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Abstract

Canada is increasingly looking to international students as a source of postsecondary tuition revenues and new immigrants. By 2014, international students accounted for 10% of graduates from Canadian postsecondary institutions, up from 3% in 2000, and 11% of new permanent residents, up from 7% in 2010. This article compares the labour market performance of former international students (FISs) entering the Canadian labour market during the first decade of the 2000s to their Canadian-born-and-educated (CBE) and foreign-born-and-educated (FBE) counterparts. We find that FISs outperform FBE immigrants by a substantial margin and underperform CBE individuals graduating from similar academic programs by a relatively modest margin. We also find some limited evidence, particularly among women, of a deterioration in FIS outcomes through the 2000s relative to both comparison groups. We argue that this deterioration is consistent with a quality tradeoff as postsecondary institutions and governments have reached deeper into international student pools to meet their demands for students and new immigrants without a commensurate increase in their supply.

Keywords: International students; labour market integration; immigrant selection policy.
JEL Classification: I23, J61, J31.

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Executive Summary

In response to substantial provincial funding cuts through the 1990s combined with a declining postsecondary-aged domestic student population, Canada's postsecondary institutions are increasingly tapping into the international student market for their tuition revenues. Complementing this increase, the Canadian government has in recent years made a number of important changes to its immigration policies easing the transition of international students to permanent residency. Consequently, by 2014, international students accounted for 10% of graduates from Canadian postsecondary institutions, up from 3% in 2000, and 11% of new permanent residents, up from 7% in 2010. In justifying the government's preference for international students, former Minister of Immigration, John McCallum, argued: "international students are the best source of immigrants, in the sense that they're educated, they speak English or French, and they know something of the country. So we should be doing everything we can do to court them."

In theory, the government's preference for international students is well justified. Canadian educated immigrants are less likely to face credential recognition issues and their time spent studying should help them acculturate more easily to Canadian society. However, the evidence on the relative labour market performance of former international students is mixed. Studies estimating separate labour market returns to foreign and Canadian sources of education have consistently found little to no evidence that immigrants' foreign credentials are discounted relative to their Canadian credentials (Ferrer and Riddell 2008, Skuterud and Su 2012, and Bonikowska, Hou and Picot 2015). Based on this evidence, the government gave no preference to applicants with Canadian postsecondary credentials over their foreign-educated counterparts in its Express Entry (EE) system introduced in January 2015 to rank and process economic immigrants.[1]

In this study, we exploit data from the 2000, 2005, 2007, and 2013 waves of the Canadian National Graduates Survey (NGS) to study the post-graduation labour market outcomes of former international students (FISs) who have transitioned to Canadian permanent residency. We examine multiple outcome variables: log hourly earnings, employment, unemployment part-time jobs, four occupation types, and two-self reported indicators of whether an individual's job matches his/her educational background in terms of the field and level of the academic program completed. We compare FIS outcomes to both Canadian-born-and-educated postsecondary students graduating from similar academic programs and foreign-born-and-educated immigrants who first entered Canadian labour market at the same time.[2]

[1] This feature of the EE system was revised in November 2016 in response to concerns that the system was biased against international students.

[2] To obtain a sample of FBE immigrants, we combine our NGS data with data from the Canadian Labour Force Survey (LFS).

There are three main findings from our analysis. First, FISs clearly outperform their foreign-educated counterparts by substantial margins. Moreover, the advantage of Canadian over foreign postsecondary education is evident for men and women, across post-secondary education levels, and the regions of origin of immigrants. Second, we find that the average labour market outcomes of FISs lag behind their Canadian-born counterparts when we compare FISs and domestic students graduating from similar academic programs. The performance gaps we identify tend to be larger for college-educated women, in fields outside of math and computer science, among Chinese men and South-Asian women, and at the lower end of the earnings distribution than at the top. Third, we find some evidence, particularly among women, that the relative labour market performance of FISs has tended to deteriorate over time, although the declines are modest in magnitude.

Unfortunately, we are unable to determine to what extent the performance gaps of FISs relative to their Canadian-born counterparts reflect something about FISs students themselves, such as their relative English-French language skills, as opposed to something about their relative labour market experiences as immigrants, such as that they are more likely to face labour market discrimination or that they will tend to have weaker social networks to access in their job search efforts. However, the fact that the deterioration in FIS outcomes is evident in the comparison to both Canadian-born-and educated graduates and foreign-educated immigrants suggests to us that it reflects something about FISs as opposed to changing labour market conditions, since there is no clear reason why Canadian-born-and-educated graduates or foreign-educated immigrants would not have been similarly adversely affected by changing labour market conditions. The most obvious explanation for this deterioration is a tradeoff in the average labour market quality of foreign students as postsecondary institutions and governments reached deeper into the pools of international students through the 2000s to meet their demands for students and new immigrants without a commensurate increase in the supply of foreign students.

1 Introduction

In January 2015, Canada introduced a new system for processing economic-class immigrants in response to a growing application backlog. Rather than process applications on a first-in first-out basis, the new Express Entry (EE) system gives priority to candidates who are deemed to be most likely to succeed economically. Within months of its introduction, the EE system was criticized for being unfairly biased against international students, as the criteria used to rank candidates gave no preference to candidates with Canadian educational credentials, but instead prioritized candidates with arranged employment, regardless of their educational backgrounds. In response to growing concerns that foreign students were being bypassed in the applicant pool, the government revised the system in November 2016 stating that it sought to increase its reliance on international students as a source of new immigrants.

Arguably, the biggest proponents of the government's objective to ease the transition to permanent residency for international students, besides foreign students themselves, are Canada's postsecondary institutions. Following significant cuts to provincial funding through the 1990s, universities and colleges were forced to increase their reliance on tuition revenues. This provided a solution while enrolments were increasing, but recent demographic trends are resulting in a decline in the university-aged population. Postsecondary institutions are responding by looking to the tuition fees of foreign students to balance their budgets, which unlike domestic fees, are not capped by provincial governments.[3] Critical to foreign student recruitment are immigration policies that promise international students a pathway to Canadian permanent residency. In this regard, recent changes in immigration policy are highly complementary to the efforts of postsecondary institutions.

In theory, the government's preference for international students is well justified. Canadian educated immigrants are less likely to experience credential recognition issues. The skills they have acquired are more likely to be relevant to the Canadian workplace. Their time spent studying in Canada should help them to acculturate more easily to Canadian society. This includes acquiring superior English and French skills, as well social networks that may be critical in job search following graduation. Canadian education may also provide opportunities to gain Canadian work experience, through cooperative education for example, which may be advantageous in finding good jobs following graduation. In justifying his intention to revise the EE System, former Minister of Immigration, John McCallum, argued: "international students are the best source of immigrants, in the sense that they're educated, they're young, they speak English or French, and they know something of the country. So we should be doing everything we can do to court them."[4]

[3]The number of foreign students enrolled in Canadian universities and colleges increased from 43,296 to 214,782 between 1999-2000 and 2014-2015 (see CANSIM table 477-0031).

[4]See Michelle Zilio and Simona Chiose, Ottawa looks to ease international students path to permanent residency,

Notwithstanding the conventional wisdom, the Canadian evidence on the labour market performance of former international students (FISs) is mixed. Studies estimating separate labour market returns to foreign and Canadian sources of education have consistently found little to no evidence that immigrants' foreign credentials are discounted relative to their Canadian credentials (Ferrer and Riddell 2008, Skuterud and Su 2012, and Bonikowska, Hou and Picot 2015).[5] Sweetman and Warman (2014) compare weekly and hourly earnings of FISs who immigrated to Canada as principal applicants under the Federal governments Skilled Worker Program (FSWP) to other immigrants, who entered under this program and find some evidence of higher earnings among FISs four years after landing. Their results, however, vary significantly depending on which FSWP criteria are used to define the sample and whether individuals with zero earnings are included in the sample. Finally, Hou and Lu (2017) employ a linkage of administrative immigration and tax data to compare the earnings of two cohorts (early-1990s and mid-2000s) of university-educated FISs to both foreign-born-and-educated (FBE) immigrants and Canadian-born-and-educated (CBE) university graduates who entered the labour market at similar times. In contrast to much of the existing evidence, they find significantly higher average earnings among FISs than among FBE immigrants, both in the short run and 10 years after arrival. However, this earnings advantage is small in comparison to the gap relative to the CBE comparison group.

In this article, we examine the relative labour market performance of three graduating cohorts (2000, 2005, and 2009/2010) of FISs who have transitioned to permanent residency using data from the 2000, 2005, 2007, and 2013 National Graduates Survey (NGS). We compare these FISs to their CBE counterparts graduating at the same time with similar credentials in similar fields of study. In addition, using data from the Labour Force Survey (LFS), we extract a sample of FBE immigrants whose landing years in Canada correspond to the graduating years of the FISs in our NGS sample and compare labour market outcomes among FISs and FBE immigrants from similar regions of the world.

The contribution of our analysis is twofold. First, by comparing FISs with CBE individuals graduating from similar academic programs, we obtain evidence on the extent and nature of the labour market challenges facing FISs. Second, with three cohorts of FISs spanning the first decade of the 2000s, we examine whether there is any evidence of a deterioration in the labour market performance of FISs as postsecondary institutions and governments have reached deeper into foreign student pools to meet their student and immigration demands. Indeed, there is evidence that Australia experienced such a tradeoff following a 2000 policy revision favouring international students,

Globe and Mail, March 14, 2016.

[5]Indeed, it was this evidence that the decision not to differentially reward foreign and Canadian education in the Express Entry point system, known as the Comprehensive Ranking System (CRS), was based.

which appears to spurred the growth of a vocational education sector targeting foreign students with questionable quality standards, as well as compromised academic and progression standards in more select established institutions (Birrell, Hawthorne, and Richardson 2006, Hawthorne 2010). As Canada has similarly moved to increase its reliance on international students, monitoring the labour market performance of FISs is critical.

Of course, there are many reasons why FISs may struggle in the labour market relative to domestic students. FISs are likely to face greater job search frictions, due in particular to their weaker social networks, which will tend to make them more sensitive to adverse macroeconomic conditions. There is also compelling evidence that FISs with foreign names are likely to face discrimination in recruiting by Canadian employers (Oreopoulos 2011). Finally, but perhaps most important, many FISs will have English/French language difficulties, which will present communication challenges in the job search process and in the workplace. However, we would expect all of these factors to affect FBE immigrants from common origin regions similarly. Therefore, evidence that the labour market outcomes of FISs are declining relative to both the CBE and FBE comparison groups is arguably most consistent with a tradeoff in the average labour market quality of FISs as the FIS share of postsecondary graduates and immigrants has increased.

Consistent with the findings of Hou and Lu (2017), we find that FISs outperform FBE immigrants by a substantial margin, but lag behind their CBE counterparts. This is true for men and women and over a wide range of labour market outcomes including hourly earnings, unemployment rates, and job-education match rates. However, the FIS gaps we identify relative to the CBE comparison group are modest. In fact, we find essentially no shortfall in the average earnings of male FISs and CBE postsecondary graduates and only small gaps for women when we do not condition on education level and field of study. However, when we compare FISs and CBE graduates from similar academic programs, the gaps become larger and tend to be largest for women with college diplomas, in fields outside of math and computer science, among Chinese men and South-Asian women, and at the lower end of the earnings distribution than at the top. Moreover, we find some evidence, particularly among women, that the relative performance of FISs has tended to deteriorate over time relative to both the FBE and CBE comparison groups.

The remainder of the paper is organized as follows. In the following section, we examine recent changes in the international student share of postsecondary graduates and new immigrants. The following two sections then describe the NGS and LFS data and the methodology we use to examine the relative labour market performance of FISs. Section 4 examines the results and the concluding sections summarize our main findings and discuss their implications for foreign student selection and settlement policies of postsecondary institutions and governments.

2 International Student Shares of Graduates and Immigrants

According to data from Statistics Canada's Post-Secondary Information System (PSIS), the international student share of postsecondary student enrolments and graduates increased steadily from about 3% in 1999 to slightly more than 10% by 2014.[6] In Figure 1, we plot the international student shares of graduates separately for universities and colleges and by gender. The data reveal a shift towards foreign students within both colleges and universities. Although universities relied more on foreign students throughout the period, recent years have seen a larger shift within colleges. Among male college students, the increase has been particularly dramatic, increasing from 6% to 12% between 2010 and 2014. As postsecondary institutions reach deeper into the foreign student applicant pools, the question is whether there has been any tradeoff in the average quality of graduating foreign students. Of course, to the extent that pools of applicants have been similarly growing, through the student recruitment efforts of postsecondary institutions and immigration policy changes luring students with ambitions to settle permanently in Canada, it is entirely possible that quality has been maintained.

In Figure 2, we use administrative data from Immigration, Refugees, and Citizenship Canada (IRCC) to plot the share of new permanent residents who had any point in the past held a study visa in Canada by broad immigration category. The FIS share of new permanent residents was stagnant at 6-7% between 2005 and 2010, but has been increasing steadily since, so that by 2016, 11% of all new immigrants were FISs. This increase appears to be entirely driven by economic-class immigration, as the FIS share of humanitarian immigration decreased over the period to below 5%, while the FIS share of family class immigration was relatively stable between 6% and 9%. By 2016, 15% of economic-class immigrants were FISs, which was twice as large as the FIS share five years earlier. This increase is entirely consistent with shifts in immigrant selection policy favouring FISs.

In Figure 3, we examine this increase further by considering through which economic-class programs FISs are entering. The data reveal an important shift since 2005 away from the FSWP towards both the Canadian Experience Class (CEC) and Provincial Nominee Programs (PNPs) so that by 2016, each of these three programs accounted for roughly one-third of FIS immigration (within the economic-class stream). There is good reason to believe that the major immigration hurdle for FISs is satisfying Canadian work experience requirements. The challenge reflects, at least in part, the hesitancy of employers to recruit workers with a precarious immigration status. In this respect, the Ontario and British Columbia PNPs are particularly attractive to international students as both wave the job offer requirement for those with Masters or Doctoral degrees (although

[6]The PSIS data are based on the administrative data of Canadas postsecondary institutions, which are provided to Statistics Canada. See CANSIM tables 473-0031 and 473-0032.

BC requires the graduate degree be in a STEM field). According to our NGS data (described in the following section), roughly one-half of foreign students who graduated in 2010 and subsequently transitioned to permanent residency held graduate degrees. More generally, the PNP and CEC programs are attractive as the selection criteria are simplified, thereby simplifying the application process and reducing processing times. For example, both programs remove the requirement for an adaptability assessment by an immigration officer.

The increasing FIS share of immigration may not only reflect the increase in foreign students graduating from Canadian postsecondary institutions, but could reflect an increase in the probability that they transition to permanent residency. Certainly, as PNPs and the CEC program ease the foreign student transition to permanent residency, we would expect permanent residency transition rates to increase. In addition to the PNPs and CEC program, the Federal Government has since 2003 gradually increased the length of time that foreign students are permitted to remain in Canada following graduation enabling them to acquire the Canadian work experience. As of April 2008, the Post-Graduation Work Program (PGWP) provides open work permits for up to three years to all international students graduating from a recognized Canadian postsecondary institution with no restrictions on the type of employment obtained. While the impact of extending the duration of permits on the labour market earnings of international students is theoretically ambiguous, the PGWP should unambiguously increase the likelihood of transitions to permanent residency.[7]

To obtain evidence on the permanent residency transition rates of international students, Lu and Hou (2015) examine administrative immigration data linking temporary visas and permanent landing records. The results of their analysis suggest that 27% of foreign students who received their first study permit in the early 1990s had transitioned to permanent residency within the following 10 years. This transition rate was, in comparison, 20% for international students arriving in the late 1990s and 25% in the early 2000s. Combining our data on FIS graduates who were permanent residents at the time of being sampled in the NGS and PSIS data on total international student graduates (reported in Figure 1), we estimate that 44%, 25%, and 35% of the 2000, 2005, and 2010 postsecondary graduation cohorts had transitioned to permanent residency by the time they were surveyed. However, while the 2000 and 2005 cohorts were sampled 2 years following graduation, the 2010 cohort was sampled 3 years after graduation, which could account for all of the increase for the most recent cohort. Therefore, both our data and that of Lu and Hou (2015) do

[7]Prior to 2003, foreign students were able to remain in Canada for 1 year following graduation. The extending work permits on the wage rates of foreign students is theoretically ambiguous, because on the one hand it should increase reservation wages during job search, since individuals have more time to obtain job offers, so that the likelihood of obtaining an offer exceeding a given reservation wage increases. However, it is also possible that the value of the option of returning to ones home country decreases with time in Canada, if for example, the psychological costs of returning home increase as deeper roots have been planted in Canada.

not suggest that transition rates to permanent residency have been rising, which implies that all of the increase in FIS immigration reflects the large increase in the number of international students graduating from Canadian postsecondary institutions.

3 Data

The National Graduates Survey (NGS) is a nationally representative survey of postsecondary graduates from Canadian public postsecondary institutions. The 2002 and 2005 cycles of the NGS surveyed individuals who graduated in 2000; the 2007 cycle surveyed 2005 graduates; and the 2013 cycle surveyed 2009/2010 graduates. Critical to our analysis is that each of these cycles of the NGS questionnaire asked all respondents who were not Canadian citizens at the time of registration in their academic program: "Were you ever a visa student (study permit holder) while pursuing post-secondary education in Canada?" To obtain our sample of FISs, we pool these four cycles of the NGS and extract the sample of respondents who answered yes to this question and reported being a landed immigrant when surveyed.[8] This provides samples of 1,824 male and 1,147 female FISs, who are observed 2, 3, or 5 years following graduation.

We compare the labour market outcomes of FISs to both CBE individuals and FBE immigrants. To obtain the CBE comparison group, we extracted the sample of individuals in the 2002, 2005, 2007, and 2013 NGS cycles who are Canadian-born and finished their highest level of schooling in Canada. This provides samples of 35,705 male and 51,682 female CBE postsecondary graduates. The NGS does not sample graduates of foreign postsecondary institutions. To obtain a sample of FBE immigrants, we instead rely on the Labour Force Survey (LFS), which since January 2006 has identified not only the country of birth and current immigration status of all respondents, but also the country in which they obtained their highest level of schooling. We pool the LFS data in all months between 2006 and 2013 and extract the sample of individuals who are foreign born, but were landed immigrants at the time that they were surveyed, and whose highest level of schooling is a postsecondary diploma or degree obtained outside Canada. In addition, we include only FBE individuals who are observed between 17 and 78 after landing in Canada, in order to match the range of months since program completion of the FIS and CBE samples. In this way, we are comparing individuals in all cases who entered the Canadian labour market at the similar time. Together these restrictions result in samples of 8,998 male and 10,363 female FBE immigrants.[9]

[8] In addition, to college and university graduates, the NGS samples individuals who have completed a trade or vocational degree. We exclude these individuals from our analysis. In addition, we restrict our sample to individuals who were under the age of 65 at the time of graduation.

[9] To reduce sampling costs, the LFS resamples the same households for six consecutive months. To avoid the complications in variance estimation that this resampling creates, we restrict our sample of FBE immigrants to the first month in which individuals are observed in the LFS (the "birth rotation").

Our analysis of labour market performance is based on 10 outcome variables: log hourly earnings and binary indicators of employment, unemployment, part-time jobs (usual weekly hours under 30), occupation type, and two self-reported indicators of whether an individual's job matches his/her educational background in terms of the field and level of the academic program completed. The occupation variable groups occupations into one of four types: nonroutine cognitive, routine cognitive, nonroutine manual, and routine manual. The approach of distinguishing jobs by whether the tasks performed are primarily cognitive versus manual and routine versus nonroutine is due to Autor, Katz, and Kearney (2006). They argue that nonroutine cognitive jobs experienced the greatest real wage growth through the 1990s, because these jobs are complementary with computerization, whereas jobs with routine tasks tend to be substitutes. In examining this variable we consider whether FISs are more or less likely to be employed in cognitive nonroutine occupations, which include managers, professionals, and various technical occupations in engineering and computing, as opposed to routine jobs, and whether this has been changing over time.[10]

Table 1 reports the sample means of the variables used in our analysis separately for the FIS, CBE, and FBE samples. The first rows report the raw means of the 10 labour market outcome variables. The estimates reveal that male and female FISs have mean log hourly earnings that exceed that of FBE immigrants by roughly 30 log points. This is a substantial advantage, which is also evident in higher employment rates, lower unemployment rates, a lower incidence of involuntary part-time jobs, higher incidence of being employed in non-routine cognitive jobs, and a higher likelihood that jobs match the educational requirements of jobs in terms of level and field of study. Male FISs also have significantly higher mean hourly earnings than the CBE men, whereas the average hourly earnings of female FISs and CBE women are almost identical. This pattern is also evident in the occupation types, where male FISs are significantly more likely to have nonroutine cognitive jobs, whereas female FISs appear similar to CBE women. The only remaining large difference worth noting is that the unemployment rate of female FISs is significantly higher (10.3%) than the CBE (5.5%) and FBE (8.2%) comparison groups. This is an unexpected result that disappears when we condition on the current year and the unemployment rate in the year of labour market entry.

The remaining rows of Table 1 compare sample means of the set of explanatory variables we use to account for the differences in labour market outcomes. First, with regard to the large performance advantage of FISs over FBE immigrants, FIS immigrants are more likely to have graduate degrees than FBE immigrants. Specifically, 60% of male and 47% of female FISs have graduate degrees, compared to 31% of male and 24% of female FBE immigrants. They are, however, also younger and

[10]For the mapping of occupation codes to occupation types, see Table A.1. in Cortes et al. (2014).

are observed fewer months since labour market entry, on average. In terms of regions of origin, FISs are more likely to come from Africa and East Asia and less likely to come from Eastern Europe and South Asia. With regard to the comparison with CBE graduates, the education advantage of FISs is even larger. Specifically, 90% of male and 84% of female FISs have university degrees, compared to 60% of male and 72% of female CBE postsecondary graduates. FISs are about 3 years older on average. Finally, they are more likely to have credentials in mathematics and engineering and less likely to have degrees in education, health, and other personal, protective, and transportation services.

Before turning to the estimation of relative labour market outcomes, Table 2 estimates the distributions of graduates across levels of postsecondary education by graduation cohorts, as well as the estimated populations of FISs, CBE graduates, and FBE immigrants. Consistent with Figure 1, our population estimates of FISs and CBE individuals in the final column of Table 1 point to a significant increase in the FIS share of Canadian postsecondary graduates from 1.6% in 2000, to 2.0% in 2005, to 3.5% in 2010. The increase is slightly larger for men (2.1% to 4.7%) than for women (1.3% to 2.7%). Table 1 also indicates that the growth in male FISs primarily reflects growth at the college and undergraduate levels, so that the share of male FISs with graduate degrees decreased from nearly 75% in 2000 to less than 50% by 2010. This pattern is not evident among the male CBE comparison group or among female FISs, where the growth, which has been roughly equivalent to the male FIS growth, is much more evenly spread across education levels. There is, however, evidence of a shift towards postsecondary diplomas below the university level among FBE male immigrants. Despite these shifts, both male and female FISs continue to be significantly more likely to have a graduate degree than either CBE postsecondary graduates or FBE immigrants. The difference among women is particularly large, as 51% of the most recent cohort of FISs have graduate degrees, compared to 20% of CBE postsecondary graduates and 24% of FBE immigrants with postsecondary educational credentials.

4 Methodology

The primary objective of our regression analysis is to compare the labour market outcomes of FISs to CBE graduates and FBE immigrants who are observed at a similar time since labour market entry facing similar labour market conditions. However, we are also interested in knowing to what extent these differences reflect the educational backgrounds and regions of origin of FISs. We therefore provide two sets of estimates for our analysis: (i) estimates that are "unconditional" on education level, field of study, and region of origin; and (ii) estimates that are "conditional" on these variables.

To make the estimated differences in labour market outcomes as transparent as possible, we begin by first estimating the following regression separately for men and women using only one of the comparison group samples (either CBE or FBE):

$$y_{it} = \beta_0 + \beta_1 age_{it} + \beta_2 age_{it}^2 + \beta_3 mse_{it} + \beta_4 ur_i + y_t'\gamma + pr_{it}'\delta + x_{it}'\theta + \varepsilon_{it} \quad (1)$$

where the dependent variable y_{it} is one of the 10 outcome variables defined above for individual i observed in year t; age_{it} is individual i's age in survey year t; mse_{it} is months since labour market entry (where "entry" is defined as month of program completion for the CBE sample and month of landing for the FBE sample); ur_i is the national-level unemployment rate in individual i's month of labour market entry; pr_{it} is a set of province dummy variables indicating individual i's residence in year t; x_{it} is a vector of dummy variables indicating postsecondary education level, field of study (in the CBE case), and region of origin dummy (in the FBE case); and ε_{it} is a random error with expected value zero, individual-specific variance σ_i^2, which is assumed to be uncorrelated with each of the explanatory variables on the right-hand-side of equation (1).[11] In all cases, the "unconditional" estimates exclude x_{it}, whereas the "conditional" estimates include x_{it}.[12]

Having estimated the parameters of equation (1), we then predict individual-level outcomes for FISs using their observed values of the explanatory variables in equation (1). The difference between their actual observed labour market outcomes and their predicted outcomes, that is $(y_{it} - \hat{y}_{it})$, are "unexplained" in the sense that these differences are unrelated to the set of explanatory variables in (1). As discussed above, many factors can potentially account for these unexplained differences. For example, we expect the average outcomes of FISs to exceed the average outcomes of observably similar FBE immigrants, since FISs are less likely to face credential recognition issues and have superior English/French language skills, even conditional on region of origin. Therefore, we expect the average "unexplained" difference $(y_{it} - \hat{y}_{it})$ in the sample of FISs to be positive in the FBE comparison case. On the other, relative to CBE graduates, we expect FISs to have weaker social networks in job search and poorer English/French language skills. Consequently, we expect $(y_{it} - \hat{y}_{it})$ to be negative on average for FISs when equation (1) is estimated using the CBE graduates.

To examine whether is any evidence of deteriorating labour market outcomes for FISs, we define the variable $time_i$ for FISs as the year of program completion minus 1998 (year of program completion ranges from 1999 to 2010) and then regress $(y_{it} - \hat{y}_{it})$ on $time_i$ and an intercept. A negative coefficient on $time_i$ is consistent with postsecondary institutions and governments reaching deeper into foreign student pools to raise quantity without a commensurate increase in the supply

[11] There are repeated observations on some individuals. We cluster standard errors by individual identifier.

[12] The estimates from these first-stage regression using log hourly earnings as the dependent variable are presented in appendix tables A.1 (CBE graduates) and A.2. (FBE immigrants). The first-stage regression results for the other nine dependent variables are available from the authors upon request

of foreign students. However, it is also consistent with broader labour market factors influencing the labour market outcomes of FISs. For example, labour market conditions facing new labour market entrants may be deteriorating over time and immigrants may be particularly sensitive to these conditions; or the value of English/French language skills in the labour market may increasing over time due to broader technological changes in the economy; or perhaps labour market discrimination against immigrant workers is rising over time. However, all of these factors should similarly influence the labour market outcomes of FBE immigrants from a common origin region. Therefore, evidence of deteriorating FIS outcomes relative to both the CBE and FBE comparison groups is arguably most consistent with deteriorating labour market "quality" of FISs as their shares of postsecondary graduates and new permanent residents increase.

We conclude our analysis in two ways. First, we examine whether the unconditional and conditional "unexplained' differences in FIS labour market outcomes vary across the education levels, fields of study, and regions of origin of FISs. To do so, we regress the values of $(y_{it} - \hat{y}_{it})$ on x_{it} (and an intercept) separately for male and female FISs. Second, we examine whether the differences in the weekly earnings of FISs tend be larger at the upper or lower ends of the earnings distribution. To do this, we estimate equation (1) by quantile regressions using the combined sample of FISs and either CBE or FBE individuals, but include a dummy variable indicating FISs.

5 Results

In Table 3 we report the mean predicted differences in labour market outcomes for FISs, that is the mean values of $(y_{it} - \hat{y}_{it})$ for each of the 10 outcome variables. When we do not condition on education level and field of study in the estimation of equation (1), FISs consistently outperform FBE immigrants and have outcomes that are roughly similar to CBE graduates. In fact, among men, mean log hourly earnings of FISs are indistinguishable from CBE graduates (female FISs lag CBE graduates by 7 log points). Moreover, male FISs are less likely to be employed in part-time jobs (3.9 percentage point (ppt) difference) and more likely to have nonroutine cognitive jobs (6.2 ppt difference). Male FISs are, however, substantially more likely to report being overqualified for their jobs (11.9 ppt difference), as are female FISs (9 ppt difference). Of course, we know from Table 1 that FISs have substantially higher postsecondary educational levels, on average, than FBE immigrants and CBE graduates. The question is to what extent their performance advantage over FBEs and parity with CBEs (at least male FISs) reflects this educational advantage.

The "conditional" estimates in Table 3 indicate that when we condition on educational level and field of study, both male and female FISs underperform their CBE counterparts across all 10 labour market outcomes. Most notably, mean log hourly earnings of male and female FISs are 15

log points below that of CBE individuals graduating from similar academic programs. They are also significantly less likely to be employed in nonroutine cognitive jobs (6 and 10 ppt gaps for male and female FISs, respectively), more likely to be employed in routine cognitive jobs (4 and 8 ppt differences), less likely to report that their job matches their field of study (5 and 9 ppt differences), and more likely to report being overqualified for their job (15 and 9 ppt differences). Furthermore, female FISs are significantly less likely to be employed (11 ppt difference) and more likely to be unemployed (4.7 ppt difference).

Conditioning on educational backgrounds or even region of origin does little to change the differences relative to FBE immigrants. The "conditional" estimates in Table 3 consistently point to substantial performance advantages of FISs over FBE immigrants. Mean log hourly earnings, for example, are nearly 30 log points higher for male and female FISs relative to FBE immigrants with similar levels of education from similar origin regions. In addition, employment rates are higher (6 and 20 percentage points higher for male and female FISs, respectively), unemployment rates are lower (2 and 4 ppts, although the female difference is not statistically significant), part-time job rates are lower (6 and 9 ppt differences), and FISs are more likely to be employed in nonroutine cognitive jobs (24 and 26 ppt differences). A potential explanation for these substantial advantages are that FISs may have more Canadian work experience. Unfortunately, neither the NGS or LFS identify previous work experience. However, it is not obvious that this can account for the differences, since we are comparing FISs and FBE immigrants with similar years since labour market entry, where entry is defined as school completion for FISs and year of landing for FBE immigrants. It is unclear whether FISs graduating from Canadian postsecondary institutions in the 2000s were more likely to work in Canada before graduating than FBE immigrants were to work on temporary work permits before landing.

In Table 4, we present the results from regressing the FIS "unexplained" log hourly earnings differences ($y_i - \hat{y}_{it}$) on a linear time trend in the enrolment cohort of FISs (and an intercept). Both the "unconditional" and "conditional" estimates imply deteriorating log hourly earnings of FISs. Moreover, this is true relative to both the CBE and FBE comparison groups. However, the magnitudes of the trends are modest and, for men, in all cases statistically insignificant at the 10% level. The imprecision of the estimates is evident in Figure 1, where we plot the mean values of ($y_i - \hat{y}_{it}$) and 95% confidence intervals for the seven observed enrollment cohorts (1999, 2000, 2004, 2005, 2008, 2009, and 2010) and the estimated linear time trend. While the 2008 and 2009 cohorts have particularly poor mean outcomes relative to both comparison groups, their sample sizes are small leading to confidence intervals which include values that do not suggest deterioration. The estimates for female FISs, on the other hand, are larger and, in the CBE-comparison case,

statistically significant at the 10% confidence level. Specifically, they suggest that the FIS earnings gap relative to CBE graduates grew by about 1 to 1.5 log points per year through the 2000s, while the earnings advantage relative to FBE immigrants have been declining by roughly the same amount. This deterioration in the labour market performance of female FISs is consistent with a tradeoff in the labour market quality of FISs consistent with the increases in the FIS shares of postsecondary graduates and new immigrants documented in Section 2.

In addition to examining whether the "unexplained" log hourly earnings differentials of FISs have been deteriorating over time, we can examine their variation across the education levels, fields of study, and countries of origin of FISs. Table 5 reports the results based on the CBE comparison group. In all cases, the reference group are FISs with a Ph.D. in the field of mathematics who originate from East Asia (the vast majority are from China). Not surprisingly, when we do not condition on education in the first stage, FISs with lower education levels face larger earnings gaps relative to the average CBE graduate. The difference is particularly large among women, as female FISs with college diplomas have earnings that are 70 log points below female FISs with PhDs in similar fields of study from similar origin regions. More interesting, when we condition on education in the first stage, the FIS-CBE gaps identified in Table 3 do not vary significantly across education levels for men, but they do for women. In particular, the log hourly earnings gap of college-educated FISs is roughly 20 log points higher than for university-educated FISs. In other words, the FIS-CBE earnings gap for women is substantially larger when we compare FIS college graduates to CBE college graduates than when compare FIS university graduates to CBE university graduates. This suggests that perhaps the deterioration in the labour market outcomes of female FISs over time, shown in Table 3, reflects a shift among female FISs towards more college graduates. However, the sample means in Table 2 indicate that this has not happened. In fact, the proportion of FISs who are college, as opposed to university, graduates was lower for the 2010 graduation cohort than for the 2000 or 2005 cohorts (13.2% compared to 16.7% and 21.0%, respectively).[13]

With regard to fields of study, the "unconditional" results in Table 5 point to lower FIS-CBE earnings gaps for FISs graduating from all fields relative to mathematics (the sole exception is visual and performing arts, although the estimates are very imprecise, due to the small sample). Earnings appear particularly low in education, social sciences and law, sciences, agriculture, and services. In contrast, they appear relatively modest for business and engineering graduates. Of course, without

[13]We also estimated the specifications in Tables 5 and 6 including the linear trend in year of program completion. The results suggest that the deterioration in female FIS outcomes is largely not accounted for by compositional shifts between education levels, fields of study, and origin regions. The only exception is there is some evidence of a significant increase in female FISs from South Asia, who the results in Table 5 indicate have particularly earnings outcomes . This increase in the South Asian international student share is also evident in the administrative data used in Figure 1.

controlling for education in the first stage, these results are simply indicating which fields of study lead to higher earnings for all graduates. Indeed, the "conditional" estimates suggest much smaller earnings differences across fields. For men, none of the differences in the FIS-CBE gaps across fields of study are statistically significant, with the exception of education, where FISs face large earnings gaps relative to CBE graduates, and arts, where they face a large earnings advantage. However, for women, the FIS-CBE earnings gaps are significantly higher among science, engineering, agriculture, and health graduates. In fact, female FISs graduating from mathematics and computer science programs are the exception, as all other fields have substantially larger FIS-CBE earnings gaps (with the exception of visual and performing arts).

Finally, with regards to the region of origin differences, the "unconditional" and "conditional" estimates in Table 5 are virtually identical, since the first stage regression using the CBE sample does not control for origin region (since CBE graduates are, by definition, all Canadian-born). Relative to East Asian FISs (the reference group), male foreign students from Europe, particularly Southern Europe, as well as West, Central, and South Asia face relatively modest FIS-CBE earnings gaps. For women, on the other hand, FISs from Africa and South Asia have significantly higher FIS-CBE gaps than their East Asian counterparts. The difference between South Asian men and women is particularly stark, but partially reflects that the reference group for men (East Asian men with PhDs in mathematics) face a FIS-CBE earnings gap of 13 log points (see the estimate of the constant in the "conditional" model for men), whereas their female counterparts (East Asian women with PhDs in mathematics) face an FIS-CBE earnings advantage (7 log points, but statistically insignificant).

In Table 6 we present similar results to those in Table 5, but based on the comparison to FBE immigrants, rather than CBE graduates. Since we are unable to condition on field of study in the first stage (because the LFS does not provide this information), we do not include field of study in the second stage regression.[14] As in Table 6, the "unconditional" results largely capture returns to education, as FISs with graduate degrees face significantly larger earnings advantages relative to the average FBE immigrant than do FISs with college diplomas. In fact, for men and particularly women, there is almost no difference in log hourly earnings between college-educated FISs and FBE immigrants from China (see the constant plus the Below Bachelor's estimate). The advantage of Canadian education, therefore, appears to be driven entirely by the earnings of university-educated immigrants. When we condition on education level and origin region in the first stage, there is once again little difference across education levels for men, but evidence of substantially smaller

[14]We could compare the FIS-FBE earnings differentials across fields, but they would capture the same broad earnings differences as the "unconditional" estimates in Table 5. For example, earnings are higher for all graduates from mathematics, business, and engineering programs

FIS-FBE earnings advantages for college-educated female FISs than for university-educated female FISs.

In the remaining rows of Table 6, we compare the FIS-FBE earnings advantages across origin regions of FISs. The "unconditional" results for men point to larger advantages of Canadian over foreign education among immigrants from Northern and Western Europe, West and Central Asia, and South Asia. For women, on the other hand, the "unconditional" results indicate relatively small earnings advantages for FISs from Africa and South Asia. When we compare FISs and FBE immigrants with similar education levels and from similar regions (the "conditional" estimates), the results for men point to relatively large FIS-FBE earnings advantages for FISs from China, West and Central Asia, and South Asia. Male FISs from the US, UK, Australia, and New Zealand, on the other hand, have exceptionally low earnings relative to their FBE counterparts. This likely reflects the selectivity of FISs from these countries, rather than differences in education quality between Canada and these countries. For women, we also find small advantages of Canadian education among FISs from Northern and Western Europe, Africa, the US, UK, Australia, and New Zealand, and South Asia.

We complete our analysis by estimating quantile regressions using the pooled sample of FISs and either CBE graduates or FBE immigrants. To identify conditional differences in FIS earnings across the earnings distribution, we include a dummy variable identifying FISs. Figures 6 and 7 plot the results for the CBE and FBE comparisons, respectively. For men, the results point to FIS-CBE earnings gaps, which decrease in magnitude as we move up the earning distribution. Below the 10th percentile, the "unconditional" gaps are roughly 5 log points and the "conditional" gaps are roughly 20 logs. In comparison, median earnings are roughly equivalent for FISs and CBE graduates when we do not condition on education (level and field) and are slightly bigger than 10 log points when we do. This changes little as we move from the 50th to the 99th percentile, as the "unconditional" gap is essentially and the "conditional" gap is slightly smaller than 10 log points above the 90th percentile. The results for women in Figure 6 similarly tend to decline FIS-CBE gaps as we move up the earnings distribution. The exception is that below 20th percentile, where the gaps are growing as we move up the distribution. In other words, female FISs face smaller FIS-CBE gaps at the 1st percentile than at the 20th percentile. This u-shaped pattern is particularly evident in the "conditional" earnings results. There is also some (weaker) evidence of increasing gaps at the very top end of the earnings distribution, particularly in the "conditional" estimates.

Finally, in Figure 7 we report the quantile regression results based on the FBE comparison group. In all cases, the inverted u-shaped patterns imply smaller FIS-FBE earnings advantages at the tails of the distribution than in the middle of the distribution. In other words, the difference in FIS and

FBE earnings at the 10th and 90th percentiles of their respective distributions are small relative to the differences in their median earnings. We have also tried estimating the quantile regressions allowing the FIS differential to vary across program completion cohorts (include an interaction of the international student dummy variable and the $time_i$ variable described in Section 4). The results suggest that, if anything, the deterioration in the labour market outcomes of female FISs has been driven by changes at the upper end of the earnings distribution, not the lower end. That is, the relatively small FIS-CBE earnings gaps at the upper end of the earnings distribution in Figure 6 have tended to grow over time, while the relatively small FIS-FBE earnings advantages at the upper end in Figure 7 have tended to become even smaller.[15]

6 Conclusions

Combining data from Canada's National Graduates Survey (NGS) and Labour Force Survey (LFS), we compare the labour market performance of FISs to both CBE graduates and FBE immigrants entering the Canadian labour market at the same time. The results of our analysis indicate that FISs clearly outperform their foreign-educated counterparts by substantial margins. Moreover, the implied advantage of Canadian over foreign postsecondary education is evident for men and women and across education levels and the regions of origin of immigrants. However, we also find that the labour market outcomes of FISs lag behind their CBE counterparts when we compare FISs and CBE individuals graduating from similar academic programs. The performance gaps we identify tend to be larger for college-educated women, in fields outside of math and computer science, among Chinese men and South-Asian women, and at the lower end of the earnings distribution than at the top.

Unfortunately, we are unable to determine to what extent the FIS-CBE gaps we identify reflect something about FISs students themselves, such as their relative English-French language skills, as opposed to something about their relative labour market experiences as immigrants, such as that they are more likely to face labour market discrimination or that they will tend to have weaker social networks to access in their job search efforts. We do, however, find some evidence, particularly among women, that the relative labour market performance of FISs has tended to deteriorate over time. The fact that this deterioration is evident in the comparison to both CBE graduates and FBE immigrants suggests to us that it reflects something about FISs as opposed to changing labour market conditions, since there is no clear reason why CBE graduates or FBE immigrants would not have been similarly adversely affected by changing labour market conditions. The most obvious explanation for this deterioration is a tradeoff in the average labour market "quality" of

[15] These results are available from the authors upon request.

foreign students as postsecondary institutions and governments reached deeper into the pools of international students through the 2000s to meet their demands for students and new immigrants.

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Table 1: Sample means by gender and student type

	Men			Women		
	FIS	*CBE*	*FBE*	*FIS*	*CBE*	*FBE*
Outcomes:						
Log hourly earnings (2013$)	3.313	3.187	3.008	3.122	3.110	2.808
	(0.030)	(0.005)	(0.008)	(0.036)	(0.004)	(0.007)
Employed	0.841	0.883	0.799	0.775	0.882	0.602
	(0.018)	(0.003)	(0.005)	(0.026)	(0.003)	(0.006)
Unemployed	0.062	0.059	0.083	0.103	0.055	0.082
	(0.010)	(0.002)	(0.004)	(0.021)	(0.002)	(0.003)
Part-time weekly hours	0.030	0.066	0.069	0.120	0.133	0.131
	(0.004)	(0.003)	(0.003)	(0.022)	(0.003)	(0.004)
Nonroutine cognitive	0.755	0.622	0.424	0.659	0.674	0.357
	(0.029)	(0.006)	(0.007)	(0.037)	(0.004)	(0.007)
Routine cognitive	0.049	0.072	0.113	0.066	0.087	0.205
	(0.013)	(0.003)	(0.004)	(0.019)	(0.003)	(0.006)
Nonroutine manual	0.137	0.162	0.194	0.271	0.221	0.349
	(0.025)	(0.005)	(0.006)	(0.036)	(0.004)	(0.007)
Routine manual	0.059	0.144	0.269	0.010	0.018	0.089
	(0.017)	(0.004)	(0.006)	(0.002)	(0.001)	(0.004)
Education-field match	0.614	0.575	–	0.551	0.626	–
	(0.028)	(0.006)		(0.036)	(0.005)	
Education-level match	0.604	0.703	–	0.640	0.712	–
	(0.027)	(0.005)		(0.034)	(0.004)	
Controls:						
Age	32.984	29.373	38.946	32.336	29.884	37.093
	(0.362)	(0.066)	(0.109)	(0.477)	(0.060)	(0.101)
Months since labour market entry	39.007	37.681	46.190	38.593	37.565	46.044
	(0.612)	(0.155)	(0.234)	(0.860)	(0.127)	(0.217)
Unemployment rate at entry	7.045	6.729	6.210	6.211	6.226	5.802
	(0.085)	(0.020)	(0.022)	(0.063)	(0.008)	(0.013)
Education level:						
Below Bachelor's	0.095	0.398	0.217	0.164	0.347	0.280
	(0.021)	(0.005)	(0.005)	(0.027)	(0.004)	(0.005)
Bachelor's	0.300	0.439	0.475	0.368	0.487	0.485
	(0.026)	(0.005)	(0.007)	(0.033)	(0.004)	(0.006)
Master's	0.426	0.148		0.384	0.154	
	(0.023)	(0.003)	0.308	(0.031)	(0.003)	0.235
Ph.D.	0.178	0.016	(0.006)	0.084	0.012	(0.005)
	(0.011)	(0.001)		(0.007)	(0.001)	
Field of study:						
Education	0.021	0.058	–	0.045	0.130	–
	(0.009)	(0.002)		(0.012)	(0.003)	
Visual and performing arts	0.030	0.047	–	0.030	0.053	–
	(0.012)	(0.002)		(0.007)	(0.002)	

Humanities	0.027	0.066	–	0.101	0.078	–
	(0.005)	(0.002)		(0.027)	(0.002)	
Social sciences and law	0.083	0.118	–	0.117	0.186	–
	(0.014)	(0.004)		(0.016)	(0.004)	
Business	0.232	0.213	–	0.328	0.219	–
	(0.026)	(0.005)		(0.035)	(0.004)	
Physical and life sciences	0.077	0.055	–	0.073	0.050	–
	(0.008)	(0.002)		(0.009)	(0.001)	
Math and computer science	0.129	0.068	–	0.086	0.021	–
	(0.012)	(0.002)		(0.013)	(0.001)	
Engineering	0.324	0.225	–	0.085	0.034	–
	(0.022)	(0.004)		(0.012)	(0.001)	
Natural resources	0.038	0.033	–	0.024	0.017	–
	(0.005)	(0.001)		(0.004)	(0.001)	
Health	0.031	0.067	–	0.096	0.186	–
	(0.007)	(0.003)		(0.018)	(0.003)	
Services	0.008	0.043	–	0.003	0.021	–
	(0.003)	(0.002)		(0.001)	(0.001)	
Other	0.002	0.005	–	0.012	0.005	–
	(0.001)	(0.001)		(0.007)	(0.001)	
Origin region:						
South and Central America	0.080	–	0.099	0.099	–	0.096
	(0.013)		(0.004)	(0.016)		(0.004)
Northern and Western Europe	0.053	–	0.040	0.080	–	0.032
	(0.007)		(0.003)	(0.011)		(0.002)
Eastern Europe	0.027	–	0.090	0.057	–	0.107
	(0.005)		(0.004)	(0.015)		(0.004)
Southern Europe	0.027	–	0.015	0.026	–	0.012
	(0.011)		(0.002)	(0.007)		(0.001)
Africa	0.248	–	0.126	0.143	–	0.100
	(0.020)		(0.004)	(0.027)		(0.004)
West and Central Asia	0.073	–	0.081	0.040	–	0.074
	(0.010)		(0.004)	(0.011)		(0.003)
East Asia	0.257	–	0.167	0.358	–	0.189
	(0.023)		(0.005)	(0.032)		(0.005)
US, UK, Australia, and NZ	0.039	–	0.039	0.087	–	0.029
	(0.010)		(0.002)	(0.024)		(0.002)
Southeast Asia	0.034	–	0.120	0.044	–	0.164
	(0.012)		(0.004)	(0.011)		(0.004)
South Asia	0.163	–	0.224	0.066	–	0.196
	(0.018)		(0.006)	(0.014)		(0.005)
Sample size	1,824	35,705	8,998	1,147	51,682	10,363

Notes: FBE immigrants have three levels of schooling (below bachelor, bachelor, and above bachelor) instead of four, since Masters and Ph.D. degrees are not distinguished in the LFS data. The social science and law field of study includes behavioural studies, such as psychology. The business field includes accounting and public administration. The science field includes physical and life sciences, as well as science technologies/technicians. The engineering field includes architecture and related technologies. The natural resources field includes conservation and agriculture. Finally, the services field of study includes personal, protective, and transportation services.

Table 2: Education level distribution by gender, student type, and graduation cohort

	College	Bachelor's	Master's	Ph.D.	Estimated Population
Men:					
FIS cohort					
2000	0.034	0.233	0.495	0.238	1,896
2005	0.061	0.329	0.474	0.137	2,700
2010	0.174	0.342	0.348	0.136	5,932
CBE cohort					
2000	0.381	0.423	0.175	0.022	88,119
2005	0.403	0.455	0.131	0.010	95,248
2010	0.395	0.425	0.163	0.017	118,972
FBE cohort					
2000	0.158	0.480	0.362		1,992
2005	0.195	0.480	0.325		21,262
2010	0.245	0.451	0.304		23,702
Women:					
FIS cohort					
2000	0.167	0.376	0.361	0.096	1,804
2005	0.210	0.394	0.333	0.063	2,300
2010	0.132	0.363	0.421	0.084	5,075
CBE cohort					
2000	0.341	0.473	0.173	0.013	132,716
2005	0.349	0.511	0.132	0.008	150,364
2010	0.331	0.469	0.183	0.016	182,309
FBE cohort					
2000	0.272	0.457	0.271		2,419
2005	0.267	0.492	0.241		23,616
2010	0.280	0.479	0.241		27,812

Notes: Bootstrapped standard errors in parentheses. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3: Unconditional and conditional mean FIS difference in labour market outcomes relative to CBE and FBE immigrants

	Men				Women			
	Unconditional		Conditional		Unconditional		Conditional	
	CBE	*FBE*	*CBE*	*FBE*	*CBE*	*FBE*	*CBE*	*FBE*
Log hourly earnings	-0.012	0.352***	-0.146***	0.295***	-0.067*	0.353***	-0.148***	0.294***
	(0.030)	(0.036)	(0.030)	(0.035)	(0.037)	(0.036)	(0.032)	(0.034)
Employed	-0.055***	0.026	-0.054***	0.058***	-0.111***	0.215***	-0.109***	0.203***
	(0.018)	(0.020)	(0.017)	(0.021)	(0.028)	(0.028)	(0.028)	(0.028)
Unemployed	0.007	-0.009	0.007	-0.021*	0.048*	-0.037*	0.047**	-0.036
	(0.010)	(0.011)	(0.010)	(0.012)	(0.021)	(0.022)	(0.021)	(0.022)
Part-time weekly hours	-0.039***	-0.053***	-0.022***	-0.061***	-0.027	-0.076***	-0.008	-0.085***
	(0.005)	(0.006)	(0.005)	(0.006)	(0.023)	(0.024)	(0.023)	(0.024)
Nonroutine cognitive	0.062**	0.352***	-0.059**	0.243***	-0.059*	0.340***	-0.096***	0.264***
	(0.030)	(0.031)	(0.027)	(0.028)	(0.035)	(0.040)	(0.030)	(0.036)
Routine cognitive	-0.002	-0.051*	0.037*	-0.045	0.077**	-0.116***	0.082***	-0.103***
	-0.025	-0.028	-0.021	-0.029	-0.033	-0.038	-0.028	-0.038
Nonroutine manual	-0.012	-0.064***	0.024*	-0.033**	-0.009	-0.140***	0.020	-0.093***
	(0.012)	(0.015)	(0.013)	(0.015)	(0.021)	(0.021)	(0.020)	(0.022)
Routine manual	-0.041*	-0.229***	0.005	-0.157***	-0.008***	0.008	-0.005**	-0.068***
	(0.022)	(0.017)	(0.019)	(0.017)	(0.002)	(0.011)	(0.002)	(0.006)
Education-field match	0.010	–	-0.054*	–	-0.104***	–	-0.093***	–
	(0.030)		(0.029)		(0.033)		(0.032)	
Education-level match	-0.119***	–	-0.150***	–	-0.085**	–	-0.076**	–
	(0.029)		(0.029)		(0.038)		(0.038)	

Notes: Bootstrapped standard errors in parentheses. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Time trends in unconditional and conditional differences in mean outcomes

	Men				Women			
	Unconditional		Conditional		Unconditional		Conditional	
	CBE	*FBE*	*CBE*	*FBE*	*CBE*	*FBE*	*CBE*	*FBE*
Log hourly earnings	-0.007	-0.011	-0.004	-0.003	-0.015*	-0.013	-0.012*	-0.010
	(0.008)	(0.010)	(0.007)	(0.010)	(0.008)	(0.010)	(0.007)	(0.009)
Employed	0.003	0.004	0.002	0.008*	0.002	0.001	0.003	0.005
	(0.003)	(0.004)	(0.003)	(0.004)	(0.007)	(0.008)	(0.007)	(0.008)
Unemployed	0.000	-0.003	0.000	-0.004	0.004	0.003	0.003	0.001
	(0.002)	(0.003)	(0.002)	(0.003)	(0.006)	(0.006)	(0.006)	(0.006)
Part-time weekly hours	-0.003***	-0.007***	-0.002*	-0.008***	-0.001	-0.003	-0.002	-0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.006)	(0.005)	(0.006)
Nonroutine cognitive	-0.003	-0.006	0.001	0.002	0.002	0.008	0.002	0.009
	(0.007)	(0.008)	(0.006)	(0.007)	(0.010)	(0.011)	(0.008)	(0.010)
Routine cognitive	0.005	0.004	0.000	0.003	-0.002	-0.010	-0.002	-0.012
	(0.006)	(0.007)	(0.005)	(0.007)	(0.009)	(0.011)	(0.008)	(0.011)
Nonroutine manual	0.007**	0.005	0.008**	0.006	-0.002	-0.007*	-0.001	-0.004
	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Routine manual	-0.007*	-0.002	-0.007*	-0.009*	0.002**	0.009***	0.001	0.006***
	(0.004)	(0.005)	(0.004)	(0.005)	(0.001)	(0.001)	(0.001)	(0.001)
Education-field match	-0.010	–	-0.007	–	-0.007	–	-0.005	–
	(0.007)		(0.006)		(0.009)		(0.009)	
Education-level match	0.007	–	0.010	–	-0.014	–	-0.014	–
	(0.006)		(0.007)		(0.009)		(0.009)	

Notes: Bootstrapped standard errors in parentheses. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5: Mean FIS-CBE log hourly earnings difference by education, major field of study, and origin region

	Men		Women	
	Unconditional	Conditional	Unconditional	Conditional
Education level: (ref=PhD)				
Below Bachelors	-0.306***	0.065	-0.698***	-0.234**
	(0.073)	(0.070)	(0.093)	(0.093)
Bachelors	-0.163***	0.031	-0.273***	-0.065
	(0.055)	(0.055)	(0.059)	(0.058)
Masters	-0.062	0.005	-0.144***	-0.077
	(0.042)	(0.041)	(0.050)	(0.048)
Field of study: (ref=Math)				
Education	-0.423**	-0.356**	-0.159	-0.137
	(0.172)	(0.164)	(0.125)	(0.127)
Visual and performing arts	0.068	0.404*	0.092	0.307
	(0.221)	(0.219)	(0.322)	(0.329)
Humanities	-0.153	0.098	-0.209*	-0.073
	(0.110)	(0.105)	(0.116)	(0.110)
Social sciences and law	-0.172**	-0.016	-0.171**	-0.093
	(0.069)	(0.069)	(0.076)	(0.074)
Business	-0.041	-0.042	-0.080	-0.105
	(0.084)	(0.083)	(0.071)	(0.069)
Physical and life sciences	-0.343***	-0.102	-0.263***	-0.147*
	(0.072)	(0.072)	(0.076)	(0.076)
Engineering	-0.034	-0.087	-0.034	-0.160**
	(0.056)	(0.055)	(0.071)	(0.070)
Natural resources	-0.216**	-0.088	-0.288***	-0.206**
	(0.093)	(0.092)	(0.105)	(0.102)
Health	-0.120	-0.025	-0.115	-0.209**
	(0.105)	(0.105)	(0.1)	(0.090)
Services	-0.236	-0.062	-0.428*	-0.315
	(0.158)	(0.150)	(0.234)	(0.228)
Other	-0.126	0.050	-0.519**	-0.408**
	(0.135)	(0.130)	(0.209)	(0.199)
Origin region: (ref=East Asia)				
South and Central America	-0.133	-0.122	0.097	0.091
	(0.093)	(0.089)	(0.096)	(0.087)
Northern and Western Europe	0.163***	0.166***	-0.112	-0.132
	(0.061)	(0.062)	(0.101)	(0.101)
Eastern Europe	0.162**	0.160**	0.141	0.106
	(0.078)	(0.079)	(0.111)	(0.101)
Southern Europe	0.332*	0.328*	0.086	0.088
	(0.199)	(0.194)	(0.177)	(0.159)

Africa	-0.051	-0.044	-0.182**	-0.176**
	(0.056)	(0.056)	(0.077)	(0.076)
West and Central Asia	0.193***	0.192***	-0.010	-0.009
	(0.059)	(0.059)	(0.161)	(0.161)
US, UK, Australia, and NZ	-0.451	-0.450	0.088	0.069
	(0.302)	(0.299)	(0.077)	(0.077)
Southeast Asia	-0.096	-0.100	0.057	0.059
	(0.256)	(0.257)	(0.111)	(0.110)
South Asia	0.152**	0.147**	-0.258***	-0.259***
	(0.071)	(0.071)	(0.100)	(0.099)
Constant	0.163***	-0.129**	0.340***	0.074
	(0.060)	(0.059)	(0.069)	(0.068)
R-squared	0.164	0.116	0.275	0.149
Sample size	1295	1295	764	764

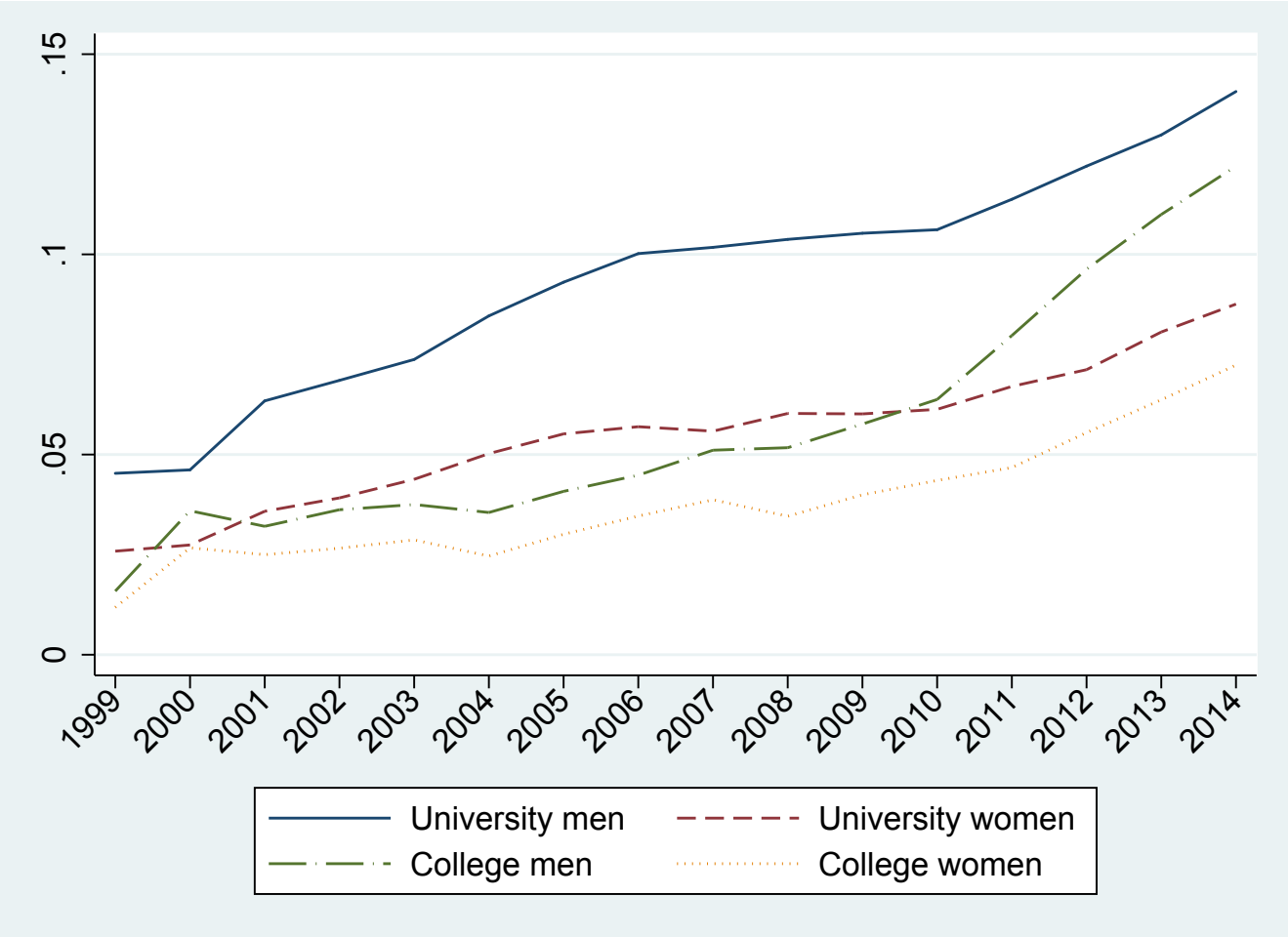
Notes: Bootstrapped standard errors in parentheses. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6: Mean FIS-FBE log hourly earnings difference by education level and origin region

	Men		Women	
	Unconditional	Conditional	Unconditional	Conditional
Education level: (ref=MA & PhD)				
Below Bachelor's	-0.330***	-0.090	-0.531***	-0.289***
	(0.061)	(0.059)	(0.103)	(0.104)
Bachelor's	-0.139	-0.021	-0.153***	-0.024
	(0.066)	(0.065)	(0.056)	(0.057)
Origin region: (ref=East Asia)				
South and Central America	-0.072	-0.183**	0.136	0.053
	(0.093)	(0.091)	(0.115)	(0.114)
Northern and Western Europe	0.192**	-0.136	-0.009	-0.298***
	(0.083)	(0.084)	(0.100)	(0.101)
Eastern Europe	0.128	-0.013	0.097	0.019
	(0.083)	(0.082)	(0.076)	(0.072)
Southern Europe	0.226	0.036	0.259	0.176
	(0.204)	(0.189)	(0.204)	(0.206)
Africa	-0.004	-0.064	-0.173**	-0.244***
	(0.058)	(0.057)	(0.078)	(0.082)
West and Central Asia	0.230***	0.163**	0.054	-0.001
	(0.071)	(0.073)	(0.201)	(0.189)
US, UK, Australia, and NZ	-0.509*	-0.908***	0.096	-0.300***
	(0.307)	(0.291)	(0.085)	(0.087)
Southeast Asia	-0.051	-0.069	0.128	0.104
	(0.234)	(0.237)	(0.115)	(0.116)
South Asia	0.149*	0.158**	-0.229**	-0.190*
	(0.078)	(0.078)	(0.110)	(0.109)
Constant	0.409***	0.359***	0.524***	0.444***
	(0.042)	(0.041)	(0.055)	(0.054)
R-squared	0.158	0.205	0.248	0.181
Sample size	1095	1095	660	660

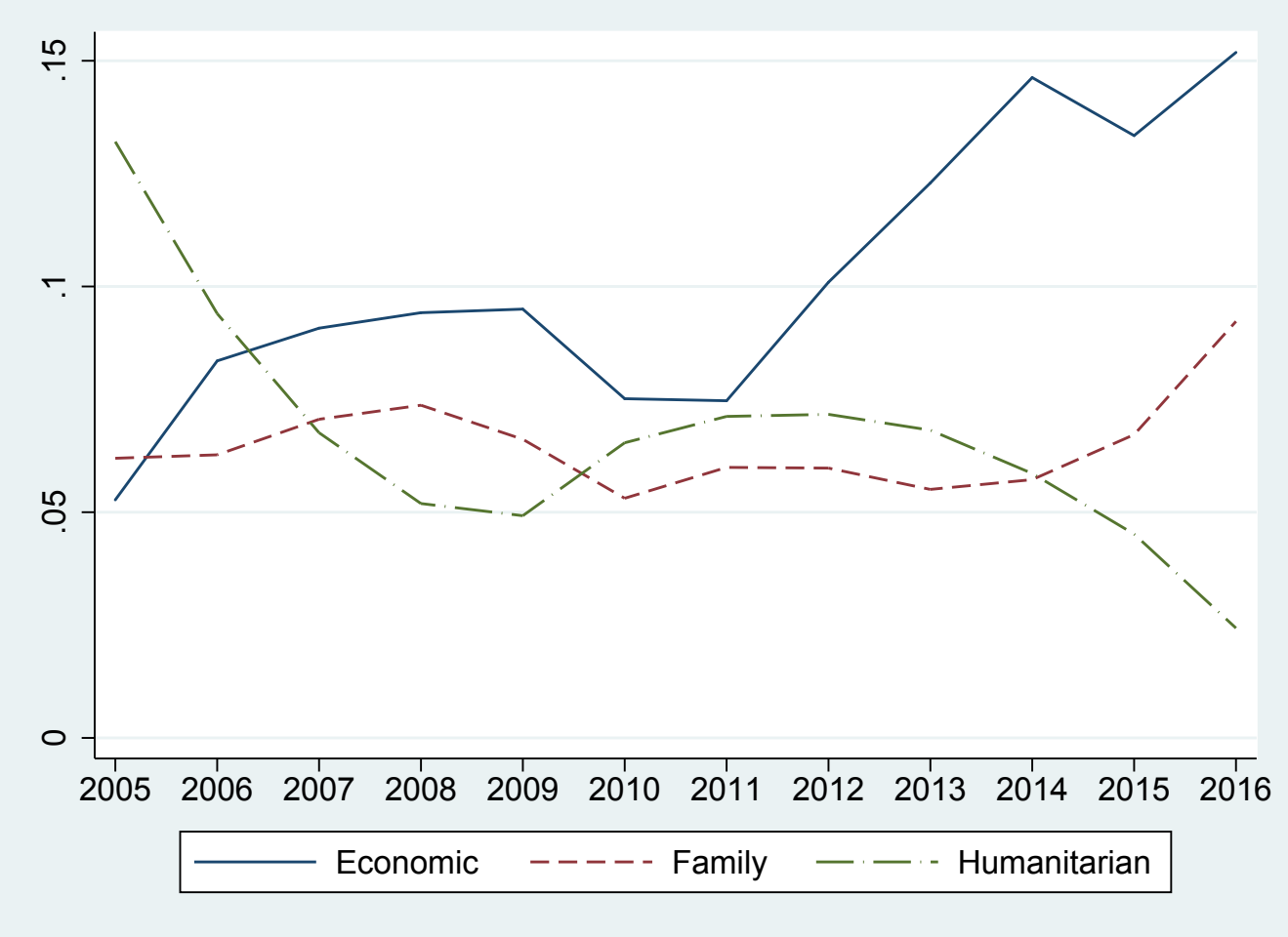
Notes: Bootstrapped standard errors in parentheses. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Figure 1: International student share of postsecondary graduates by gender and education level, 1999-2014



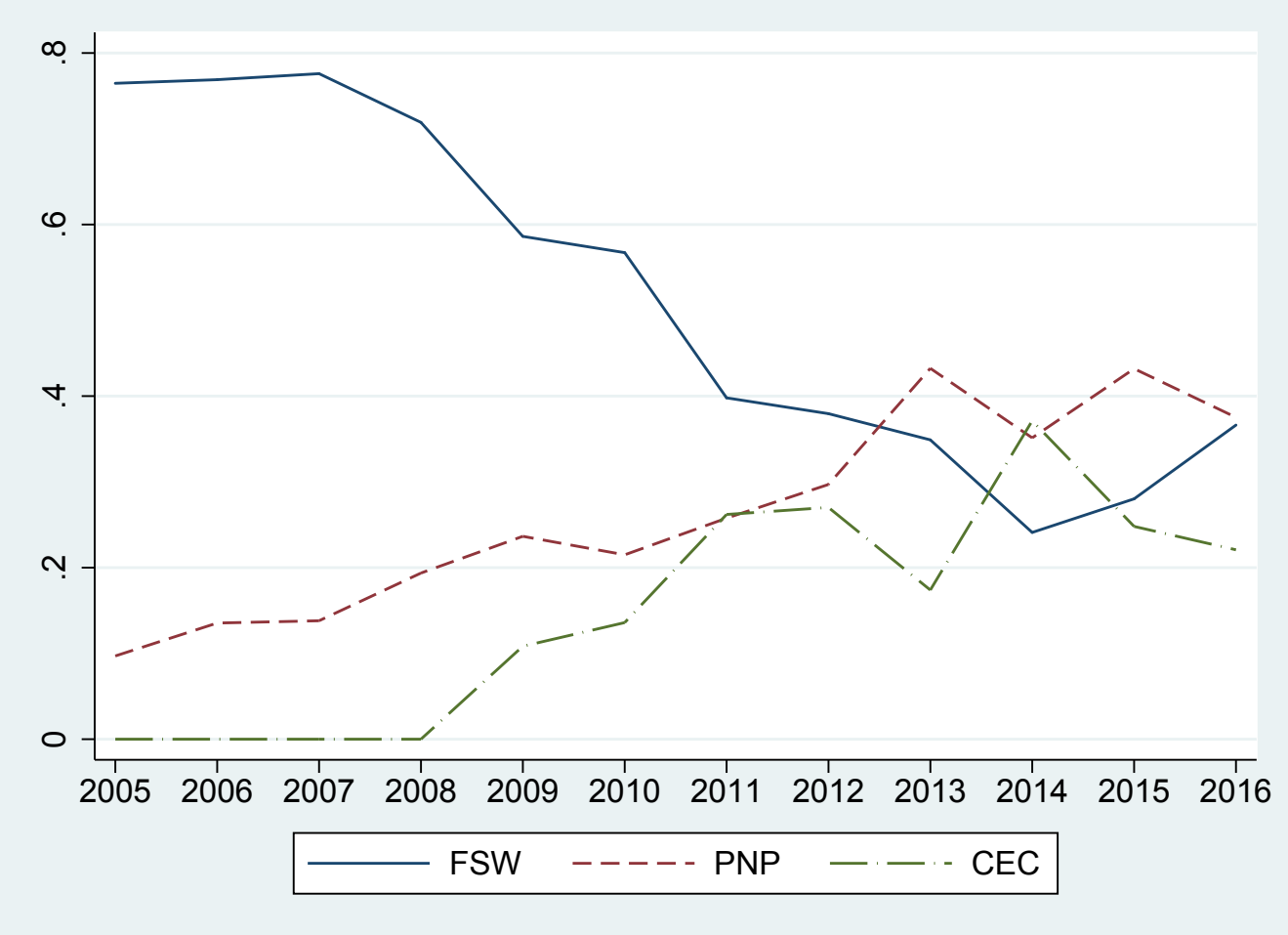
Source: Postsecondary Information System (PSIS), Statistics Canada, CANSIM tables 477-0031 and 477-0032.

Figure 2: FIS share of new permanent residents by broad immigration category, 2000-2016



Source: Immigration, Refugees, and Citizenship Canada (IRCC). Available on the Open Government Data Portal as "Admissions of Permanent Residents who have ever held a Study Permit by Intended Province/Territory of Destination and Immigration Category, 2005-October 2016."

Figure 3: Economic-class immigration programs of FISs, 2005-2016



Notes: Programs are the Federal Skilled Worker (FSW) Program, Provincial Nominee Programs (PNP), and the Canadian Experience Class (CEC) Program. Shares do not sum to one. A decreasing share (14% in 2005 to 4% in 2016) entered through other economic class programs, including business class programs, such as the investor program.
Source: Immigration, Refugees, and Citizenship Canada (IRCC). Available on the Open Government Data Portal as "Admissions of Permanent Residents who have ever held a Study Permit by Intended Province/Territory of Destination and Immigration Category, 2005-October 2016."

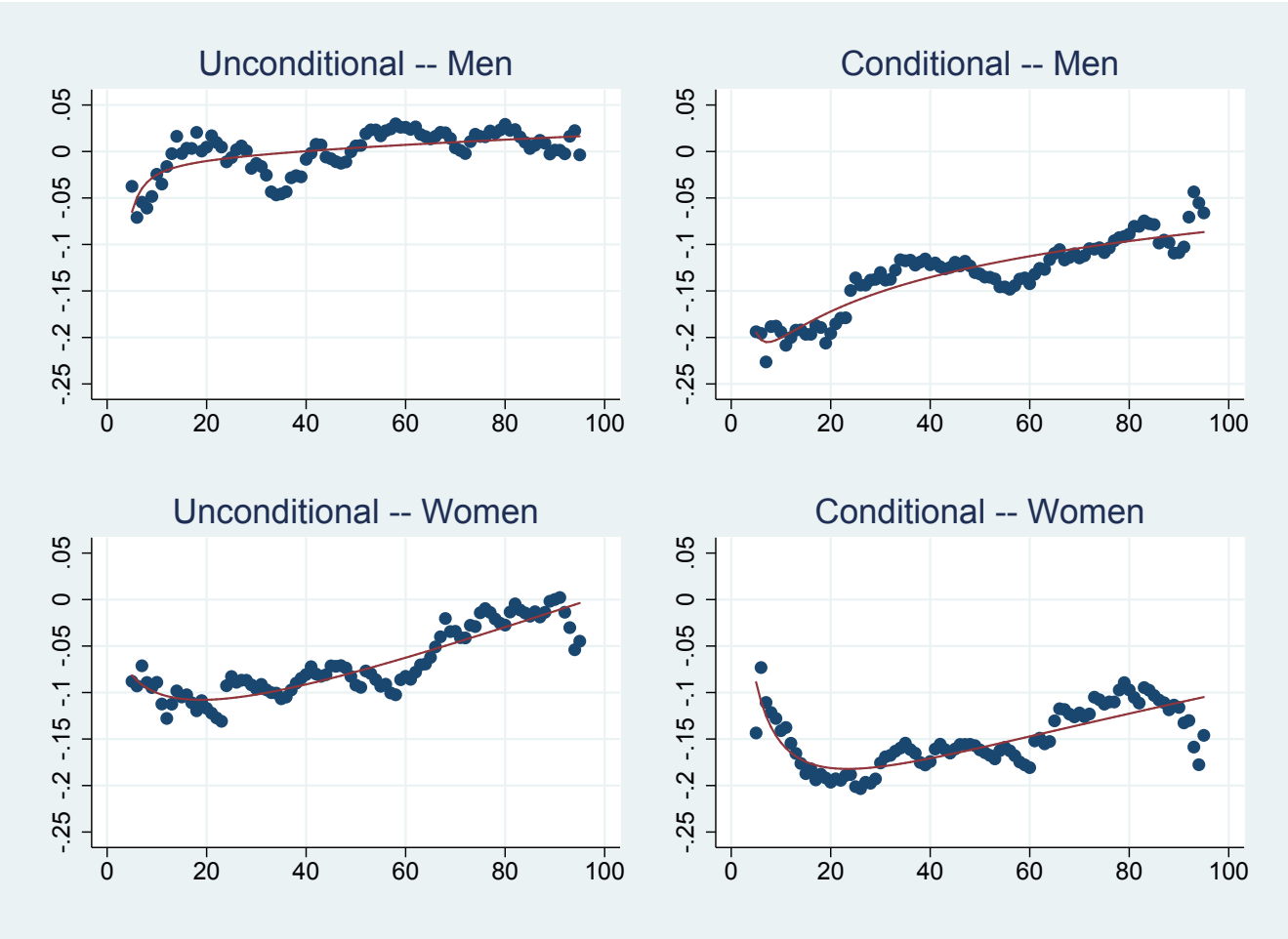
Figure 4: Time trends in FIS-CBE log hourly earnings differentials

Notes: Dots indicate the mean values of the unexplained earnings difference ($y_{it} - \hat{y}_{it}$) across program completion cohorts of FISs. Bands indicate the 95% confidence intervals of the sample means. The red line indicates the estimated linear time trends reported in Table 4.

Figure 5: Time trends in FIS-FBE log hourly earnings differentials

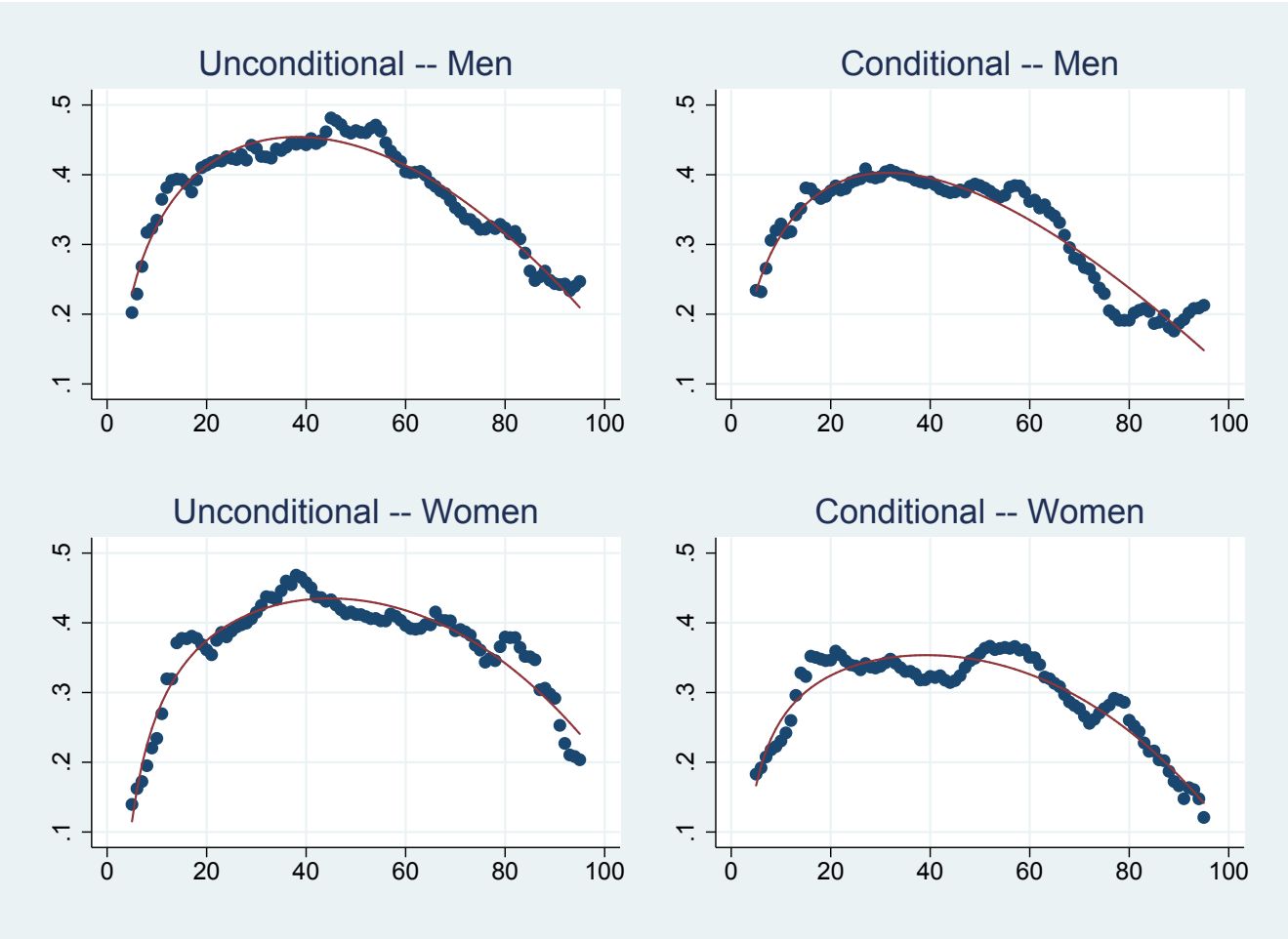
Notes: Dots indicate the mean values of the unexplained earnings difference ($y_{it} - \hat{y}_{it}$) across program completion cohorts of FISs. Bands indicate the 95% confidence intervals of the sample means. The red line indicates the estimated linear time trends reported in Table 4.

Figure 6: FIS-CBE differentials in log hourly earnings quantiles



Notes: Dots are the estimated differences in FIS log hourly earnings at the 1st through 99th percentiles. "Unconditional" estimates are the coefficients on a FIS dummy variable in a conditional quantile regression, which includes controls for age, age squared, months since labour market entry, unemployment rate at entry, and survey year. The "conditional" estimates also include controls for education level and field of study in the CBE comparison case and education level and region of origin in the FBE comparison case.

Figure 7: FIS-FBE differentials in log hourly earnings quantiles



Notes: Dots are the estimated differences in FIS log hourly earnings at the 1st through 99th percentiles. "Unconditional" estimates are the coefficients on a FIS dummy variable in a conditional quantile regression, which includes controls for age, age squared, months since labour market entry, unemployment rate at entry, and survey year. The "conditional" estimates also include controls for education level and field of study in the CBE comparison case and education level and region of origin in the FBE comparison case.

Table A.1: First-stage CBE log hourly earnings regressions

	Men		Women	
	Unconditional	Conditional	Unconditional	Conditional
Age	0.091***	0.064***	0.099***	0.060***
	(0.005)	(0.005)	(0.004)	(0.004)
Age squared /100	-0.098***	-0.066***	-0.113***	-0.065***
	(0.007)	(0.007)	(0.005)	(0.005)
Months since labour market entry	0.007***	0.004***	0.007***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Unemployment rate at entry	0.002	-0.001	-0.012***	-0.009***
	(0.003)	(0.003)	(0.004)	(0.003)
Survey year 2005	-0.155***	-0.048	-0.160***	-0.026
	(0.053)	(0.052)	(0.038)	(0.037)
Survey year 2007	0.016	0.019	0.040***	0.037***
	(0.013)	(0.012)	(0.010)	(0.010)
Survey year 2013	-0.053**	0.001	-0.029	0.019
	(0.026)	(0.025)	(0.020)	(0.019)
Below Bachelor's		-0.420***		-0.529***
		(0.022)		(0.035)
Bachelor's		-0.233***		-0.273***
		(0.020)		(0.035)
Master's		-0.087***		-0.110***
		(0.021)		(0.035)
Education		-0.047		0.017
		(0.029)		(0.021)
Visual and performing arts		-0.337***		-0.200***
		(0.028)		(0.024)
Humanities		-0.258***		-0.143***
		(0.027)		(0.025)
Social sciences and law		-0.155***		-0.095***
		(0.024)		(0.022)
Business		0.003		0.029
		(0.021)		(0.021)
Physical and life sciences		-0.235***		-0.114***
		(0.026)		(0.025)
Engineering		0.052***		0.124***
		(0.019)		(0.025)
Natural resources		-0.124***		-0.067**
		(0.023)		(0.027)
Health		-0.082***		0.117***
		(0.027)		(0.021)
Services		-0.065**		-0.101***
		(0.027)		(0.035)
Other		-0.164**		-0.081
		(0.069)		(0.051)
Constant	1.186***	2.119***	1.105***	2.226***
	(0.092)	(0.104)	(0.073)	(0.085)
R-squared	0.162	0.25	0.156	0.287
Sample size	27,527	27,527	40,753	40,753

Notes: Robust standard errors in parentheses. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Both specifications also include province of residence dummies.

Table A.2: First-stage FBE log hourly earnings regressions

	Men		Women	
	Unconditional	Conditional	Unconditional	Conditional
Age	0.060***	0.052***	0.047***	0.040***
	(0.007)	(0.007)	(0.007)	(0.007)
Age squared / 100	-0.075***	-0.066***	-0.059***	-0.053***
	(0.009)	(0.009)	(0.009)	(0.009)
Months since labour market entry /10	0.038***	0.037***	0.024***	0.029***
	(0.005)	(0.004)	(0.004)	(0.004)
Unemployment rate at entry	-0.002	-0.001	-0.003	0.005
	(0.007)	(0.007)	(0.008)	(0.008)
Survey year 2007	-0.021	-0.008	-0.037	-0.019
	(0.030)	(0.029)	(0.030)	(0.029)
Survey year 2008	0.018	0.023	0.036	0.046
	(0.031)	(0.029)	(0.030)	(0.029)
Survey year 2019	-0.001	-0.004	0.047	0.054
	(0.032)	(0.031)	(0.030)	(0.029)
Survey year 2010	-0.022	-0.015	0.028	0.042
	(0.032)	(0.030)	(0.030)	(0.029)
Survey year 2011	-0.034	-0.023	-0.018	-0.001
	(0.031)	(0.030)	(0.028)	(0.027)
Survey year 2012	-0.019	-0.008	0.004	0.006
	(0.031)	(0.030)	(0.028)	(0.027)
Survey year 2013	-0.014	-0.008	0.054	0.046
	(0.029)	(0.028)	(0.028)	(0.026)
Below Bachelor's		-0.256***		-0.266***
		(0.021)		(0.020)
Bachelor's		-0.135***		-0.146***
		(0.019)		(0.019)
South and Central America		0.129***		0.117***
		(0.032)		(0.029)
Northern and Western Europe		0.366***		0.340***
		(0.040)		(0.037)
Eastern Europe		0.139***		0.079***
		(0.032)		(0.026)
Southern Europe		0.193***		0.123***
		(0.061)		(0.057)
Africa		0.088***		0.121***
		(0.032)		(0.030)
West and Central Asia		0.088**		0.075**
		(0.038)		(0.037)
US, UK, Australia, and NZ		0.422***		0.402***
		(0.039)		(0.049)
Southeast Asia		0.013		0.033
		(0.027)		(0.022)
South Asia		-0.021		-0.045*
		(0.026)		(0.026)
Constant	1.705***	1.946***	1.817***	1.974***
	(0.152)	(0.148)	(0.145)	(0.141)
R-squared	0.063	0.144	0.034	0.123
Sample size	6,245	6,245	5,861	5,861

Notes: Robust standard errors in parentheses. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Both specifications also include province of residence dummies.