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The determinants of the migration decisions of immigrant and non-immigrant physicians in Canada

James Ted McDonald
Christopher Worswick

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James Ted McDonald
University of New Brunswick

Christopher Worswick
Carleton University

Abstract:

In this paper, we use data from the confidential master files of the Canadian Census over the years 1991-2006 to study the geographic mobility of immigrant and non-immigrant physicians who are already resident in Canada. We consider both inter- and intra- provincial migration, with a particular focus on migration to and from rural areas of Canada. We exploit the fact that it is possible to link individuals within families in the Census files in order to investigate the impact on the migration decision of the characteristics of a married physician's spouse. Our results indicate that the magnitude of outflows is substantial and that the retention of immigrant physicians in rural areas and in some provinces will continue to be difficult. We find strong evidence that migration is a family decision, and spousal characteristics (education, age, years in Canada for immigrants) are important. As well, we find that large Canadian cities (mainly in Ontario) are the likely destination for the types of immigrant physicians typically able to be recruited to other areas, implying recruitment efforts of smaller provinces may have significant implications for the size of health care costs in larger provinces.

Keywords: physicians, immigrants, internal migration, family migration

JEL: I18, J12, J61

Résumé:
Dans cet article, nous étudions la mobilité géographique des médecins immigrants et non-immigrants déjà installés au Canada à partir des données des fichiers maîtres confidentielles du recensement canadien couvrant les années 1991-2006. Nos examinons la migration inter- et intra-provincial, et nous concentrons plus particulièrement sur la migration vers les régions rurales du Canada. Nous exploitons la possibilité qu'offre les fichiers du recensement de croiser les individus avec leurs familles afin d'étudier l'impact des caractéristiques du conjoint d'un médecin marié sur ses décisions de migration. Nos résultats indiquent que l'ampleur de l'exode est importante et que la rétention des médecins immigrants dans les zones rurales et dans certaines provinces demeurera difficile. Nous trouvons une forte évidence empirique que la migration est une décision familiale, et que les caractéristiques des conjoints (le niveau d'éducation, l'âge, le nombre d'années passées au Canada pour les immigrants) jouent un rôle important. En outre, nous constatons que les grandes villes canadiennes (principalement en Ontario) sont la destination probable du type des médecins immigrants qui pourraient généralement être recrutés dans d'autres régions, ce qui implique que les efforts de recrutement des plus petites provinces pourraient avoir des répercussions importantes sur la taille des coûts des soins de santé dans les plus grandes provinces.

1. Introduction

There is a common perception in Canada that a shortage of both general and specialist physicians is looming. Many regions of Canada – particularly rural and more remote areas – already face significant difficulties in attracting physicians to replace others who have retired, moved to urban areas of Canada, or moved to the US. Partly as a result of a series of policies enacted in the late 1980s and early 1990s aimed at controlling health care spending, there was a 10% cutback in medical school admissions in the 1990s that reduced the production of domestically trained physicians (Dauphinee, 2005). Interprovincial migration of new physicians was limited, and new physicians practicing in "overserviced" areas were financially penalized, or threatened with financial penalties (Phillips et.al, 2007). The early 1990s also saw a wave of retirements by doctors who came to Canada in the 1950s and 1960s. In addition, Canada experienced its greatest net loss of Canadian physicians to the US and other countries in the mid 1990s, with a net loss of 508 physicians in 1996. (Dauphinee, 2005). What has exacerbated these domestic trends has been Canada's official policy during the period 1975-99 of discouraging immigration of foreign physicians, although foreign trained physicians were often recruited to underserved areas (Dauphinee, 2005). There was also a commitment within the medical profession to "self-sufficiency" so that the potential supply of foreign-trained doctors met stern resistance from the Canadian medical community (Grant and Oertel, 1997).

Growth of the Canadian physician workforce since 2000 has kept pace with population growth, in large part due to an increase in the number of family physicians from 94 per 100 000 in 1999 to 98 per 100 000 in 2004 (Phillips et.al., 2007). In the

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period 2000-2004, there was an 11.9% increase in the number of international medical graduates (IMGs) practicing in Canada compared to a 5.1% increase in graduates from Canadian medical schools. As of 2005, 23% of practicing physicians in Canada were graduates of medical schools outside of Canada. However, reliance on internationally trained physicians to augment domestic production of physicians is complicated by the fact that migration rates to the US of internationally trained physicians are comparable to the migration rates of Canadian trained physicians (Dauphinee, 2005). Furthermore, the Association of American Medical Colleges pronounced an impending physician shortage in the United States and called for a 30% expansion in medical school enrolment over the next decade and similar expansion in residency training programs (Phillips et.al, 2007). This means that difficulties in attracting and retaining physicians in Canada are likely to intensify in the future.

While the physician/population has stabilized at the national level, there continues to be an unequal distribution of physicians per capita across the provinces (Benarroch and Grant, 2004). Since the delivery of health care services is a provincial responsibility, provinces have different fee schedules for physicians that result from negotiations between the government's health ministry and the provincial medical associations. As well, since provinces have different fiscal capacities to fund health care expenditures, there is significant variation in hospital facilities and other inputs complementary to physician services that may influence an individual physician's location decision (Ferrall et al., 1998). There also continues to be unequal distribution of physicians within provinces, particularly between urban and rural areas. While the percentage of the population living in rural areas fell from 29.2% in 1991 to 22.2% in 1996, the percentage

of physicians practicing in rural areas fell from 14.9% to 9.8% over the same period. Further, the ratio of physicians per 1000 population in rural areas is forecast to fall from 0.79 in 1999 to 0.53 in 2021 (Laurent, 2002). More generally, government funding reductions and downsizing have led to devolution of the responsibility for health care to local communities and individuals, which has made the provision of health care to vulnerable populations such as those in rural areas more challenging (Cloutier-Fisher and Joseph, 2000).

It is well established that immigrant physicians, particularly new physicians are relatively more likely to be working in rural communities. For instance, 40 percent of IMGs are located in Weak MIZ[1] (Dumont, Zurn, Church and Le Thi , 2008). Likewise IMGs account for 53 percent of new physicians starting practice in rural regions, while they constitute only 22 percent of the national physician workforce (CMAJ, 2009). This finding is true for all provinces except Ontario and Quebec where physicians are relatively more likely to be IMGs in urban areas (CIHI, 2009).

Although IMGs make up a significant proportion of the physician workforce in some provinces and regions, they also exhibit higher rates of out-migration. Statistics from CIHI indicate that, overall, 66 percent of new Canadian-trained physicians practiced in just one jurisdiction between 1978 and 2008, and of those who moved, most did so within the first three years. In contrast, 34 percent of new foreign-trained physicians and 28 percent of new foreign-trained specialists remained in their original jurisdiction over the same period. Of those who moved, most did so within four to five

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[1] MIZ or metropolitan influenced zone is a Statistics Canada concept that attempts to reflect the extent to which communities outside of urban areas are nevertheless connected to the labour markets of those urban areas. Weak MIZ means that there is only a weak connection to the nearest urban area. The only category less connected to urban areas is the no MIZ group, which are remote and sparsely populated areas of Canada.

years (CIHI, 2008). For some regions that are reliant on IMGs, such as Newfoundland, out-migration to other provinces is substantial: only 8 percent of IMGs who began practice in Newfoundland still remain (Dumont, Zurn, Church and Le Thi , 2008).

The extent to which particular health regions and provinces are able to retain their physicians is crucial if shortages in the delivery of physician and surgeon services in both the short and longer terms are to be avoided. In addition, retention of physicians is important for the continuity of care between physicians and their patients. At the same time, migration of physicians into particular regions and particular provinces can also pose significant budgetary problems. For example, Ontario and BC both struggle to control the supply of physicians in an effort to contain health expenditures (Phillips et.al, 2007). It is clearly the case that Canada will continue to rely on internationally trained medical graduates to help meet the healthcare needs of Canadians, particularly those individuals living in 'have-not' provinces and in rural and remote areas, and that recruitment into these areas may also have implications for the health budgets of other provinces that may be the subsequent destination of these physicians. Therefore, an understanding of the extent and determinants of the migration of immigrant physicians both between and within provinces is important.

In this paper, we use data from the confidential masterfiles of the Canadian Census over the years 1991-2006 to study the geographic mobility of immigrant and non-immigrant physicians. Our analysis will help inform public policy on the recruitment and retention strategies of provinces and health regions that are dependent on immigrant physicians for the provision of crucial health care services to their residents. More

generally, our analysis will offer lessons for federal immigration policy with regard to the attraction and retention of immigrants with skills in high demand.

2. Previous Research

Much of the published literature on physician migration patterns has focused exclusively on inter-provincial migration. Overall, approximately one percent of all physicians changed provincial jurisdictions each year between 1978 and 2008 (CIHI, 2008), and individual characteristics such as age, immigration status, specialty and language have been found to be significant determinants of the decision to move provinces. Using physician registry data, Basu and Rajbhandary (2006) find that physicians younger than 45 to 50 years are more likely to change provinces than older physicians, while IMGs are 33 percent more likely to change provinces relative to Canadian-trained physicians. Moreover specialists are more likely to migrate compared to family physicians. Basu and Rajbhandary (2006) also find that French-speaking physicians are 66 percent less likely to move compared to those whose language is English. Moreover French-speaking physicians in provinces other than Quebec have a greater likelihood of moving compared to those whose language is English; whereas English-speaking physicians in Quebec are more likely to move than those residing in any other province.[2]

Location-specific attributes are also very important determinants of inter-provincial migration. These include population, distance, working conditions and other provincial characteristics. Benarroch and Grant (2004) analyze time-series data on

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[2] The referendum in Quebec held in 1995 may also have contributed to the out-migration from Quebec of immigrant physicians who were not Francophones. We briefly consider this issue later in the paper.

physician flows and find that physicians are attracted to provinces with higher

populations but are less likely to move to provinces with a higher proportion of rural

residents. Benarroch and Grant also study the relationship between net in-migration and

proxies for working conditions of physicians, such as health expenditures per capita and

number of hospital beds. In accordance with their expectations, they find a positive

relationship between hospital beds and in-migration though they also find a negative

relationship between per capita health expenditures and in-migration. They attribute the

latter finding to the possibility that scale economies in health care provision mean that

more densely populated provinces spend less per capita on non-physician inputs.   Other

provincial characteristics are also important. Basu and Rajbhandary (2006) find net

positive movements of physicians from low to medium, low to high and medium to high

physician-to-population ratios. Likewise physicians are more likely to leave the Atlantic

and Prairie provinces to settle in Ontario and BC (Grant and Oertel, 1997; Benarroch and

Grant, 2004), and the magnitude of these flows is non-trivial. Bennaroch and Grant

(2004) estimate that the average annual departure of GPs from Saskatchewan is

approximately equal to two thirds of the graduating medical school class at the University

of Saskatchewan; while the gross inflow of physicians to BC approaches the number of

medical school graduates in that province each year. Baeolocher (2006) find that

provinces losing the greatest number of physicians to inter-provincial migration also have

a greater number of IMGs, likely reflecting the increasingly reliance of such provinces on

IMGs to supply physician services to their populations.[3]

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[3] Net losers of inter-provincial migration also endure substantial international emigration. For example, the Atlantic and Prairie provinces experienced sizeable net inter-provincial outflows and even higher net international out-migration, making the cumulative effect very large (Grant and Oertel, 1997).

Studies based on both time-series and physician registry data find that income has a significant effect on physician migration. Benarroch and Grant (2004) find that provinces with higher after-tax income, larger expenditures per physician and more favourable fee schedules experience higher net in-migration. Dostie and Léger (2009) use physician registry data find that earning differentials based on fee schedules and observable characteristics such as age, gender, language, specialty and medical school are not statistically significant in the migration decisions of Ontario physicians and that physicians from Quebec and BC are more likely to migrate to provinces with lower earning potential. However, when they incorporate the return to unobserved productivity, they find that physicians in Ontario, Quebec and BC are more likely to migrate given a higher earning potential elsewhere for those unobservable skills.

3. Data and Methods

The data used in the estimation come from the 1991, 1996, 2001 and 2006 Canadian Census 20% confidential master files accessed through the UNB-RDC. We restrict our sample to those individuals aged 29-65 who reported that their occupation as physician or specialist and who have positive earned income during the reference year. Unfortunately, it is not possible in Census files prior to 2006 to identify the country in which the person's medical degree was obtained. We also restrict the sample to include only permanent residents and citizens of Canada. Although temporary residents are included in the Canadian Census files, we exclude them from this analysis since their migration decisions are typically restricted as a condition of their temporary work visa. For example, IMGs in Canada as temporary residents may be issued provisional medical

licenses by the licensing boards of some provinces such Newfoundland that allow them to practice medicine only in certain, usually rural, areas.[4]

Since we are interested in both inter- and intra- provincial mobility, and in particular migration out of less populated areas, we base our notion of mobility on the Statistics Canada Census Metropolitan Area (CMA) and Census Agglomeration (CA). CMAs and CAs are areas consisting of one or more adjacent municipalities situated around a major urban core. To form a CMA, the urban core must have a population of at least 100,000. To form a CA, the urban core must have a population of at least 10,000.[5] We define six provincial groups: BC, Alberta, Prairies (Manitoba and Saskatchewan), Ontario, Quebec, and Atlantic (New Brunswick, Nova Scotia, PEI and Newfoundland), and divide each provincial group into three types of areas: larger urban areas (CMAs with a population of at least 175,000 in 2006), smaller urban areas (other CMAs and all CAs), and rural areas (not in a CMA or CA). We exclude residents of Canada's territories. Thus, we divide provincial Canada into 18 separate locations. The Canadian Census files contain questions on geographic mobility in the previous five years, including detailed geographic information on the location of residence five years ago (which may be a residence outside of Canada). We identify a person as a mover if the person changed from one of our 18 zones to another zone in the previous five years. Note that a person who moved from one municipality to a different municipality of the same type in the same provincial group is classified as a non-mover for our purposes. Individuals who resided outside of Canada five years ago are classified as new entrants.

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[4] It is also the case that permanent residents who are not licensed to practice medicine may be granted provisional licenses on condition that they practice in such areas. However we cannot ascertain from the data the type of medical license that is held – we only know that they report working as a physician or specialist and whether they report still being in study.

[5] Statistics Canada (2010)

One important but unavoidable limitation of the Census files is that each Census is cross-sectional, with retrospective information limited to region of residence five years prior to the Census year. Thus, while we observe current demographic and socio-economic characteristics, we do not observe this information at the beginning of the five year period during which we might observe geographic mobility. While the migration decisions of this particular group of individuals (currently practicing physicians aged 29-65) will certainly account for a large proportion of changes in physician numbers (and by extension, physicians per thousand population) in any particular region over time, we will not be able to account fully for all changes in physicians numbers over time. For example, individuals who completed their medical training in one region and began practicing in another region within five years of the Census will be counted as the migration of a practicing physician even though the individual was not practicing prior to the move. We will examine the sensitivity of our results to this issue by restricting the age range to physicians unlikely to have completed their training within five years.

In the empirical analysis, we subject our analysis to some robustness checks based on physician age. In a related vein, individuals resident in Canada five years previously but who left the country prior to the Census count will not be observable, so that a potentially significant source of physician out-migration cannot be measured. However, this may not be a quantitatively significant issue. The Canadian Health Services Research Foundation (2008) reports that the annual net loss of physicians is small, and has not been more than one percent per year since 1980. Furthermore, Watanabe et al (2008) find that less than one percent of IMGs practicing in Canada left in any given year between 1995

and 2005. Thus, migration out of Canada may only constitute a small proportion of total out-migration.

One important advantage of the Census files over Physician registry data is that it is possible to link individuals within families. Migration decisions in families are very likely to be based on joint decision-making that will reflect the net welfare gains of the family from relocating (Mincer, 1978; Jacobson and Levin, 1997, 2000; Pixley 2008). It is particularly the case for immigrant families that the characteristics of the spouse can have a significant impact on migration decisions, in particular language fluency, credential recognition, social networks, and education levels. For example, if an immigrant physician practices medicine in a rural community but his or her spouse cannot find employment in that community commensurate with his or her education and experience, out-migration to a larger community with better opportunities is more likely to occur. Similarly, an immigrant spouse from a developing country may find living in a rural community is associated with significant isolation, particularly if the spouse has language difficulties or is not employed outside the home.

To capture these effects, we need to know the characteristics of the spouse, if present. Given that the only retrospective questions in the Census relate to location, we can only directly identify whether a spouse is present as of the Census year, not when a decision to migrate would have been made. We impute the presence of a spouse five years ago using the following decision rules. First we identify currently married couples by selecting those physicians and other adults in the family who report being either the household head or the spouse of the household head.[6] If an individual physician is

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[6] It is not possible to identify with certainty that two individuals in a family are a married couple if they have some other relationship to the household head since we only observe the relationship to the household

currently married (or common-law) and neither the person nor his/her spouse moved

house in the past five years, we classify them as a married couple five years previously. If

the physician is currently married and did move residence in the past five years, and if his

or her current spouse resided in the same Census subdivision (the equivalent of a

municipality) as the respondent five years ago, then we also classify them as a married

couple five years previously.[7] For other currently married couples, we assume that they

were not married five years previously and so do not include the spouse's characteristics

as possible determinants of any migration decision of the physician. Physicians who are

not heads of households or spouses are treated similarly.[8]

Our main research question concerns the identification of factors associated with

the decision to change CMA category as we have defined above. Conceptually, the

decision to move areas will be based on an estimation of the utility from moving

compared to the utility from not moving, where utility captures both pecuniary benefits

(cost of living, employment opportunities, income) and non-pecuniary benefits (working

conditions, amenities) to the individual and his or her family (if present). As with much

of the migration literature, we do not attempt to estimate a structural model of migration

(e.g., Basu and Rajbhandary, 2006, Bennaroch and Grant, 2004). Instead we estimate a

reduced form model in which the decision to move is expressed as a function of personal

characteristics and location controls expected to be correlated with the underlying

determinants of any migration. Our first outcome variable of interest is defined to be a

head, not to other members of the household. However, the vast majority of physicians in our sample can
be identified as a part of a married couple or as an unmarried member of a Census family.
[7] It is possible that two individuals are currently married, were single or married to other people five years
earlier, moved to the same municipality independently and then got married, though we feel that this will
be a fairly rare situation.
[8] As a robustness check, we also re-estimate the models after excluding from the sample those individuals
classified as single five years ago but married now. Imposing this restriction has no effect on the results
reported in this paper.

binary variable that takes the value 1 if the individual has moved CMA category in the previous five years, and zero otherwise. The index function is given as:

$$I_{it} = X_{it}\beta + CMA_{it-5}\gamma + FB_{it}CMA_{it-5}\partial + FAM_{it-5}\vartheta + \delta \cdot FB_{it} + \delta_1 YSE_{it} + \delta_2 YSE_{it}^2 + COB_{it}\Omega + XS_{it}\psi + \varepsilon_{it}$$

$$(1)$$

where X is a vector of personal characteristics including gender, age, and area of medical study (in some regressions), FB indicates an immigrant, YSE is years since migration for immigrants, COB is a vector of indicators for country of birth if an immigrant, and XS is a vector of personal characteristics of the spouse (if present) including age, education level, immigrant status, and years since migration if an immigrant, plus an indicator for whether the spouse comes from a different country of origin than his or her partner. CMA is a set of indicator variables for the CMA/CA region of residence five years ago. These controls will reflect unobserved factors associated with the location of residence (for example, amenities, labour market conditions, regulatory differences) that may be important determinants of out-migration, while interactions of these terms with the FB indicator allow for the impact of these characteristics to vary between immigrants and non-immigrants. FAM is a set of indicators for family structure, in which we also incorporate immigrant composition. Specifically, we define six different types of families: Canadian-born married couples, foreign-born married couples, Canadian-born individuals, foreign-born individuals, and married couples in which one partner is an immigrant and the other is Canadian born.[9] Individuals who are part of a Canadian-born married couple are in the reference group.

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[9] One extension of the model in equation (1) is to allow the age-mobility profile to vary by birth cohort. In regressions not reported in this paper, including separate age profiles by five-year birth cohort has almost no effect on the results.

To allow the effect of immigrant status, family structure, spousal characteristics and other factors to vary by region of residence prior to a decision to move being made, we estimate (1) separately for each of three subsamples: those resident in large cities five years ago, those resident in smaller cities and towns five years ago, and those resident in rural areas five years ago.

Our second outcome variable reflects not just the decision to move CMA region but the destination of the move. We define a categorical variable that takes a separate value for each of the following outcomes: the person does not move, the person moves to a major city, the person moves to a smaller city or town, and the person moves to a rural area. We estimate multinomial Logit and Probit models of location choice for each subsample of individuals based on region of residence five years ago as outlined above.[10]

4. Empirical Results

We begin the empirical analysis by presenting a set of descriptive statistics on the distribution, characteristics and migration flows of immigrant and non-immigrant physicians in Canada. The first column of Table 1 gives the distribution of physicians across the 15 CMA regions defined above. 25% of all physicians reside in large cities in Ontario and another 25% reside in large cities in Quebec, while each of the other regions has between 1% and 8% of physicians. The second column gives the proportion of physicians in each CMA region who are foreign-born and in most regions immigrants constitute between 30-40% of physicians residing in those regions. The main exception is

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[10] We also experiment with nested Logit models that conceptualize the migration decision in two stages – first, the individual decides to leave his or her current location, and second, the individual chooses the destination that will yield the highest net utility gain. Results from this analysis are comparable to what is reported in the paper.

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Quebec, where outside of the major cities, only 5-7% of physicians are immigrants. At the other extreme, 53% of physicians in rural areas of the Prairie provinces and 65% of physicians in smaller cities and towns in these provinces are immigrants.

The third column of Table 1 gives the net five-year change in the number of physicians in the region as a proportion of the number of physicians in that region five years earlier. Since we have pooled four consecutive Census files, these figures are averages over the four census years from 1991-2006 inclusive. It should be reiterated that we cannot observe those who left the country in the previous five years so this source of out-migration will not be included in the figures. More generally, the net migration figures presented relate to the recent mobility decisions of those individuals aged 29-65 who are currently practicing as physicians in a particular Census year, so that net changes will not necessarily correspond exactly to the change in total physician numbers over time.[11] The results indicate that most CMA regions, particularly smaller cities and towns, experienced a net increase in physician numbers over the period because of retention and attraction (from other regions and from outside Canada). The net change was actually negative in both large cities and rural areas in Atlantic Canada and the Prairies, and in large cities in Quebec. The final six columns decompose this net change into component parts – migration of immigrants and non-immigrants to and from other CMA regions, and entry into Canada of immigrants and non-immigrants from another country, each expressed as a proportion of the count of (currently practicing) physicians in each region five years before. Together these columns sum to the net proportional change for each CMA region. For example, the number of physicians currently in larger cities in Atlantic

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[11] In fact, when we compare the number of physicians of a particular age cohort who were in Canada five years before to the count of physicians to a cohort of physicians in the preceding Census who are five years younger, the discrepancy is in the order of 0.5% of the total.

Canada is 2% smaller than the number of (currently practicing) physicians who were resident in these cities five years before. 19% of that group were Canadian born physicians who moved to other CMA regions, while inflows of Canadian born physicians from other regions added 15%. Inflows of non-immigrants from other countries were small at 1%, as were inflows of immigrants from other countries at 3%. While larger cities in Atlantic Canada gained 5% from immigrants moving to these cities from other parts of Canada, they also lost 9% from immigrants leaving these cities to move to other CMA regions. The net change is a 2% decrease in the number of the physicians resident in those cities five years before. Overall, it is clear that the inflows and outflows of physicians from many CMA regions are very large relative to the number of physicians present. For Atlantic Canada and the Prairies, the regions experiencing net negative changes, the main driver appeared to be mobility patterns of immigrant physicians. CMA regions in those provinces experienced outflows of immigrant physicians in the range of 5-19%. Only for smaller cities and towns in Atlantic Canada was this loss compensated for by migration of immigrants from other CMA regions. These net outflows were not made up for by net migration of Canadian-born physicians from other CMA regions, again except in the case of smaller cities and towns in Atlantic Canada. Instead, inflows of recent immigrants from other countries were particularly important to the smaller urban areas and rural areas of these provinces, with for example a 20% inflow in the number of physicians in smaller city Prairies coming from immigrants who were resident in other countries five years before. Mirroring general population flows, CMA regions of Ontario, Alberta and BC all experienced marked increase in physician numbers, with immigrant and non-immigrant inflows from other regions as well as recent immigrants

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from other countries all contributing. Quebec's CMA regions had only small inflows and

outflows of immigrants, implying that it was outmigration of non-immigrants from the

large Quebec cities that led to proportional increases in the number of physicians in other

urban and rural areas of the province.

The next table of descriptive statistics focuses attention on the importance of

family structure and marital status on physician mobility decisions. Specifically, Table 2

presents data on the proportion of individuals who leave their CMA region of residence

in the five years prior to the Census, disaggregated by family structure.[12] These numbers

can be interpreted as the unconditional probability that a physician with a given family

structure and living in a given CMA region moves out of that CMA region. The figures

show that both immigrant and non-immigrant couples have lower outmigration rates than

corresponding immigrant and non-immigrant individuals with no spouse present. For

most regions, these differences are very large indeed: for example about 10% of non-

immigrant and immigrant couples will have moved out of smaller cities and towns in

Ontario, but about 38% of physicians without spouses will have moved out of these areas.

Comparisons between immigrant and non-immigrant physicians suggest that patterns

vary by CMA region. Immigrant couples and immigrants without spouses are both

substantially less likely to leave large cities in Ontario, Alberta and BC than

corresponding non-immigrant families and singles. In contrast, immigrants are more

likely to leave each CMA region of Atlantic Canada and the Prairies than are non-

immigrants, and they are also relatively more likely to leave rural areas of most

provinces. The final column of Table 2 gives the probability of out-migration of

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[12] Characteristics of individuals and spouses (where present) based on family structure are contained in
Appendix Table A1.

physicians in mixed couples where one spouse is an immigrant and the other is not. For most CMA regions of residence, the proportion of couples leaving the region is roughly between the figures for non-immigrant couples and immigrant couples.

We now turn to a statistical analysis of the decision to move CMA region that will indicate the extent to which different demographic, socio-economic and geographic characteristics of the physician and his or her spouse (where present) are significantly correlated with the decision to move to another CMA region. Table 3 gives odds ratios and associated p-values for the decision to move, for three subsets of physicians based on whether the physician's place of residence prior to a potential move is a large city, a smaller city or town, or a rural area. We begin with the importance of demographic factors – age and family type. The estimated profile for age suggests that regardless of the type of urban region of residence, the incidence of migration is highest for young physicians and declines significantly with age. Female physicians and French-speaking physicians resident in large cities in Quebec are also less likely to move out of their CMA region of residence. Relative to a non-immigrant physician with a non-immigrant spouse (the default group), immigrant married couples are more likely to move CMA region and the effects are largest if the immigrant couple happens to reside in a smaller city or town or in a rural area (OR= 1.94 pval= .01 for large cities, OR=8.37 pval=.00 for smaller cities and towns, and OR=9.15 pval =.00 for rural areas). After controlling for other factors, a non-immigrant physician who is not married has an incidence of outmigration that is not significantly different from that of non-immigrant married couples. However, immigrant physicians without spouses have the highest odds of outmigration from rural areas (OR=12.39 pval= .03). Physicians in immigrant/non-immigrant couples are also

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more likely than non-immigrant couples to move out of each type of region though the odds ratios are smaller than what are found for immigrant couples.

The incidence of out-migration also varies significantly for immigrant physicians depending on how long they have been in Canada and where they were born. As with age, outmigration is highest for the most recent arrivals in Canada but declines with additional years in Canada (as indicated by the OR on YSE that is less than 1). Other regression results that include a set of 5-year arrival period cohort variables are similar to what is reported here, and there is little evidence of any significant cohort effects in out-migration for immigrant physicians. Relative to the default group of immigrant physicians who were born in the UK, immigrant physicians from Eastern Europe (OR 1.54 pval .01), South Asia (OR 1.44 pval .03) and other regions (OR 1.32 pval .05) are significantly more likely to leave a large city, while immigrant physicians from developed countries in Asia are less likely to leave a large city (OR 0.68 pval .03). Physicians born in China and Southeast Asian countries are significantly more likely to leave smaller cities and towns (OR 2.30 pval .02) and rural areas (OR 3.91 pval .00). Where a spouse is present in the family, his or her characteristics are also found to be important determinants of the decision to move. A Bachelor's degree is associated with lower outmigration from large cities (OR 0.82 pval .01)[13] and a higher degree is associated with higher outmigration from rural areas (OR 1.61 pval .04). For spouses who are also immigrants themselves, again outmigration is highest for the most recent arrivals and declines with additional years in Canada, regardless of the urban type of the physician's region of residence. For those immigrant couples where the physician was

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[13] The magnitude of the OR for having a higher degree is very close in magnitude to this estimate but is not significant at conventional levels (OR .88 pval .14).

born in Europe or the US and the spouse was born in Asia or Africa, outmigration is found to be more likely from smaller cities and towns (OR 3.13 pval .02).

The province of residence prior to a potential move is also found to be a very important determinant of out-migration. Relative to living in a large Ontario city (mainly Toronto), physicians are significantly more likely to leave large cities in every other provincial group and the largest effects are for Atlantic and Prairie provinces: Atlantic Canada (OR 2.70 pval .00), Prairies (OR 2.25 pval .00), Alberta (OR 1.73 pval .00), Quebec (OR 1.56 pval .00) and BC (OR 1.45 pval .00). Furthermore, for immigrant physicians, some of these provincial effects are even larger. Immigrant physicians are significantly more likely to leave large cities in Atlantic Canada than are non-immigrant residents of those cities (OR 2.92 pval .00) and this is also true for immigrant residents of the Prairies (OR 2.90 pval .00) and to a lesser extent Alberta (OR 1.50 pval .01). In contrast, there are no significant differences in outmigration from smaller cities in towns in other provinces compared to Ontario, or from rural areas in other provinces compared to Ontario (the only exception being a higher incidence of out-migration from rural areas of the Prairies compared to rural areas of Ontario). There is also no evidence that out-migration rates differ for immigrant physicians residing in these provinces compared to immigrant physicians residing in Ontario.

The results in Table 3 identify factors correlated with the decision to move out of an individual's CMA region of residence but give no indication of the destination of that location decision. To address this, we estimate multinomial Logit models where for tractability we define four possible outcomes: no move, move to a large city, move to a smaller city or town, and move to a rural area. We estimate this specification again for 3

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subgroups of physicians: those resident in large cities, in smaller cities and towns, and in rural areas. Given the sheer number of estimates produced by multinomial Logit estimation (3 sets of relative risk ratios for each subsample), we simply summarize the key points here.[14] The higher incidence of outmigration by immigrant couples and unmarried immigrants from smaller cities and towns and from rural areas is directed at large cities. The higher incidence of outmigration from smaller cities and towns and from rural areas by immigrant physicians from developing countries in East and Southeast Asia also tends to be towards large cities. Higher education levels of the spouses of physicians who are resident in rural areas also lead to migration towards large cities. In summary, the multinomial results indicate a significant rural-city shift by immigrant physicians, particularly those born in parts of Asia, and by married physicians whose spouses have a university education. The higher incidence of outmigration by immigrant married couples and by South Asian and Eastern European born physicians from large cities is found to be a tendency to move to other large cities. Similarly, those factors identified as being important correlates of outmigration from smaller cities and towns are found to be associated with increased migration to larger cities and to other smaller cities and towns, but not to rural areas.

Discussion

Many regions of Canada face ongoing difficulties in attracting and retaining physicians, particularly in rural areas. In response, provincial health authorities continue to offer financial and non-financial inducements to physicians willing to practice in such areas, and are relying to varying degrees on recently arrived IMGs that hold provisional

[14] Full regression results are contained in Appendix Tables A2, A3 and A4.

licenses to supply the general and specialty physician services required in those areas. Our results suggest that such regions will likely need to continue to rely on new immigrants to meet the demand for physicians, since the retention of immigrant physicians is problematic. Recently arrived immigrant physicians, particularly those who are unmarried, have a high incidence of outmigration, particularly from rural areas. This is also true of immigrants from some regions of Asia. Furthermore, the fact that married physicians, whether immigrant or non-immigrant, tend to have highly educated spouses means that they are more likely to migrate out of rural. Analysis of destination using a multinomial Logit indicates that greater outmigration from rural areas of physicians with these characteristics is not to other rural areas or smaller cities and towns but to large cities. The results also show that, as with the general population, large cities in Ontario continue to be a favorite destination of physicians in Canada. Physicians who are resident in large cities in other provinces are also significantly more likely to move CMA region than physicians resident in Ontario's large cities, and this is particularly the case for immigrant physicians and for physicians residing in large cities in Atlantic Canada and the Prairie provinces.

Clearly, the significant rate of outmigration from rural areas of most provinces is a cause for concern for rural health authorities to ensure the continued availability of primary and specialist medical care. Rural areas in the Atlantic provinces and the Prairie provinces in particular rely to a significant extent on the inflow of internationally trained physicians, yet these physicians exhibit higher rates of outmigration from rural areas, making retention even more difficult. Furthermore, policies designed to attract physicians to rural and small town areas of Canada have implications for other provincial

governments in Ontario and BC, and health authorities in larger municipal areas such as

Toronto, since it is these areas that are the main destinations for internationally educated

physicians who are practicing in rural areas. Given the regulated nature of the medical

profession in Canada, an excess supply of physicians in larger urban areas can result in

substantial under-employment, including some physicians having little choice but to work

in other occupations. Related work by the authors (McDonald, Warman and Worswick,

2010) finds that approximately 40% of internationally educated medical graduates in

Canada in 2001 are not working as physicians, a figure that may reflect in part the

combined issues of low retention in rural areas and restrictions on physician supply in

larger urban areas.

The Census files on which this analysis has been based do have some limitations

which should be kept in mind when interpreting our results. First, even though the Census

master files are comprehensive in their coverage of the Canadian population, the

information collected therein on occupation, educational attainment, and earnings that has

been used to define our sample is still based on self-reports rather than registry data

compiled from physician registries (which themselves are subject to various limitations).

As well, since the Census files are not longitudinal in nature but instead have limited

(retrospective) information on location of residence five years before, we are unable to

ascertain for certain the employment status, earnings, and marital status of the individuals

in our dataset at the time they were making the decision to stay or move. Finally, even

with the extremely large sample sizes available to us from using four consecutive Census

files, some of our estimates for migration incidence for particular geographies and

particular subsamples of immigrant physicians may still be based on relatively small

sample sizes.

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Table 1: Geographic Mobility of Physicians in Canada aged 29-65

				Components of net change in last 5 years					
	Share of Canadian Total	Share of those who are FB	Net change in last 5 years	NB from other CMA region	NB to other CMA region	NB outside Canada 5 yrs ago	FB from other CMA region	FB to other CMA region	FB outside Canada 5 yrs ago
ATL – large city	0.05	0.30	-0.02	0.15	-0.19	0.01	0.05	-0.09	0.03
ATL – other city/town	0.02	0.33	0.20	0.24	-0.15	0.01	0.06	-0.05	0.08
ATL – rural	0.01	0.33	-0.01	0.15	-0.16	0.01	0.06	-0.14	0.07
QUE – large city	0.25	0.20	-0.02	0.04	-0.09	0.01	0.01	-0.02	0.02
QUE - other city/town	0.05	0.05	0.10	0.23	-0.13	0.00	0.02	-0.02	0.00
QUE – rural	0.04	0.07	0.06	0.22	-0.16	0.00	0.02	-0.03	0.01
ONT– large city	0.25	0.44	0.05	0.06	-0.07	0.01	0.03	-0.03	0.04
ONT– other city/town	0.06	0.32	0.09	0.18	-0.13	0.01	0.07	-0.05	0.01
ONT– rural	0.03	0.24	0.15	0.23	-0.11	0.01	0.05	-0.04	0.01
PRA – large city	0.05	0.37	-0.08	0.06	-0.15	0.01	0.05	-0.08	0.03
PRA – other city/town	0.00	0.65	0.13	0.06	-0.07	0.03	0.09	-0.19	0.20
PRA – rural	0.01	0.53	-0.02	0.11	-0.11	0.02	0.04	-0.18	0.10
ALTA – large city	0.07	0.36	0.05	0.13	-0.13	0.02	0.05	-0.05	0.02
ALTA– other city/town	0.01	0.35	0.20	0.18	-0.11	0.02	0.10	-0.05	0.07
ALTA – rural	0.01	0.42	0.02	0.09	-0.09	0.01	0.05	-0.08	0.05
BC – large city	0.08	0.43	0.11	0.11	-0.08	0.01	0.06	-0.03	0.04
BC – other city/town	0.03	0.36	0.19	0.21	-0.09	0.01	0.08	-0.05	0.02
BC – rural	0.01	0.38	0.24	0.24	-0.10	0.01	0.10	-0.06	0.05

- Figures are averaged across Census years 1991, 1996, 2001, and 2006
- Excluding individuals on temporary visas
- Net change in last five years is the proportional change in the population of MDs compared to five years before. Net change does not reflect physicians leaving Canada in the five years prior to the Census year. The sum of the component changes will equal the net change for reach CMA region.
- ATL includes NF, NB, PEI and NS; PRA includes MAN and SASK

Table 2: Proportions of physicians moving to another CMA region, by Family Type and CMA region of residence 5 years ago

CMA Region 5 years ago	Couple, both born in Canada	Couple, both born outside Canada	Person born in Canada, no spouse	Person born outside Canada, no spouse	Couple, one CDN born, one foreign born*
ATL – large city	0.21	0.27	0.37	0.33	0.22
ATL – other city/town	0.12	0.14	0.34	0.47	--
ATL – rural	0.12	0.48	0.38	0.43	0.21
QUE – large city	0.07	0.04	0.16	0.20	0.07
QUE - other city/town	0.09	0.51	0.25	0.33	0.13
QUE – rural	0.12	--	0.26	0.66	0.22
ONT– large city	0.09	0.04	0.16	0.11	0.06
ONT– other city/town	0.10	0.09	0.39	0.37	0.12
ONT– rural	0.09	0.14	0.32	0.21	0.11
PRA – large city	0.16	0.18	0.37	0.44	0.19
PRA – other city/town	0.06	0.34	0.57	0.22	--
PRA – rural	0.13	0.29	0.49	0.59	0.16
ALTA – large city	0.15	0.08	0.30	0.25	0.11
ALTA– other city/town	0.10	0.16	0.40	0.30	--
ALTA – rural	0.12	0.17	0.37	0.47	0.08
BC – large city	0.10	0.04	0.20	0.10	0.08
BC – other city/town	0.08	0.07	0.43	0.33	0.09
BC – rural	0.14	0.14	0.27	0.31	0.11
All regions	0.10	0.09	0.23	0.20	0.09

* one member of the married couple born in Canada, one born outside Canada. Means and proportions for the immigrant variables are based on immigrant members of the couple only

Table 3: Logistic regression results on the incidence of moving CMA region, by type of region of residence 5 years previously

Residence 5 yrs ago:	Large City		Smaller city/town		Rural	
	OR	p-val	OR	p-val	OR	p-val
Age	**0.73**	**0.00**	**0.67**	**0.00**	**0.70**	**0.00**
Age-sq	**1.00**	**0.00**	**1.00**	**0.00**	**1.00**	**0.00**
Female	**0.89**	**0.01**	1.11	0.32	0.95	0.65
French speaker in QUE	**0.47**	**0.00**	0.47	0.16	0.68	0.33
NB married couple	1.00	--	1.00	--	1.00	--
FB married couple	**1.94**	**0.01**	**8.37**	**0.00**	**9.15**	**0.00**
NB not married	0.48	0.13	0.43	0.35	4.75	0.17
FB not married	0.67	0.43	1.08	0.93	**12.39**	**0.03**
FB/NB married couple	**1.37**	**0.04**	**3.23**	**0.00**	**2.56**	**0.00**
YSE	**0.94**	**0.00**	**0.94**	**0.05**	0.96	0.15
YSE-sq	**1.00**	**0.00**	1.00	0.37	1.00	0.49
Born UK	1.00	--	1.00	--	1.00	--
Born USA	1.20	0.30	0.85	0.66	0.28	0.06
Born W-Europe	1.15	0.45	1.22	0.57	0.47	0.13
Born E-Europe	**1.54**	**0.01**	1.92	0.07	0.97	0.95
Born Jap/Korea/HK	**0.68**	**0.03**	1.32	0.43	2.45	0.18
Born South Africa	0.97	0.91	0.82	0.59	**2.21**	**0.02**
Born other East Asia	1.09	0.64	**2.30**	**0.02**	**3.91**	**0.00**
Born South Asia	**1.44**	**0.03**	1.44	0.24	1.91	0.09
Born Elsewhere	**1.32**	**0.05**	1.32	0.29	1.21	0.53
Spouse*						
Age	0.99	0.54	0.93	0.07	1.04	0.48
Age-sq	1.00	0.39	1.00	0.20	1.00	0.29
University degree	**0.82**	**0.01**	1.05	0.76	1.14	0.39
Higher degree	0.88	0.14	1.23	0.29	**1.61**	**0.04**
YSE	**0.96**	**0.00**	**0.94**	**0.05**	**0.93**	**0.01**
YSE-sq	**1.00**	**0.01**	1.00	0.29	**1.00**	**0.04**
Born in Asia/Africa*	0.91	0.78	**3.13**	**0.02**	0.76	0.67
Province 5 yrs ago						
Atlantic	**2.70**	**0.00**	1.17	0.46	1.32	0.20
Quebec	**1.56**	**0.00**	1.63	0.36	1.54	0.29
Ontario	1.00	--	1.00	--	1.00	--
Prairies	**2.25**	**0.00**	1.53	0.25	**1.94**	**0.02**
Alberta	**1.73**	**0.00**	1.24	0.37	1.37	0.24
BC	**1.45**	**0.00**	1.11	0.51	1.34	0.25
Atlantic x FB	**2.92**	**0.00**	0.95	0.89	1.57	0.24
Ontario x FB	1.00	--	1.00	--	1.00	--
Quebec x FB	1.32	0.08	2.40	0.06	1.90	0.17
Prairies x FB	**2.90**	**0.00**	1.70	0.27	0.48	0.12
Alberta x FB	**1.50**	**0.01**	1.19	0.67	0.50	0.13
BC x FB	0.89	0.53	0.81	0.49	0.57	0.18
N	27660		5312		3432	
p-Rsq	0.1822		0.2004		0.168	
Incidence of outmigration	0.11		0.15		0.18	

- set to zero if no spouse is present
- takes the value 1 if spouse born in Asia/Africa and physician born in UK/USA/Europe

Appendix Table A1: Characteristics of physician by Family Type

	Couple, both born in Canada	Couple, both born outside Canada	Person born in Canada, no spouse	Person born outside Canada, no spouse	Couple, one CDN born, one foreign born*
Female	0.27	0.26	0.45	0.35	0.30
Age	45.1	49.4	39.8	43.1	46.1
Years since migration		21.4		22.1	28.8
Born USA		0.03		0.07	0.11
Born UK		0.21		0.20	0.28
Born Western Europe		0.05		0.07	0.15
Born Eastern Europe		0.10		0.09	0.09
Born South Africa		0.06		0.05	0.03
Born Japan/Korea/HK		0.08		0.11	0.06
Born elsewhere		0.47		0.40	0.28
Spouse					
Age	43.8	47.8			44.1
University degree	0.33	0.27			0.31
Higher degree	0.33	0.39			0.39
Years since migration		21.3			27.8
Born USA		0.04			0.18
Born UK		0.22			0.28
Born Western Europe		0.07			0.19
Born Eastern Europe		0.10			0.08
Born South Africa		0.06			0.02
Born Japan/Korea/HK		0.07			0.05
Born elsewhere		0.44			0.20
Prop of total	0.44	0.18	0.16	0.07	0.15
N	16459	6516	5723	2390	5444

- one member of the married couple born in Canada, one born outside Canada. Means and proportions for the immigrant variables are based on immigrant members of the couple only

Appendix Tables A2, A3, A4: Multinomial Logit Results

A2: Resident in a Large City 5 years ago
BASE - didn't move

moved to

	Large city		smaller city/town		rural	
Age	0.75	0.00	0.74	0.00	0.71	0.00
Age-sq	1.00	0.00	1.00	0.00	1.00	0.00
Female	0.87	0.02	0.84	0.02	1.05	0.62
FB married couple	**2.03**	**0.03**	**2.78**	**0.03**	0.89	0.87
NB not married	1.51	0.61	**0.23**	**0.04**	**0.24**	**0.05**
FB not married	1.85	0.46	0.39	0.22	0.26	0.09
FB/NB married couple	1.39	0.09	**1.63**	**0.05**	1.07	0.87
YSE	**0.95**	**0.00**	**0.93**	**0.00**	**0.94**	**0.02**
YSE-sq	**1.00**	**0.03**	**1.00**	**0.01**	1.00	0.22
Born USA	1.31	0.26	1.07	0.82	1.14	0.68
Born W-Europe	**1.65**	**0.03**	0.95	0.86	**0.28**	**0.03**
Born E-Europe	**1.74**	**0.01**	1.44	0.22	1.10	0.81
Born Jap/Korea/HK	1.09	0.66	**0.13**	**0.00**	0.34	0.07
Born South Africa	1.16	0.64	0.55	0.32	1.22	0.77
Born other East Asia	**1.58**	**0.03**	**0.44**	**0.05**	0.72	0.43
Born South Asia	1.46	0.06	**1.85**	**0.04**	0.73	0.44
Born Other	**1.54**	**0.01**	0.99	0.98	1.23	0.47
Atlantic	**3.12**	**0.00**	**2.31**	**0.00**	**2.48**	**0.00**
Quebec	**2.29**	**0.00**	1.07	0.72	**0.57**	**0.05**
Prairies	**3.26**	**0.00**	1.41	0.08	**1.60**	**0.03**
Alberta	**2.34**	**0.00**	1.21	0.32	1.29	0.20
BC	**1.66**	**0.00**	**1.37**	**0.04**	1.14	0.56
Atlantic x FB	**3.43**	**0.00**	**1.89**	**0.05**	**3.09**	**0.00**
Quebec x FB	1.26	0.30	1.08	0.77	**2.69**	**0.00**
Prairies x FB	**2.84**	**0.00**	**2.19**	**0.03**	**3.86**	**0.00**
Alberta x FB	1.31	0.18	1.23	0.54	**2.85**	**0.00**
BC x FB	0.87	0.54	0.92	0.76	0.85	0.75
Spouse*						
Age	1.02	0.70	0.97	0.50	0.97	0.37
Age-sq	1.00	0.27	1.00	0.63	1.00	0.90
University degree	0.92	0.45	**0.77**	**0.03**	0.76	0.06
Higher degree	1.19	0.16	**0.70**	**0.02**	**0.65**	**0.02**
YSE	0.97	0.09	0.92	0.00	0.99	0.71
YSE-sq	1.00	0.39	1.00	0.00	1.00	0.98
French in Quebec	**0.09**	**0.00**	1.01	0.94	**2.27**	**0.00**
Both physicians	0.90	0.42	1.26	0.19	1.09	0.72
Born in Asia/Africa	0.80	0.58	1.51	0.42	0.14	0.06

A3: Resident in a Smaller City/Town 5 years ago
BASE - didn't move

moved to

	large city		smaller city/town		rural	
Age	0.67	0.00	0.75	0.09	0.69	0.00
Age-sq	1.00	0.00	1.00	0.30	1.00	0.00
Female	**1.25**	**0.05**	**0.42**	**0.03**	0.93	0.74
FB married couple	**11.47**	**0.00**	0.90	0.93	4.27	0.12
NB not married	0.49	0.52	1.05	0.99	0.23	0.26
FB not married	1.46	0.75	0.38	0.77	0.53	0.64
FB/NB married couple	**3.20**	**0.00**	1.26	0.76	**3.32**	**0.03**
YSE	0.97	0.42	0.90	0.06	**0.91**	**0.02**
YSE-sq	1.00	0.74	**1.00**	**0.05**	1.00	0.07
Born USA	0.57	0.18	**8.04**	**0.01**	0.97	0.96
Born W-Europe	1.27	0.58			0.94	0.93
Born E-Europe	1.82	0.13	3.79	0.27	1.13	0.84
Born Jap/Korea/HK	1.47	0.32	3.39	0.25		
Born South Africa	0.52	0.16	4.05	0.09	1.38	0.61
Born other East Asia	**2.51**	**0.02**	**7.52**	**0.04**		
Born South Asia	1.28	0.49	**7.28**	**0.03**	0.52	0.45
Born Other	1.03	0.92	**7.35**	**0.01**	0.83	0.80
Atlantic	1.18	0.52	**1.96**	**0.24**	1.00	0.99
Quebec	1.53	0.47	1.61	0.56	1.82	0.56
Prairies	1.88	0.16	1.51	0.70	0.71	0.67
Alberta	1.34	0.31	**3.20**	**0.05**	0.54	0.30
BC	1.33	0.12	1.29	0.66	0.56	0.10
Atlantic x FB	0.52	0.12	**7.55**	**0.02**	1.45	0.58
Quebec x FB	2.59	0.06	2.32	0.47	1.64	0.64
Prairies x FB	0.92	0.89	**21.20**	**0.02**	1.72	0.60
Alberta x FB	1.29	0.59			2.16	0.42
BC x FB	0.56	0.09	2.65	0.32	2.00	0.31
Spouse*						
Age	0.93	0.15	0.98	0.87	0.91	0.13
Age-sq	1.00	0.40	1.00	0.90	1.00	0.20
University degree	1.16	0.40	1.22	0.63	0.76	0.34
Higher degree	1.42	0.13	0.38	0.28	1.09	0.82
YSE	0.94	0.11	0.98	0.80	0.95	0.42
YSE-sq	1.00	0.38	1.00	0.43	1.00	0.86
French in Quebec	0.55	0.31	**0.18**	**0.03**	0.36	0.31
Both physicians	0.67	0.15	1.71	0.60	1.00	0.99
Born in Asia/Africa	2.52	0.09	**9.14**	**0.01**	0.87	0.90

A4: Resident in a Rural Area 5 years ago
BASE - didn't move

moved to

	large city		smaller city/town		rural	
Age	0.74	0.00	0.68	0.00	0.49	0.00
Age-sq	1.00	0.00	1.00	0.00	1.01	0.00
Female	0.90	0.45	1.07	0.73	0.82	0.57
FB married couple	**9.73**	**0.00**	**7.40**	**0.01**	1.38	0.89
NB not married	13.07	0.09	0.98	0.99	1.88	0.89
FB not married	**36.06**	**0.02**	2.73	0.56	0.63	0.93
FB/NB married couple	**2.92**	**0.01**	1.51	0.47	1.14	0.92
YSE	0.98	0.47	0.97	0.69	0.85	0.07
YSE-sq	1.00	0.96	1.00	0.94	**1.00**	**0.05**
Born USA	0.25	0.14	0.43	0.24		
Born W-Europe	0.73	0.55	0.20	0.07		
Born E-Europe	1.13	0.81	0.44	0.37	3.40	0.29
Born Jap/Korea/HK	2.80	0.18	0.80	0.86	11.09	0.08
Born South Africa	**3.05**	**0.01**	1.56	0.38	0.92	0.92
Born other East Asia	**6.91**	**0.00**	0.68	0.66		
Born South Asia	**2.77**	**0.02**	1.34	0.59		
Born Other	1.80	0.11	0.51	0.24	0.71	0.68
Atlantic	**1.77**	**0.04**	0.89	0.72	1.09	0.90
Quebec	**3.23**	**0.01**	0.24	0.27		
Prairies	**2.74**	**0.00**	1.22	0.71	1.38	0.68
Alberta	1.79	0.07	0.65	0.38	2.52	0.18
BC	1.54	0.20	1.24	0.55	0.94	0.94
Atlantic x FB	0.92	0.84	2.57	0.14	22.12	0.10
Quebec x FB	0.98	0.96	5.57	0.04		
Prairies x FB	**0.31**	**0.03**	0.41	0.26	16.62	0.21
Alberta x FB	**0.33**	**0.03**	0.66	0.60	7.88	0.33
BC x FB	0.55	0.23	0.30	0.11	4.59	0.45
Spouse*						
Age	1.07	0.37	1.00	0.96	1.02	0.92
Age-sq	1.00	0.28	1.00	0.63	1.00	0.87
University degree	1.38	0.08	0.83	0.50	0.91	0.85
Higher degree	**1.72**	**0.05**	1.36	0.37	1.97	0.31
YSE	**0.92**	**0.02**	0.95	0.33	1.04	0.82
YSE-sq	1.00	0.08	1.00	0.32	0.99	0.31
French in Quebec	0.53	0.09	2.52	0.46	1.68	0.35
Both physicians	0.82	0.54	0.74	0.46	0.74	0.72
Born in Asia/Africa	1.05	0.94	0.51	0.66		

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