EPRI #GradEarnings RESEARCH BRIEF #4 (Version '14-11-24)

The Boom and Bust of ICT Graduates' Earnings Over Time

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Overview of EPRI #GradEarnings Research Briefs:

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Part I: Introduction

Major Findings

This Research Brief presents an analysis of labour market outcomes of university graduates with bachelor's degrees using a new dataset that links information on students from the University of Ottawa to tax records held at Statistics Canada. We study their outcomes across different areas of study from 1998 through 2010. We do this by following their earnings on a year-by-year and cohort-by-cohort basis from 1999 through 2011, the last year for which tax data were available. We also compare the earnings of male and female graduates, and compare those at different ranges of the earnings distribution across faculties.

Graduates are separated into three groups: 1) ICT (Information and Communications Technology) graduates, 2) Engineers (from non-ICT fields), and 3) All Other graduates (see #GradEarnings Research Brief #3 for a split across other faculty groups).

The major findings are:

1. ICT graduates and non-ICT Engineers earned a premium over graduates from all other disciplines taken together (All Others).
2. All Others earned less, but their earning patterns over time were far more stable.
3. The dot-com bust after 2001 had strongly negative effects on the earnings of ICT graduates.
4. Women had lower earnings than men across all program groups and this gap increased in the years following graduation.
5. Students were more likely to enroll in an ICT program during boom times, and less likely to enroll after earnings prospects diminished.

Data and Methodology

The University of Ottawa's Institutional Research and Planning (IRP) office provided administrative data on all graduating students from the University of Ottawa from 1998 through to 2010 to Statistics Canada. The data included information on field of study and gender, among other variables. Statistics Canada linked these data to each student's tax record so their post-schooling earnings could be tracked on an individual basis.

To measure labour market outcomes, this analysis focuses on total before-tax earnings, combining earnings from the T4 slips, self-employment income and other employment income. We focus on mean (i.e. average) earnings, adjusted to 2011 dollars, although we also look at more detailed breakdowns.

In this initial project, we focus on bachelor degree graduates who were in the labour force. We excluded the following groups from our analysis: graduates whose before-tax annual earnings were less than or equal to $1,000, graduates who continued their schooling, individuals with advanced degrees, and those with bachelor degrees that cannot be undertaken directly from high school (e.g. education or law).

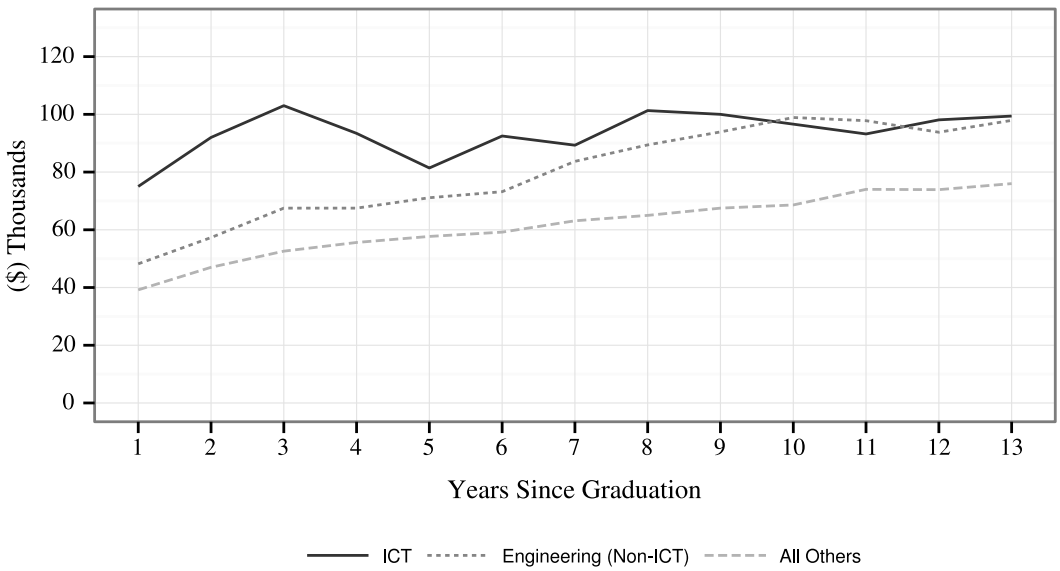
For a more detailed description of the data and methodology see the Data and Methodology document in this series of briefs.

Part II: Findings

Earning Patterns of 1998 Graduates

Figure 1 shows that in the first year after graduation, the 1998 cohort of ICT graduates had much higher earnings than other graduates. ICT earnings were $75,000, which is about $27,000 higher than the (non-ICT) Engineering group, and $35,000 higher than the All Others group.

Figure 1: Mean Earnings, 1998 Cohort



However, the earnings gap between ICT graduates and All Others narrowed to around $20,000 at the end of the 13-year period, and it was almost entirely eliminated between ICT and Engineering graduates. This narrowing of ICT and others' earnings reflects the sharp decline of ICT graduates' earnings in 2002 and 2003.

Like ICT graduates, Engineers experienced substantial gains in year-over-year earnings over their first three years of employment, but did not experience earnings decreases after the dot-com bust.

Graduates from All Other programs had more consistent earnings profiles, although their earnings rose faster during the first 3 years after graduation than afterwards.

Earnings Patterns for Selected Cohorts

Figure 2 shows earnings for representative cohorts of graduates. The three groups of graduates clearly had very different patterns for each of the 1998, 2000, 2004 and 2008 cohorts.

Earnings were by far the most variable across cohorts for the ICT group: the 1998 and 2000 ICT cohorts had significantly higher earnings than the later cohorts, and this was especially notable early on in their careers. For example, mean earnings in the third year after graduation were almost $40,000 lower for the 2004 cohort when compared to the 1998 cohort.

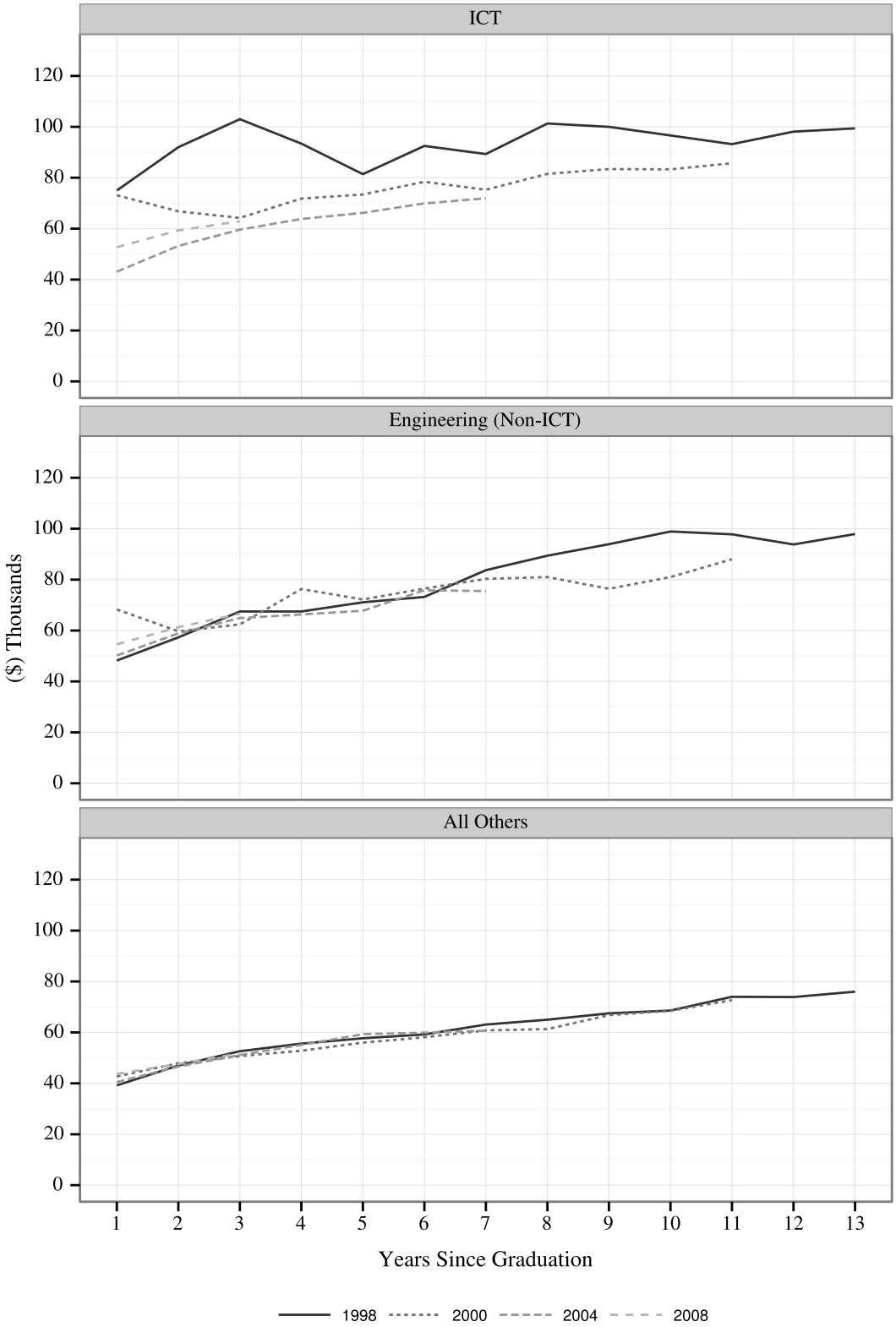
Earnings of Engineering graduates were considerably less variable, but still showed some differences across cohorts. In contrast, the earnings profiles of All Others were remarkably stable.

First Year Earnings Across All Cohorts

Figure 3 profiles the first year earnings across all cohorts of ICT, Engineering and All Other graduates. ICT graduates' starting earnings were far higher than those of All Other graduates prior to the dot-com bust: ICT graduates earned around $35,000 more than All Others in the bubble years through 2001. They also earned $27,000 more than Engineers in 1999, but the Engineers almost caught up to ICT earnings prior to the end of the bubble.

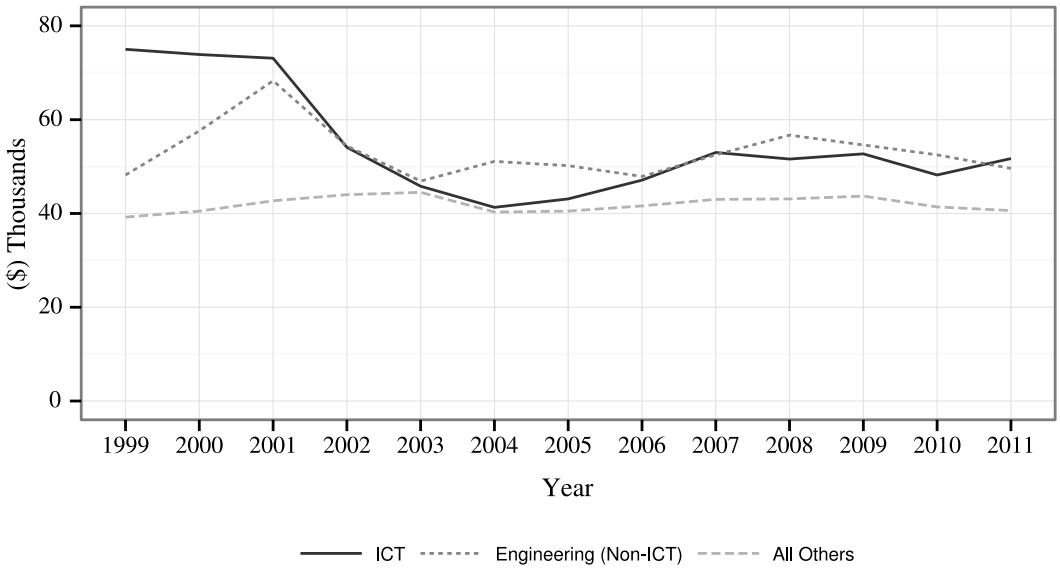
Both ICT and Engineering graduates were heavily affected by the busting of the dot-com bubble, as their first year earnings declined precipitously from fiscal years 2001 to 2003.

Figure 2: Mean Earnings, Selected Cohorts



After 2003, first year earnings of ICT and Engineering graduates were roughly similar, with Engineering graduates earning somewhat more in some later years.

Figure 3: Mean First Year Earnings



Graduates from the All Others group had the lowest first year earnings of the three groups in every year covered by this study, but their earnings were much more stable across cohorts.

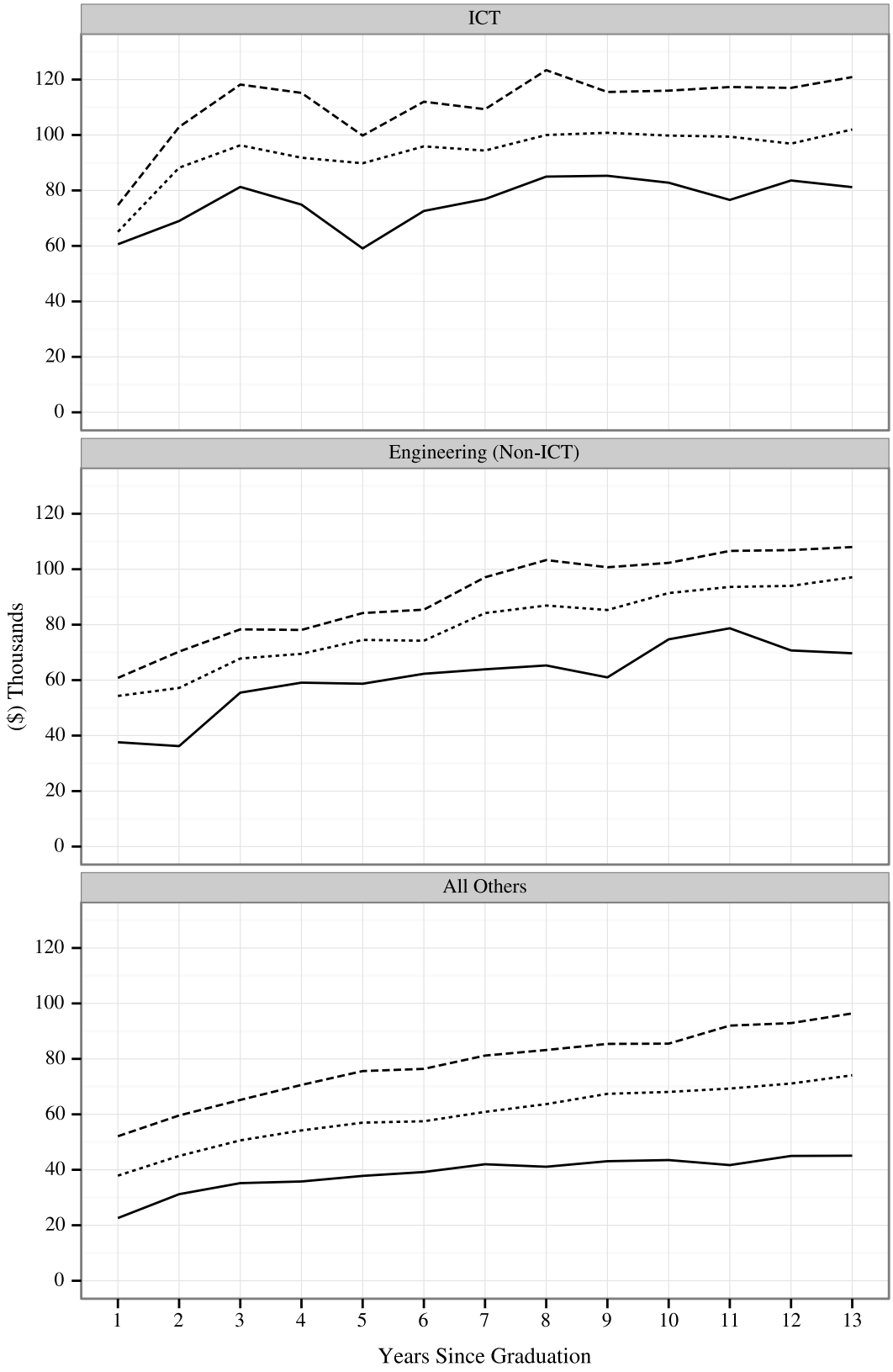
Quartile Earnings

Figure 4 presents quartile earnings of ICT graduates, Engineers, and All Others for the 1998 cohort (i.e. the sample was divided into four equally sized groups sorted by earnings, with the numbers representing the earnings levels that divide these groups).

Firstly, median earnings (a point where half of the sample earns below this amount, and the other half above) of ICT graduates for this cohort fell only modestly after the dot-com bust, while earnings fell significantly for the upper and lower quartiles, declining by roughly $15,000 each.

Another perspective in this dynamic is seen in how the *lowest* quartile of ICT graduates earned more than the *top* quartile of All Other graduates in the boom

Figure 4: Quartile Earnings, 1998 Cohort



years, whereas the earnings of the lowest quartile of ICT graduates fell considerably below those of the highest earnings quartile of All Other graduates after the bust.

Gender

Figure 5 presents the earnings of the 2000 cohort of ICT and All Other graduates, separated by gender. (This is the earliest cohort where sample sizes permitted a gender breakdown.) Female sample sizes were too small for the Engineering group.

There was a gender earnings gap for this cohort for both the ICT graduates and All Others. With respect to the ICT graduates, we see an immediate gap in earnings directly after graduation, whereas for All Others, the gap only emerged over time.

Interestingly, among ICT graduates, male earnings began to diminish in the second year after graduation and bottomed out in the third year. The same is not true for female earnings, which were flat over these years. The bust therefore appears to have hit male graduates more than female graduates.

Responsiveness to Labour Market Conditions

Figure 6 illustrates the responsiveness of the number of ICT graduates to labour market signals (earnings of ICT graduates).

We show the number of ICT graduates who joined the workforce by calendar year, and compare that to the earnings of ICT graduates. In other words, the left scale shows mean earnings, while the right scale shows the number of graduates.

The number of graduates increased sharply over time, hitting a peak in 2005 before declining and bottoming out in 2010.

The 2005 graduates (i.e., the peak) generally started school when earnings were at their highest, but came into the labour market when earnings were at approximately their lowest level. As the bubble burst and salaries declined, so did the enrollment of the ICT programs and subsequent numbers of graduates.

The system (at least as it pertained to the University of Ottawa) was thus responsive to labour market conditions, but the ICT bust meant that this resulted in poor outcomes for the increased number of graduates.

Figure 5: Earnings by Gender, 2000 Cohort

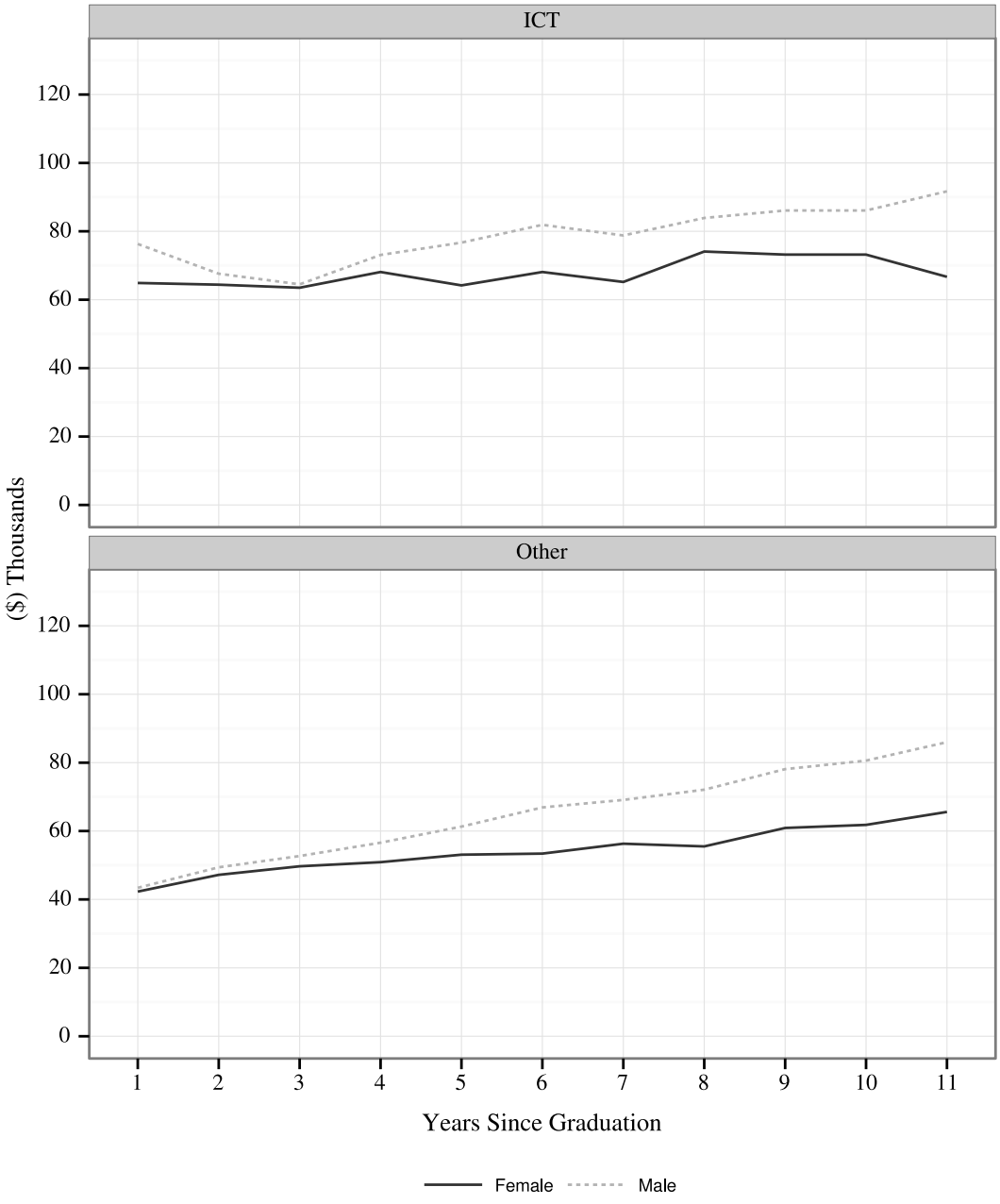
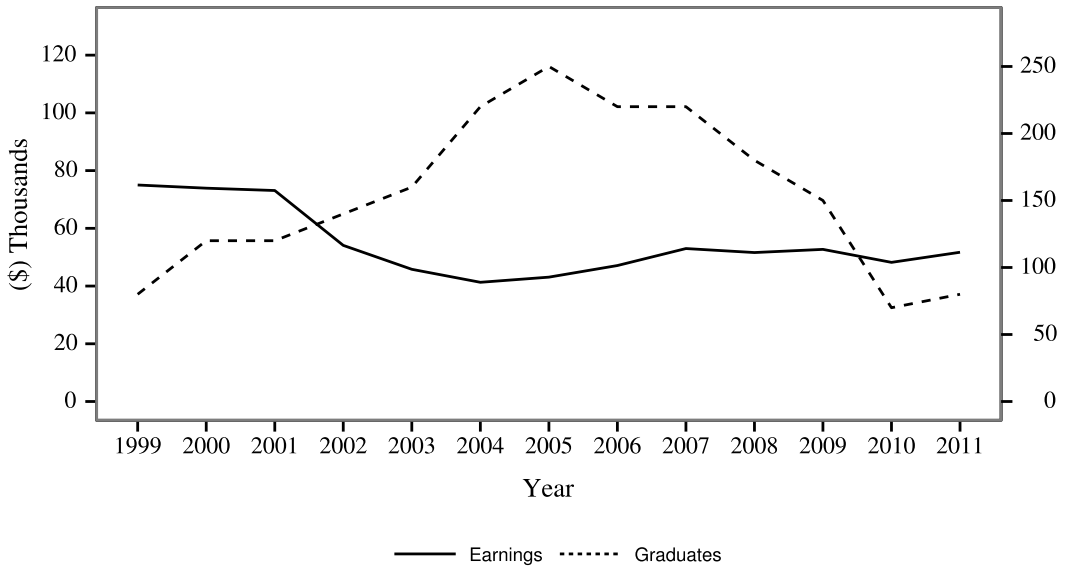


Figure 6: Earnings and Number of Graduates



Part III: Conclusion

The approach adopted here has provided new and powerful information on the labour market outcomes of ICT graduates. Extensions of this work will allow us to delve further into these patterns for University of Ottawa graduates or, indeed, for any other individual institution. Finally, and what is perhaps more interesting, expanding the analysis to include institutions—and graduates—from across the country would allow us to determine if the results found here generalise.