remove the initial period of dislocation from our analysis since permanent residents have been in Canada for at least a year and a quarter by the time of the census, fielded in May 2006. Again, this approach represents a “conservative” test of the double jeopardy argument. If very recent arrivals were included, even more negative effects might be observed.

Numerical constraints prevent a multiple jeopardy approach to the intersection of gender, immigrant status, and race. There are too few native-born women of colour in the census database who studied engineering to permit nativity, race and gender-specific analyses. However, the visible minority variable which represents persons of colour is included as a “main effect” independent variable in our analysis. The term “visible minority” was developed by the federal government to meet data needs of federal employment equity legislation in the mid-1980s and

beyond. It includes ten subgroups: Black, South Asian, Chinese, Korean, Japanese, South East Asian, Filipino, Other Pacific Islanders, West Asian and Arab, and Latin American. People who declare they are members of the non-visible minority population are overwhelming "white," although the non-visible minority population also includes a very small number of aboriginals (less than 1 percent for our population of interest.

The full 2006 census database contains 520 occupational titles (NOCS 2006) that represent the occupational structure of the Canadian economy (Statistics Canada, 2007). Following previous research, these are collapsed into four occupational groupings: managerial, engineering, technical, and all others (Appendix A). This categorization captures the four types of outcomes for engineers observed in other studies (Fernandez, 1998; Lim, Waldinger, and Bozorgmehr, 1998; Tang, 1993a, 1993b, 1995, 1997). For some, engineering occupations lead to managerial occupations. Others find a glass ceiling between engineering and managerial jobs. Still others will find employment in occupations that removed from engineering *per se* but which are of a technical nature that may require or utilize engineering knowledge and applications. And some will find no employment at all in engineering-related occupations.

In this study, gender-nativity variations in two indicators of labour market integration are analysed: 1) occupational location for those working in 2005 and/or 2006 (the experienced labour force), including work in engineering occupations; and 2) annual earnings in 2005 for those with one or more weeks of employment in that year. Descriptive data on other indicators of labour market insertion also are presented for informational purposes. However, given the focus on the interactive effects of re-accreditation and gender barriers, we do not study unemployment or labour force participation outcomes. Gender roles, particularly family responsibilities frequently assumed by women may well cause immigrant women, particularly

recent arrivals, to remain outside the labour market or to experience high unemployment rates. But, the role of accreditation barriers in producing these patterns remains more ambiguous; we suggest that the double impact of gender *and* accreditation barriers are most evident for those who are in the labour force.

The analyses of occupational location and earnings use a number of different analytical techniques. We employ descriptive statistics and multinomial regression to model occupational location, and ordinary least squares regression to predict annual earnings expressed in actual dollar amounts (Hodson, 1985). Multinomial regression logits are converted into probabilities for ease of interpretation (Liao, 1994); similarly dummy variable regression coefficients are transformed to produce multiple classification results (Andrews, Morgan, and Sonquest, 1967). A down weighting protocol is used in which the sampling design for generating population estimates is preserved, but where the statistical tests of significance are based on the actual number of cases that exist for the population under investigation (the 2B questionnaire database is taken from a one in five sample of the entire Canadian population).

Our multivariate analyses adjust for the effects of age, place of residence, visible minority status, language spoken at home, and school attendance in the preceding year. These variables can influence the labour market experiences of those who studied engineering. Age is associated with increased labour market experience and it is expected to increase the likelihood of working in an engineering occupation or earning higher wages. Place of residence captures the effects of local labour markets; large cities, represented in our study by residency in census metropolitan areas (CMAs), have more extensive knowledge based economies than smaller towns, and employment demand may be better for residents of these large cities. Studies show that visible minorities or persons of colour fare poorly in the Canadian labour force, and some

suggest discrimination as a factor (Boyd and Yiu, 2009; Li, 2000; Pendakur and Pendakur, 1998, 2002; Swidinsky and Swidinsky, 2002). Language spoken at home consists of those who speak only one or both of Canada's charter languages, English and French, or those who speak other languages; unlike the United States or Australia, the Canadian census questions do not break down home language use into levels of proficiency. The ability to effectively use English or French is a form of human capital, enlarging employment opportunities; it also is a requirement for engineering re-certification in Canada. Finally, individuals who attend school may not be full participants in the labour force or holding jobs commensurate with their training; the census asks respondents if they attended a school, college, or university during the nine months preceding the census.

A First Look

Table 1 shows differences by nativity, gender and place of highest degree in the population of interest. Compared to the Canadian born and to those who are foreign born but educated in Canada, immigrants who are internationally educated are older, more likely to reside in Toronto and Vancouver, more likely to speak languages other than English and/or French at home, more likely to have fewer years spent in Canada (duration), higher rates of being unemployed or not in the labour force, more likely to be employed in occupations not related to engineering, and to have lower 2005 earnings. Immigrants who received their highest degrees in Canada are the most likely to be persons of colour (visible minorities), to have masters or doctorate degrees and to be attending school in the nine months preceding the census. This pattern of higher school attendance may reflect the need for re-accreditation or the acquisition of another field of expertise. In general, the higher school attendance is consistent with the higher

percentages of immigrants (both Canadian and internationally educated) compared to the Canadian-born who are not in the labour force.

Table 1 here

With labour force characteristics, gender differences and their interaction with immigrant status and place of education become more evident. Compared to men who studied engineering, lower percentages of women are in the labour force. They also are less likely than men to have employment in managerial or engineering occupations, and more likely to work in occupations not directly related to engineering. Women earn less with respect to annual wage, self-employment earnings, and weekly earnings. Being foreign-born (and foreign-trained) exacerbates these gender differences. Of the internationally educated immigrant women whose major field of study was engineering, nearly 1 out of 5 are not in Canada's labour force and six out of ten are in occupations not directly related to engineering. Finally, these women have the lowest earnings of all groups.

Many aspects of the univariate profile found in Table 1 for Canadian and foreign-born women and men are interrelated. For example, persons who attend school presumably have time constraints that affect the type of employment and occupation held. Recent arrivals may not be fluent in English and French, and/or they may be attending school: both characteristics may affect employment and earnings. Given these intercorrelations, and others noted in the data and methods section, we undertake multivariate analyses that control for compositional differences among the groups with respect to variables that affect labour market participation, occupations held, and earnings. A central question is whether the pattern of a double negative simply reflects compositional differences among the groups defined by gender and immigrant status or whether it persists despite taking characteristics into account (see Table 1).

Gender, Training, and Occupational Location

Are foreign-trained and/or women engineers as likely as Canadian-born men to work in engineering and managerial occupations? Or do different occupational patterns exist among different groups, to the detriment of the foreign born, and in particular to the disadvantage of foreign born women? Data from Table 1 indicate an affirmative answer to the latter question. However, in order to adjust for differences among groups in age, place of residence, visible minority status, highest level of educational attainment, school attainment and language used in the home, multinomial analysis is performed. This technique produces (logged) likelihoods of employment in management, technical, and other occupations relative to employment in engineering occupations for women and men, each divided into three groups: the foreign born whose highest degree is received outside Canada, the foreign born whose highest degree is received inside Canada; and the Canadian born whose highest degree is received inside Canada. (The small fraction of the Canadian-born who received their highest degree outside Canada is omitted from the analysis).

Table 2 presents the logits associated with the multinomial analysis for the most aggregated groups that have university degrees and studied engineering– the foreign born whose highest degrees were received outside or inside Canada and the Canadian born who received degrees in Canada. Table 3 presents the logits for these groups differentiated by years in Canada for the foreign born.

Tables 2 and 3 here

Because the verbal interpretations of multinomial logits are cumbersome, all results are transformed into probabilities, expressed as “chances out of 100.” Table 4 displays the

hypothetical chances out of 100 of employment in managerial, engineering, technical, and other occupations for different groups by gender and nativity, using the logits found in Table 2. Table 5 indicates the chances by the number of years since arriving in Canada, using the logits displayed in Table 3. These results assume that all groups have the average age of the total population under investigation (slightly over age 40) and that they have the same distributions for the total population with respect to other variables that influence the occupational sites of employment. The patterns of probabilities, or chances out of 100, produce four main conclusions.

Tables 4 and 5 here

First, the patterns of probabilities, or chances out of 100, confirm the advantages of receiving a degree from Canada for those who studied engineering. For those who immigrated at age 25 or later, exiting from a Canadian school confers higher chances of employment in managerial or engineering occupations than is true for those who studied outside Canada. This finding may reflect the nature of engineering as self-regulated profession: possibly, foreign-trained engineers enter engineering occupations once they overcome accreditation barriers and a lack of Canadian experience to meet the engineering associations' requirements for the professional license. That said, the chances of working in management or engineering occupations still remain lower than those of the Canadian born who received their last degrees in Canada.

Second, a persistent gender gap exists with respect to the chances of employment in areas that are related, or unrelated, to the field of engineering. The probabilities of employment in managerial or engineering occupations are consistently lower for women than men, regardless of whether or not they are Canadian born and trained, foreign born but last studied engineering in

Canada, or foreign trained. Further, foreign-born women who receive their highest degrees in engineering from schools outside Canada have substantially lower chances of being in managerial and engineering occupations and high chances of employment in technical and all other occupations (Table 4, panels 1 and 2) than all other groups. Foreign-born women who were employed in 2005 and/or 2006 are more likely to engage in occupations that bear little or no correspondence to engineering training, even when they are compared with Canadian-born women and foreign-born men. The probabilities of employment in "other occupations" unrelated to engineering training are over twice as high for immigrant women who were educated outside Canada compared to Canadian born and Canadian trained men. In short, immigrant women with foreign training are the most disadvantaged of all groups, confirming support for the doubly disadvantaged model.

Third, when duration in Canada is taken into account for the foreign-born, immigrant women and men improve their chances of being in managerial and engineering occupations with longer residence in Canada (Table 5). Again, those who are educated outside of Canada have lower probabilities of employment in these occupations than those immigrants who studied engineering in Canada; chances for the Canadian born and educated remain the highest of all groups. Admittedly, the duration patterns may be capturing not only time spent in Canada but also entry cohort differences in variables not included in our analysis, such as class of entry or coming from countries whose educational credentials were more readily accepted. The census does not collect data by class of admission, and the reliability of accurately recalling such information remains untested in any case. The small number of foreign trained women also prevents building duration by country of education interactions to directly test the implications of shifts in source countries.

The fourth and final conclusion is that foreign-born women face substantial gaps in occupational locations in contrast to Canadian-born men and women, even after 15 or more years in Canada. Foreign-born women who studied engineering outside of Canada have much lower chances of being in managerial and engineering occupations and higher chances of employment in technical and all other occupations than Canadian-born women and immigrant women who studied in Canada (Table 5). If they had the same set of characteristics as all other groups, only one fourth of foreign-born and internationally educated women with 15 or more years duration in Canada would be employed in managerial or engineering occupations. Over half (54 percent) would still be employed in other occupations unrelated to the fields of engineering (Table 5, column 6). Clearly, being foreign-trained and female puts foreign-born women in a profoundly marginal position in terms of occupation location.

Gender, Site of Educational Training and Earnings

Immigrant women receive the lowest earnings of all groups (Table 1). To a certain extent, this reflects the compositional differences among groups with respect to age, visible minority status, home language, school attendance, place of residence, and education, but it also reflects the impacts of occupations held by groups, since earnings vary by type of occupation held.

Tables 6 and 7 present the results of OLS regressions for women and men by nativity and site of last degree, with the reference group selected as those Canadian born males who received their highest degrees from a Canadian institution. In order to calculate the cumulative impacts of group compositional differences in demographic, educational, and occupational distributions, earnings are coded in dollar amounts rather than being transformed into logged (ln) metric (also see Hodson, 1985). Further, because of the interest in assessing the

effects of differential access to engineering occupations, our earnings determination model does not include variables such as full or part time work or weeks worked. Although economists frequently argue that occupations are exogenous to their theoretical modeling of earnings as productivity functions, occupations heavily influence whether or not work is full or part-time, and full year or not. In our analysis, including variables such as full or part-time work or weeks worked thus would mask the direct effect of occupational location on the earnings of those who studied engineering (Alwin and Hauser, 1975).

Tables 6 and 7 here

Tables 8 and 9 transform the regression estimates in Tables 6 and 7 into the actual (baseline) and adjusted earnings of foreign born and Canadian born women and men (Andrews, Morgan and Sonquist, 1967). For those who are university-educated and who studied engineering, earnings are highest for the Canadian-born who are educated in Canada, followed by the foreign born who arrived at age 20 or later and who received their highest degree in Canada. Within the Canadian-born and immigrant populations, men earn more than women (Table 8, column 1), with internationally educated foreign born women having the lowest earnings of all groups. The average annual salary of these women is one half that of Canadian born and educated women and one third that of Canadian born and educated men.

Columns 2 and 3 present the average annual earnings that would be observed if all groups had the same distributions for age, visible minority status, CMA residence, language spoken at home, highest level of schooling and school attendance (column 2) and occupational location (column 3). The differences between column 1 and 3 (Table 8, column 4) indicate the overall effect of the group specific characteristics have on that group's annual earnings. Using a

technique found elsewhere (Boyd, 1984; Duncan, Featherman and Duncan, 1972: 233-234), this total difference is then decomposed into two parts: the first (column 5) shows the contribution of group-specific demographic and social characteristics to that group's earnings while the second (column 6) indicates the contribution that the group-specific occupational location makes to their average earnings.

When distributional differences in characteristics that influence earnings are taken into account, wage gaps narrow between groups. For example, if all groups had the same distributions with respect to socio-demographic variables, the average earnings of foreign-born and Canadian-born women who are educated in Canada would be $57,260 and $64,440, respectively compared to 43,280 for foreign born women who are internationally educated (Table 8, column 2) instead of the actual observed earnings of $48,140, $71,590 and $35,270. If all groups were to have the same distributions with respect to socio-demographic variables and occupational location, earnings for foreign-born women would rise to $49,320 (Table 8, column 3). However, foreign-born women would still have the lowest earnings of all groups, even if they and Canadian-born men and women or foreign-born men had the same characteristics (Table 8).

Tables 8 and 9 here

The decomposition found in Table 8 (columns 4 – 6) show the impact of specific variables on the earnings of foreign born and Canadian born women and men. Because of their demographic, social and occupational characteristics in relation to those of the overall population, internationally educated immigrant women and men lose, on average, $8,010 and $6,410 in annual wage and self-employment earnings, while Canadian-born and educated men gain approximately $9,260 dollars annually (Table 8, column 5). These characteristics, which include

the depressive impacts of non-English/non-French home language and current school attendance for immigrants account for a major share of the earnings gaps between Canadian-born and educated engineering majors and immigrants, including the internationally educated as well as those whose highest degrees were obtained in Canada. Differences in occupational location also matter, even after taking socio-economic differences into account (Table 8, column 6). The unfavourable occupational distribution of internationally educated immigrant women and men (compared to that of the total population of engineering majors) means a loss approximately $6,000 and $2,100 respectively (Table 8, column 6). Thus, the fact that the internationally educated are not as likely to be in management or in engineering occupations and more likely to be in occupations unrelated to their engineering majors compared to their Canadian born and educated counterparts negatively affects earnings.

Taking duration into account only slightly changes the basic conclusion. For both immigrant women and immigrant men, wages are lowest for those in Canada 2-5 years (Table 9, column 1). Among these most recent arrivals, foreign born internationally educated women have the lowest earnings of all, under $25,000. Earnings increase with additional years of duration, although they remain below levels noted for the Canadian born who are Canadian educated. In general, immigrants whose highest degree was obtained in Canada earn more than those who studied outside Canada. However, absolute earnings differences are extremely small between recently arrived immigrant men educated inside and outside Canada (Table 9, column 9). These men arrived between 1995 and 2004 and it is likely that their 2005 salaries were influenced by the information technology meltdown that occurred after 2000. Picot and Hou (2009) note that the fall in immigrant entry earnings during the early 2000s was concentrated among entering immigrants to Canada who intended to practice the IT or engineering occupations. However their

entry coincided with the IT downturn; immigrant men were especially affected by the resultant deterioration in employment and in earnings.

If compositional differences between groups are taken into account, gender-specific differences within the foreign-born population are diminished (Table 9, column 2). Further, the overall penalty for age, visible minority, home language, school attendance, and city locational characteristics is the highest for the most recently arrived female and male immigrants, diminishing for groups with a longer period of residence in Canada (Table 9, column 5). However, the effects of occupational location, net of demographic, social and educational factors still are the highest for internationally trained immigrant women, regardless of length of stay in Canada. For example, internationally educated immigrant women who have bachelors' degrees or higher with engineering as the major field of study, and who have been in Canada only for 2-4 years lose an average of nearly $7,500 in annual earnings because of their more unfavourable occupational profile relative to the one for the entire population under study (Table 9, column 6). Dollar amounts for other groups are much less. This pattern persists for other periods of duration in Canada.

Conclusion

Our findings with respect to the underemployment, occupational locations, and earnings of persons aged 30-54 with at least a university bachelors degrees and engineering as a major field of study are consistent point to the existence of barriers to engineering employment for the foreign-trained and the operation of a "doubly disadvantaged" motif. Women and those who are foreign-born and internationally educated do less well than Canadian-born men with respect to occupational location and earnings. The impact of being female *and* foreign trained means that

immigrant women are the most likely to be in occupations not related to engineering as a field of study, and to earn less than other groups. These patterns persist after taking into account group differences in age, place of residence, level of education, school attendance, visible minority status, and home language.

These findings have implications for recent initiatives to address barriers to integration in the workplace. In December 2002, the federal government announced funding for the umbrella organization, the Canadian Council of Professional Engineers, to implement a project called *From Consideration to Integration*. This project subsequently provided an overview of the Canadian immigration process, provincial and territorial engineering licensing procedures, and approaches to assess the credentials of internationally-trained engineers (HRSDC, 2002, 2005a). Some recommendations for additional projects were subsequently implemented, particularly with respect to the establishment of language standards required for internationally-trained engineers.

On April 25, 2006, the federal government launched the Internationally Trained Workers Initiative. Contained within this broad policy initiative is the Foreign Credential Recognition program with $68 million in funds to enable stakeholder organizations, such as professional bodies, to implement projects that will facilitate the assessment and recognition of qualifications obtained outside Canada. Within this FCR program, $1.8 million was targeted specifically for new projects by the Canadian Council of Professional Engineers (CCPE), the Canadian Foundation for Economic Education, the Association of Canadian Community Colleges, and the Canadian Tourism Human Resource Council. According the Honourable Lucienne Robillard, Minister of Human Resources and Human Development, the intent of the projects was to “help ensure that internationally trained engineers and workers in non-regulated occupations can better integrate and make full use of their skills”(HRSDC, 2005b; also see HRSDC, 2007).

Within the $1.8 million dollar budget were two projects directly targeted at foreign-trained engineers.[1] The first, with a budget of $181,525, was for CCPE (now renamed as Engineers Canada) to conduct research to develop a database of foreign institutions offering degrees in engineering. This funded research was followed by the second phase in Summer 2006. In the second phase, the CCPE was to develop the International Institution and Degree Database (IIDD) that is accessible to engineering licensing bodies to verify the education of licensing applicants (CCPE, 2006a, 2006b). The second project, with funding of $468,057, enabled the Canadian Foundation for Economic Education (CFEE) to "help Canada's engineering regulated profession reach newcomer with relevant information related to credential assessment and recognition in Canada; to help newcomer obtain credential assessment recognition and required upgrading to work in the engineering field in Canada; and to help employers verify and assess the credentials of newcomer to Canada and assist in the integration of newcomers into Canada's workforce" (HRSDC, 2005b)

Based on its 2006 election campaign promise, the new federal Conservative government subsequently announced the establishment of a federal agency for the assessment of foreign credentials. Announced on May 24, 2007, a Foreign Credentials Referral Office (FCRO) was established with a budget of 32 millions dollars; its purpose is to help internationally trained individuals who plan to work in Canada get their credentials assessed and recognized more quickly (see: www.credentials.gc.ca). The federal government also announced providing $5 million to top up the existing Foreign Credential Recognition (FCR) Program, bringing its total funding to $73 million. This program, which falls under Human Resources and Social

[1] There is some ambiguity in the reports of specific projects and the amount of funding. In a webpage on achievements, the Canadian federal government announced a total of $810,414 awarded to the Canadian Council of Professional Engineers for Phase II of the From Consideration to Integration project with some $268,000 having already been allocated to Phase I discussed in the text. The total sum of the 4 national projects described in this web-page exceed the allotted $1.8 million (see: HRSDC, 2005a).

Development, works to strengthen foreign credentials assessment and recognition processes in Canada, usually by funding small pilot projects.

Policy initiatives regarding the economic integration of foreign-trained engineers have also occurred at the provincial level. In 2006, the Ontario government announced a $14 million investment in 24 new bridge training programs for skilled new immigrants intending to practice professions and trades in the province (Ministry of Citizenship and Immigration, 2006). For the engineering profession, $500,000 was allocated to the Accessible Community Counselling and Employment Services for New Canadians (ACCES) in Toronto and the Greater Toronto Area to support 150 foreign-trained engineers find employment in engineering. As well, universities are offering bridging programs, such as the Internationally Educated Engineers Qualification (IEEQ) Program at the University of Manitoba and the Internationally Educated Engineers Qualification Bridging (IEEQB) offered at Ryerson University in the Ontario province (see: /www.feas.ryerson.ca/styles/1/ieeqb_program/index.html). Although bridging programs are considered fairly effective in helping immigrants to access professions, these programs are relatively small in the number of slots available to foreign-trained professionals and limited to particular regions (Alboim et al., 2005).

Such initiatives signal the growing awareness of the barriers to accreditation for foreign-trained professionals in Canada. Unfortunately, the official and often brief descriptions of these initiatives contain no acknowledgement of the specific difficulties faced by immigrant women. Such gender neutrality carries the potential to perpetuate unequal outcomes, since practices which surround program delivery may unwittingly have differential impacts for women than for men. In the federal policy arena during the early 2000s, Gender Based Analysis was identified as a tool that reveals how public policies differentially affect men and women; it is supported by

the production of gender-disaggregated data, gender-sensitive indicators and guidelines, and criteria for assessing when gender is likely to be an issue in the development of policies (Status of Women, 1995).

However, relying on government initiative to alleviate the "doubly disadvantaged status of internationally trained foreign born women currently faces two difficulties. First, the federal government has undertaken a number of steps to signal that it is no longer in the business of supporting proactive work to remove gender inequality. In 2006 the government, headed by Prime Minister Harper announced a $5 million dollar cut to the Status of Women Canada's budget (total budget $23 million), removed the term 'gender equality' from its mandate and closed 12 out of the 16 regional offices (Status of Women Canada (SWC) is a federal government organization with its own minister). More recently, all commissioned reports have disappeared from its web site, including those that are about migrant women. In 2008, Citizenship and Immigration Canada, which is the department that is responsible for immigration policy and migrant integration policies, disbanded its Gender Based Analysis group.

Second, government efforts in the area of re-accreditation are more correctly labelled as out-reach initiatives with the private sector, and the initiatives do not represent the usual type of federal public policies where mandated gender-based analysis occurs, such as unemployment insurance, pensions, or immigration policies. Even so, our results in which immigrant women who studied engineering are the most disadvantaged among all groups seeking engineering occupations with respect to a number of labour market indicators, suggest that the gender optic will be a useful, even essential, component when assessing the new programs targeted at immigrants, engineers and other professionals alike.

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Table 1: Characteristics of Canadian Born and Foreign Born Women and Men, Age 30-54 with University Bachelors or Higher Degrees, Engineering as the Major Field of Study, Canada, 2006

		Women			Men		
	Total	Foreign born Trained Abroad	Foreign born, Trained in Canada	CB Trained in Canada	Foreign born Trained Abroad	Foreign born, Trained in Canada	CB Trained in Canada
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Population Estimates[a]	267,265	31,695	3,025	13,885	105,055	15,205	98,405
Age	100	100	100	100	100	100	100
30-39	41	46	54	61	36	42	41
40-49	44	44	41	33	48	43	43
50-54	15	10	5[b]	6	16	15	16
Mean Age	41	41	39	38	42	41	41
City of Residence	100	100	100	100	100	100	100
Montreal	15	13	22	22	12	20	18
Toronto	31	45	25	13	46	29	13
Vancouver	10	15	9	5	15	9	5
Other CMAs	34	24	40	45	24	38	45
Non-CMAs	10	3	4	15	3	4	19
Visible Minority Status	100	100	100	100	100	100	100
Visible minority	41	58	75	8	67	82	5
Not visible minority	59	42	25	92	33	18	95
Language Spoken at Home	100	100	100	100	100	100	100
Non-English/French language	44	80	60	1	77	62	1
English/French	56	20	40	99	23	38	99
Duration in Canada, for Foreign Born	(na)	100	100	(na)	100	100	(na)
2-4 years	(na)	32	14	(na)	30	14	(na)
5-9 years	(na)	43	45	(na)	42	36	(na)
10-14	(na)	17	22	(na)	17	22	(na)
15+ years	(na)	8	19	(na)	11	28	(na)
Mean Years in Canada	(na)	7	9	(na)	8	11	(na)
Highest Degree	100	100	100	100	100	100	100
BA only	66	60	26	73	60	33	77
Univ cert or diploma above Bachelor	9	13	5	6	12	6	6
Masters degree(s)	21	24	55	18	23	45	14
Earned doctorate degree	4	3	14	3	5	16	3
Mean Total Years in University	18	18	19	18	18	19	17
School Attendance since Sept 2005	100	100	100	100	100	100	100
Attended	13	21	24	10	15	24	7
Did not attend	87	79	76	90	85	76	93
Labour Force/Employment Status, 2005	100	100	100	100	100	100	100
Employed	88	75	81	87	87	87	94
Unemployed	4	7	6[b]	3	5	6	2
Not in LF	8	18	13	10	8	7	4
Main Occupation, 2005 and/or 2006	100	100	100	100	100	100	100
Management	16	7	7	17	12	12	24
Engineering	29	12	29	39	20	35	42
Technical	18	21	21	11	22	18	12
All others	37	60	43	33	46	35	22
Mean Total Annual Earnings[c]	$ 71,298	$ 35,273	$ 48,138	$ 71,588	$ 50,545	$ 62,830	$ 103,074
Mean Total Weekly Earnings[c]	$ 1,522	$ 838	$ 1,126	$ 1,652	$ 1,122	$ 1,362	$ 2,113

(a) Rounded to the nearest 5.
(b) Calculated using weighted rounded frequencies (rounded to the nearest 5).
(c) Positive self-employment and wage earnings for those working one week or more in 2005.
(na) Not applicable
Source: Statistics Canada, 2006 Census of Population

Table 2: Multinomial Logit Estimates of Employment in Managerial, Technical, and All Other Occupations Versus Engineering Occupations for Persons Age 30-54 with Bachelors and Higher Degrees in Engineering by Sex, Nativity, and Location of Training, Canada, 2006

	Model 1			Model 2		
	Manager vs Engineer	Technical vs Engineer	All Other Occ vs Engineer	Manager vs Engineer	Technical vs Engineer	All Other Occ vs Engineer
	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables	logits	logits	logits	logits	logits	logits
Groups						
Foreign Born Women, Trained Abroad	-0.058 (ns)	1.757 ***	2.249 ***	-0.021 (ns)	1.306 ***	1.741 ***
Foreign Born Women, Trained in Canada	-0.849 ***	0.920 ***	1.096 ***	-0.570 **	0.608 ***	0.791 ***
Canadian Born Women, Trained in Canada	-0.315 ***	-0.079 (ns)	0.510 ***	-0.185 **	-0.214 **	0.558 ***
Foreign Born Men, Trained Abroad	0.047 (ns)	1.367 ***	1.539 ***	0.052 (ns)	0.951 ***	0.995 ***
Foreign Born Men, Trained in Canada	-0.531 ***	0.567 ***	0.700 ***	-0.349 ***	0.284 ***	0.277 ***
Canadian Born Men, Trained in Canada	(rg)	(rg)	(rg)	(rg)	(rg)	(rg)
Age				0.035 ***	-0.038 ***	0.018 ***
City of Residence						
Montreal				-0.279 ***	-0.307 ***	-0.177 ***
Toronto				(rg)	(rg)	(rg)
Vancouver				-0.007 (ns)	-0.189 ***	-0.108 *
Other CMAs				-0.457 ***	-0.445 ***	-0.477 ***
Non-CMAs				-0.340 ***	-0.844 ***	-0.098 *
Visible Minority Status						
Visible minority				-0.116 **	0.076 *	0.363 ***
Not visible minority				(rg)	(rg)	(rg)
Highest Level of Education						
Bachelor's only				(rg)	(rg)	(rg)
University certificate or diploma above Bachelor				0.145 **	0.136 **	0.176 ***
Masters, doctorate degree				-0.209 ***	-0.138 ***	-0.335 ***
School Attendance since September 2005						
Attended				-0.040 (ns)	0.012 (ns)	0.649 ***
Did not attend				(rg)	(rg)	(rg)
Language Spoken at Home						
Non-English/French language				-0.151 **	0.300 ***	0.270 ***
English/French				(rg)	(rg)	(rg)
Constant	-0.553 ***	-1.217 ***	-0.675 ***	-1.647 ***	0.736 ***	-1.168 ***
Cox and Snell	0.131			0.176		
Nagelkerke	0.141			0.189		
McFadden	0.053			0.073		

(ns) Not significant at p=0.05 level *p<0.05, **<0.01, ***<0.001
(rg) Reference group.
Source: Statistics Canada, 2006 Census of Population Masterfile

Table 3: Multinomial Logit Estimates of Employment in Managerial, Technical, and All Other Occupations Versus Engineering Occupations for Persons Age 30-54 with Bachelors and Higher Degrees in Engineering by Sex,Nativity, Location of Training, and Duration in Canada, Canada, 2006

	Model 1			Model 2		
	Manager vs Engineer	Technical vs Engineer	All Other Occ vs Engineer	Manager vs Engineer	Technical vs Engineer	All Other Occ vs Engineer
	(1) logits	(2) logits	(3) logits	(4) logits	(5) logits	(6) logits
Groups						
Foreign Born Women, Trained Abroad, in Can 2-4 yrs	-0.110 (ns)	1.761 ***	2.619 ***	0.026 (ns)	1.168 ***	2.137 ***
Foreign Born Women, Trained Abroad, in Can 5-9 yrs	-0.298 **	1.745 ***	2.167 ***	-0.270 *	1.241 ***	1.689 ***
Foreign Born Women, Trained Abroad, in Can 10-14 yrs	0.278 *	1.913 ***	1.944 ***	0.161 (ns)	1.627 ***	1.512 ***
Foreign Born Women, Trained Abroad, in Can 15+ yrs	0.267 (ns)	1.359 ***	2.118 ***	0.060 (ns)	1.295 ***	1.658 ***
Foreign Born Women, Trained in Canada, in Can 2-4 yrs	-0.891 (ns)	0.764 *	1.163 ***	-0.435 (ns)	0.223 (ns)	0.908 **
Foreign Born Women, Trained in Canada, in Can 5-9 yrs	-1.239 ***	1.108 ***	1.217 ***	-0.905 **	0.677 ***	0.986 ***
Foreign Born Women, Trained in Canada, in Can 10-14 yrs	-0.581 (ns)	0.898 ***	0.911 ***	-0.389 (ns)	0.742 **	0.752 **
Foreign Born Women, Trained in Canada, in Can 15+ yrs	-0.535 (ns)	0.547 (ns)	0.954 ***	-0.550 (ns)	0.475 (ns)	0.595 *
Canadian Born Women, Trained in Canada	-0.315 ***	-0.079 (ns)	0.510 ***	-0.194 **	-0.226 **	0.588 ***
Foreign Born Men, Trained Abroad, in Can 2-4 yrs	-0.142 *	1.453 ***	1.875 ***	-0.040 (ns)	0.900 ***	1.376 ***
Foreign Born Men, Trained Abroad, in Can 5-9 yrs	-0.055 (ns)	1.454 ***	1.459 ***	-0.051 (ns)	0.983 ***	0.936 ***
Foreign Born Men, Trained Abroad, in Can 10-14 yrs	0.171 **	1.282 ***	1.217 ***	0.030 (ns)	1.013 ***	0.716 ***
Foreign Born Men, Trained Abroad, in Can 15+ yrs	0.460 ***	0.865 ***	1.434 ***	0.214 **	0.830 ***	0.909 ***
Foreign Born Men, Trained in Canada, in Can 2-4 yrs	-0.775 ***	0.515 ***	0.798 ***	-0.343 (ns)	0.006 (ns)	0.489 ***
Foreign Born Men, Trained in Canada, in Can 5-9 yrs	-1.136 ***	0.639 ***	0.800 ***	-0.821 ***	0.209 *	0.467 ***
Foreign Born Men, Trained in Canada, in Can 10-14 yrs	-0.320 **	0.547 ***	0.590 ***	-0.214 (ns)	0.285 *	0.231 *
Foreign Born Men, Trained in Canada, in Can 15+ yrs	-0.133 (ns)	0.509 ***	0.599 ***	-0.232 *	0.520 ***	0.126 (ns)
Canadian Born Men, Trained in Canada	(rg)	(rg)	(rg)	(rg)	(rg)	(rg)
Age				0.032 ***	-0.041 ***	0.025 ***
City of Residence						
Montreal				-0.277 ***	-0.292 ***	-0.206 ***
Toronto				(rg)	(rg)	(rg)
Vancouver				-0.007 (ns)	-0.186 ***	-0.108 *
Other CMAs				-0.454 ***	-0.439 ***	-0.494 ***
Non-CMAs				-0.335 ***	-0.834 ***	-0.123 **
Visible Minority Status						
Visible minority				-0.095 *	0.086 *	0.333 ***
Not visible minority				(rg)	(rg)	(rg)
Highest Level of Education						
Bachelor's only				(rg)	(rg)	(rg)
University certificate or diploma above Bachelor				0.147 **	0.131 *	0.190 ***
Masters, doctorate degree				-0.205 ***	-0.135 ***	-0.334 ***
School Attendance since September 2005						
Attended				-0.026 (ns)	0.040 (ns)	0.598 ***
Did not attend				(rg)	(rg)	(rg)
Language Spoken at Home						
Non-English/French language				-0.113 *	0.305 ***	0.237 ***
English/French				(rg)	(rg)	(rg)
Constant	-0.553 ***	-1.217 ***	-0.675 ***	-1.545 ***	0.855 ***	-1.467 ***
Cox and Snell	0.143			0.184		
Nagelkerke	0.154			0.198		
McFadden	0.058			0.076		

(ns) Not significant at p=0.05 level *p<0.05, **<0.01, ***<0.001
(rg) Reference group.
Source: Statistics Canada, 2006 Census of Population Masterfile

Table 4: Chances out of 100 of Employment in Managerial, Engineering, Technical and Other Occupations for Population Age 30-54 with Engineering Fields of Study by Sex, Nativity, and Location of Training, Canada, 2006

Groups	Total (1)	Managers (2)	Engineers (3)	Technical (4)	All Others (5)
Canadian Born and Foreign Born					
Baseline[a]					
Foreign Born Women, Trained Abroad	100.0	6.7	12.4	21.2	59.7
Foreign Born Women, Trained in Canada	100.0	7.0	28.5	21.1	43.4
Canadian Born Women, Trained in Canada	100.0	16.5	39.3	10.8	33.4
Foreign Born Men, Trained Abroad	100.0	11.7	19.5	22.6	46.2
Foreign Born Men, Trained in Canada	100.0	11.7	34.7	18.1	35.5
Canadian Born Men, Trained in Canada	100.0	24.2	42.0	12.4	21.4
Adjusted[b]					
Foreign Born Women, Trained Abroad	100.0	7.9	14.6	19.7	57.8
Foreign Born Women, Trained in Canada	100.0	8.9	28.4	19.1	43.6
Canadian Born Women, Trained in Canada	100.0	15.6	33.6	9.9	40.9
Foreign Born Men, Trained Abroad	100.0	13.3	22.6	21.5	42.6
Foreign Born Men, Trained in Canada	100.0	14.0	35.7	17.4	32.8
Canadian Born Men, Trained in Canada	100.0	21.3	38.2	14.0	26.6

[a] Calculation based on logits in Model 1 in Table 2

[b] Calculation based on logits in Model 2 in Table 2 (adjusted for age, city of residence, visible minority status, education, school attendance, and home language)

Source: Statistics Canada, 2006 Census of Population Masterfile

Table 5: Chances out of 100 of Employment in Managerial, Engineering, Technical and Other Occupations for Population Age 30-54 with Engineering Fields of Study by Sex Nativity, Location of Training, and Duration in Canada, Canada, 2006

	Baseline[a]					Adjusted[b]				
Groups	Total (1)	Managers (2)	Engineers (3)	Technical (4)	All Others (5)	Total (6)	Managers (7)	Engineers (8)	Technical (9)	All Others (10)
Women										
Foreign Born Women, Trained Abroad, in Can 2-4 yrs	100	5.0	9.8	16.9	68.3	100	6.9	12.0	14.2	66.9
Foreign Born Women, Trained Abroad, in Can 5-9 yrs	100	5.6	13.2	22.4	58.7	100	6.8	15.9	20.4	56.9
Foreign Born Women, Trained Abroad, in Can 10-14 yrs	100	10.4	13.7	27.4	48.6	100	10.1	15.3	28.8	45.8
Foreign Born Women, Trained Abroad, in Can 15+ yrs	100	10.5	14.0	16.1	59.3	100	9.3	15.6	21.1	54.1
Foreign Born Women, Trained in Canada, in Can 2-4 yrs	100	6.7	28.6	18.2	46.5	100	10.5	28.9	13.4	47.3
Foreign Born Women, Trained in Canada, in Can 5-9 yrs	100	4.4	26.4	23.7	45.5	100	6.1	26.8	19.5	47.5
Foreign Born Women, Trained in Canada, in Can 10-14 yrs	100	9.7	30.2	21.9	38.2	100	10.7	28.1	21.8	39.4
Foreign Born Women, Trained in Canada, in Can 15+ yrs	100	10.6	31.5	16.1	41.7	100	10.4	32.1	19.1	38.4
Canadian Born Women, Trained in Canada	100	16.5	39.3	10.8	33.4	100	15.7	33.9	10.0	40.4
Men										
Foreign Born Men, Trained Abroad, in Can 2-4 yrs	100	8.2	16.4	20.8	54.6	100	10.6	19.7	18.0	51.6
Foreign Born Men, Trained Abroad, in Can 5-9 yrs	100	10.9	20.0	25.3	43.8	100	12.7	23.8	23.5	40.0
Foreign Born Men, Trained Abroad, in Can 10-14 yrs	100	15.3	22.4	23.9	38.5	100	14.6	25.3	25.8	34.2
Foreign Born Men, Trained Abroad, in Can 15+ yrs	100	19.2	21.0	14.8	45.0	100	16.6	23.9	20.3	39.2
Foreign Born Men, Trained in Canada, in Can 2-4 yrs	100	9.2	34.6	17.1	39.1	100	14.0	35.1	13.1	37.8
Foreign Born Men, Trained in Canada, in Can 5-9 yrs	100	6.4	34.7	19.5	39.4	100	9.0	36.3	16.5	38.2
Foreign Born Men, Trained in Canada, in Can 10-14 yrs	100	14.7	35.1	18.0	32.3	100	16.3	36.0	17.7	30.0
Foreign Born Men, Trained in Canada, in Can 15+ yrs	100	17.2	34.2	16.9	31.7	100	15.8	35.5	22.1	26.6
Canadian Born Men, Trained in Canada	100	24.2	42.0	12.4	21.4	100	21.7	38.6	14.3	25.5

Notes:

[a] Calculation based on logits in Model 1 in Table 1.

[b] Calculation based on logits in Model 2 in Table 1 (Adjusted for age, city of residence, visible minority status, education, school attendance, and home language)

Table 6: Coefficient Estimates of OLS Regressions on Wage and Self-Employment Earnings in 2005 for Canadian born and Foreign born Women and Men, Age 30-54, with Bachelors or Higher Degrees and with Engineering as the Major Field of Study, by Nativity, Gender, and Place of Training, Canada, 2006

	Model 1		Model 2		Model 3	
	coeff	signif	coeff	signif	coeff	signif
	(1)		(2)		(3)	
Groups						
Foreign Born Women, Trained Abroad	-67801	***	-50528	***	-40792	***
Foreign Born Women, Trained in Canada	-54936	***	-36554	***	-30397	***
Canadian Born Women, Trained in Canada	-31486	***	-25370	***	-21507	***
Foreign Born Men, Trained Abroad	-52528	***	-36858	***	-31019	***
Foreign Born Men, Trained in Canada	-40244	***	-23927	***	-20971	***
Canadian Born Men, Trained in Canada	(rg)		(rg)		(rg)	
Age			1549	***	1465	***
Visible Minority Status						
Visible minority			-11200	***	-8583	***
Not visible minority			(rg)		(rg)	
City of Residence						
Montreal			-15485	***	-15335	***
Toronto			(rg)		(rg)	
Vancouver			-6041	***	-6479	***
Other CMAs			3598	**	3098	*
Non-CMAs			-14716	***	-14295	***
Language Spoken at Home						
Non-English/French language			-15378	***	-13233	***
English/French			(rg)		(rg)	
Highest Level of Education						
Bachelor's only			(rg)		(rg)	
University certificate or diploma above Bachelor			-309	(ns)	55	(ns)
Masters, doctorate degree			4622	***	3886	***
School Attendance since September 2005						
Attended			-16339	***	-12996	***
Did not attend			(rg)		(rg)	
Occupation at the time of Census						
Management					26946	***
Engineering					(rg)	
Technicall					-6184	***
All other occupations					-20347	***
Constant	103074	***	44378	***	46175	***
Adjusted R Square	0.061		0.083		0.103	

(ns) Not significant at p=0.05 level *p<0.05, **<0.01, ***<0.001
(rg) Reference group.
Source: Statistics Canada, 2006 Census masterdata base.

Table 7: Coefficient Estimates, OLS Regressions on Wage and Self-Employment Earnings in 2005 for Canadian born and Foreign born Women and Men, Age 30-54 with Bachelors or Higher Degrees and with Engineering as the Major Field of Study, by Nativity, Gender, and Location of Education & Duration in Canada, Canada, 2006

	Model 1		Model 2		Model 3	
	coeff	signif	coeff	signif	coeff	signif
	(1)		(2)		(3)	
Groups						
Foreign Born Women, Trained Abroad, in Can 2-4 yrs	-79522	***	-54738	***	-43426	***
Foreign Born Women, Trained Abroad, in Can 5-9 yrs	-68286	***	-50526	***	-40507	***
Foreign Born Women, Trained Abroad, in Can 10-14 yrs	-56688	***	-49308	***	-41477	***
Foreign Born Women, Trained Abroad, in Can 15+ yrs	-50572	***	-50584	***	-40562	***
Foreign Born Women, Trained in Canada, in Can 2-4 yrs	-71634	***	-42855	***	-37121	**
Foreign Born Women, Trained in Canada, in Can 5-9 yrs	-62710	***	-41022	***	-33533	***
Foreign Born Women, Trained in Canada, in Can 10-14 yrs	-44431	***	-35089	***	-29273	**
Foreign Born Women, Trained in Canada, in Can 15+ yrs	-36475	***	-30142	**	-24429	*
Canadian Born Women, Trained in Canada	-31486	***	-25939	***	-21964	***
Foreign Born Men, Trained Abroad, in Can 2-4 yrs	-67129	***	-44836	***	-36757	***
Foreign Born Men, Trained Abroad, in Can 5-9 yrs	-52423	***	-35774	***	-29993	***
Foreign Born Men, Trained Abroad, in Can 10-14 yrs	-40378	***	-32780	***	-28341	***
Foreign Born Men, Trained Abroad, in Can 15+ yrs	-33221	***	-33374	***	-28825	***
Foreign Born Men, Trained in Canada, in Can 2-4 yrs	-68297	***	-38532	***	-34966	***
Foreign Born Men, Trained in Canada, in Can 5-9 yrs	-53404	***	-30306	***	-25234	***
Foreign Born Men, Trained in Canada, in Can 10-14 yrs	-28887	***	-17739	***	-15346	***
Foreign Born Men, Trained in Canada, in Can 15+ yrs	-20455	***	-18186	***	-16453	***
Canadian Born Men, Trained in Canada	(rg)		(rg)		(rg)	
Age			1400	***	1357	***
Visible Minority Status						
Visible minority			-10651	***	-8303	***
Not visible minority			(rg)		(rg)	
City of Residence						
Montreal			-14863	***	-14857	***
Toronto			(rg)		(rg)	
Vancouver			-5963	***	-6408	***
Other CMAs			3943	**	3371	**
Non-CMAs			-14148	***	-13890	***
Language Spoken at Home						
Non-English/French language			-14530	***	-12679	***
English/French			(rg)		(rg)	
Highest Level of Education						
Bachelor's only			(rg)		(rg)	
University certificate or diploma above Bachelor			-422	(ns)	-10	(ns)
Masters, doctorate degree			4747	***	4021	***
School Attendance since September 2005						
Attended			-15088	***	-12112	***
Did not attend			(rg)		(rg)	
Occupation at the Time of Census						
Management					26936	***
Engineering					(rg)	
Technical					-6276	***
All other occupations					-19975	***
Constant	103074	***	50009	***	50187	***
Adjusted R Square	0.067		0.084		0.103	

(ns) Not significant at p=0.05 level *p<0.05, **<0.01, ***<0.001
(rg) Reference group.
Source: Statistics Canada, 2006 Census masterdata base.

Table 8: Multiple Classification Analysis Estimates of Wages and Self-Employment Earnings in 2005, for Canadian Born and Foreign Born Women and and Men, Age 30-54, with Bachelors or Higher Degrees in Engineering, by Nativity, Gender, and Place of Training, Canada, 2006

	Model 1	Model 2	Model 3		Due to	
Nativity and Location of Highest Degree	Baseline[a] (1)	Demographic & Socioeconomic added[b] (2)	Occupation added (3)	Difference Col (1)-Col(3) (4)	Demographic & Socioeconomic Composition (5)	Occupational Location (6)
Foreign Born Women, Trained Abroad	35,270	43,280	49,320	-14,050	-8,010	-6,040
Foreign Born Women, Trained in Canada	48,140	57,260	59,720	-11,580	-9,120	-2,460
Canadian Born Women, Trained in Canada	71,590	68,440	68,610	2,980	3,150	-170
Foreign Born Men, Trained Abroad	50,550	56,950	59,100	-8,550	-6,410	-2,140
Foreign Born Men, Trained in Canada	62,830	69,880	69,140	-6,310	-7,050	740
Canadian Born Men, Trained in Canada	103,070	93,810	90,120	12,960	9,260	3,690

(a) Calculations based on the coefficients in Model 1, Table 6 and then rounded to the nearest $10.

(b) Calculations based on the coefficients in Model 2, Table 6, adjusted for age, visible minority status, city of residence, language spoken at home, highest degree and school attendance). Calculations are then rounded to the nearest $10.

(c) Calculations based on the coefficients in Model 3, Table 6, adjusted for occupation. Calculations are then rounded to the nearest $10.

Source: Statistics Canada, 2006 Census masterdata base.

Table 9: Wages and Self-Employment Earnings[(a)], for the Canadian Born and Foreign Born Women and Men, Age 30-54 with Bachelors or Higher Degrees and with Engineering as the Major Field of Study, by Nativity, Gender, and Location of Education, Duration in Car

	Model 1	Model 2	Model 3		Due to	
Nativity, Location of Highest Degree and Years in Canada	Baseline (1)	Demographic & Socioeconomic added[(b)] (2)	Occupation added (3)	Difference col 1- col 3 (4)	Demographic & Socio-economic Variables (5)	Occupation (6)
Women						
Foreign Born Women, Trained Abroad, in Can 2-4 yrs	23,560	39,570	47,040	-23,480	-16,010	-7,470
Foreign Born Women, Trained Abroad, in Can 5-9 yrs	34,790	43,780	49,960	-15,170	-8,990	-6,180
Foreign Born Women, Trained Abroad, in Can 10-14 yrs	46,390	45,000	48,990	-2,600	1,390	-3,990
Foreign Born Women, Trained Abroad, in Can 15+ yrs	52,510	43,730	49,900	2,600	8,780	-6,180
Foreign Born Women, Trained in Canada, in Can 2-4 yrs	31,440	51,450	53,340	-21,900	-20,010	-1,890
Foreign Born Women, Trained in Canada, in Can 5-9 yrs	40,370	53,290	56,930	-16,560	-12,920	-3,650
Foreign Born Women, Trained in Canada, in Can 10-14 yrs	58,650	59,220	61,190	-2,550	-570	-1,970
Foreign Born Women, Trained in Canada, in Can 15+ yrs	66,600	64,170	66,040	570	2,440	-1,870
Canadian Born Women, Trained in Canada	71,590	68,370	68,500	3,090	3,220	-130
Men						
Foreign Born Men, Trained Abroad, in Can 2-4 yrs	35,950	49,470	53,710	-17,760	-13,520	-4,240
Foreign Born Men, Trained Abroad, in Can 5-9 yrs	50,660	58,540	60,470	-9,820	-7,880	-1,940
Foreign Born Men, Trained Abroad, in Can 10-14 yrs	62,700	61,530	62,120	580	1,170	-600
Foreign Born Men, Trained Abroad, in Can 15+ yrs	69,860	60,930	61,640	8,220	8,920	-710
Foreign Born Men, Trained in Canada, in Can 2-4 yrs	34,780	55,780	55,500	-20,720	-20,990	280
Foreign Born Men, Trained in Canada, in Can 5-9 yrs	49,670	64,000	65,230	-15,560	-14,330	-1,230
Foreign Born Men, Trained in Canada, in Can 10-14 yrs	74,190	76,570	75,120	-930	-2,380	1,450
Foreign Born Men, Trained in Canada, in Can 15+ yrs	82,620	76,120	74,010	8,610	6,500	2,110
Canadian Born Men, Trained in Canada	103,080	94,310	90,470	12,610	8,770	3,840

(a) Calculations based on Table 7, Models 1-3. Calculations are then rounded to the nearest $10.
(b) Adjusted for age, visible minority status, CMA residence, language spoken at home, highest degree, and school attendance
Source: Statistics Canada, 2006 Census masterdata base.