Supplementary Appendix

"**The Short- and Long-Term Career Effects of Graduating in a Recession"**

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Contents

Appendix I: Data and Sample

Our data combines three administrative datasets from Statistics Canada. The first is the University Student Information System (USIS), which includes enrollment and graduate information of post-secondary students in Canada from 1974 to 1997. We augment the USIS data by linking it to income data from the T1 Family File (T1FF) between 1982 and 1999, and to an employer-employee matched dataset called the Longitudinal Employment Analysis Program database (LEAP). Each is described below, followed by how we defined the variables used in our analysis.

USIS is a national database containing pertinent up-to-date information on student participation in and graduation from Canadian degree granting institutions obtained from administrative records provided at the individual level. USIS has two main components. The *enrolment* survey collects information on student counts, and requests information on a broad array of student and program characteristics including institution, province, gender, age, mother tongue, immigration status, country of citizenship and country of origin, full- or part-time status, type of qualification sought (e.g., bachelor, masters, etc., or none), field of study, year of study in program and an individual identifier. The *degrees* survey collects information on all students who have received a degree, diploma or certificate during the calendar year. The degrees survey has a more limited number of data elements than the enrolment survey. These datasets have been merged by the Education, Culture and Tourism Division of Statistics Canada, creating a third file commonly referred to as the *linkage* file. We use the linkage file in this analysis.

The information is obtained from the administrative records of Canadian degree-granting institutions, generally in an individual record format. Approximately 70 percent of post-secondary institutions provided regular annual individual information, including student identifiers that allow matching to the other two administrative datasets. We therefore focus on students from these institutions.[1] All information in the USIS is checked for validity edited by the universities and, in some cases, by the province and by Statistics Canada.

The enrolment survey collects information on student counts as of December 1st in all provinces except Ontario, where the reference date is November 1st. This means that each student who attends university in the fall session is counted only once annually, even though the student may be enrolled in more than one program. This student count is used as a proxy for the total number of students enrolled during a complete academic year.

The degrees survey collects information on all students who have received a degree, diploma or certificate during the calendar year ending in December. It is a count of the number of degrees, diplomas and certificates awarded, not the number of individual students who receive them.

From the enrolment data, we keep all males that began a full-time undergraduate program at a post-secondary school institution between the ages of 17 and 20. We note students' graduation date, or last year enrolled full time (plus one since enrolment was recorded as of December 1). Experience is defined as number of years since graduation or number of years since ending full-time post-secondary education. We examine earnings starting when experience equals zero, since students are likely to have worked for 7 months since graduation. We remove any student taking longer than 8 years to complete an undergraduate degree (dropping less than 1 percent of the sample). We also calculate predicted graduation year based on entry year plus four.

The enrolment data includes information on home province. If missing, home province was assumed to be the province of the institution the student began their program. After finding that national and regional unemployment rates at time of graduation were not correlated with obtaining a subsequent degree, we focus on students that obtain no more than one degree.

The post-secondary students we examine from the USIS are matched to the T1FF using the student identifier. The T1FF is a data set of individual tax records from 1982 to 1999. The T1FF includes information on earnings, defined as the sum of taxable earnings from employment and self-employment. The dataset also contains information on transfers, as well as age, gender, residential address and an identification number for the firm at which the individual is employed. Some students (fewer than 15 percent of the sample) were not matched, mostly due to missing identifiers. Missing ID may be because (1) the

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[1] For more on the USIS and the match to the T1FF, see Heisz (2001) and Heisz (2003).

student did not have an ID code (perhaps because he or she was a foreign student), (2) the student had an ID code, but either did not give it to the institution or the institution did not request it, or (3) the institution collected the ID code but did not report it on the USIS survey. To remove individuals that have left the country, we drop any student that does not file in the last two years of the T1FF data.

Our baseline sample compares well with Census data for the same underlying population. Supplementary Figure A2 of our Supplementary Appendix, for example, shows mean earnings profiles generated from a 1995 cross section of our baseline data with analogous profiles generated from the 1996 Canadian Census (that surveys 1995 annual earnings) of college graduate males. Predicted differences over potential experience are highly similar.

The cross-section outcome variables we examine include whether a student receives a degree, and years in post-secondary school. The annual outcome variables we focus on are log earnings, dummy variables for not filing taxes, zero earnings, and living in different province than initial province.

Individuals working in the USIS-T1FF are also matched annually to information about their firms from Statistics Canada's Longitudinal Employment Analysis Program database (LEAP), beginning in 1983. The match rate was 96 percent.[2] LEAP is a company-level database that includes all employers in Canada, both corporate and unincorporated. The database tracks the employment and payroll characteristics of individual firms from their year of entry to their year of exit.[3] Employers in Canada are required to register a payroll deduction account and issue a T4 slip to each employee that summarizes earnings received in a given fiscal year. The LEAP database includes every business that issues a T4 taxation slip.

The LEAP includes a 3-digit industry code and information on annual firm size and total payroll amounts. We recorded average firm size, and total firm size between 1982 and 1999, and also subtracted the mean amounts for each year before averaging. Both methods produced similar results.[4] We also recorded when individuals switched firms and industries.

The data are collapsed into cell means by home province, year left post-secondary education, predicted year left post-secondary education, and experience. Supplementary Appendix Table A3, Panel A and B show sample sizes of the two-way match by graduation and experience year for graduation cohorts from 1977 to 1995 (including and excluding observations with missing earnings). Since graduation year 1994 is an outlier both in terms of sample size and the level of average earnings, in Figure 1 it is omitted. Since the earnings difference is stable across experience years, in the regressions cohort-effects absorb for the difference.

The cell means are matched to national and provincial unemployment rates both at time of school exit and predicted school exit. We use Statistics Canada's youth unemployment rate (ages 16 to 25). Results with the full unemployment rate were similar.

We work with two samples – the two-way student-earnings match, and the three-way match that also includes firm variables. The main results are obtained on the former, but estimates differ little between the two samples. To maximize the range of cohorts with as much as possible experience history we focus on the full range of graduation cohorts that we can match to unemployment rates at time of labor market entry (1976-1995). In the empirical analysis, we also report alternative results with subsets of cohorts.

Appendix II: Accounting for Selective College Graduation

The decision to leave college may be a function of the business cycle.[5] If workers postpone college exit in recessions, we would expect that the unemployment rate in the year of *predicted graduation* is positively related

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[2] In the case of multiple employers, the main employer is the one from which a worker has the most earnings. In defining our mobility measures, we have taken particular care with missing values for firm identifiers and industry codes. To address the problem of missing values, we first fill in single missing values with the adjacent past firm identifier or industry code. We then estimate a conservative and a more inclusive measure of mobility. The first only considers changes between two valid firm identifiers or industry codes. The second treats remaining missing values as a job or industry change. The two measures approximate upper and lower bounds of job mobility.

[3] The self-employed that do not draw a salary are not included on the LEAP database. In addition, businesses comprised solely of individuals or partnerships who do not draw a salary are also excluded from the LEAP.

[4] The USIS industry code is documented in Statistics Canada's USIS user guide, 1995.

[5] College enrollment decisions also depend on the state of the local labor market. However, the effects appear to be small in the U.S. since the 1960s (e.g., the fraction of men age 19 to 21 in college is not affected by the unemployment

to college duration. Similarly, since workers with shorter durations are more likely to be able to further postpone graduation labor market entrants in a recession are more likely to have longer durations. Appendix Table H3 shows the effects on various basic measures of college duration of the national and regional unemployment rates, as well as of predicted regional rates, separately for all workers and for those at least on grade. We see no significant correlations at the national level or for regional unemployment at the time when workers should have graduated were they on grade. However, we see some significant effect of early unemployment rates at actual graduation with duration. For a five percent change in unemployment rates, this would imply an increase of 2.5 percentage points (10% relative to the 0.26 average shown in Appendix Table A1).

Panels D to F of Appendix Table H3 show the same specifications for those workers on or above grade (see also Appendix Tables H1 and H2 for more detail). The effects are somewhat smaller. A five point shock to unemployment implies a 0.05 increase in average years of college (corresponding to three weeks or 1.4% relative to a mean of 4.11 years). These results suggest that a very small fraction of workers who are barely on or above grade tend to extend their stay in college by one or two years.[6] The fact that unemployment at predicted graduation matters less suggests this is driven primarily by workers who are already beyond grade. Consistently, the fact that the results are even weaker for the full sample and the fact that being on or above grade is not affected indicates that students overall do not make significant attempts to avoid leaving school in a recession by delaying graduation or enrolling in a new program.[7]

To directly address endogenous college exit we instrument unemployment in the actual year of exit with unemployment in the predicted year of exit based on official degree duration. Predicted year of exit is a valid instrument for actual year if college entry is uncorrelated with unemployment rates in the year of predicted exit, if it has no direct effect beyond the actual unemployment rate, and if it correlates with unemployment at actual exit. We believe the exclusion restrictions are valid, since even if students wanted, given the covariance structure of unemployment rates it would be hard for them to forecast future unemployment rates. The case could be made that the unemployment rate at predicted graduation could in itself be viewed as the relevant 'shock' to workers' careers. Thus, we present and discuss both reduced form and instrumental variable (IV) estimates.

The first two columns of Appendix Table H4 present the reduced form estimates of the interactions of potential labor market experience for the same specifications as in Table 1 (OLS). Columns 3 and 4 show the IV results and the coefficients on the instrument from the corresponding first stage. The reduced form estimates are either equal (all workers) or slightly smaller (graduates) than the corresponding OLS estimates. The numbers in Appendix Table H3 imply that delayed entry is unlikely to affect the estimates of the catch-up pattern in the reduced form. The first stage coefficient is highly significantly different from zero and

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rate for mature workers, see Card and Lemieux (2000) Table 4, nor is the proportion of workers who finish 12th grade and start college (Table 5). The unemployment rate at age 17 does not affect the probability of having a college degree, but raises the fraction of workers with some college (Table6)). Note that if unemployment triggers entry into college of workers with particular unobserved characteristics, this could affect our instrumental variable strategy even if workers are not forward looking due to correlation of the unemployment rate at entry and at exit. However, as shown in the next section, most of the correlation of unemployment rates fades after three years.

[6] Additional results in Appendix Tables H suggest that for this sample the probability of being above grade 1-3 years is raised marginally. Taking the results from Panel F, if 0.85% of workers stay longer and raise average college duration by 0.0056 years, the average additional time spent in college must be more than one year.

[7] Note that as pointed out in Section 2, the propensity of obtaining a graduate degree is also not affected by the unemployment rate in the year of the first exit from college (a 5 point unemployment shock leads to an increase in the probability to obtaining a post graduate degree of 0.008, relative to a mean of 0.2, with the lowest p-value of 0.157 in the regional sample for all workers). Post-graduate degrees are specially concentrated in the health professions, social sciences, and other majors (25-30% of all graduates obtain a graduate degree) and less concentrated in business, engineering, and teaching (8-12% obtain a graduate degree). Our sample restriction tends to more heavily exclude health profession and the social sciences than economics and engineering. To assess whether for some of these subjects the propensity to obtain a higher degree responds more strongly to unemployment at time of graduation, we ran the regressions by major. Social sciences is the only major experiencing consistent increases in the fraction of post-grad degrees during recessions, while health professions experiences consistent declines. All other majors show no clear patterns.

different from one. The ensuing IV results are either the same as OLS (for those on/above grade), or slightly more negative and more persistent (for all workers). All IV coefficient estimates are well within the confidence intervals for OLS results.[8] Since the general effects of unemployment rates on labor market entry are quite small, it would have been surprising to find much of a difference. We conclude that OLS is appropriate to analyze the effects of early labor market conditions on the long-term career outcomes of Canadian college graduates.

Appendix III: Accounting for Labor Market History

All estimates presented so far represent summary effects of the dynamic impact of the initial unemployment rate plus the dynamic effects of ensuing unemployment rates that correlate with the first. They characterize the expected earnings loss of a worker graduating in a recession and help to assess the implications of different models of career determination. Another estimate of interest is the long-term impact of an isolated temporary shock of labor market conditions for individuals entering the full-time labor market for the first time, holding all else constant. This effect can also be compared to similar shocks at later experience years to benchmark whether initial shocks, when virtually all labor market entrants must search for employment, generate different permanent and transitory effects than subsequent shocks.

Since the current province of residence is available from income tax records, we can use our data to construct unemployment rate histories for each individual starting in 1982. We interact these histories with unrestricted experience dummies and include them into the basic model as additional control variables to isolate the effect of the unemployment rate at time of college exit. Since we only have complete data for 'market history' of individuals graduated starting in 1982, we focus on this restricted group of cohorts.[9] Although shocks are highly persistent initially, the auto-covariance structure dips to zero after three to four years.[10] Thus, the inclusion of two to three lags should suffice to absorb most of omitted variable bias.

Table 2 shows a series of models with augmented controls for unemployment history, each interacted with experience. The table shows the basic regional model with the graduate sample for two models with outcomes recorded between 1982 and 1995. To compare similarly defined unemployment shocks, all models include current province fixed effects.[11] The first model includes the unemployment rate at the current experience year interacted with experience dummies, without additional labor market history. As expected, this has some small initial effects for experience years one to three, but little thereafter. Given that each of these unemployment rates has itself a potentially dynamic effect, the next models include interactions of these unemployment rates with experience dummies.

The first model, shown in Column 3 of Table 2 only includes dynamic effects of unemployment rates occurring in experience years one to three. The result shows an increasing spread in the two estimates that flattens out after experience year 5, exactly as predicted by a simple omitted variable bias calculation.[12] At each experience year the worker is exposed to additional shocks correlated with the initial shock that in itself have dynamic effects, leading to an increasing bias; as the effects of shocks decline for mature workers (as shown in Table 6 of Oreopoulos et al. 2006) and the correlation with unemployment fades or becomes

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[8] Note that Hausman tests cannot be read off the tables since standard are clustered at either graduation cohort or graduation cohort-initial province level. Although we could implement a test based on Davidson and McKinnon's (1989) approach, we believe that the differences so small that it would not reverse our conclusions.

[9] As shown in Figure 4, this group of cohorts has slightly more persistent effects of initial labor market conditions. We have also experimented with including cohorts with incomplete unemployment histories. We also included unemployment histories based on unemployment rates for all workers, with no differences in the results.

[10] If as commonly done we specify the time series process of the unemployment rate as an AR(2), the coefficients are 0.87 and -.158 for the first and second lag, respectively, in a sample pooling all states and including year and state fixed effects (a procedure followed by Blanchard and Katz 1992). Figures of the auto-covariance structure and further discussion are available in Appendix Figures B.

[11] As shown in Appendix Figure C1, Panel D and discussed in Section 4, this has little bearing on our original results.

[12] With the notation of Equation (4) the omitted variable bias of the coefficients on the first unemployment rates is

$$p\lim \hat{\beta}_{e,0} = \beta_{e,0} + \sum_{d=1}^{e} \beta_{e-d,d} \frac{\text{cov}(UR_{rc0}, UR_{r_d d})}{\text{var}(UR_{rc0})}.$$

slightly negative, the size of the gap stabilizes. Towards experience year eight the estimates become imprecise as the number of cohorts decline. The next model in Column 4 includes the entire interacted history for each experience year from one to ten. As predicted, the model is extremely similar to the one in Column 3 (however, the joint hypothesis that all additional coefficients or that all dynamic effects at higher experience years are jointly equal to zero is rejected by an F-test). Overall, the effect of the unemployment rate a worker faces in the year of college entry has a long term effect even when controlling for unrestricted dynamic effects of each single unemployment shock experience afterwards.

Since the estimates at later experience become imprecise, we now turn to a grouped model. We restrict the dynamic effects to be equal in two-year intervals (i.e., the effects of the unemployment rate at experience years 0-1, 2-3, 4-5, etc., is constrained to be equal). To keep the size of the coefficients comparable to that of the main model, we take the averages of unemployment rates within groups (the results are the same if we were to compare coefficients at two standard deviations of the respective regressors). The fully interacted model with grouped unemployment rates then is

$$\log \overline{w}_{crt} = \phi_t + \theta_r + \chi_c + \gamma_e + \beta_{e,0}(UR_{cr0} + UR_{r_1 1})/2 + \beta_{e,1}(UR_{r_2 2} + UR_{r_3 3})/2 + ... + u_{crt}.$$

Our data does not allow us to estimate the dynamic effects of unemployment shocks at experience years greater than three with a sufficient degree of precision due to a declining number of cohorts.[13] Thus, we present dynamic estimates for groups 0-1 and 2-3, and include additional dynamic interactions as controls for omitted variable bias. The dynamic effect at experience year 2-3 will help us to give a benchmark for the size of the impact of initial labor market conditions.

The effect of a single shock at experience zero and the effect of the average unemployment in experience years zero and one are very similar. The last columns of Table 2 then show the model with fully interacted controls for grouped unemployment history. The coefficient estimates are graphed in Figure 5 (Panel A). The effect of omitted variable bias is again as predicted. Moreover, now the estimated effects are smooth and show a similar convergence pattern as before.[14]

Appendix IV: The Role of Regional Mobility

In our NBER Working Paper (Oreopoulos et al. 2006) we compare the effect of initial unemployment rates on the gains from regional mobility by experience (columns 6 and 7 of Table 5).[15] Interestingly, while regional movers gain more if affected by an early recession initially, these gains fade after experience year three. It is those who stay in the region or residence who have consistently higher earnings growth. Thus, while regional mobility may still be as beneficial in booms as in recessions, it appears regional movers do not have permanently higher rates of catch up than regional stayers. That gains at regional mobility are not as exceptional as gains at job or industry moves also results from the fact that average earnings growth for region movers and stayers is quite similar, as shown in the last columns of Panel A, Table 5 (Oreopoulos et al. 2006). This is also shown in Figure D3 in the Supplementary Appendix, which shows that the effect of graduating in a tight labor market fades faster for those moving province, but that the main results are driven by those staying in the same province.

It appears that regional mobility is not as important in Canada as in the U.S. (Wozniak 2006). To further explore whether the higher job mobility for workers entering the job market in recessions is associated with higher mobility across provinces, the last columns of Table 3 shows the effects of the unemployment rate at college exit on subsequent provincial mobility. The national unemployment rate is uncorrelated with moving to other provinces for both the full sample and graduate sample in Columns 5 to 6 respectively. The results here suggest no inter-provincial mobility response from worsening in overall economic conditions. For the

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[13] Thus, dynamic estimates for unemployment shocks at higher experience years pick up the behavior of a limited number of cohorts. While interesting in its own right, the analysis of single cohorts is left to a separate study.

[14] If we repeat the exercise with the full set of cohorts (for which we do not have complete history controls) the results are very similar for the grouped model, with complete convergence occurring after six years in the labor market (shown in Appendix Figure B2).

[15] See also Supplementary Appendix Tables D5 and D6.

regression models identifying regional economic shocks, however, we do observe initially increased provincial mobility for cohorts exposed to higher unemployment conditions at time of college exit. For the graduate sample, a 5 percentage point difference in the unemployment rate at entry is associated with about a .75 percentage point difference in the provincial mobility rate in the first two years. This rate is about half that for firm mobility, and drops quickly after the third year.[16] The small effect of unemployment at college exit on provincial mobility suggests that most of the pattern of catch-up in wages over time for individuals that began the labor market in a recession occurs within provinces.

Appendix V: Weeks Worked and Weekly Earnings in the Canadian Census

Since our sample does not contain information on time worked, we also replicated our results with the Canadian Census (Appendix Table C5). We use four years from the Census (1981, 1986, 1991, and 1996). Due to the different nature of the data we have to make assumptions on the timing and province of college graduation. The fact that the main effects on annual earnings are very similar to our results is reassuring. Decomposing the effect of early unemployment rates on annual earnings into the effect on weeks worked and on weekly wages we find that the effect on weeks worked is short lived. The majority of the persistent effects we find is driven by a reduction in weekly earnings. Consistent with the small effects on employment we find our results change little if we restrict our sample to workers with positive earnings in each year (see Table 1). Thus, neither changes in labor market experience nor selective entry or exit from the earnings sample of workers of different abilities affect the main pattern of reversion we see.[17]

Appendix VI: Simulation Exercise

While our model can reconcile important facts in the data, there are several potential channels in the theory to which the data does not speak directly. To assess the potential role of additional mechanisms implied by the model and to see whether they could be reconciled with the data as well, we simulated the model for different values of the basic parameters. We first simulated the model for the case of a stationary environment (i.e., without returns to tenure or age-related costs); second, we introduced different degrees of age-related costs of search. To keep the analysis simple, we work with two groups of workers (high and low skilled). The parameter values are chosen to replicate basic features of our data. The main outcome of interest is the effect of a one-period initial reduction of the hiring rate at good firms (a reduction in p_0).[18]

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[16] After the fifth year out of college, the unemployment rate at time of exit is negatively correlated with provincial mobility. Those induced to move to another province from entering the local labor market during high unemployment appear to be less likely to move thereafter. We also replicated our estimates separately for workers who never switch region and for movers. Those never moving, about three quarters of our sample, behave very similar as the full sample (see Appendix Figure D3).

[17] This is corroborated by the fact that those who permanently stop filing do not appear to be any different from those who remain active (Panel A of Appendix Figure C3). The estimates based on the balanced panel in Figure 5 (Panel C) are by 0.002 smaller in absolute value than our main estimates, a difference that is not statistically significant. Note that, if at all, the figure suggests negative initial selection, possibly consistent with a certain degree of out-migration to the U.S. of high earners. This is consistent with small decline in average predicted earnings with experience in our sample.

[18] The basic parameter values are $\beta = 0.9$, $\lambda = 0.5$, $\alpha = 1.4$, $w_2 = 1$, and $w_1 = 1.4$, where we think of wages as log-wages for this purpose (so high-skilled workers earn 40% than low-skilled workers at firm 1, and firm 1 pays 40% higher wages than firm 2). In addition, we set the fraction of high skilled workers in the economy to 0.4. We let returns to job tenure be 5% in the first four years, 1% in the five following years, and zero thereafter, which is in the middle to high range of what has been estimated in the literature. Age-dependent search costs γ are benchmarked at 1 initially, and are allowed to increase 20% in the first five years after graduation, and 10% for the five following years (30% and 20%, respectively, in the scenario for "steep" rise in costs). These increments loosely follow the observed increase in marriage and home ownership rates among Canadian college graduates observed in the Canadian Census. Note that to avoid needing to model further job mobility, we have set age equal to job tenure at low firm equal to time since exit from college. We then chose alternative values for the initial hiring rate (p_0) and the steady state hiring rate (p). We allow for separate values for high and low skilled workers as described in the text. The values were

The simulation exercise highlights some important insights from the model. First, given that high skilled workers lose more from down grading to the low-wage firm, the fact they appear to do better initially suggests that their hiring rate at good firms falls less in recessions. Second, the large observed discrepancy in the rate of catch-up between high and low skilled workers is unlikely due to differences in search intensity alone; steady state hiring rates at good firms (p) appear to be higher for high skilled workers. Thus, we allow for differential steady state and initial hiring rates by skill-group in our simulations. Third, given differential steady state and initial hiring rates, age-related search costs have a larger effect on low-skilled workers (Appendix Figure J1, Panel B); the effect averages out in part at the mean (Appendix Figure J1, Panel A), but is still present. Fourth, the effect of age-related costs is particularly strong for very low skilled workers; it also increases with the dispersion of firm quality. Thus, the higher the pre-existing inequality in the labor market, the bigger is the persistent rise in inequality due to initial shocks predicted by the model. Fifth, the model implies that the degree of persistence increases with the size of the shock, especially for older and lower-skilled college graduates. This arises because for large initial shocks it is more likely that the slow down in search occurs before the initial effect has dissipated.

These simulations are robust to alternative choices of parameter values. They further underline the ability of the model to make rich predictions regarding the long-term effects of early short-term labor market shocks. In particular, the simulations underscore the importance of interactions of age-related costs with other factors determining search intensity (such as skills), the hiring rate, and the size of the initial shock. Yet, another result apparent from the figure is that the predicted slowdown in the recovery due to age-related costs, although significant, is not as large as in the data. This suggests that other factors may matter as well, such as long-term contracting or on-the-job human capital accumulation.

Appendix VII: The Effect of Firm, Industry, and Regional Mobility on Earnings

Mobility across Firms, Industries, and Regions. Job search is a common explanation for both high wage growth and high job mobility in young workers' careers (e.g., Topel and Ward 1992). Several studies aim at testing the basic elements of job search theory, such as the effect of past wages, tenure, and experience on the probability of job change (e.g., Topel and Ward 1992, Manning 2006, Farber 1994). While most of these studies try to control for unobserved heterogeneity, few exploit external sources of variation to identify the effects of interest. In this section we report estimates of the direct effect of early labor market conditions on the annual propensity of job change.

To gauge the magnitude of the effect initial labor market conditions on job mobility, consider the reductions in job change with labor market experience apparent in Supplementary Appendix Figure A1. Between experience years 2 and 4, the rate of job change for graduates declines by 3 percentage points annually. If this increasing stability reflects improving job matches due to search, a 2 percentage point increase in job mobility is comparable to holding workers back 3 to 4 months in their job search efforts. A similar pattern holds in experience years 5 and 6, where overall mobility declines 2 percentage points, such that a 1 percentage point increase in mobility compares to a loss in job search of about 4-6 months. Thus, entering the labor market in a recession implies that workers lose about 4 months of search effort annually due to a bad initial start.[19]

To what extent does the increased job and industry mobility contribute to the reversion of earnings losses? Clearly, the initial increase and gradual fading of mobility-responses with experience follow similar patterns as the change in the experience-earnings gradient. Mobility is likely endogenous itself, and thus we

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$p^{High} = 0.8$, $p^{Low} = 0.5$ in scenario with a higher steady state hiring rate for low skilled workers ("more offers", and

$p^{Low} = 0.4$ for the scenario with a lower hiring rate; the values for the initial hiring rate were

$p_0^{High} = 0.65$, $p_0^{Low} = 0.1$ for the "severe" shock and $p_0^{High} = 0.7$, $p_0^{Low} = 0.25$ for the less severe shock, respectively. Note that given the size of the earnings premium and the speed of observed recovery, the baseline and initial hiring rate have to be higher for high skilled workers to match the patter of the data.

[19] The initial increase in job mobility we find is of comparable size as the effect of a 10% reduction in wages found by Topel and Ward (1992), consistent with the magnitude of wage losses we find.

cannot 'condition out' the contribution of mobility on earnings effects of early unemployment rates. To gauge the potential of job and industry mobility to explain the observed earnings pattern, the upper panel of Appendix Table D5 shows the average earnings gain at job and industry changes by experience. Columns 1 through 5 show percentage annual earnings increases for movers and stayers, as well as for the full sample.

The purpose of this descriptive table is to characterize the association of mobility and wage growth without any causal interpretation. Similar to Topel and Ward (1992)'s results, the table documents a strong correlation between job changes and wage growth. On average, wage changes at job changes account for about 40% of overall wage growth in the first five experience years, and thereafter steadily declines to reach about 20% in experience year 10. Despite the differences in samples (their sample included workers of all education levels), these fractions are remarkably similar from what results in Topel and Ward (1992) and Giuliano and von Wachter (2005).

Earnings growth at job and industry mobility is 24% on average, and about double the growth for stayers from experience years 2 to 5, and then 1.5 times thereafter.[20] If one took this as a typical gain associated with a job change, then the estimated 1.5 point increase in job changes due to a 5 point recession shock could explain about 20-25% of the reversion of initial losses. (Appendix Table D5, Panel B, implies that an average increase in the rates of earnings growth for the first experience years due to 5 point initial UR shock is about 1.5-2 points.) Thus, job and industry mobility have the potential to explain an important fraction of the decay of initial job losses. However, the actual effect is likely to be larger since in a search framework the gains for workers starting at lower wages are likely to exceed those of the average.

To take this into account, Appendix Table D6 presents models of the effect of initial unemployment rates on the rate of earnings growth by mover status. Due to selection into mover status, we cannot obtain a causal effect for wage growth of movers and stayers, neither is there a simple decomposition of the effect on total wage growth into the effects on its components. Instead, to complement the results in Panel A, the goal of Panel B is to assess whether the correlation of earnings growth and job mobility strengthens for workers entering the labor market in a recession. Column (1) shows that the effect on changes in earnings for the full sample is of similar magnitude as the corresponding level estimates in Table 1 of the main paper.[21]

Columns 2 and 3 show that the correlation between earnings growth and job mobility rises in recessions. This implies that the average earnings gains shown in Panel A are likely to understate the true gains of those moving jobs in response to a recession. Job movers have persistently higher wage gains than stayers in response to an initial unemployment shock, that is, job movers catch up faster from the initial loss. Columns 4 and 5 suggest that earnings gains at moves across industries are less precisely estimated, but follow a similar pattern. Appendix Table D6 also shows estimated gains from regional mobility. As further discussed in this appendix, while the regional mobility appears conducive to wage growth, most of reversion of the losses from initial labor market shocks appears to take place within regions.

Careers Between Firms. The experience profiles in firm size and firm wages shown in Appendix Figure A1 suggests workers search for better employers over time. This is consistent with a growing literature documenting large difference in firms' wages not explained by worker and firm characteristics (e.g., Abowd, Creecy, Kramarz 2002, Idson and Oi 1999). A similar gradient arises if high wage firms gradually screen for more able workers among labor market entrants, either because of comparative advantage (Gibbons, Katz, Lemieux, Parent 2005) or because they thereby minimize the rents they pay (Lemieux 1998).[22] Adverse labor market conditions may impact these processes and reduce the quality of firms at which workers start their

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[20] Experience year one includes transitions from jobs with half a year to jobs with a full year of earnings and thus is overstated. Note that these gains are higher than those found by Topel and Ward (1992) (Table VII), but they look at all workers and at quarterly earnings data.

[21] The effects based on changes are slightly more persistent, partially due to a slight difference in samples as well as due to the implicit control for worker fixed effects in the wage growth model.

[22] This process is reinforced if human capital increases with experience. Fox (2004) suggested that large firms will try to attract older, more experience workers because of span of control considerations. Or if, as in Neal (1998), high ability workers are better at acquiring specific human capital, and large high-wage firms value human capital more, over time more able workers will again transit to high wage firms. Alternatively, workers may start at low paying firms that allow for more general human capital investment on the job and then switch employers (Rosen 1972, Mincer 1974).

careers. Bils and McLaughlin (2001) find that better paying industries have pro-cyclical hiring patterns.[23] Similar pattern are appear to hold for better paying or large firms; for example, this may arise due to changes in demand for products of different quality, differences in the costs of job creation, or because of changes in product market competition. In addition, it has long been speculated that firms raise their hiring standards in recessions (e.g., Hall 1974, Barsky, Solon, and Parker 1994). This would lead to a temporary cyclical downgrading as workers tend to start at low wage firms.

The paper provides evidence of this process. A reduction occurs in initial firm size that fades within four years; for the graduate sample, a 5 percentage point recession reduces firm size by 4-5% in the first years. The average median log wages of a workers' employer falls 3-5% in the first years after entry into a 5 point recession. This effect declines to a 2% reduction in years 5 to 9, and only fades by year 10. Since the effect of average log payroll combines the effects on average size and average median wages, the effects are initially larger (7-10%) than those on median earnings but decline more rapidly over time.

These numbers suggest that about 40% to 50% of the effect of an initial 5 point unemployment shock on wages shown in Table 1 could be explained by reductions in the average wage of an employer. To gain further insight about the economic significance of these results, compare the effects of early recessions on average median firm wages with the experience profiles in firm 'quality' in Appendix Figure A1. The increase in average median firm wages due to experience is 8%, 6%, 4%, 4%, and 2% from year zero to year five (in the graduate sample).[24] If workers search continuously throughout the year, and job search entails a continuous increase in firm size, then the effects of recessions set people back by about half a year in their job search process consistently in each of the first five years in the job market.[25]

It appears that a considerable part of earnings losses from graduating in a recession can be explained by the start of working life in lower paying industries and firms. Over time, affected workers improve their relative position vis-à-vis other more lucky workers by switching to better paying establishments. These moves entail switches across industries and across regions as well, but little losses in the time spent working. Thus, firms appear to play an important role in the determination of early wage growth and in the persistence of early labor market shocks on wages. This is consistent with a pattern of cyclical down- and upgrading of workers between industries and firm-types (e.g., Okun 1973). However, workers do not appear to be confined to their initial employer and can remedy an initial bad draw due to temporary changes in hiring standard in a recession by switching employers as the economy turns back to normal.

Appendix VIII: The Effect of Unemployment on Outcomes for Mature Workers

To explore the difference between labor market entrants and more mature workers further, Appendix Table D7 analyzes the profile in the effect of unemployment rates on wages and other outcomes by five experience groups. To make our estimates comparable with the previous literature, we show effects of the natural logarithm of unemployment rates controlling for current province fixed effects. The upper panel uses the unemployment rate for workers age 15 to 24 and the lower panel considers the effect of unemployment rates for all workers. The first rows of Panel A and B show the effect of unemployment without experience interaction. The elasticities in the first row of Column 1 of the two panels essentially replicate the results typically found in wage-curve estimates. The remaining columns show the effects of unemployment on other outcomes; the remaining rows of the table show separate estimates by experience groups.

The table makes strongly confirms the exceptional role of labor market entrants vis-à-vis mature workers. First, in all estimates there is an important experience gradient in the effect of current unemployment rates. Thus, the pooled estimates in the first row potentially obscure important effects present in the data. Second, the initial effects in early experience years are the strongest across all groups. Unemployment conditions in

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[23] Typical high wage and pro-cyclical industries are durable goods manufacturing and construction. Typical low wage, less pro-cyclical sectors are retail trade or personal services.

[24] Relative to the increase in average firm size (-4%, 7%, 4.4%, 1.3%, and 4% in years 1 to 5 for the graduate sample), the effect of initial firm size sets workers back by about a little more than half a year.

[25] Similar results are also obtained for average one, two, and three-digit industry wage premiums, consistent with the fact that high wage industries have more pro-cyclical employment creation. However, changes in average industries wage premiums for labor market entrants can only partially explain decline in average firm wages.

the local labor market matter three to four times as much for labor market entrants than for young workers who already progressed into their career by a few years. Third, the estimated gradient is as expected from results of the previous literature. For example, job to job mobility of mature workers declines in recessions (Shimer 2005), effects on non-employment are small, and average firm size rises for mature workers since smaller plants are more likely to close (Krashinsky 2002). Note that since later experience years pick up some of the persistent effect of the initial shock, the difference between the effect of unemployment at experience years 0-1 and 2-3 or later years is understated. A replication of the table with full dynamic controls yields qualitatively similar results but larger initial differences.

Appendix IX: Alternative Measures of the Differential Cost of Recessions

To characterize the overall cost due to cyclical fluctuations sustained by different groups in the population, we can use our estimates to approximate the present discounted loss of annual earnings arising from actual early recession shocks. This complements existing estimates of the costs of recessions based on the average standard deviation of consumption or earnings process. Most of these estimates are based on Lucas' (1987) original exercise of comparing the present discounted value of utility derived from two consumption streams, one uncertain and one certain. Lucas asked by what proportion consumption has to rise to make workers indifferent between the two paths.[26] Lucas' initial findings of small valuations of uncertainty have been revised in the literature in favor of more nuanced estimates taking into account imperfect capital markets, lack of savings, or concentrated job losses (e.g., Barlevy 2005). We replicate the classic Lucas measure for different groups in the population using the actual changes in the streams of annual earnings we estimate. Since none of these estimates use actual changes in earnings or consumption in response to a recession shock to estimate the cost of recessions or explores the role of heterogeneity in the costs of recessions, our estimates provide a useful complement to the existing literature.

The patterns of earnings losses, job mobility, and recovery by our measure of skill discussed in the main paper are summarized in Appendix Figure G3 (Panel A). By deciles of predicted earnings, the figure shows the fraction of earnings losses that have faded after five years in the labor market, as well as the improvements in firm quality and the fraction of workers that left their first employer. Those deciles with highest rate of job mobility and larges changes in firm quality appear to have faster reversion of earnings. The correlations in the figure lend additional support to the result based on the average in our sample that increasing job mobility and improvements in firm quality are important channels of recovery from an initial recession shock.[27]

The longitudinal data also allows us to obtain a direct measure of the cost of recessions that is a useful complement to measures in the literature based on the standard deviations of earnings. Appendix Figure G3 (Panel B) graphs two summary measures of the present discounted loss due to entry into the labor market in a recession by deciles of the predicted earnings distribution. First, it plots the percentage decline in the present discounted value of annual earnings; second, it shows the fraction increase in annual earnings a worker would require to be indifferent between the noisy earnings path and an alternative, stable path. The

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[26] Specifically, Lucas compares the present discounted value (PDV) of utility from two consumption streams; one certain, $\left\{C_1^*, C_2^*, ...\right\}$, and one uncertain $\left\{C_1, C_2, ...\right\}$, where $C_t = (1 + \varepsilon_t)C_t^*$, and epsilon is a white noise shock with constant variance. He then asks by proportion μ the uncertain stream has to be higher in each period than the certain stream to be of equal PDV utility. Using a constant relative risk aversion (CRRA) utility function with coefficient of relative risk aversion equal to one and estimates of the standard deviation of aggregate consumption, he derives that for the average worker μ is extremely small. More generally, Lucas' calculations suggest that costs of recessions are very small unless risk aversion is extremely high. Lucas' original study has been extended to take into account different form of risk aversion, absence of savings, or unevenly distributed income shocks. To our knowledge, no one has used the effects of actual recessions shocks or considered heterogeneity in workers' underlying earnings capacity.

[27] As Figure 7 (Panel D) shows, the lowest ability workers are an exception and tend to converge by improving labor force attachment relative to similar workers graduating in booms.

latter corresponds conceptually to the original Lucas measure where we have replaced consumption by annual earnings and is comparable to several estimates of costs of recessions in the literature.[28]

Appendix Figure G3 (Panel B) has two key messages. First, there is an important gradient in the cost of recessions in predicted earnings – those individuals with lower earnings capacity have four to five times costs of recessions than the most advantaged workers. The least advantaged appear to bear most of the costs of recessions. Second, the losses from starting to work in a recession as measured by actual changes in the present discounted values of earnings or utility losses are high even for the more able workers. In particular, they are much higher for the median worker in our sample than what is typically found in the literature.[29]

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[28] This approximation has clearly important flaws, since social insurance programs smooth temporary earnings shocks and may lead consumption to be less volatile than earnings. On the other hand, this might be less of a concern for highly educated workers whose take up of social programs is low. Here we follow the literature on the costs of recessions by approximating the risk faced by individuals with earnings risk.

[29] We find that an uncertain stream of earnings had to be increased by about 7% for the median worker in our sample to be of equal utility as a comparable certain path. The typical estimate in the literature is below 1%. Some studies, such as Storesletten, Telmer, and Yaron (2001) or Krusell and Smith (1999) find effects comparable to ours for households with no wealth.

Tables and Figures of Supplementary Appendix

Appendix Figure A1: Experience-Profiles in Earnings, Mobility, and Firm Charachteristics for workers with some college in Canada (Administrative Data) and U.S. (Current Population Survey)

Panel A: Change in Annual Earnings   Panel B: Fraction Job Change
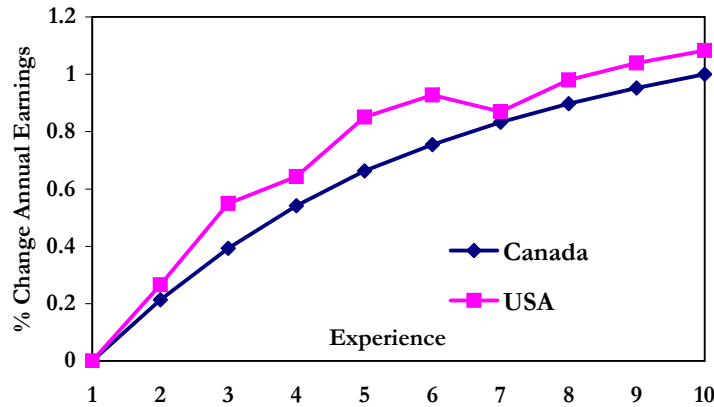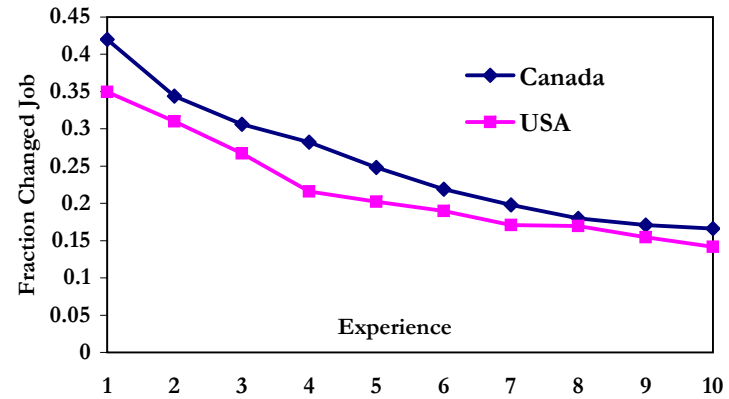
Panel C: Change in Firm Size   Panel D: Change in Average Firm Earnings (Canada Only)
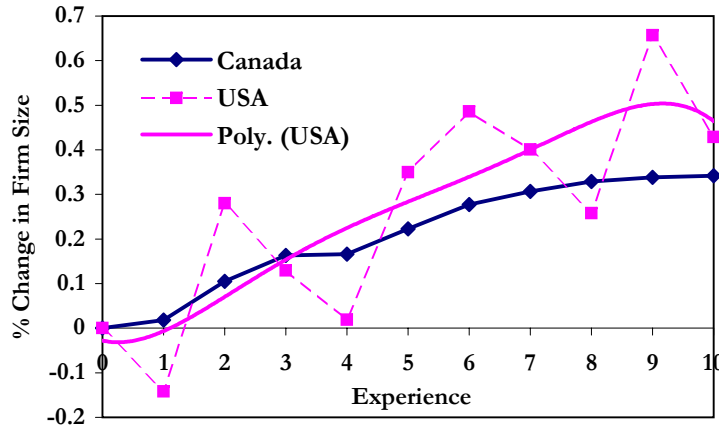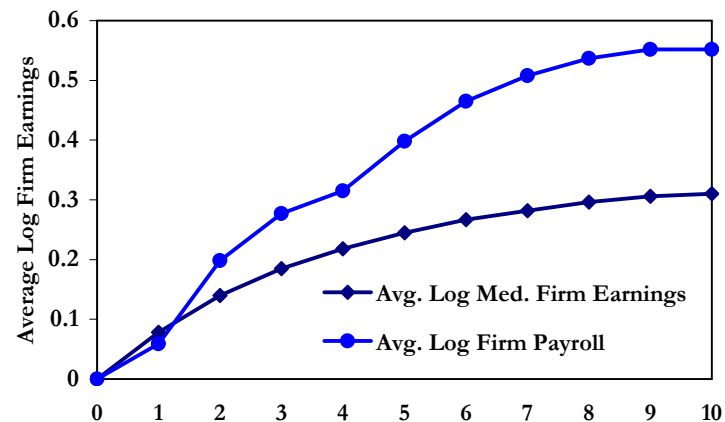
Notes: The figure shows average cross-sectional profiles in potential labor market experience (years since graduation) in Canada and the U.S.; the Canadian figures are derived from the administrative data we use in the paper; the U.S. data are taken from various years of the Current Population Survey (CPS). The underlying sample are all workers with some college in the relevant range of potential experience. Panel A shows percentage increases in annual earnings (for the U.S. from the March Demographic Supplement of the CPS in 1994-1996). Panel B shows the fraction of workers changing jobs in a given experience year (for the U.S., these figures are calculated as the fraction of workers with one year of tenure from the CPS' tenure, mobility, and pension supplements from 1979 to 2000.). Panel C shows the percentage change in firm employment (for Canada, this is average firm employment taken over all years the firm was alive from 1982 to 1999, controlling for year fixed effects; for the U.S., this is current firm size from firm size brackets taken from Supplements to the CPS in 1979, 1983, and 1988; for the U.S., we also show a polynomial approximation). Panel D shows average firm log median earnings or firm log payroll taken over all years the firm was alive from 1982 to 1999, controlling for year fixed effects (see text for details).

Appendix Figure A2: Compare Census Experience Profile with Sample Profile, with and without Controlling for Region and Years of College (Graduate Sample)

Panel A: All Sample Years
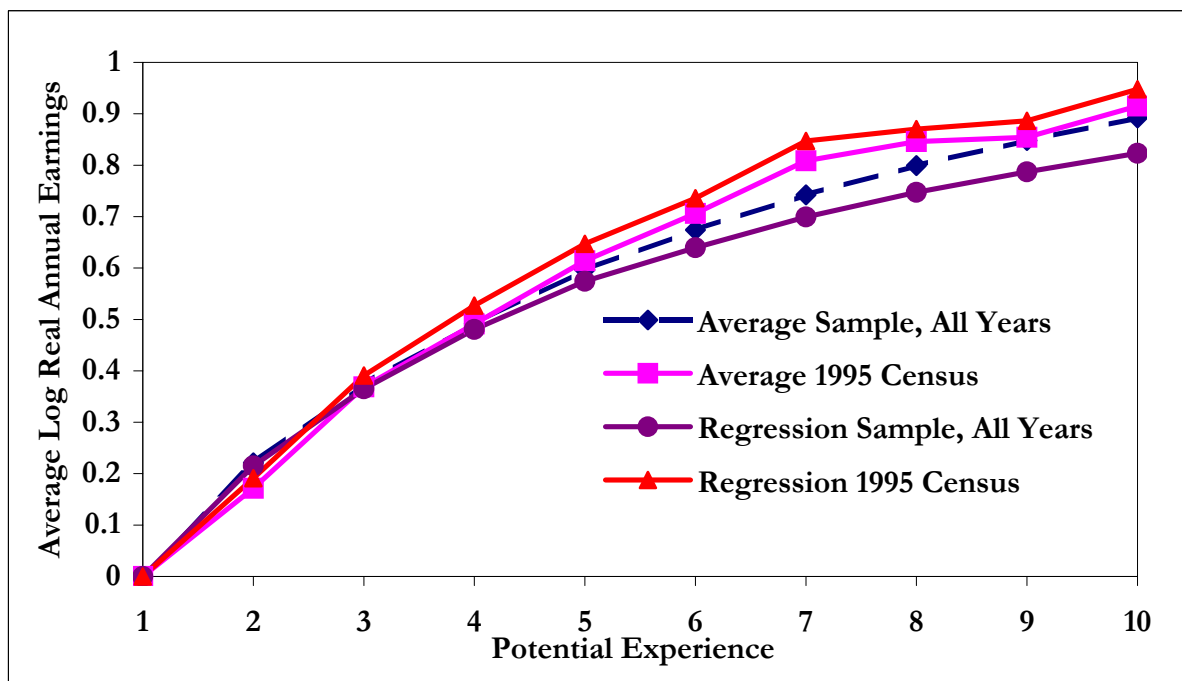
Panel B: Single Year 1995
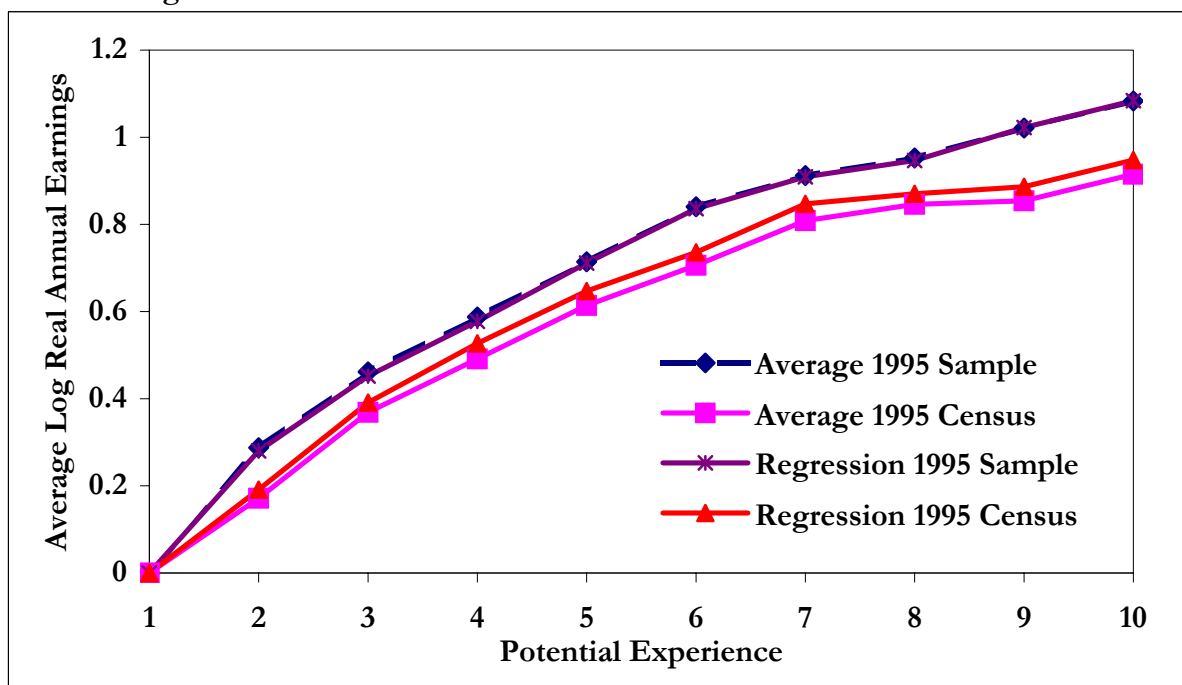
Notes: Figures compare cumulative growth in annual earnings for male workers with a college degree in the 1996 Census with the earnings data drawn from income tax records matched to administrative university data. Only cohorts graduating from 1976 to 1995 are included. Other restrictions on the administrative data are the same as in the paper. Since the distribution of years of college and regions are different in the two sample, the figures also compare estimates controlling for fixed effects for years of college and region of residence.

Appendix Table A1: Descriptive Statistics from Administrative College Data 1976-1995

	Entire Sample (Some College)				Graduates (Actual ≥ Predicted Year)			

Panel A: Duration of College

	Years Until BA	In Graduate Sample	Fraction Above Grade	Predicted-Actual BA Years	Years Until BA	In Graduate Sample	Fraction Above Grade	Predicted-Actual BA Years
At Exp. Zero	3.31	0.63	0.26	-0.10	4.11	0.89	0.40	0.86
	(1.29)	(0.38)	(0.37)	(1.69)	(0.59)	(0.11)	(0.39)	(1.08)

	Fraction D >1	Fraction D >2	Fraction D<-1	Fraction D<-2	Fraction D >0	Fraction D >1	Fraction D >2	--
At Exp. Zero	0.13	0.06	0.23	0.10	0.52	0.20	0.09	--

Panel B: Unemployment Rates Ages 15-24

	Average	Standard Deviation	Maximum	Minimum
National	14.76	2.42	19.2	11.0
Province	14.13	3.98	32.7	6.3
National Detrended	0	2.41	4.53	-3.83
Province Demeaned	0	3.01	6.53	-7.12

Panel C: Provinces

	Sample Size			Unemployment Rate	
	N	Fraction		Average	Std. Dev.
Nova Scotia	1,143	0.84		18.99	2.50
PEI	109	0.08		18.91	2.08
Newfoundland	2,535	1.86		27.11	3.51
New Brunswick	7,281	5.33		20.07	2.13
Quebec	10,472	7.66		17.20	2.60
Ontario	71,995	52.69		13.03	3.14
Manitoba	10,308	7.54		12.59	1.81
Saskatchewan	4,557	3.34		11.84	2.26
Alberta	11,742	8.59		11.68	3.08
British Columbia	16,493	12.07		15.93	3.86

Notes: See text and Data Appendix. D=Actual Graduation Year - Graduation Year Based on Program Duration.

Appendix Table A2, Panel A. Sample Size by Graduation Cohort and Experience

Graduation Year	Years Since Graduation											Total
	0	1	2	3	4	5	6	7	8	9	10	
1976							3732	3732	3732	3732	3732	18660
1977						6875	6875	6875	6875	6875	6875	41250
1978					7863	7863	7863	7863	7863	7863	7863	55041
1979				7780	7780	7780	7780	7780	7780	7780	7780	62240
1980			7869	7869	7869	7869	7869	7869	7869	7869	7869	70821
1981		7899	7899	7899	7899	7899	7899	7899	7899	7899	7899	78990
1982	8033	8033	8033	8033	8033	8033	8033	8033	8033	8033	8033	88363
1983	9146	9146	9146	9146	9146	9146	9146	9146	9146	9146	9146	100606
1984	8746	8746	8746	8746	8746	8746	8746	8746	8746	8746	8746	96206
1985	9584	9584	9584	9584	9584	9584	9584	9584	9584	9584	9584	105424
1986	9379	9379	9379	9379	9379	9379	9379	9379	9379	9379	9379	103169
1987	9307	9307	9307	9307	9307	9307	9307	9307	9307	9307	9307	102377
1988	9621	9621	9621	9621	9621	9621	9621	9621	9621	9621	9621	105831
1989	9391	9391	9391	9391	9391	9391	9391	9391	9391	9391	9391	103301
1990	9408	9408	9408	9408	9408	9408	9408	9408	9408	9408		94080
1991	9288	9288	9288	9288	9288	9288	9288	9288	9288			83592
1992	9770	9770	9770	9770	9770	9770	9770	9770				78160
1993	10429	10429	10429	10429	10429	10429	10429					73003
1994	14416	14416	14416	14416	14416	14416						86496
1995	10117	10117	10117	10117	10117							50585
Total	136,635	144,534	152,403	160,183	168,046	164,804	154,120	143,691	133,921	124,633	115,225	

Appendix Table A2, Panel B. Sample with Non-Missing Earnings by Graduation Cohort and Experience

Graduation Year	Years Since Graduation											Total
	0	1	2	3	4	5	6	7	8	9	10	
1976							3416	3364	3387	3367	3429	16963
1977						6320	6263	6322	6227	6303	6233	37668
1978					7284	7199	7199	7073	7173	7050	7168	50146
1979				7119	7058	7088	6934	7026	6937	7032	7097	56291
1980			7226	7134	7208	7073	7139	7041	7135	7194	7138	64288
1981		7166	7115	7160	7069	7097	7004	7102	7139	7131	7096	71079
1982	7083	7204	7274	7170	7214	7131	7209	7287	7218	7201	7288	79279
1983	7863	8144	8130	8249	8201	8221	8284	8221	8214	8221	8351	90099
1984	7723	7796	7896	7763	7858	7906	7876	7774	7835	7895	7899	86221
1985	8422	8637	8561	8637	8689	8672	8599	8616	8689	8693	8742	94957
1986	8443	8456	8512	8557	8524	8440	8457	8475	8476	8560	8571	93471
1987	8308	8428	8453	8375	8318	8311	8364	8383	8453	8473	8672	92538
1988	8790	8776	8717	8661	8670	8658	8668	8746	8773	8854	9029	96342
1989	8621	8530	8451	8433	8460	8411	8440	8557	8666	8785	9391	94745
1990	8532	8454	8427	8421	8445	8452	8532	8658	8742	9408		86071
1991	8325	8300	8294	8302	8392	8410	8510	8632	9288			76453
1992	8650	8707	8737	8806	8814	8895	9044	9770				71423
1993	9284	9389	9410	9371	9462	9650	10429					66995
1994	12756	12863	12941	13160	13376	14416						79512
1995	9149	9152	9291	9403	10117							47112
Total	121949	130002	137435	144721	153159	150350	140367	131047	122352	114167	106104	

Appendix Table A3: Cross-Sectional Experience Profiles in Annual Earnings, Unemployment, Participation, and Job Change, Canada and USA

| | Entire Sample (Some College) | | | | Graduates (Actual ≥ Predicted Year) | | | |

Panel A: Average Experience Profile Canada (Income Tax Records, 1982-1999)

Year of Exp.	Average Log Earnings	Fraction on UI	Frac. Not in Labor Force	Fraction Changed Firm	Average Log Earnings	Fraction on UI	Frac. Not in Labor Force	Fraction Changed Firm
0	8.83	0.016	0.111	-	8.93	0.020	0.102	-
1	9.30	0.023	0.103	0.42	9.49	0.020	0.094	0.40
2	9.51	0.023	0.100	0.35	9.71	0.020	0.093	0.31
3	9.69	0.021	0.099	0.31	9.87	0.016	0.093	0.28
4	9.84	0.017	0.091	0.28	9.99	0.013	0.085	0.25
5	9.96	0.016	0.090	0.25	10.10	0.012	0.085	0.22
6	10.05	0.015	0.092	0.22	10.18	0.011	0.086	0.20
7	10.13	0.013	0.090	0.20	10.25	0.009	0.084	0.18
8	10.20	0.012	0.089	0.18	10.30	0.008	0.082	0.17
9	10.25	0.011	0.086	0.17	10.36	0.007	0.082	0.16
10	10.30	0.010	0.081	0.17	10.40	0.007	0.077	0.16

Panel B: Average Experience Profile USA (March Current Population Survey 1994-1996)

Year of Exp.	Average Log Earnings	Fraction Unemployed	Frac. Not in Labor Force	Fraction Changed Firm[a]	Average Log Earnings	Fraction Unemployed	Frac. Not in Labor Force	Fraction Changed Firm[a]
1	8.94	0.047	0.150	0.349	8.91	0.044	0.144	0.386
2	9.21	0.068	0.132	0.310	9.30	0.064	0.128	0.326
3	9.49	0.045	0.120	0.267	9.57	0.041	0.119	0.258
4	9.59	0.038	0.054	0.216	9.62	0.036	0.054	0.208
5	9.79	0.028	0.055	0.202	9.84	0.025	0.059	0.198
6	9.87	0.040	0.052	0.190	9.91	0.032	0.055	0.180
7	9.81	0.030	0.048	0.171	9.89	0.024	0.048	0.183
8	9.92	0.028	0.039	0.170	9.98	0.019	0.036	0.169
9	9.98	0.015	0.037	0.155	10.05	0.012	0.037	0.146
10	10.03	0.023	0.034	0.142	10.12	0.021	0.035	0.133

Notes: Years of experience refer to potential labor market experience in the U.S. (age-years of education-6), and years since graduation in Canada. In the U.S. data, graduates refer to workers with a college degree or more; those with some college are workers with more than a high school but less than a college degree. See notes to Appendix Figure A1 and Data Appendix for further details.

[a]These figures are calculated as the fraction of workers with one year of tenure from the CPS' tenure, mobility, and pension supplements from 1979 to 2000.

Appendix Table A4: Experience Profile in Mobility and Firm Characteristics, Canada 1982-1999, Graduates Only

Panel A. Mobility Outcomes by Potential Labor Market Experience

Year of Exp.	Difference >=0 (Graduates)							
	Fraction Changed Industry 1	Fraction Changed Industry 2	Fraction Changed Industry 3	Fraction Changed Province	Fraction Left 1st Firm	Fraction Left 1st Industry 1	Fraction Left 1st Industry 2	Fraction Left 1st Province
0	--	--	--	--	--	--	--	--
1	0.308	0.352	0.365	0.040	0.399	0.31	0.35	0.052
2	0.220	0.257	0.270	0.029	0.558	0.42	0.48	0.086
3	0.186	0.220	0.233	0.027	0.65	0.48	0.56	0.104
4	0.163	0.194	0.207	0.024	0.709	0.52	0.61	0.115
5	0.141	0.169	0.181	0.021	0.745	0.55	0.64	0.124
6	0.126	0.151	0.163	0.020	0.769	0.56	0.66	0.133
7	0.113	0.135	0.146	0.015	0.784	0.57	0.67	0.138
8	0.104	0.124	0.134	0.012	0.799	0.58	0.68	0.143
9	0.098	0.118	0.128	0.011	0.813	0.59	0.69	0.147
10	0.098	0.116	0.126	0.009	0.827	0.61	0.71	0.150

Panel B. Firm Outcomes by Potential Labor Market Experience

Year of Exp.	Difference >=0 (Graduates)							
	Mean Log Firm Size	Actual Mean Firm Size	Fraction Firm > 100	Fraction Firm > 500	Fraction Firm > 1000	Fraction Firm > 5000	Avg. Log Med. Firm Earnings	Avg. Log Firm Payroll
0	6.94	27705	0.73	0.59	0.53	0.34	0.62	5.94
1	6.95	26563	0.74	0.59	0.53	0.33	0.70	6.00
2	7.03	28549	0.75	0.60	0.54	0.33	0.76	6.14
3	7.07	29701	0.75	0.61	0.55	0.34	0.81	6.22
4	7.08	30210	0.75	0.61	0.55	0.34	0.84	6.26
5	7.13	31429	0.76	0.62	0.55	0.35	0.87	6.34
6	7.17	33207	0.76	0.62	0.56	0.36	0.89	6.41
7	7.20	34164	0.76	0.63	0.56	0.36	0.91	6.45
8	7.21	34981	0.76	0.63	0.56	0.37	0.92	6.48
9	7.21	35286	0.76	0.63	0.57	0.37	0.93	6.50
10	7.20	35810	0.76	0.63	0.57	0.37	0.94	6.50

Notes: See text and Data Appendix.

Appendix Table A5: Firm Size and Average Firm Wages Experience -- USA

Year of Experience	All Workers (Some College)				At Least 16 Years of Schooling			
	Log Firm Size	Fraction Firm Size > 100	Fraction Firm Size > 500	Fraction Firm Size > 1000	Log Firm Size	Fraction Firm Size > 100	Fraction Firm Size > 500	Fraction Firm Size > 1000
0	5.30	0.58	0.42	0.33	5.70	0.62	0.49	0.40
1	5.16	0.52	0.40	0.33	5.65	0.61	0.47	0.40
2	5.58	0.62	0.46	0.37	5.86	0.66	0.51	0.41
3	5.43	0.59	0.42	0.34	5.52	0.59	0.44	0.36
4	5.32	0.58	0.39	0.33	5.52	0.60	0.42	0.36
5	5.65	0.61	0.47	0.36	5.89	0.64	0.50	0.40
6	5.79	0.64	0.48	0.39	5.89	0.64	0.50	0.42
7	5.70	0.63	0.48	0.38	5.80	0.65	0.50	0.39
8	5.56	0.59	0.45	0.37	5.68	0.63	0.47	0.39
9	5.96	0.67	0.51	0.44	6.18	0.71	0.54	0.46
10	5.73	0.63	0.48	0.40	5.88	0.67	0.50	0.40

Notes: Pension and Benefit Supplements to The Current Population Survey, 1979, 1983, 1988. Sample size is 4607 for all workers with 13 to 18 years of schooling and 2987 for workers with at least 16 years of schooling.

Appendix Table A6: Experience Profile in Mobility and Firm Characteristics, Canada 1982-1999, All Workers with Some College

Panel A. Mobility Outcomes by Potential Labor Market Experience

Year of Exp.	All Workers With Some College							
	Fraction Changed Industry 1	Fraction Changed Industry 2	Fraction Changed Industry 3	Fraction Changed Province	Fraction Left 1st Firm	Fraction Left 1st Industry 1	Fraction Left 1st Industry 2	Fraction Left 1st Province
0	--	--	--	--	--	--	--	--
1	0.329	0.374	0.387	0.029	0.423	0.33	0.37	0.034
2	0.253	0.293	0.306	0.028	0.586	0.45	0.51	0.059
3	0.217	0.252	0.265	0.027	0.677	0.52	0.59	0.076
4	0.191	0.225	0.239	0.025	0.736	0.56	0.64	0.090
5	0.165	0.195	0.208	0.022	0.772	0.59	0.67	0.099
6	0.144	0.170	0.183	0.021	0.791	0.60	0.69	0.105
7	0.127	0.151	0.162	0.019	0.806	0.61	0.70	0.110
8	0.114	0.136	0.146	0.018	0.82	0.62	0.71	0.116
9	0.108	0.129	0.139	0.016	0.831	0.63	0.72	0.120
10	0.105	0.124	0.134	0.015	0.844	0.64	0.74	0.124

Panel B. Firm Outcomes by Potential Labor Market Experience

Year of Exp.	All Workers With Some College							
	Mean Log Firm Size	Actual Mean Firm Size	Fraction Firm > 100	Fraction Firm > 500	Fraction Firm > 1000	Fraction Firm > 5000	Avg. Log Med. Firm Earnings	Avg. Log Firm Payroll
0	6.76	26978	0.70	0.56	0.50	0.32	0.52	5.66
1	6.78	26419	0.71	0.56	0.50	0.31	0.60	5.73
2	6.87	28656	0.72	0.58	0.52	0.32	0.67	5.88
3	6.92	29858	0.73	0.58	0.52	0.33	0.72	5.99
4	6.93	30342	0.73	0.58	0.52	0.33	0.76	6.03
5	6.98	31373	0.73	0.59	0.53	0.34	0.80	6.12
6	7.04	33148	0.74	0.60	0.54	0.34	0.83	6.21
7	7.07	34202	0.74	0.60	0.54	0.35	0.86	6.26
8	7.09	35085	0.74	0.61	0.54	0.35	0.87	6.31
9	7.10	35465	0.74	0.61	0.55	0.35	0.89	6.33
10	7.10	35933	0.74	0.61	0.55	0.36	0.89	6.35

Notes: See text and Data Appendix.

Appendix Table A7: Longitudinal Experience Profiles in Career Outcomes, Full Sample with and without Cohort, Year, Region Controls and Cross-Sectional Experience Profile Calendar Year 1995 with Region Controls (Graduate Sample Only)

Years Since Graduation	Earnings			Firm Size			Firm Wage			Payroll		
	All Years		1995	All Years		1995	All Years		1995	All Years		1995
	Average	Controls	Controls	Average	Controls	Controls	Average	Controls	Controls	Average	Controls	Controls
0	0	0	0	0	0	0	0	0	0	0	0	0
1	0.563	0.560	0.476	0.002	0.040	0.128	0.078	0.082	0.084	0.058	0.103	0.194
2	0.782	0.775	0.753	0.084	0.148	0.125	0.140	0.149	0.193	0.197	0.275	0.288
3	0.942	0.928	0.933	0.123	0.222	0.293	0.184	0.197	0.257	0.274	0.395	0.513
4	1.062	1.043	1.058	0.133	0.270	0.356	0.217	0.235	0.328	0.314	0.481	0.653
5	1.169	1.142	1.196	0.187	0.312	0.494	0.245	0.255	0.358	0.397	0.545	0.848
6	1.248	1.213	1.314	0.229	0.350	0.604	0.267	0.271	0.418	0.465	0.603	1.000
7	1.320	1.278	1.391	0.255	0.382	0.601	0.282	0.284	0.429	0.510	0.650	1.014
8	1.377	1.328	1.434	0.266	0.409	0.614	0.297	0.297	0.456	0.540	0.694	1.054
9	1.428	1.371	1.511	0.269	0.432	0.672	0.306	0.308	0.466	0.556	0.732	1.124
10	1.472	1.409	1.565	0.259	0.450	0.651	0.311	0.314	0.470	0.554	0.763	1.109

Years Since Graduation	Industry Mobility			Firm Mobility			On UI			Zero Earnings		
	All Years		1995	All Years		1995	All Years		1995	All Years		1995
	Average	Controls	Controls	Average	Controls	Controls	Average	Controls	Controls	Average	Controls	Controls
0	--	--	--	--	--	--	0.020	0.045	0.042	0.047	0.032	0.038
1	0.351	0.334	0.340	0.398	0.363	0.375	0.020	0.046	0.046	0.036	0.020	0.030
2	0.256	0.241	0.260	0.309	0.278	0.301	0.020	0.047	0.053	0.035	0.020	0.025
3	0.217	0.194	0.210	0.272	0.231	0.254	0.016	0.044	0.048	0.034	0.020	0.022
4	0.191	0.164	0.158	0.245	0.199	0.201	0.013	0.041	0.048	0.030	0.019	0.018
5	0.165	0.139	0.129	0.216	0.172	0.165	0.012	0.040	0.045	0.031	0.020	0.024
6	0.148	0.124	0.112	0.196	0.154	0.146	0.011	0.039	0.048	0.032	0.021	0.021
7	0.132	0.109	0.093	0.177	0.137	0.125	0.009	0.037	0.044	0.033	0.022	0.017
8	0.122	0.099	0.088	0.165	0.125	0.117	0.009	0.037	0.044	0.033	0.023	0.024
9	0.114	0.091	0.068	0.155	0.114	0.097	0.007	0.037	0.040	0.035	0.025	0.019
10	0.110	0.084	0.066	0.148	0.106	0.094	0.007	0.037	0.041	0.033	0.023	0.020

Notes: For full sample (All Years), model with controls includes fixed effects for cohort of graduation, region of first residence, and year. For year 1995, model with controls includes fixed effects for region of first residence.

Appendix B: Auto-Covariance Structure of Regional Unemployment Rates

If as commonly done we specify the time series process of the unemployment rate as an AR(2), the coefficients are 0.87 and -.158 for the first and second lag, respectively, in a sample pooling all states and including year and state fixed effects (a procedure followed by Blanchard and Katz 1992). Additional lags are not significant.

The auto-covariance structure of the unemployment rate for the observations in our sample controlling for cohort, region, and year fixed effects is shown in the Figure. (These correspond to the auxiliary regression coefficients that pre-multiply the effects of the omitted unemployment rate history in the omitted variable bias calculation of Section 2.) Although shocks are highly persistent initially, the auto-covariance structure dips to zero after three to four years. Thus, the inclusion of two to three lags should suffice to absorb most of omitted variable bias.

To account for the high persistence of unemployment shocks, often an ARIMA(1,1,0) process is specified instead of an AR(2). It is often difficult to distinguish the two processes in short samples, but given a prior of stationarity for the unemployment rate we opt for the latter. A strand of literature in time series econometrics models the unemployment rate accounting directly for asymmetry and short-run persistence in the dynamics of unemployment rates (e.g., Koop and Potter 1999, Rothman 1998), although the AR(2)/ARIMA(1,1,0) appears to be a common choice (Montgomery et al. 1998). On the time series properties of the unemployment in Canada see Fauvel et al. (1999) or Mikhail et al. (2003).

References:

Fauvel, Yvon, Alain Paquet, and Christian Zimmerman (1999). 'Short-Term Forecasting of National and Provincial Employment in Canada.' Working Paper No. R-99-6E Applied Research Branch, Strategic Policy, Human Resource Development Canada.

Mikhail, Ossama, Curtis Eberwein, and Jagdish Handa (2003). 'Testing and Estimating Persistence in Canadian Unemployment.' Mimeo, University of Central Florida.

Montgomery, Alan, Victor Zarnovitz, Ruey Tsay, and George Tiao (1998). 'Forecasting the U.S. Unemployment Rate.' Journal of the American Statistical Association 93 pp. 478-493.

Rothman, Philip (1998). 'Forecasting Asymmetric Unemployment Rates.' Review of Economics and Statistics pp . 164-168.

Appendix Figure B1: Auto-Covariance of Unemployment Rate at Ages 15-24, Regional Graduate Sample

Panel A: Cohorts 1982-1995

Year since Graduation
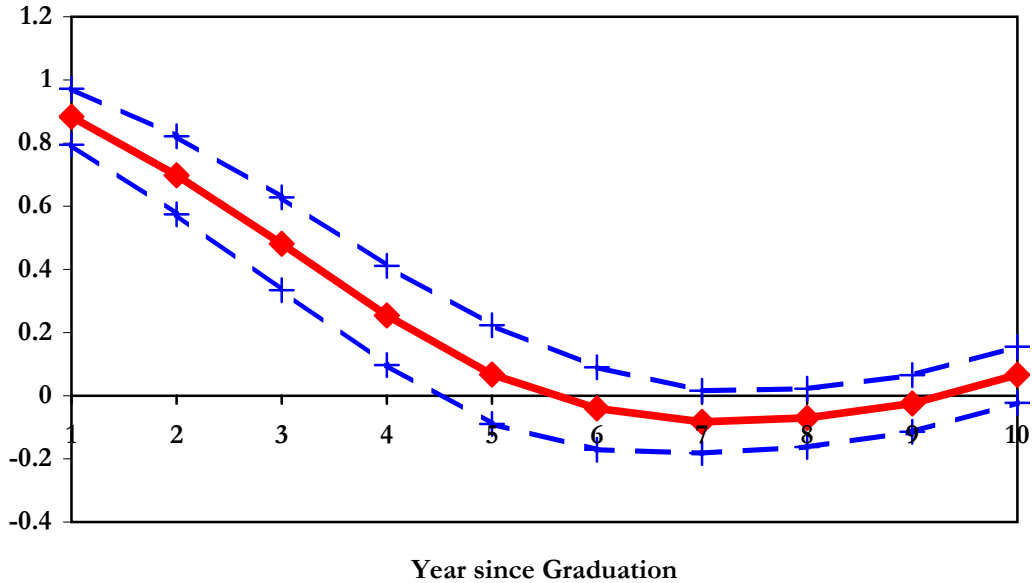
Panel B: Cohorts 1976-1995

Year since Graduation
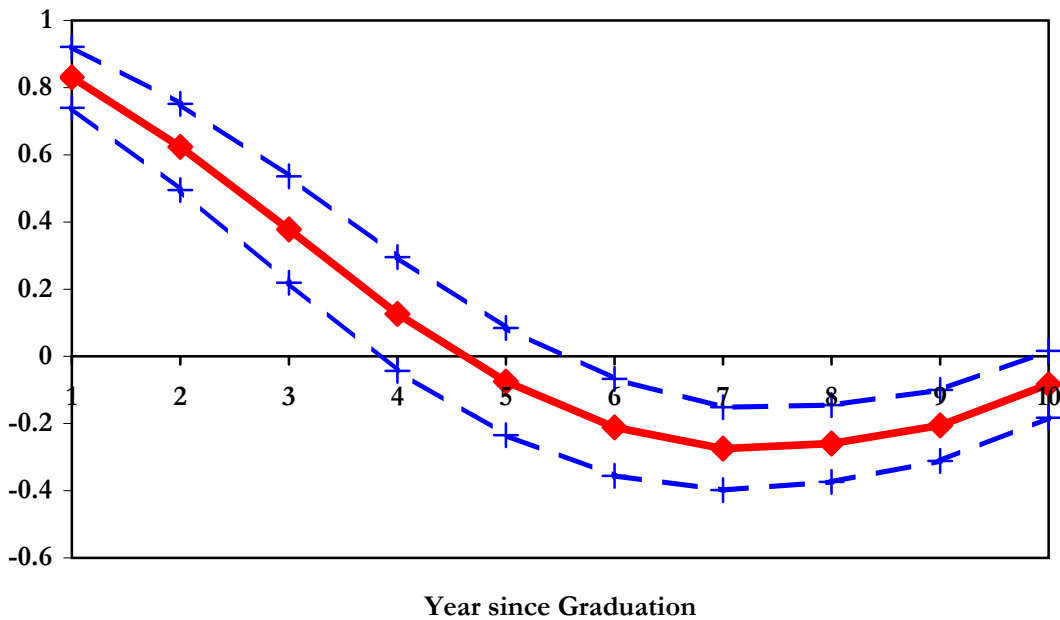
Notes: Figure displays regression coefficients of regional unemployment rates in given experience year on unemployment rate at graduation, controlling for fixed effects for region of first residence, region of current residence, and year of graduation. The regression are weighted by individuals present in the respective cell and cohort-range.

Appendix FigureB2 (A): Effect of Unemployment Rate at Time of Graduation on Log Real Earnings With Controls for Unemployment Rate History: 1982-1995 Cohorts, Full Sample
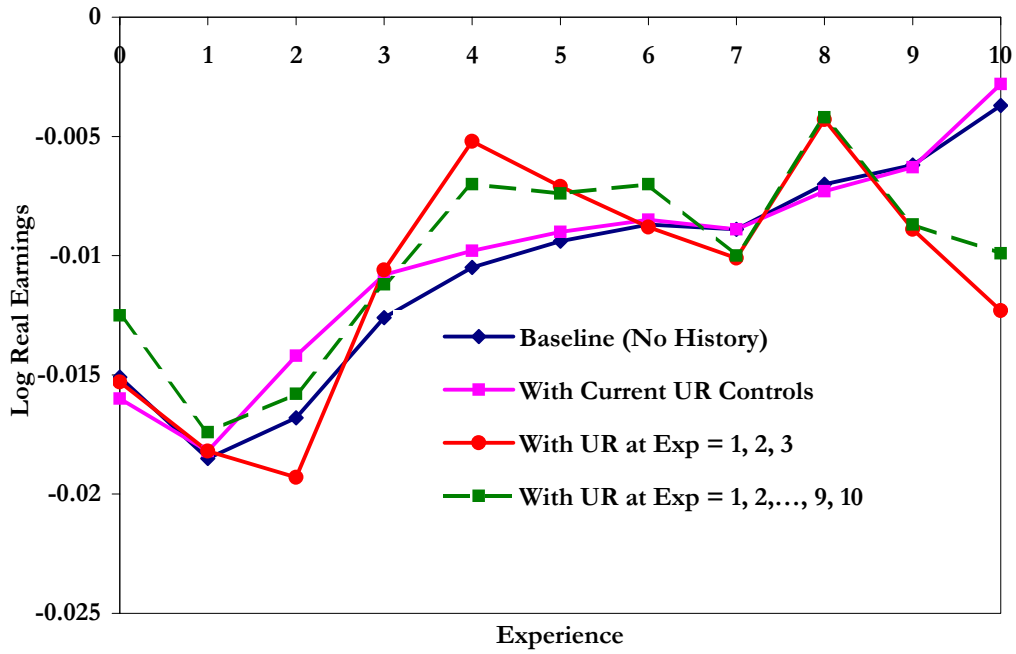
Appendix Figure B2 (B): Grouped Model of Effect of Unemployment Rate at Time of Graduation on Log Real Earnings With Controls for Unemployment Rate History: 1982-1995 Cohorts, Full Sample
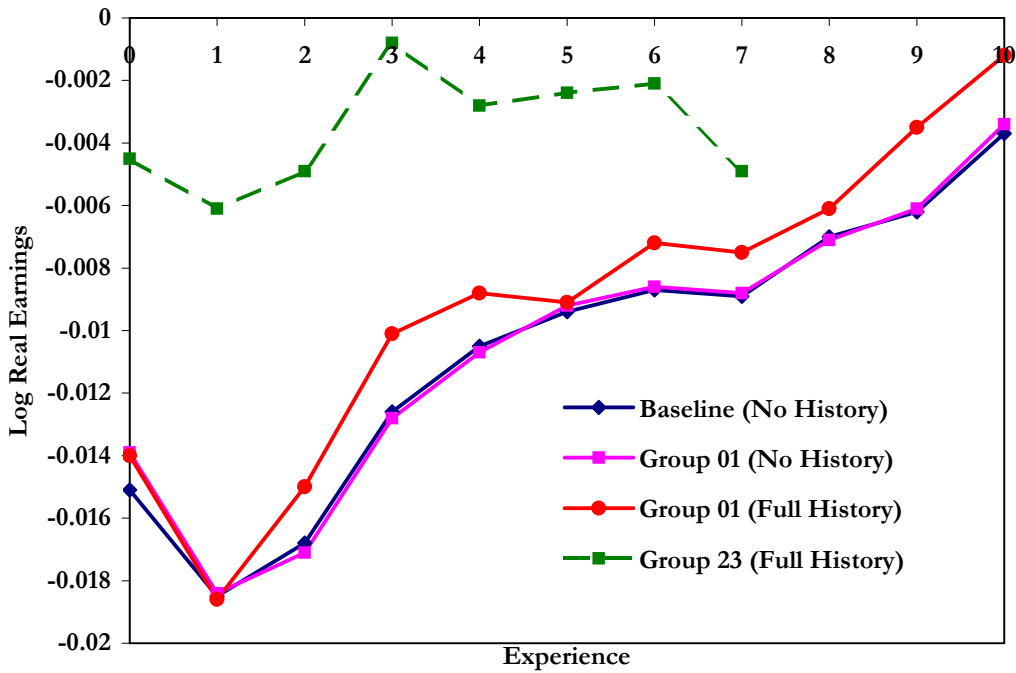
Notes: See notes and discussion of Figure 5 in text.

Appendix Table B1: Effect of Unemployment Rate at time of Graduation With Controls for UR History, Basic and Grouped Model - Full Sample, Regional Model, Cohorts 1982-1995

Model	Specification							
	Baseline (No UR History)	With Current UR Only	With History in Exp=1,2,3	With Full UR History	Baseline (No UR History)	Baseline Group 0-1 (No Hist.)	Group 01 With Full History	Group 23 With Full History
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Experience Year								
0	-0.0151	-0.016	-0.0153	-0.0125	-0.0151	-0.0139	-0.014	---
	[0.0032]***	[0.0032]***	[0.0031]***	[0.0029]***	[0.0032]***	[0.0034]***	[0.0036]***	---
1	-0.0185	-0.0182	-0.0182	-0.0174	-0.0185	-0.0184	-0.0186	---
	[0.0028]***	[0.0054]***	[0.0052]***	[0.0052]***	[0.0028]***	[0.0029]***	[0.0032]***	---
2	-0.0168	-0.0142	-0.0193	-0.0158	-0.0168	-0.0171	-0.015	-0.0045
	[0.0025]***	[0.0028]***	[0.0056]***	[0.0051]***	[0.0025]***	[0.0025]***	[0.0029]***	[0.0030]
3	-0.0126	-0.0108	-0.0106	-0.0112	-0.0126	-0.0128	-0.0101	-0.0061
	[0.0023]***	[0.0023]***	[0.0048]**	[0.0042]***	[0.0023]***	[0.0025]***	[0.0028]***	[0.0027]**
4	-0.0105	-0.0098	-0.0052	-0.007	-0.0105	-0.0107	-0.0088	-0.0049
	[0.0023]***	[0.0023]***	[0.0047]	[0.0038]*	[0.0023]***	[0.0024]***	[0.0027]***	[0.0033]
5	-0.0094	-0.009	-0.0071	-0.0074	-0.0094	-0.0092	-0.0091	-0.0008
	[0.0022]***	[0.0023]***	[0.0051]	[0.0040]*	[0.0022]***	[0.0023]***	[0.0034]***	[0.0052]
6	-0.0087	-0.0085	-0.0088	-0.007	-0.0087	-0.0086	-0.0072	-0.0028
	[0.0024]***	[0.0024]***	[0.0056]	[0.0045]	[0.0024]***	[0.0025]***	[0.0042]*	[0.0054]
7	-0.0089	-0.0089	-0.0101	-0.01	-0.0089	-0.0088	-0.0075	-0.0024
	[0.0025]***	[0.0025]***	[0.0055]*	[0.0045]**	[0.0025]***	[0.0027]***	[0.0042]*	[0.0042]
8	-0.007	-0.0073	-0.0043	-0.0042	-0.007	-0.0071	-0.0061	-0.0021
	[0.0024]***	[0.0024]***	[0.0050]	[0.0038]	[0.0024]***	[0.0026]***	[0.0034]*	[0.0040]
9	-0.0062	-0.0063	-0.0089	-0.0087	-0.0062	-0.0061	-0.0035	-0.0049
	[0.0024]**	[0.0024]**	[0.0051]*	[0.0041]**	[0.0024]**	[0.0026]**	[0.0036]	[0.0049]
10	-0.0037	-0.0028	-0.0123	-0.0099	-0.0037	-0.0034	-0.0012	-0.0015
	[0.0025]	[0.0025]	[0.0051]**	[0.0042]**	[0.0025]	[0.0027]	[0.0040]	[0.0047]
Constant	8.9864	9.0247	9.0278	8.9509	8.9864	8.9719	9.0123	---
	[0.1300]***	[0.1303]***	[0.1272]***	[0.1239]***	[0.1300]***	[0.1334]***	[0.1387]***	---
N	8304	8304	8304	7704	8304	8304	8038	---
R^2	0.97	0.97	0.97	0.97	0.97	0.97	0.97	---

Notes: Robust standard errors in brackets. See notes and discussion of Table 2 in text.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Figure C1: Effect of Unemployment Rate at Time of Graduation on Log Real Earnings, Alternative Models, Regional Graduate Models for Cohort 1982-1995 (Unless Otherwise Noted)

Panel A: Different Early Labor Market Conditions (2 Std.Dev. Shock)
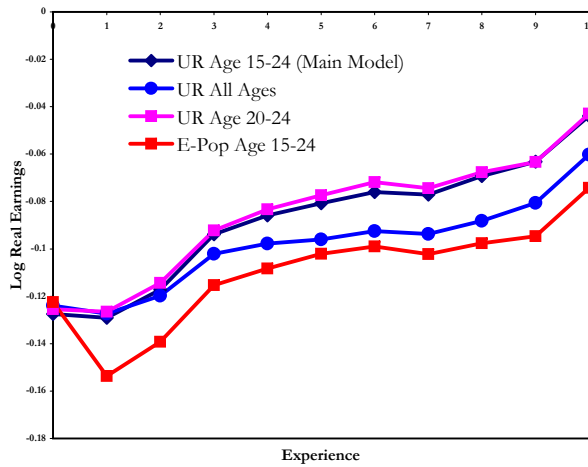
Panel B: Different Early Labor Market Horizons (Average UR)
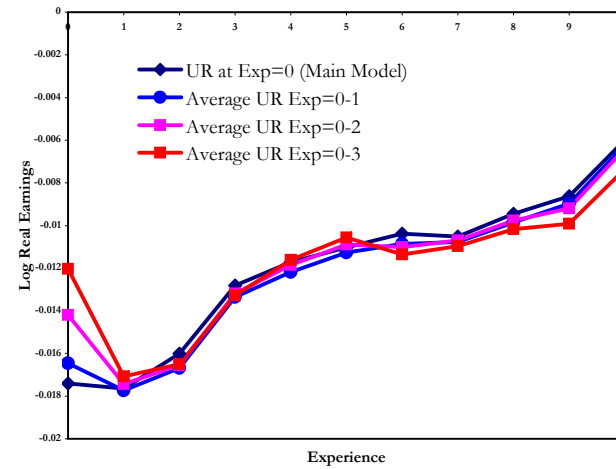
Panel C: Shock in Region of College vs. Region of First Residence
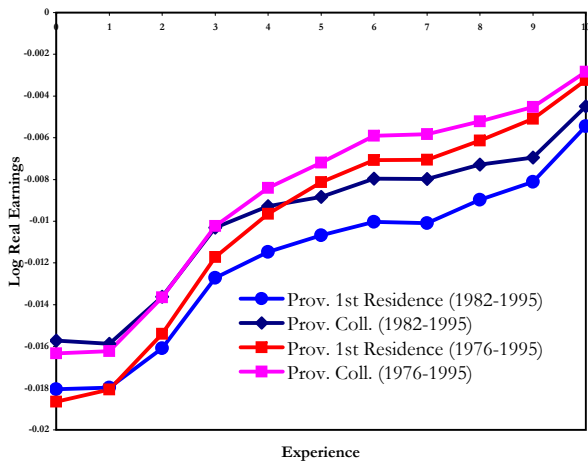
Panel D: Current Province and Current Province-Year Controls
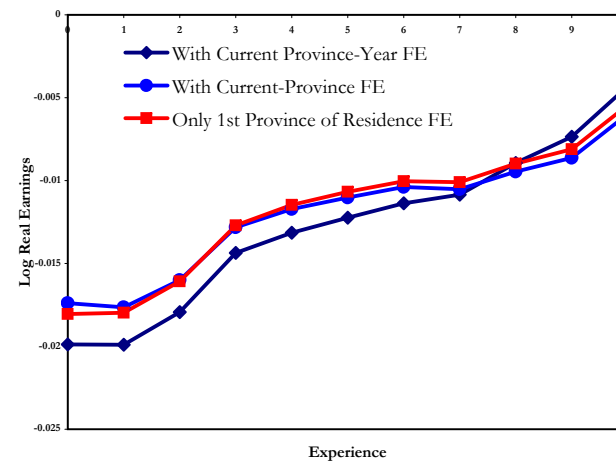
Notes: Panel A shows the main coefficients from the basic regional regression specification using alternative measures of the state of the labor market. To make effects comparable, the figure shows the coefficients multiplied by two standard deviations of the respective measure. Panel A shows the main coefficients from a basic regional regression specification using the average unemployment rates in the first years of labor market experience. Panel C compare estimates of the effect of the regional unemployment rate in the year of graduation in the province of college attendande and the province of first residence for different cohort ranges. Panel D compares the main coefficients from the basic regional model with fixed effects for province of first residence with models when also fixed effects for either current-province or current-province-current-year are included.

Appendix Figure C2: Regression Residuals of Separate Regressions of Log Annual Earnings and Unemployment Rates including Fixed Effect for Current Year, First Province of Residence, and Year of Graduation, Plotted for Various Experience Years with Corresponding Line of Regression of Earnings Residuals on Unemployment Rate Residuals
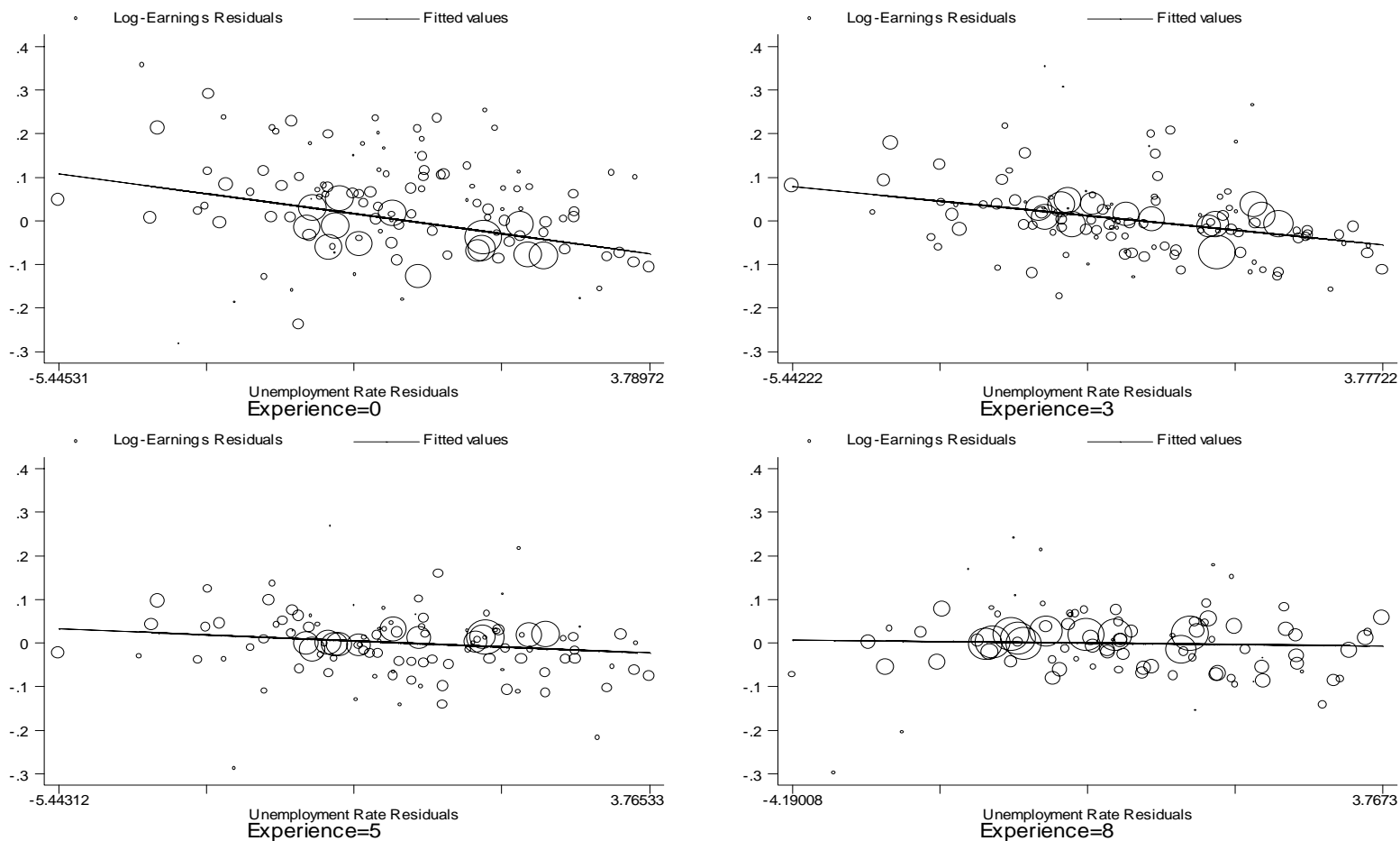
Notes: Circles correspond to cell sizes. "Fitted Residuals" refer to the predicted regression line of a regression of earnings residuals on unemployment rate residuals, weighted by cell sizes.

Appendix Figure C3: Effect of Unemployment Rate at Time of Graduation on Log Real Earnings for Different Samples: Regional Models, Some College (All) and Graduate Sample, All Cohorts

Panel A: Including Workers Who Stop Filing Income Taxes (Excluded From Main Models)
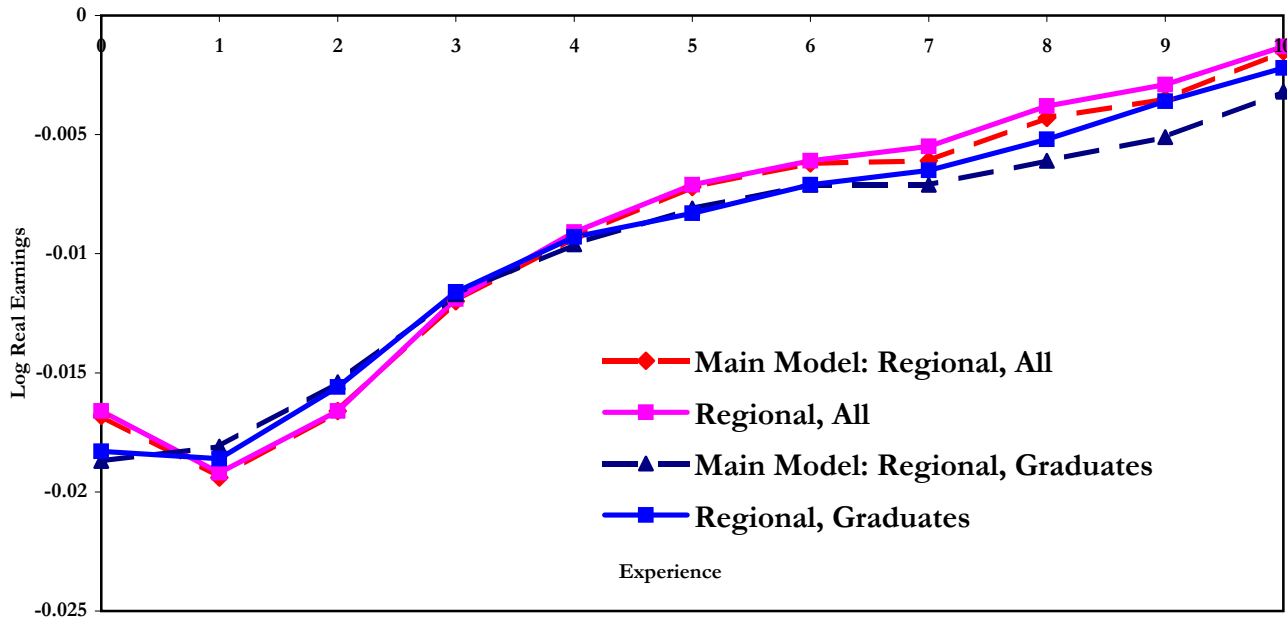
Panel B: Estimates for Sample Including Graduate Degrees
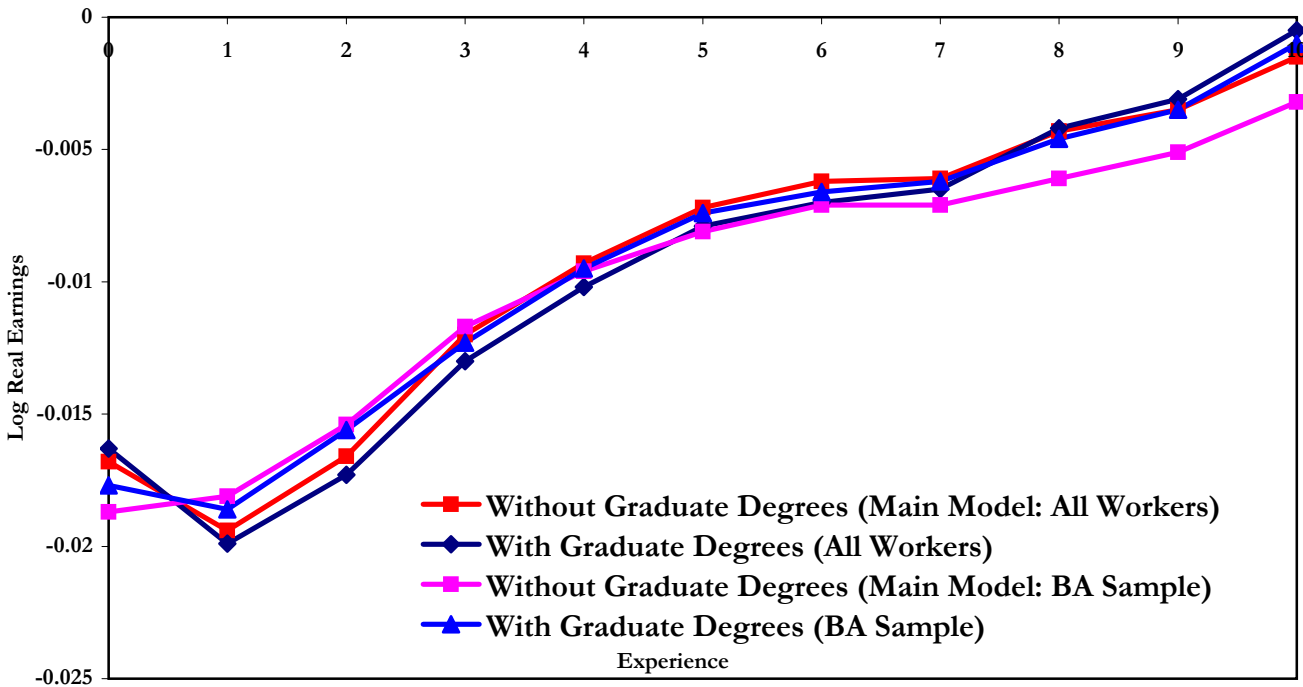
Appendix Table C1: Effect of Unemployment Rate at time of Graduation on Log Real Earnings by Potential Experience for Workers with Positive Earnings Every Period (Panel Sample)

National/Regional	Specification					
	National	National	Regional	National	National	Regional
Trend	Linear	Quadratic	NA	Linear	Quadratic	NA
D>=0?	No	No	No	Yes	Yes	Yes
	(1)	(2)	(3)	(4)	(5)	(6)
Experience Year						
0	-0.0212	-0.0229	-0.0172	-0.0235	-0.0234	-0.0177
	[0.0058]***	[0.0038]***	[0.0027]***	[0.0042]***	[0.0033]***	[0.0025]***
1	-0.0153	-0.0167	-0.0186	-0.0134	-0.0135	-0.0156
	[0.0067]**	[0.0030]***	[0.0023]***	[0.0060]**	[0.0027]***	[0.0021]***
2	-0.0106	-0.0118	-0.0153	-0.0087	-0.0093	-0.0129
	[0.0045]**	[0.0025]***	[0.0021]***	[0.0039]**	[0.0020]***	[0.0019]***
3	-0.0066	-0.0072	-0.0111	-0.0031	-0.0039	-0.0096
	[0.0034]*	[0.0022]***	[0.0021]***	[0.0030]	[0.0013]***	[0.0017]***
4	-0.0052	-0.0049	-0.0084	-0.0019	-0.0024	-0.0079
	[0.0035]	[0.0023]*	[0.0020]***	[0.0034]	[0.0015]	[0.0016]***
5	-0.0046	-0.003	-0.0059	-0.0006	-0.0002	-0.0057
	[0.0035]	[0.0019]	[0.0020]***	[0.0030]	[0.0013]	[0.0017]***
6	-0.0018	-0.0011	-0.006	0.0001	0.0009	-0.0058
	[0.0040]	[0.0018]	[0.0021]***	[0.0032]	[0.0016]	[0.0018]***
7	-0.0023	-0.0019	-0.006	-0.0015	-0.0003	-0.0062
	[0.0052]	[0.0023]	[0.0020]***	[0.0041]	[0.0019]	[0.0018]***
8	-0.0004	0	-0.0048	-0.0017	0.0002	-0.0055
	[0.0059]	[0.0028]	[0.0020]**	[0.0040]	[0.0017]	[0.0017]***
9	0.0034	0.0034	-0.0045	0.0014	0.0034	-0.0052
	[0.0060]	[0.0027]	[0.0020]**	[0.0042]	[0.0017]*	[0.0018]***
10	0.0071	0.0041	-0.0035	0.005	0.0048	-0.004
	[0.0070]	[0.0027]	[0.0020]*	[0.0049]	[0.0021]**	[0.0018]**
Constant	7.1728	-7.4295	8.8027	7.4451	-5.1739	8.9846
	[0.3142]***	[2.2783]***	[0.0966]***	[0.2565]***	[0.7255]***	[0.0675]***
N	43728	43728	43728	26084	26084	26084
R-squared	0.74	0.75	0.78	0.89	0.89	0.91

Notes: Robust standard errors in brackets. See notes to Table 1 for information on regression specification. See also discussion and notes of Figure 5.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table C2: Effect of Unemployment Rate at time of Graduation on Log Real Earnings by Potential Experience - Including Workers that Permanently Stop Filing Income Taxes

National/Regional	Specification					
	National	National	Regional	National	National	Regional
Trend	Linear	Quadratic	NA	Linear	Quadratic	NA
D>=0?	No	No	No	Yes	Yes	Yes
	(1)	(2)	(3)	(4)	(5)	(6)
Experience Year						
0	-0.0195	-0.0211	-0.0166	-0.022	-0.0223	-0.0183
	[0.0045]***	[0.0037]***	[0.0026]***	[0.0035]***	[0.0036]***	[0.0023]***
1	-0.0168	-0.0181	-0.0192	-0.0169	-0.0171	-0.0186
	[0.0049]***	[0.0027]***	[0.0024]***	[0.0047]***	[0.0026]***	[0.0021]***
2	-0.0132	-0.0141	-0.0166	-0.0121	-0.0125	-0.0156
	[0.0032]***	[0.0024]***	[0.0022]***	[0.0029]***	[0.0018]***	[0.0020]***
3	-0.0085	-0.009	-0.0119	-0.0061	-0.0066	-0.0116
	[0.0023]***	[0.0021]***	[0.0021]***	[0.0023]**	[0.0015]***	[0.0018]***
4	-0.0063	-0.0062	-0.0091	-0.0037	-0.004	-0.0093
	[0.0026]**	[0.0025]**	[0.0019]***	[0.0029]	[0.0018]**	[0.0017]***
5	-0.0069	-0.0058	-0.0071	-0.0044	-0.0041	-0.0083
	[0.0030]**	[0.0020]***	[0.0019]***	[0.0027]	[0.0016]**	[0.0017]***
6	-0.0027	-0.0023	-0.0061	-0.0028	-0.0022	-0.0071
	[0.0032]	[0.0019]	[0.0020]***	[0.0026]	[0.0017]	[0.0018]***
7	-0.0022	-0.0019	-0.0055	-0.0019	-0.001	-0.0065
	[0.0041]	[0.0022]	[0.0020]***	[0.0031]	[0.0014]	[0.0018]***
8	0.0008	0.0009	-0.0038	-0.0001	0.0011	-0.0052
	[0.0049]	[0.0027]	[0.0020]*	[0.0033]	[0.0014]	[0.0018]***
9	0.0044	0.0041	-0.0029	0.0031	0.0042	-0.0036
	[0.0049]	[0.0028]	[0.0020]	[0.0034]	[0.0018]**	[0.0018]**
10	0.0073	0.005	-0.0013	0.0054	0.005	-0.0022
	[0.0049]	[0.0029]*	[0.0020]	[0.0034]	[0.0022]**	[0.0018]
Constant	7.0909	-3.9354	8.7626	7.4203	-2.112	9.0364
	[0.2579]***	[2.3657]	[0.1041]***	[0.2068]***	[0.7413]**	[0.0661]***
N	14645	14645	14645	1731	1731	1731
R-squared	0.76	0.76	0.79	0.97	0.97	0.99

Notes: Robust standard errors in brackets. See notes to Table 1 for information on regression specification. See also Appendix Figure C3, Panel A.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table C3: Effect of Unemployment Rate at time of Graduation on Log Real Earnings by Potential Experience Including Workers With Post-Graduate Degrees

National/Regional	Specification			
	Regional	Regional	Regional	Regional
With Graduates	No	Yes	No	Yes
D>=0?	No	No	Yes	Yes
	(1)	(2)	(3)	(4)
Experience Year				
0	-0.0168	-0.0163	-0.0187	-0.0177
	[0.0026]***	[0.0025]***	[0.0024]***	[0.0023]***
1	-0.0194	-0.0199	-0.0181	-0.0186
	[0.0024]***	[0.0024]***	[0.0021]***	[0.0022]***
2	-0.0166	-0.0173	-0.0154	-0.0156
	[0.0022]***	[0.0021]***	[0.0019]***	[0.0021]***
3	-0.012	-0.013	-0.0117	-0.0123
	[0.0021]***	[0.0019]***	[0.0017]***	[0.0020]***
4	-0.0093	-0.0102	-0.0096	-0.0095
	[0.0020]***	[0.0018]***	[0.0016]***	[0.0018]***
5	-0.0072	-0.0079	-0.0081	-0.0074
	[0.0019]***	[0.0017]***	[0.0016]***	[0.0016]***
6	-0.0062	-0.007	-0.0071	-0.0066
	[0.0020]***	[0.0019]***	[0.0017]***	[0.0018]***
7	-0.0061	-0.0065	-0.0071	-0.0062
	[0.0020]***	[0.0018]***	[0.0017]***	[0.0017]***
8	-0.0043	-0.0042	-0.0061	-0.0046
	[0.0019]**	[0.0017]**	[0.0017]***	[0.0015]***
9	-0.0035	-0.0031	-0.0051	-0.0035
	[0.0019]*	[0.0018]*	[0.0017]***	[0.0016]**
10	-0.0015	-0.0005	-0.0032	-0.001
	[0.0020]	[0.0019]	[0.0017]*	[0.0017]
Constant	8.8017	8.7677	9.0456	9.0136
	[0.1012]***	[0.1024]***	[0.0668]***	[0.0649]***
N	14407	26219	8679	15941
R-squared	0.8	0.76	0.95	0.82

Notes: Robust standard errors in brackets. See notes to Table 1 for information on regression specification. See also Appendix Figure C3, Panel B.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table C4: Effect of Unemployment Rate at time of Graduation on Log Real Earnings by Potential Experience -- Different Graduation Cohorts

Area	Specification							
	National				Regional			
Trend	Quadratic				N.A.			
D>=0?	Yes				Yes			
Cohorts	1978-1995	1982-1995	1978-1992	1982-1992	1978-1995	1982-1995	1978-1992	1982-1992
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Experience Year								
0	-0.0212	-0.0497	-0.0245	-0.0164	-0.0174	-0.0177	-0.0181	-0.0157
	[0.0036]***	[0.0069]***	[0.0034]***	[0.0025]***	[0.0032]***	[0.0045]***	[0.0024]***	[0.0026]***
1	-0.0127	-0.0277	-0.0163	-0.0168	-0.0164	-0.0203	-0.0164	-0.0188
	[0.0031]***	[0.0020]***	[0.0023]***	[0.0026]***	[0.0028]***	[0.0040]***	[0.0023]***	[0.0023]***
2	-0.0094	-0.0179	-0.0115	-0.0113	-0.0151	-0.0188	-0.0142	-0.0164
	[0.0032]**	[0.0030]***	[0.0022]***	[0.0027]***	[0.0022]***	[0.0029]***	[0.0020]***	[0.0022]***
3	-0.0054	-0.0103	-0.0067	-0.0071	-0.0127	-0.0141	-0.0115	-0.0134
	[0.0025]*	[0.0024]***	[0.0015]***	[0.0020]***	[0.0019]***	[0.0026]***	[0.0018]***	[0.0021]***
4	-0.005	-0.0069	-0.0054	-0.0053	-0.0124	-0.0118	-0.0103	-0.0117
	[0.0032]	[0.0021]**	[0.0019]**	[0.0033]	[0.0017]***	[0.0023]***	[0.0016]***	[0.0021]***
5	-0.0045	-0.0069	-0.0049	-0.0037	-0.0117	-0.009	-0.0089	-0.0104
	[0.0026]	[0.0018]***	[0.0015]***	[0.0029]	[0.0016]***	[0.0022]***	[0.0015]***	[0.0020]***
6	-0.0024	-0.0052	-0.0021	0.0002	-0.0111	-0.0081	-0.0078	-0.0089
	[0.0031]	[0.0015]***	[0.0022]	[0.0026]	[0.0017]***	[0.0023]***	[0.0016]***	[0.0021]***
7	-0.001	-0.003	-0.0009	0.0002	-0.0106	-0.0074	-0.0074	-0.0092
	[0.0028]	[0.0014]*	[0.0020]	[0.0023]	[0.0017]***	[0.0022]***	[0.0016]***	[0.0021]***
8	0.0016	-0.0039	0.0003	0.0003	-0.0096	-0.0059	-0.0065	-0.0097
	[0.0027]	[0.0019]*	[0.0015]	[0.0026]	[0.0018]***	[0.0022]***	[0.0016]***	[0.0021]***
9	0.0054	-0.0028	0.0032	0.002	-0.0088	-0.0046	-0.0054	-0.0104
	[0.0025]*	[0.0015]*	[0.0018]	[0.0023]	[0.0020]***	[0.0023]**	[0.0017]***	[0.0021]***
10	0.0079	-0.0026	0.0045	0.0057	-0.0062	-0.0038	-0.0036	-0.0073
	[0.0026]**	[0.0011]**	[0.0023]*	[0.0029]*	[0.0022]***	[0.0025]	[0.0017]**	[0.0020]***
Constant	-5.0063	-7.7747	-3.3741	1.2771	9.2186	8.7422	8.8482	9.3224
	[3.5595]	[4.2340]*	[1.4871]**	[2.9338]	[0.1125]***	[0.1251]***	[0.0782]***	[0.0666]***
N	1150	841	1551	1110	1150	841	1551	1110
R-squared	0.97	0.97	0.97	0.97	0.99	0.99	0.99	0.99

Notes: Robust standard errors in brackets. See notes to Table 1 for information on regression specification. See also discussion and notes of Figure 5.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table C5: Effect of UR at Time of Predicted Graduation on Log Weekly Wages and Log Weeks, Canadian Census 1981,9186,1991,1996

Exp. Year	Without Current Year FE			With Current Year FE		
	Log Earn	Log Weekly Earn	Log Weeks	Log Earn	Log Weekly Earn	Log Weeks
0	-0.013	-0.009	-0.004	-0.011	-0.002	-0.010
	(0.0084)	(0.0073)	(0.0026)	(0.0076)	(0.0074)	(0.0035)
1	-0.013	-0.009	-0.005	-0.011	-0.005	-0.005
	(0.0086)	(0.0048)	(0.0049)	(0.0095)	(0.0058)	(0.0057)
2	-0.012	-0.006	-0.006	-0.012	-0.005	-0.007
	(0.0060)	(0.0039)	(0.0031)	(0.0068)	(0.0037)	(0.0044)
3	-0.010	-0.008	-0.003	-0.009	-0.004	-0.005
	(0.0046)	(0.0033)	(0.0025)	(0.0054)	(0.0037)	(0.0029)
4	-0.012	-0.010	-0.002	-0.014	-0.008	-0.006
	(0.0046)	(0.0037)	(0.0020)	(0.0048)	(0.0036)	(0.0025)
5	-0.009	-0.008	-0.001	-0.011	-0.005	-0.006
	(0.0055)	(0.0042)	(0.0026)	(0.0047)	(0.0037)	(0.0029)
6	-0.007	-0.007	0.000	-0.012	-0.006	-0.005
	(0.0061)	(0.0043)	(0.0038)	(0.0065)	(0.0038)	(0.0047)
7	-0.011	-0.008	-0.003	-0.010	-0.002	-0.008
	(0.0053)	(0.0040)	(0.0024)	(0.0062)	(0.0041)	(0.0034)
8	-0.005	-0.008	0.003	-0.003	-0.003	-0.001
	(0.0048)	(0.0039)	(0.0026)	(0.0059)	(0.0044)	(0.0030)
9	-0.006	-0.007	0.002	-0.006	-0.002	-0.004
	(0.0045)	(0.0033)	(0.0020)	(0.0050)	(0.0032)	(0.0024)
10	0.002	-0.001	0.002	0.006	0.008	-0.002
	(0.0052)	(0.0037)	(0.0023)	(0.0065)	(0.0045)	(0.0030)

Notes: Replication of main estimates using Census data, see Sensitivity Appendix D.

Appendix Figure D1 (A): Effect of Unemployment Rate at Time of Graduation on Zero Earnings, on UI, and Missing - National Models, Cohorts 1976-1995

Experience
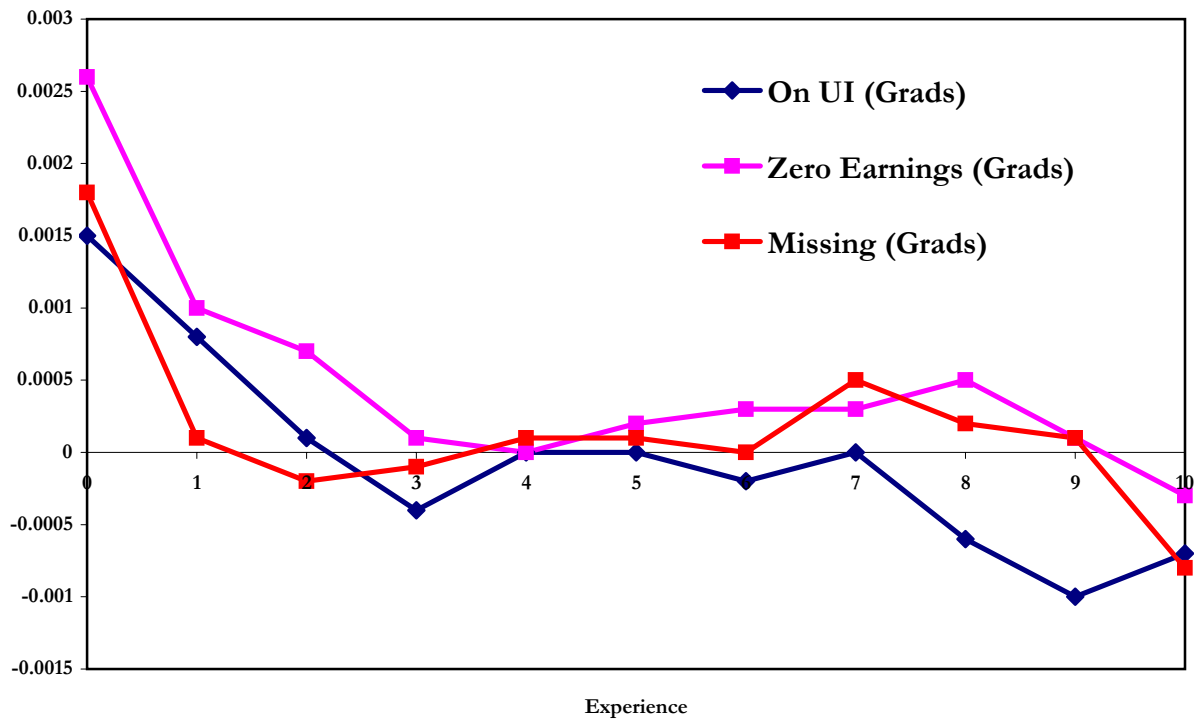
Appendix Figure D1 (B): Effect of Unemployment Rate at Time of Graduation on Provincial Mobility - Regional Models, Full Sample, Cohorts 1976-1995

Experience
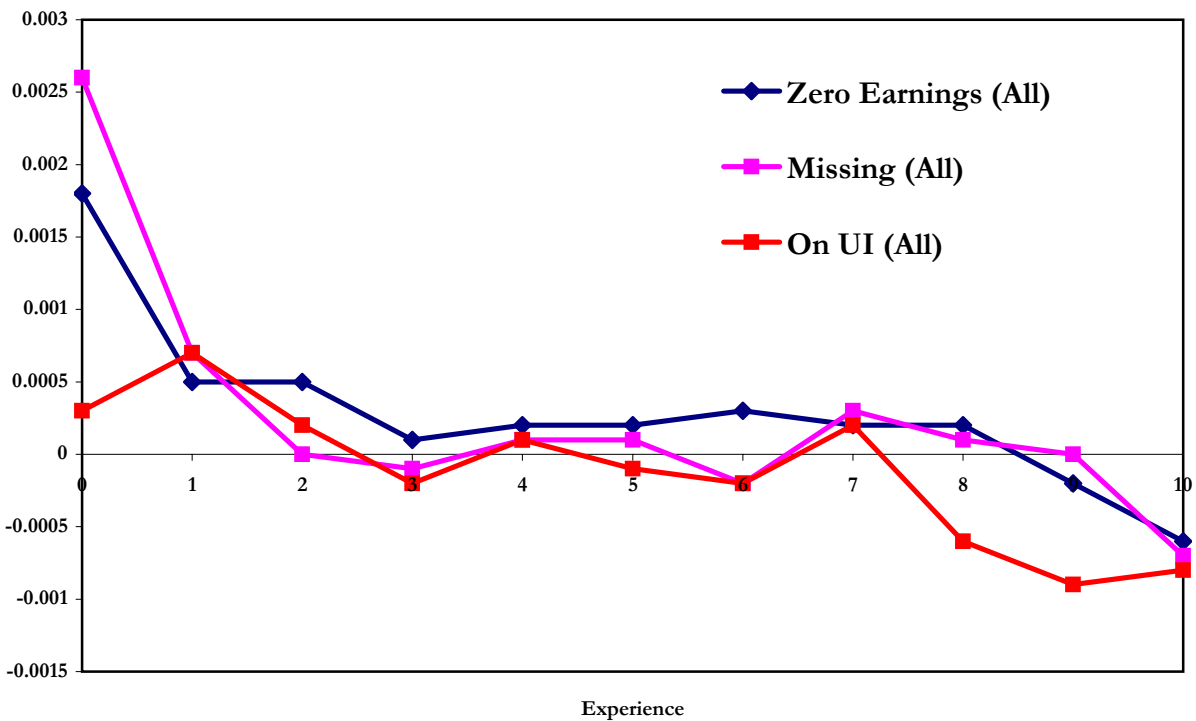
Notes: See text and notes to Figure 4.

Appendix Figure D2: Effect of Unemployment Rate at Time of Graduation on Job and Insutry Mobility: National Models, Cohorts 1976-1995

Panel A: Graduate Sample
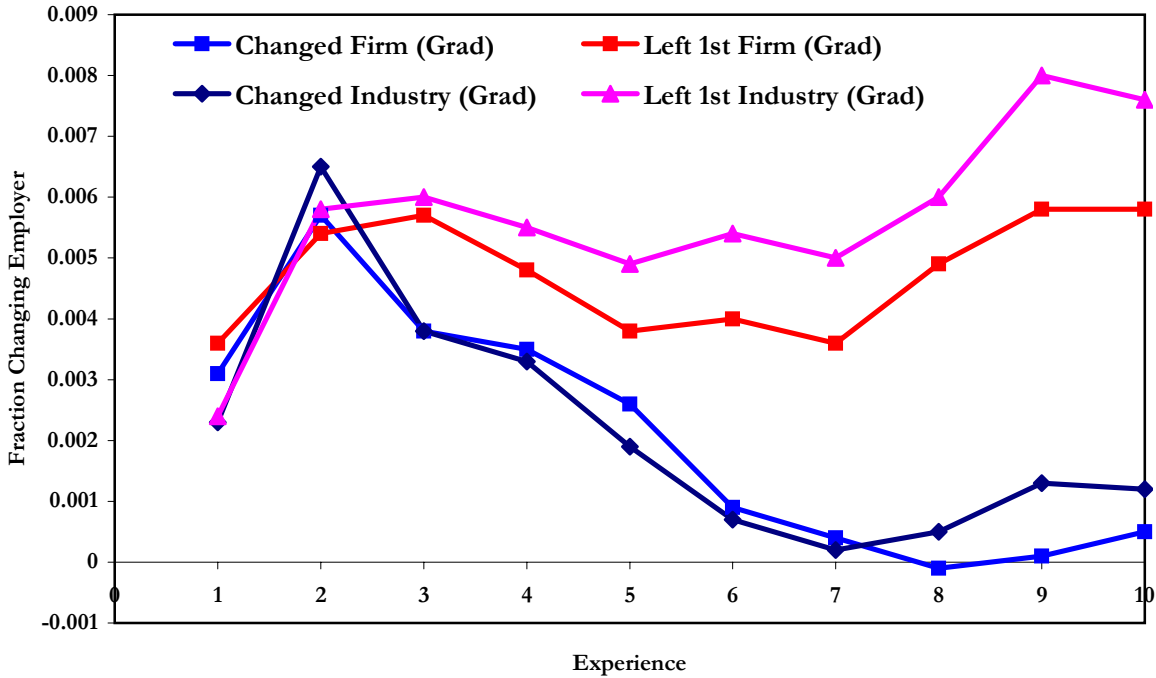
Panel B: Full Sample of Workers
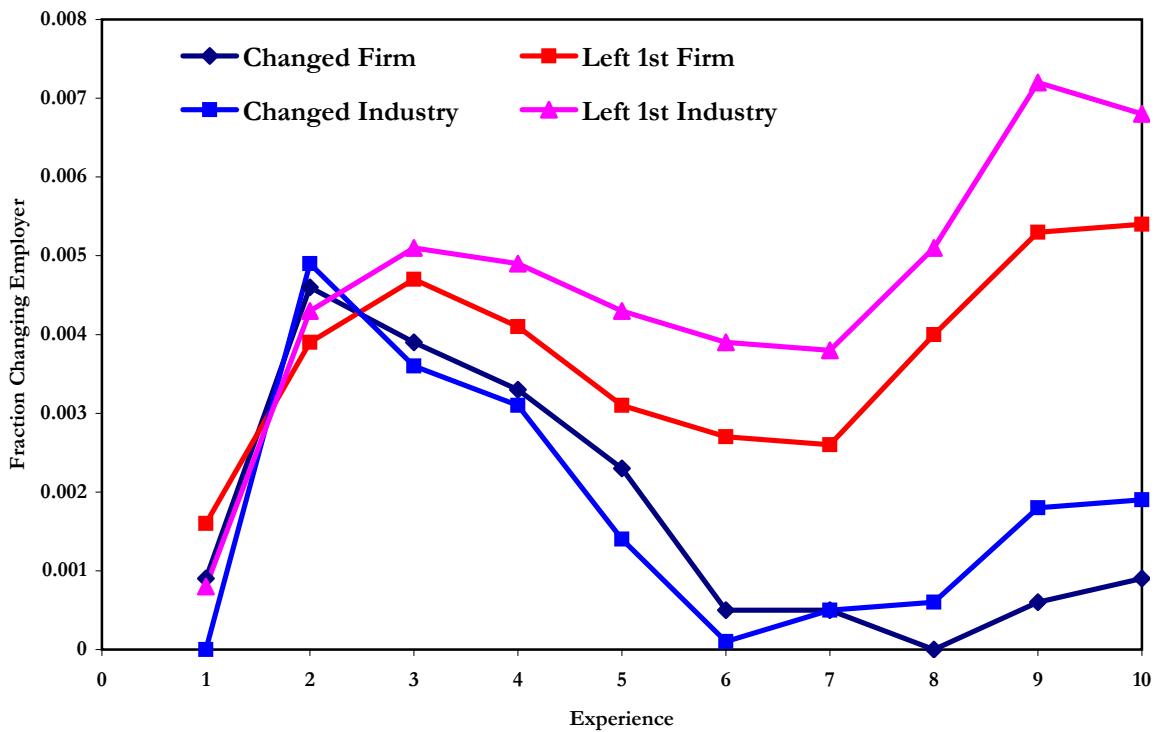
Notes: See text and notes to Figure 4.

Appendix Figure D3: Effects of Initial Unemployment Rates on Earnings For Workers Who Moved Province at Least Once and Those Who Never Moved
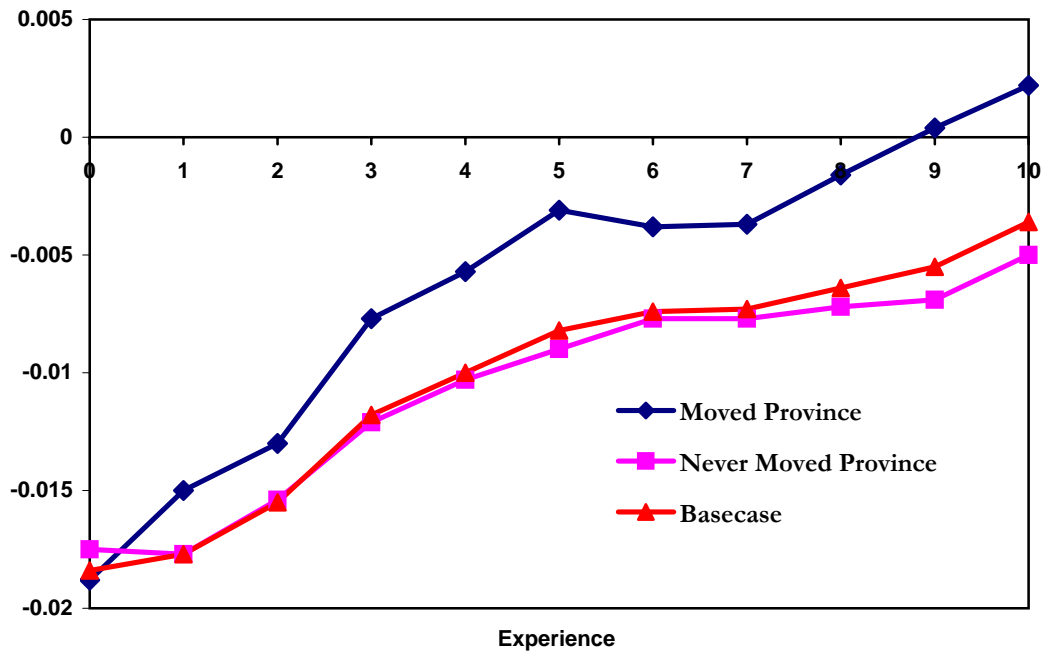
Notes: See notes of Table 1 for regression specification.

Appendix Table D1: Effect of Unemployment Rate at time of Graduation on Labor Force Participation (All Workers with Some College vs. Graduate Sample)

Area	Specification					
D>=0?	Regional No			Regional Yes		
Outcome	Fraction Zero Earnings	Fraction Not in Sample	Fraction on UI	Fraction Zero Earnings	Fraction Not in Sample	Fraction on UI
	(1)	(2)	(3)	(5)	(6)	(7)

Experience Year

0	0.0003	0.0018	0.0002	0.0008	0.0014	0.0017
	[0.0001]***	[0.0006]***	[0.0003]	[0.0001]***	[0.0005]***	[0.0003]***
1	0.0003	0.0005	0.0011	0.0003	0.0002	0.0011
	[0.0001]***	[0.0004]	[0.0002]***	[0.0001]***	[0.0003]	[0.0002]***
2	0.0003	-0.0003	0.0011	0.0002	-0.0001	0.0009
	[0.0001]***	[0.0003]	[0.0003]***	[0.0001]**	[0.0003]	[0.0002]***
3	0	-0.0003	0.0003	-0.0001	0	0
	[0.0001]	[0.0003]	[0.0003]	[0.0001]	[0.0003]	[0.0002]
4	0	-0.0005	0.0002	0	0.0001	0.0002
	[0.0001]	[0.0003]*	[0.0002]	[0.0001]	[0.0002]	[0.0001]
5	-0.0001	-0.0006	-0.0003	0	-0.0001	-0.0001
	[0.0001]	[0.0003]**	[0.0002]*	[0.0001]	[0.0003]	[0.0002]
6	0	-0.001	-0.0004	0	-0.0005	-0.0002
	[0.0001]	[0.0002]***	[0.0002]**	[0.0001]	[0.0003]*	[0.0002]
7	0	-0.0007	-0.0003	0	-0.0002	-0.0002
	[0.0001]	[0.0002]***	[0.0002]*	[0.0001]	[0.0002]	[0.0002]
8	-0.0001	-0.0006	-0.0007	0	-0.0002	-0.0005
	[0.0001]**	[0.0003]**	[0.0002]***	[0.0001]	[0.0003]	[0.0002]***
9	-0.0003	-0.0008	-0.001	-0.0002	-0.0004	-0.0007
	[0.0001]***	[0.0002]***	[0.0002]***	[0.0001]***	[0.0002]*	[0.0002]***
10	-0.0001	-0.0011	-0.001	0	-0.0008	-0.0005
	[0.0001]**	[0.0003]***	[0.0002]***	[0.0001]	[0.0003]***	[0.0002]***
Constant	0.0054	0.0334	0.0645	-0.0032	0.0227	0.0162
	[0.0022]**	[0.0121]***	[0.0093]***	[0.0025]	[0.0118]*	[0.0072]**
N	14407	14407	14407	8679	8679	8679
R²	0.16	0.35	0.31	0.2	0.39	0.34

Notes: Robust standard errors in brackets. See text and notes to Table 3 for information on regression specification.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table D2: Effect of Unemployment Rate at time of Graduation on Job and Industry Mobility (All Workers with Some College vs. Graduate Sample)

Area	Specification							
	Regional				Regional			
D>=0?	No				Yes			
Outcome	Fraction Changed Firm	Fraction Changed Industry	Fraction Left First Firm	Fraction Left First Industry	Fraction Changed Firm	Fraction Changed Industry	Fraction Left First Firm	Fraction Left First Industry
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Experience Year

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
1	0.0013	0.0007	0.0014	0.0005	0.0029	0.0021	0.0038	0.0025
	[0.0007]*	[0.0007]	[0.0009]	[0.0010]	[0.0008]***	[0.0007]***	[0.0010]***	[0.0011]**
2	0.0029	0.003	0.0029	0.0026	0.0031	0.0034	0.0046	0.0041
	[0.0007]***	[0.0007]***	[0.0010]***	[0.0010]**	[0.0007]***	[0.0006]***	[0.0011]***	[0.0011]***
3	0.0022	0.0022	0.0035	0.0035	0.0021	0.0023	0.0049	0.0045
	[0.0007]***	[0.0006]***	[0.0008]***	[0.0009]***	[0.0007]***	[0.0006]***	[0.0009]***	[0.0009]***
4	0.0018	0.0015	0.0039	0.0037	0.0018	0.0015	0.0052	0.0046
	[0.0007]**	[0.0007]**	[0.0008]***	[0.0009]***	[0.0006]***	[0.0006]**	[0.0009]***	[0.0009]***
5	0.0017	0.0014	0.0031	0.0032	0.0022	0.0019	0.0043	0.0039
	[0.0007]**	[0.0006]**	[0.0009]***	[0.0010]***	[0.0005]***	[0.0005]***	[0.0010]***	[0.0010]***
6	0.0009	0.0005	0.0029	0.003	0.0015	0.0011	0.0043	0.004
	[0.0006]	[0.0006]	[0.0009]***	[0.0009]***	[0.0005]***	[0.0005]**	[0.0010]***	[0.0010]***
7	0.0012	0.0014	0.0027	0.0029	0.0018	0.002	0.0041	0.0039
	[0.0007]*	[0.0007]**	[0.0009]***	[0.0010]***	[0.0006]***	[0.0006]***	[0.0011]***	[0.0010]***
8	0.0012	0.0012	0.0029	0.0032	0.0018	0.002	0.0044	0.0042
	[0.0009]	[0.0008]	[0.0010]***	[0.0009]***	[0.0008]**	[0.0007]***	[0.0011]***	[0.0010]***
9	0.0015	0.0016	0.0033	0.0039	0.0016	0.002	0.0047	0.0052
	[0.0011]	[0.0010]	[0.0009]***	[0.0009]***	[0.0010]	[0.0009]**	[0.0010]***	[0.0010]***
10	0.001	0.001	0.0036	0.0041	0.0013	0.0015	0.005	0.0055
	[0.0011]	[0.0010]	[0.0009]***	[0.0010]***	[0.0011]	[0.0011]	[0.0010]***	[0.0010]***
Constant	0.1485	0.1116	0.6686	0.5978	0.3407	0.3151	0.1391	0.523
	[0.0269]***	[0.0254]***	[0.0357]***	[0.0357]***	[0.0184]***	[0.0187]***	[0.0428]***	[0.0403]***
N	9629	9629	9611	9606	5871	5871	5863	5861
R^2	0.69	0.68	0.8	0.68	0.8	0.79	0.86	0.77

Notes: Robust standard errors in brackets. See text and notes to Table 5 for information on regression specification.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table D3: Effect of Unemployment Rate at time of Graduation on Labor Force Participation, National Model

	Specification							
Area	National				National			
D>=0?	No				Yes			
Outcome	Fraction Zero Earnings	Fraction Not in Sample	Fraction on UI	Father's Income	Fraction Zero Earnings	Fraction Not in Sample	Fraction on UI	Father's Income
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Experience Year								
0	0.0018	0.0026	0.0003	-0.0016	0.0026	0.0018	0.0015	-0.0049
	[0.0006]***	[0.0006]***	[0.0006]	[0.0038]	[0.0005]***	[0.0005]***	[0.0006]**	[0.0060]
1	0.0005	0.0007	0.0007	-0.003	0.001	0.0001	0.0008	-0.0044
	[0.0005]	[0.0003]**	[0.0003]**	[0.0042]	[0.0005]*	[0.0003]	[0.0003]***	[0.0059]
2	0.0005	0	0.0002	-0.0047	0.0007	-0.0002	0.0001	-0.0058
	[0.0004]	[0.0002]	[0.0003]	[0.0048]	[0.0004]	[0.0003]	[0.0003]	[0.0067]
3	0.0001	-0.0001	-0.0002	-0.0035	0.0001	-0.0001	-0.0004	-0.0057
	[0.0005]	[0.0002]	[0.0003]	[0.0050]	[0.0004]	[0.0003]	[0.0003]	[0.0069]
4	0.0002	0.0001	0.0001	-0.003	0	0.0001	0	-0.0051
	[0.0004]	[0.0003]	[0.0002]	[0.0049]	[0.0004]	[0.0004]	[0.0002]	[0.0070]
5	0.0002	0.0001	-0.0001	-0.0028	0.0002	0.0001	0	-0.0039
	[0.0005]	[0.0003]	[0.0002]	[0.0047]	[0.0005]	[0.0003]	[0.0002]	[0.0070]
6	0.0003	-0.0002	-0.0002	-0.0026	0.0003	0	-0.0002	-0.0034
	[0.0004]	[0.0002]	[0.0002]	[0.0047]	[0.0004]	[0.0003]	[0.0002]	[0.0069]
7	0.0002	0.0003	0.0002	-0.0032	0.0003	0.0005	0	-0.004
	[0.0005]	[0.0002]	[0.0003]	[0.0049]	[0.0004]	[0.0003]*	[0.0002]	[0.0072]
8	0.0002	0.0001	-0.0006	-0.002	0.0005	0.0002	-0.0006	-0.0024
	[0.0005]	[0.0003]	[0.0002]***	[0.0051]	[0.0004]	[0.0003]	[0.0002]***	[0.0073]
9	-0.0002	0	-0.0009	-0.001	0.0001	0.0001	-0.001	-0.001
	[0.0005]	[0.0002]	[0.0002]***	[0.0047]	[0.0004]	[0.0004]	[0.0002]***	[0.0068]
10	-0.0006	-0.0007	-0.0008	-0.0012	-0.0003	-0.0008	-0.0007	-0.0013
	[0.0004]	[0.0002]***	[0.0003]***	[0.0051]	[0.0004]	[0.0002]***	[0.0002]***	[0.0076]
Constant	0.1378	0.2133	0.0963	1.1904	0.1155	0.1942	0.0423	2.0907
	[0.0148]***	[0.0158]***	[0.0139]***	[0.3531]***	[0.0139]***	[0.0153]***	[0.0134]***	[0.5703]***
N	14989	14989	14989	11547	8989	8989	8989	6412
R²	0.23	0.26	0.19	0.08	0.26	0.32	0.28	0.16

Notes: Robust standard errors in brackets. See text and notes to Table 1 for information on regression specification.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table D4: Effect of Unemployment Rate at time of Graduation on Job and Industry Mobility, National Model

Area	Specification							
	National				National			
D>=0?	No				Yes			
Outcome	Fraction Changed Firm	Fraction Changed Industry	Fraction Left First Firm	Fraction Left First Industry	Fraction Changed Firm	Fraction Changed Industry	Fraction Left First Firm	Fraction Left First Industry
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Experience Year								
0	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
1	0.0009	0	0.0016	0.0008	0.0031	0.0023	0.0036	0.0024
	[0.0008]	[0.0007]	[0.0026]	[0.0021]	[0.0010]***	[0.0009]**	[0.0027]	[0.0022]
2	0.0046	0.0049	0.0039	0.0043	0.0057	0.0065	0.0054	0.0058
	[0.0010]***	[0.0010]***	[0.0023]	[0.0021]*	[0.0011]***	[0.0010]***	[0.0026]*	[0.0023]**
3	0.0039	0.0036	0.0047	0.0051	0.0038	0.0038	0.0057	0.006
	[0.0009]***	[0.0009]***	[0.0017]**	[0.0016]***	[0.0010]***	[0.0008]***	[0.0018]***	[0.0017]***
4	0.0033	0.0031	0.0041	0.0049	0.0035	0.0033	0.0048	0.0055
	[0.0011]**	[0.0011]**	[0.0012]***	[0.0013]***	[0.0009]***	[0.0009]***	[0.0013]***	[0.0014]***
5	0.0023	0.0014	0.0031	0.0043	0.0026	0.0019	0.0038	0.0049
	[0.0007]***	[0.0008]*	[0.0013]**	[0.0016]**	[0.0006]***	[0.0007]**	[0.0014]**	[0.0017]**
6	0.0005	0.0001	0.0027	0.0039	0.0009	0.0007	0.004	0.0054
	[0.0007]	[0.0006]	[0.0013]*	[0.0016]**	[0.0006]	[0.0005]	[0.0014]**	[0.0018]**
7	0.0005	0.0005	0.0026	0.0038	0.0004	0.0002	0.0036	0.005
	[0.0011]	[0.0011]	[0.0013]*	[0.0014]**	[0.0012]	[0.0012]	[0.0013]**	[0.0016]**
8	0	0.0006	0.004	0.0051	-0.0001	0.0005	0.0049	0.006
	[0.0020]	[0.0022]	[0.0013]**	[0.0014]***	[0.0015]	[0.0018]	[0.0012]***	[0.0014]***
9	0.0006	0.0018	0.0053	0.0072	0.0001	0.0013	0.0058	0.008
	[0.0025]	[0.0025]	[0.0018]**	[0.0019]***	[0.0025]	[0.0023]	[0.0017]***	[0.0017]***
10	0.0009	0.0019	0.0054	0.0068	0.0005	0.0012	0.0058	0.0076
	[0.0021]	[0.0021]	[0.0013]***	[0.0017]***	[0.0018]	[0.0018]	[0.0013]***	[0.0017]***
Constant	-0.0756	0.0933	0.5615	0.4969	-0.1821	0.0026	0.0905	0.3862
	[0.0314]**	[0.0288]***	[0.0902]***	[0.0879]***	[0.0358]***	[0.0310]	[0.1250]	[0.0890]***
N	9854	9848	9836	9829	6025.0000	6023	6014	6012
R²	0.74	0.74	0.83	0.72	0.8300	0.83	0.86	0.77

Notes: Robust standard errors in brackets. See text and notes to Table 1 for information on regression specification.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table D5: Average Wage Growth for Stayers and Movers Between Firms, Industries, and Provinces -- Regional Model, Cohorts 1982-1995

| | Overall Earnings Growth | Wage Growth by Movers Status | | | | | |
| | | Gains of Job Movers | Gains of Job Stayers | Gains of Industry Movers | Gains of Industry Stayers | Gains of Province Movers | Gains of Province Stayers |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Experience Year				Panel A: All Workers			
1	0.469	0.485	0.4588	0.4594	0.4589	0.5562	0.4667
2	0.2145	0.2707	0.1858	0.2861	0.1858	0.2828	0.2128
3	0.1834	0.2488	0.155	0.2736	0.1552	0.244	0.182
4	0.1542	0.2244	0.1272	0.2128	0.1269	0.1957	0.1533
5	0.1245	0.1922	0.1026	0.2202	0.1028	0.165	0.1238
6	0.0952	0.131	0.0853	0.1021	0.0854	0.1166	0.0948
7	0.0829	0.1216	0.0736	0.1049	0.0736	0.1089	0.0825
8	0.0646	0.0831	0.0606	0.0613	0.0606	0.0848	0.0643
9	0.0606	0.0847	0.0559	0.075	0.0559	0.0952	0.0602
10	0.0615	0.0962	0.0549	0.0744	0.0549	0.0823	0.0612
Experience Year				Panel B: Graduates			
1	0.5571	0.5927	0.5363	0.5907	0.5364	0.6357	0.555
2	0.2186	0.2824	0.1908	0.2872	0.1907	0.278	0.2172
3	0.1614	0.2204	0.1395	0.2268	0.1395	0.2012	0.1606
4	0.128	0.1839	0.1099	0.1627	0.1096	0.1277	0.128
5	0.1051	0.1571	0.0907	0.1536	0.0908	0.1226	0.1048
6	0.0858	0.1107	0.0797	0.0744	0.0798	0.0788	0.0859
7	0.0769	0.1003	0.0719	0.0511	0.0716	0.0765	0.0769
8	0.0587	0.0716	0.0561	0.0444	0.0563	0.0714	0.0585
9	0.0578	0.0774	0.0542	0.0072	0.0541	0.0561	0.0578
10	0.0578	0.0762	0.0545	0.03	0.0543	0.0775	0.0575

Notes: See Oreopoulos et al. (2006) for discussion.

Appendix Table D6: Effect of Unemployment Rate at time of Graduation on Gains from Job, Industry, and Regional Mobility -- Regional Model for All Workers, Cohorts 1982-1995

	Effect on Overall Earnings Growth	Marginal Effect on Wage Growth by Movers Status					
		Effect on Gains of Job Movers	Effect on Gains of Job Stayers	Effect on Gains of Industry Movers	Effect on Gains of Industry Stayers	Effect on Gains of Province Movers	Effect on Gains of Province Stayers
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Experience Year							
1	-0.0017	0.0011	-0.0039	0.0065	-0.0039	0.0115	-0.0024
	[0.0019]	[0.0027]	[0.0018]**	[0.0058]	[0.0018]**	[0.0070]	[0.0020]
2	0.0047	0.0062	0.0034	0.0071	0.0033	0.0006	0.0047
	[0.0010]***	[0.0015]***	[0.0011]***	[0.0050]	[0.0010]***	[0.0055]	[0.0010]***
3	0.0063	0.0089	0.0049	0.0153	0.0049	0.0042	0.0063
	[0.0007]***	[0.0015]***	[0.0007]***	[0.0056]***	[0.0007]***	[0.0053]	[0.0007]***
4	0.0044	0.006	0.0037	-0.0007	0.0036	-0.0076	0.0047
	[0.0007]***	[0.0018]***	[0.0005]***	[0.0061]	[0.0005]***	[0.0058]	[0.0007]***
5	0.0039	0.007	0.0029	0.0054	0.0029	-0.0037	0.0042
	[0.0007]***	[0.0022]***	[0.0006]***	[0.0054]	[0.0006]***	[0.0054]	[0.0007]***
6	0.0028	0.0057	0.0021	0.0051	0.002	-0.0181	0.0033
	[0.0007]***	[0.0016]***	[0.0007]***	[0.0056]	[0.0007]***	[0.0058]***	[0.0007]***
7	0.0026	0.0036	0.0023	0.0062	0.0022	0.0006	0.0028
	[0.0008]***	[0.0023]	[0.0006]***	[0.0068]	[0.0006]***	[0.0066]	[0.0008]***
8	0.0044	0.007	0.0035	0.0047	0.0034	-0.0054	0.0046
	[0.0008]***	[0.0020]***	[0.0006]***	[0.0066]	[0.0006]***	[0.0069]	[0.0008]***
9	0.0025	-0.0003	0.0025	-0.0095	0.0025	-0.0053	0.0027
	[0.0007]***	[0.0023]	[0.0006]***	[0.0066]	[0.0005]***	[0.0092]	[0.0008]***
10	0.004	0.0052	0.0034	-0.0038	0.0035	-0.0052	0.0042
	[0.0009]***	[0.0026]**	[0.0007]***	[0.0076]	[0.0007]***	[0.0070]	[0.0009]***
Constant	[0.0380]***	[0.0512]	[0.0175]***	[0.1588]	[0.0373]***	[0.2047]	[0.0198]***
	39648	23240	16408	10654	18084	8587	31061
N	0	0	0	0	0	0	0
R-squared	0	0	0	0	0	0	0

Notes: Robust standard errors in brackets. See Oreopoulos et al. (2006) for a discussion.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table E1: Effect of Unemployment Rate at time of Graduation on Firm Size and Firm Wages (All Workers with Some College vs. Graduate Sample)

Area	Specification							
D>=0?	Regional				Regional			
	No				Yes			
Outcome	Log Firm Size	Fraction Firm Size > 1000	Average Median Firm Wage	Average Log Firm Payroll	Log Firm Size	Fraction Firm Size > 1000	Average Median Firm Wage	Average Log Firm Payroll
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Experience Year								
0	-0.0051	-0.0012	-0.0107	-0.0135	-0.008	-0.0016	-0.0097	-0.0169
	[0.0051]	[0.0008]	[0.0013]***	[0.0058]**	[0.0050]	[0.0008]*	[0.0014]***	[0.0058]***
1	-0.0084	-0.0016	-0.0105	-0.0186	-0.0115	-0.002	-0.0096	-0.0224
	[0.0052]	[0.0008]**	[0.0011]***	[0.0057]***	[0.0049]**	[0.0009]**	[0.0011]***	[0.0055]***
2	-0.0043	-0.0013	-0.0074	-0.0118	-0.0088	-0.002	-0.0073	-0.0173
	[0.0050]	[0.0008]*	[0.0011]***	[0.0055]**	[0.0050]*	[0.0008]**	[0.0011]***	[0.0056]***
3	0.0013	-0.0004	-0.0057	-0.0047	-0.0034	-0.0012	-0.0057	-0.0107
	[0.0047]	[0.0008]	[0.0010]***	[0.0051]	[0.0047]	[0.0008]	[0.0010]***	[0.0052]**
4	0.0025	-0.0003	-0.004	-0.0015	-0.0022	-0.0009	-0.0044	-0.008
	[0.0048]	[0.0008]	[0.0010]***	[0.0052]	[0.0048]	[0.0008]	[0.0011]***	[0.0054]
5	0.0061	0	-0.0032	0.0034	0.0025	-0.0003	-0.0039	-0.0023
	[0.0048]	[0.0008]	[0.0010]***	[0.0053]	[0.0051]	[0.0009]	[0.0012]***	[0.0057]
6	0.0048	-0.0002	-0.0039	0.0011	0.0014	-0.0005	-0.0049	-0.0046
	[0.0047]	[0.0008]	[0.0011]***	[0.0052]	[0.0050]	[0.0009]	[0.0012]***	[0.0056]
7	0.005	-0.0002	-0.0039	0.0014	0.0013	-0.0007	-0.005	-0.0047
	[0.0050]	[0.0008]	[0.0011]***	[0.0055]	[0.0054]	[0.0009]	[0.0012]***	[0.0060]
8	0.008	0.0002	-0.0029	0.0055	0.0029	-0.0003	-0.0044	-0.0022
	[0.0051]	[0.0008]	[0.0011]***	[0.0056]	[0.0054]	[0.0009]	[0.0011]***	[0.0060]
9	0.0095	0.0004	-0.002	0.0075	0.0044	0.0001	-0.0035	0.0002
	[0.0051]*	[0.0008]	[0.0011]*	[0.0057]	[0.0055]	[0.0009]	[0.0011]***	[0.0063]
10	0.0122	0.001	-0.0002	0.0119	0.0048	0.0002	-0.002	0.0021
	[0.0057]**	[0.0009]	[0.0013]	[0.0063]*	[0.0068]	[0.0010]	[0.0015]	[0.0077]
Constant	7.5036	0.6255	0.702	6.4307	8.1745	0.719	0.8069	7.2971
	[0.1883]***	[0.0280]***	[0.0500]***	[0.2252]***	[0.1953]***	[0.0283]***	[0.0368]***	[0.2203]***
N	13978	13978	13978	13978	8435	8435	8435	8435
R²	0.36	0.32	0.53	0.4	0.53	0.47	0.75	0.6

Notes: Robust standard errors in brackets. See text and notes to Table 5 for information on regression specification.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table E2: Effect of Unemployment Rate at time of Graduation on Firm Size and Firm Wages - National Sample with Linear Cohort Trends

				Specification				
Area		National				National		
D>=0?		No				Yes		
Outcome	Log Firm Size	Fraction Firm Size > 1000	Average Median Firm Wage	Average Log Firm Payroll	Log Firm Size	Fraction Firm Size > 1000	Average Median Firm Wage	Average Log Firm Payroll
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Experience Year

0	-0.0283	-0.0045	-0.014	-0.0382	-0.0428	-0.006	-0.0143	-0.0543
	[0.0088]***	[0.0012]***	[0.0043]***	[0.0095]***	[0.0088]***	[0.0012]***	[0.0043]***	[0.0099]***
1	-0.0333	-0.0049	-0.011	-0.0432	-0.0438	-0.0059	-0.0112	-0.0549
	[0.0052]***	[0.0008]***	[0.0037]***	[0.0070]***	[0.0070]***	[0.0010]***	[0.0035]***	[0.0083]***
2	-0.0347	-0.0054	-0.0075	-0.0431	-0.042	-0.0061	-0.0074	-0.0508
	[0.0058]***	[0.0009]***	[0.0026]***	[0.0073]***	[0.0072]***	[0.0010]***	[0.0027]**	[0.0086]***
3	-0.0295	-0.0045	-0.0066	-0.0377	-0.0336	-0.005	-0.0057	-0.041
	[0.0063]***	[0.0009]***	[0.0017]***	[0.0069]***	[0.0072]***	[0.0010]***	[0.0020]**	[0.0079]***
4	-0.0266	-0.0043	-0.0046	-0.0323	-0.0267	-0.0042	-0.0035	-0.032
	[0.0052]***	[0.0008]***	[0.0016]***	[0.0060]***	[0.0062]***	[0.0008]***	[0.0020]	[0.0073]***
5	-0.0239	-0.0039	-0.006	-0.0306	-0.0238	-0.0035	-0.0046	-0.0297
	[0.0058]***	[0.0009]***	[0.0021]***	[0.0071]***	[0.0058]***	[0.0010]***	[0.0022]*	[0.0072]***
6	-0.0271	-0.0042	-0.0074	-0.0353	-0.0267	-0.0037	-0.0061	-0.0345
	[0.0050]***	[0.0008]***	[0.0023]***	[0.0062]***	[0.0048]***	[0.0008]***	[0.0022]**	[0.0059]***
7	-0.0199	-0.0029	-0.0064	-0.0264	-0.0237	-0.0035	-0.0062	-0.0311
	[0.0050]***	[0.0008]***	[0.0027]**	[0.0066]***	[0.0048]***	[0.0007]***	[0.0025]**	[0.0064]***
8	-0.0115	-0.0013	-0.004	-0.0147	-0.0226	-0.0027	-0.0051	-0.0282
	[0.0057]*	[0.0009]	[0.0031]	[0.0073]*	[0.0055]***	[0.0008]***	[0.0029]*	[0.0072]***
9	-0.003	0.0002	0.0001	-0.0028	-0.0183	-0.0016	-0.0015	-0.0205
	[0.0080]	[0.0012]	[0.0031]	[0.0096]	[0.0076]**	[0.0012]	[0.0029]	[0.0091]**
10	0.0028	0.0016	0.0049	0.007	-0.0116	0	0.0031	-0.0096
	[0.0071]	[0.0011]	[0.0030]	[0.0092]	[0.0080]	[0.0012]	[0.0024]	[0.0096]
Constant	12.0757	1.2584	1.8382	11.9304	13.1274	1.445	1.9796	13.2333
	[0.3681]***	[0.0570]***	[0.1541]***	[0.4772]***	[0.2838]***	[0.0460]***	[0.1542]***	[0.3754]***
N	13978	13978	13978	13978	8435	8435	8435	8435
R^2	0.29	0.25	0.45	0.35	0.42	0.38	0.64	0.51

Notes: Robust standard errors in brackets. See text and notes to Table 1 for information on regression specification.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table E3: Effect of Unemployment Rate at time of Graduation on Firm and Industry Wages (2-Digit), Graduate Sample

Outcome	Specification				
	Average Median Firm Wage	Average Median Firm Wage Controlling for Region	Average Median Firm Wage Controlling for Experience	Average Industry Wage	Average Industry Wage Controlling for Experience
	(1)	(2)	(3)	(4)	(5)
Experience Year					
0	-0.0097	-0.0087	-0.009	-0.0028	-0.0027
	[0.0014]***	[0.0015]***	[0.0010]***	[0.0005]***	[0.0005]***
1	-0.0096	-0.0089	-0.0082	-0.0025	-0.0024
	[0.0011]***	[0.0012]***	[0.0009]***	[0.0005]***	[0.0005]***
2	-0.0073	-0.007	-0.006	-0.0019	-0.0018
	[0.0011]***	[0.0011]***	[0.0008]***	[0.0005]***	[0.0005]***
3	-0.0057	-0.0057	-0.005	-0.0014	-0.0013
	[0.0010]***	[0.0011]***	[0.0007]***	[0.0004]***	[0.0004]***
4	-0.0044	-0.0044	-0.0041	-0.0009	-0.0009
	[0.0011]***	[0.0011]***	[0.0008]***	[0.0004]**	[0.0004]**
5	-0.0039	-0.004	-0.0037	-0.0011	-0.0011
	[0.0012]***	[0.0012]***	[0.0008]***	[0.0005]**	[0.0004]**
6	-0.0049	-0.005	-0.0043	-0.0015	-0.0014
	[0.0012]***	[0.0012]***	[0.0008]***	[0.0005]***	[0.0004]***
7	-0.005	-0.0052	-0.0043	-0.0013	-0.0013
	[0.0012]***	[0.0012]***	[0.0008]***	[0.0005]***	[0.0004]***
8	-0.0044	-0.0045	-0.0043	-0.0009	-0.0009
	[0.0011]***	[0.0012]***	[0.0008]***	[0.0005]**	[0.0005]**
9	-0.0035	-0.0036	-0.0034	-0.0009	-0.0008
	[0.0011]***	[0.0011]***	[0.0009]***	[0.0005]*	[0.0005]*
10	-0.002	-0.0022	-0.0027	-0.0004	-0.0004
	[0.0015]	[0.0015]	[0.0009]***	[0.0005]	[0.0005]
Constant	0.8069	1.1159	0.0244	9.1073	0.0053
	[0.0368]***	[0.0407]***	[0.0284]	[0.0160]***	[0.0149]
N	8435	8512	8507	8479	8479
R^2	0.75	0.75	0.61	0.49	0.5

Notes: Robust standard errors in brackets. See text and notes to Table 5 for information on regression specification.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table F1: Effect of Unemployment Rate at time of Graduation on Log Real Earnings Controlling for Fixed Effects for First Industry or First Firm and by Size of Average Median Firm Wage and Average Log Firm Payroll

	Fixed Effects for First Firm/ Industry		By Average Median Firm Wage		By Average Log Firm Payroll	
			Main Effect	Difference	Main Effect	Difference
	Firm	Industry	<75th Percentile	>=75th Percentile	<75th Percentile	>=75th Percentile
	(1)	(2)	(3)	(4)	(5)	(6)
Experience Year						
0	-0.0091	-0.0091	-0.0146	-0.0021	-0.0157	-0.0025
	[0.0033]***	[0.0033]***	[0.0028]***	[0.0022]	[0.0028]***	[0.0020]
1	-0.0111	-0.0111	-0.0159	-0.0036	-0.0159	-0.0038
	[0.0028]***	[0.0028]***	[0.0026]***	[0.0023]	[0.0024]***	[0.0021]*
2	-0.009	-0.009	-0.0134	-0.0053	-0.0136	-0.0058
	[0.0027]***	[0.0027]***	[0.0024]***	[0.0022]**	[0.0024]***	[0.0021]***
3	-0.0069	-0.0069	-0.0109	-0.0051	-0.0101	-0.0068
	[0.0025]***	[0.0025]***	[0.0025]***	[0.0023]**	[0.0023]***	[0.0023]***
4	-0.0051	-0.0051	-0.0096	-0.0039	-0.0096	-0.0044
	[0.0027]*	[0.0027]*	[0.0020]***	[0.0019]**	[0.0021]***	[0.0018]**
5	-0.0032	-0.0032	-0.0082	-0.0026	-0.0088	-0.0026
	[0.0024]	[0.0024]	[0.0018]***	[0.0016]*	[0.0020]***	[0.0017]
6	-0.0031	-0.0031	-0.0067	-0.0043	-0.007	-0.0041
	[0.0025]	[0.0025]	[0.0021]***	[0.0017]***	[0.0020]***	[0.0017]**
7	-0.0027	-0.0027	-0.0052	-0.0058	-0.0069	-0.0039
	[0.0027]	[0.0027]	[0.0019]***	[0.0016]***	[0.0019]***	[0.0014]***
8	-0.0005	-0.0005	-0.005	-0.0033	-0.0073	-0.0006
	[0.0023]	[0.0023]	[0.0020]**	[0.0018]*	[0.0021]***	[0.0016]
9	-0.0013	-0.0013	-0.0036	-0.006	-0.0061	-0.0013
	[0.0027]	[0.0027]	[0.0023]	[0.0017]***	[0.0022]***	[0.0020]
10	0.0028	0.0028	-0.0011	-0.0049	-0.0022	-0.0034
	[0.0030]	[0.0030]	[0.0026]	[0.0016]***	[0.0025]	[0.0021]
Constant	15.3696	15.3696	8.9546	--	8.8768	--
	[.]	[.]	[0.0908]***	--	[0.0664]***	--
N	418600	418600	12700	--	14614	--
R-squared	0.8	0.8	0.93	--	0.93	--

Note: First two columns indicate models with firm or industry fixed effects. The remainign columns display coefficients from two interacted regression models, respectively. Each columns shows the unemployment rate and experience interactions from regressing log annual earnings on the youth unemployment rate in the province of first residence, interacted with experience years 0 to 10, plus province of first residence fixed effects, experience fixed effects, and year of graduation fixed effects. One, two, and three asterix indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels respectively. See text for more details.

Appendix Table F2: Effect of Unemployment Rate at time of Graduation on Log Real Earnings Controlling for Fixed Effects for First Industry or First Firm

	Specification							
National/Regional	National	National	Regional	Regional	National	National	Regional	Regional
Trend	Linear	Linear	NA	NA	Linear	Linear	NA	NA
D>=0?	No	No	No	No	Yes	Yes	Yes	Yes
Fixed Effects for First Firm/ Industry	Firm	Industry	Firm	Industry	Firm	Industry	Firm	Industry
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Experience Year								
0	-0.0067	-0.0141	-0.0079	-0.0119	-0.0077	-0.0077	-0.0091	-0.0091
	[0.0046]	[0.0030]***	[0.0033]**	[0.0026]***	[0.0048]	[0.0048]	[0.0033]***	[0.0033]***
1	-0.0058	-0.013	-0.0111	-0.0144	-0.0061	-0.0061	-0.0111	-0.0111
	[0.0049]	[0.0037]***	[0.0029]***	[0.0023]***	[0.0046]	[0.0046]	[0.0028]***	[0.0028]***
2	-0.0035	-0.0091	-0.0093	-0.0128	-0.0036	-0.0036	-0.009	-0.009
	[0.0040]	[0.0033]**	[0.0030]***	[0.0021]***	[0.0034]	[0.0034]	[0.0027]***	[0.0027]***
3	-0.0005	-0.0047	-0.0056	-0.0087	-0.001	-0.001	-0.0069	-0.0069
	[0.0026]	[0.0024]*	[0.0028]**	[0.0021]***	[0.0023]	[0.0023]	[0.0025]***	[0.0025]***
4	-0.0006	-0.0027	-0.0035	-0.0066	-0.0001	-0.0001	-0.0051	-0.0051
	[0.0035]	[0.0028]	[0.0027]	[0.0020]***	[0.0032]	[0.0032]	[0.0027]*	[0.0027]*
5	-0.0021	-0.0039	-0.0019	-0.0056	-0.0004	-0.0004	-0.0032	-0.0032
	[0.0038]	[0.0028]	[0.0023]	[0.0019]***	[0.0031]	[0.0031]	[0.0024]	[0.0024]
6	0	-0.0022	-0.0011	-0.0051	0.0006	0.0006	-0.0031	-0.0031
	[0.0047]	[0.0031]	[0.0027]	[0.0022]**	[0.0045]	[0.0045]	[0.0025]	[0.0025]
7	-0.0011	-0.0027	-0.0015	-0.0051	0.0011	0.0011	-0.0027	-0.0027
	[0.0047]	[0.0031]	[0.0029]	[0.0023]**	[0.0041]	[0.0041]	[0.0027]	[0.0027]
8	0.001	-0.0003	0.0005	-0.0036	0.0024	0.0024	-0.0005	-0.0005
	[0.0041]	[0.0031]	[0.0026]	[0.0021]*	[0.0025]	[0.0025]	[0.0023]	[0.0023]
9	0.0032	0.0013	0.0001	-0.0036	0.0035	0.0035	-0.0013	-0.0013
	[0.0044]	[0.0029]	[0.0028]	[0.0022]*	[0.0028]	[0.0028]	[0.0027]	[0.0027]
10	0.0068	0.0041	0.0038	-0.0014	0.0075	0.0075	0.0028	0.0028
	[0.0035]*	[0.0023]*	[0.0031]	[0.0023]	[0.0025]**	[0.0025]**	[0.0030]	[0.0030]
Constant	6.8467	7.6874		10.1806	13.8693	13.8693	15.3696	15.3696
	[.]	[0.1990]***		[0.0825]***	5.4863e+11	5.4863e+11	[.]	[.]
N	596931	60212	596931	60212	418600	418600	418600	418600
R-squared	0.79	0.85	0.8	0.86	0.8	0.8	0.8	0.8

Notes: Robust standard errors in brackets. Basic regression models described in text and notes to Table 1 with firm or industry fixed effects.

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table F3: Effect of Unemployment Rate at time of Graduation by Initial Firm Type - Regional Sample with D>=0

	Firm Size		Firm Size		Average Median Firm Wage		Average Log Firm Payroll	
	Level <1000	Difference >=1000	Level <5000	Difference >=5000	Level <75th Percentile	Difference >=75th Percentile	Level <75th Percentile	Difference >=75th Percentile
	(3)	(4)	(1)	(2)	(5)	(6)	(7)	(8)
Experience Year								
0	-0.0168	-0.0025	-0.0174	-0.0028	-0.0146	-0.0021	-0.0157	-0.0025
	[0.0025]***	[0.0020]	[0.0024]***	[0.0024]	[0.0028]***	[0.0022]	[0.0028]***	[0.0020]
1	-0.0154	-0.0038	-0.0162	-0.0036	-0.0159	-0.0036	-0.0159	-0.0038
	[0.0024]***	[0.0021]*	[0.0021]***	[0.0023]	[0.0026]***	[0.0023]	[0.0024]***	[0.0021]*
2	-0.0119	-0.0058	-0.013	-0.0055	-0.0134	-0.0053	-0.0136	-0.0058
	[0.0023]***	[0.0021]***	[0.0021]***	[0.0019]***	[0.0024]***	[0.0022]**	[0.0024]***	[0.0021]***
3	-0.0074	-0.0068	-0.0091	-0.0055	-0.0109	-0.0051	-0.0101	-0.0068
	[0.0025]***	[0.0023]***	[0.0020]***	[0.0017]***	[0.0025]***	[0.0023]**	[0.0023]***	[0.0023]***
4	-0.0072	-0.0044	-0.0082	-0.0036	-0.0096	-0.0039	-0.0096	-0.0044
	[0.0020]***	[0.0018]**	[0.0018]***	[0.0015]**	[0.0020]***	[0.0019]**	[0.0021]***	[0.0018]**
5	-0.0065	-0.0026	-0.007	-0.0022	-0.0082	-0.0026	-0.0088	-0.0026
	[0.0021]***	[0.0017]	[0.0019]***	[0.0017]	[0.0018]***	[0.0016]*	[0.0020]***	[0.0017]
6	-0.0046	-0.0041	-0.006	-0.0025	-0.0067	-0.0043	-0.007	-0.0041
	[0.0020]**	[0.0017]**	[0.0018]***	[0.0017]	[0.0021]***	[0.0017]***	[0.0020]***	[0.0017]**
7	-0.0046	-0.0039	-0.006	-0.0024	-0.0052	-0.0058	-0.0069	-0.0039
	[0.0018]**	[0.0014]***	[0.0017]***	[0.0016]	[0.0019]***	[0.0016]***	[0.0019]***	[0.0014]***
8	-0.006	-0.0006	-0.0063	-0.0002	-0.005	-0.0033	-0.0073	-0.0006
	[0.0020]***	[0.0016]	[0.0018]***	[0.0017]	[0.0020]**	[0.0018]*	[0.0021]***	[0.0016]
9	-0.0046	-0.0013	-0.0049	-0.0011	-0.0036	-0.006	-0.0061	-0.0013
	[0.0023]*	[0.0020]	[0.0020]**	[0.0019]	[0.0023]	[0.0017]***	[0.0022]***	[0.0020]
10	-0.0012	-0.0034	-0.0008	-0.005	-0.0011	-0.0049	-0.0022	-0.0034
	[0.0025]	[0.0021]	[0.0022]	[0.0020]**	[0.0026]	[0.0016]***	[0.0025]	[0.0021]
Constant	8.8768		8.943		8.9546		8.8768	
	[0.0664]***		[0.0664]***		[0.0908]***		[0.0664]***	
N	14614		14569		12700		14614	
R²	0.93		0.93		0.93		0.93	

Note: Columns indicate the sample selected on for each regression. Each columns shows the unemployment rate and experience interactions from regressing log annual earnings on the youth unemployment rate in the province of first residence, interacted with experience years 0 to 10, plus province of first residence fixed effects, experience fixed effects, and year of graduation fixed effects. One, two, and three asterix indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels respectively. See text for more details.

Appendix Table F4: Effect of Unemployment Rate at time of Graduation by Average Industry Turnover Rate- Regional Sample with D>=0

	Average Turnover Rate at 2-Digit Industry Level, Controlling for Year Effects	
	Bottom Quintile	Top Quintile
	(1)	(2)
Experience Year		
0	-0.0165	-0.0206
	(0.003)	(0.004)
1	-0.0176	-0.0208
	(0.003)	(0.004)
2	-0.0149	-0.0161
	(0.003)	(0.003)
3	-0.0132	-0.0118
	(0.002)	(0.003)
4	-0.0110	-0.0091
	(0.002)	(0.003)
5	-0.0102	-0.0067
	(0.002)	(0.003)
6	-0.0100	-0.0049
	(0.002)	(0.003)
7	-0.0103	-0.0050
	(0.003)	(0.003)
8	-0.0090	-0.0052
	(0.002)	(0.003)
9	-0.0097	-0.0014
	(0.002)	(0.003)
10	-0.0085	-0.0021
	(0.002)	(0.003)

Note: Columns indicate the sample selected on for each regression. Each columns shows the unemployment rate and experience interactions from regressing log annual earnings on the youth unemployment rate in the province of first residence, interacted with experience years 0 to 10, plus province of residence fixed effects, experience fixed effects, and year of graduation fixed effects. See text for more details.

Appendix Figure F1: Effects of Initial Unemployment Rates on Wages by Initial Firm Type

Panel A: Losses and Reversion by Payroll and Median Earning

Experience
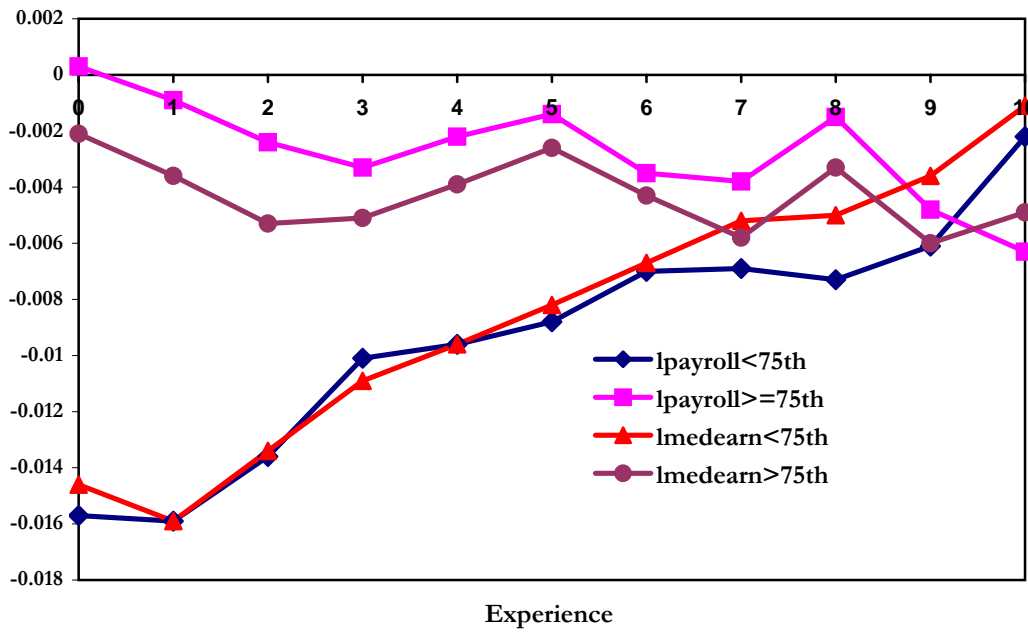
Panel B: Losses and Reversion by Firm Size

Experience
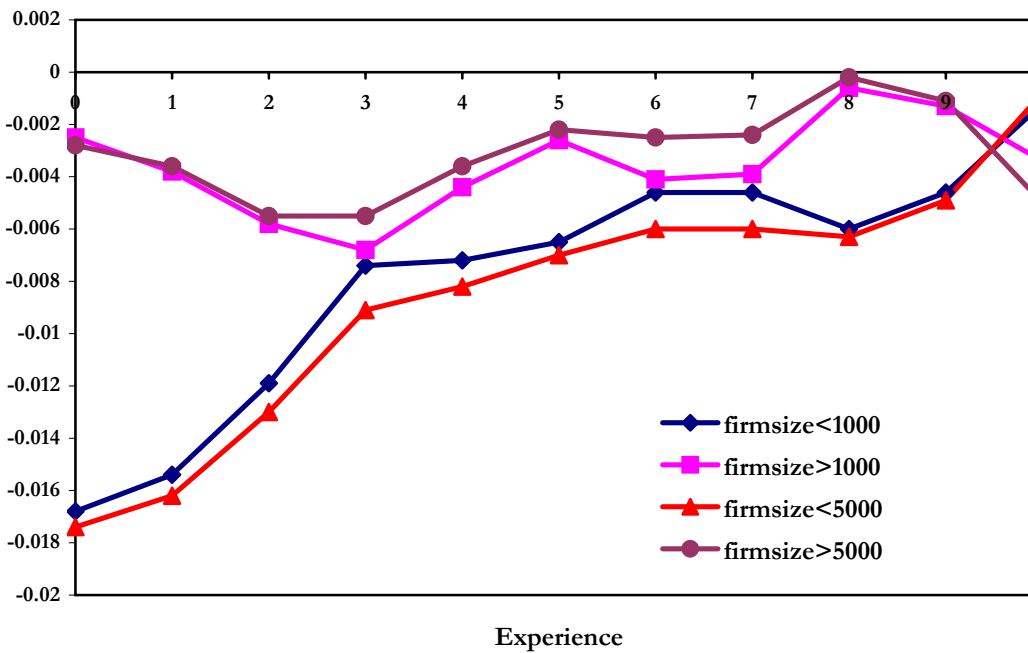
Notes: See notes in Appendix Table F3.

Appendix Figure G1: Effect of Graduating in Recession on Annual Earnings by Major of Study (Graduates Only)

Notes: See notes of Table 1 and text for regression specification.

Appendix Table G1: Heterogeneity in Initial Loss and Reversion for Workers from Top, Middle, and Bottom Colleges [Classified by Average Wage of Graduates]

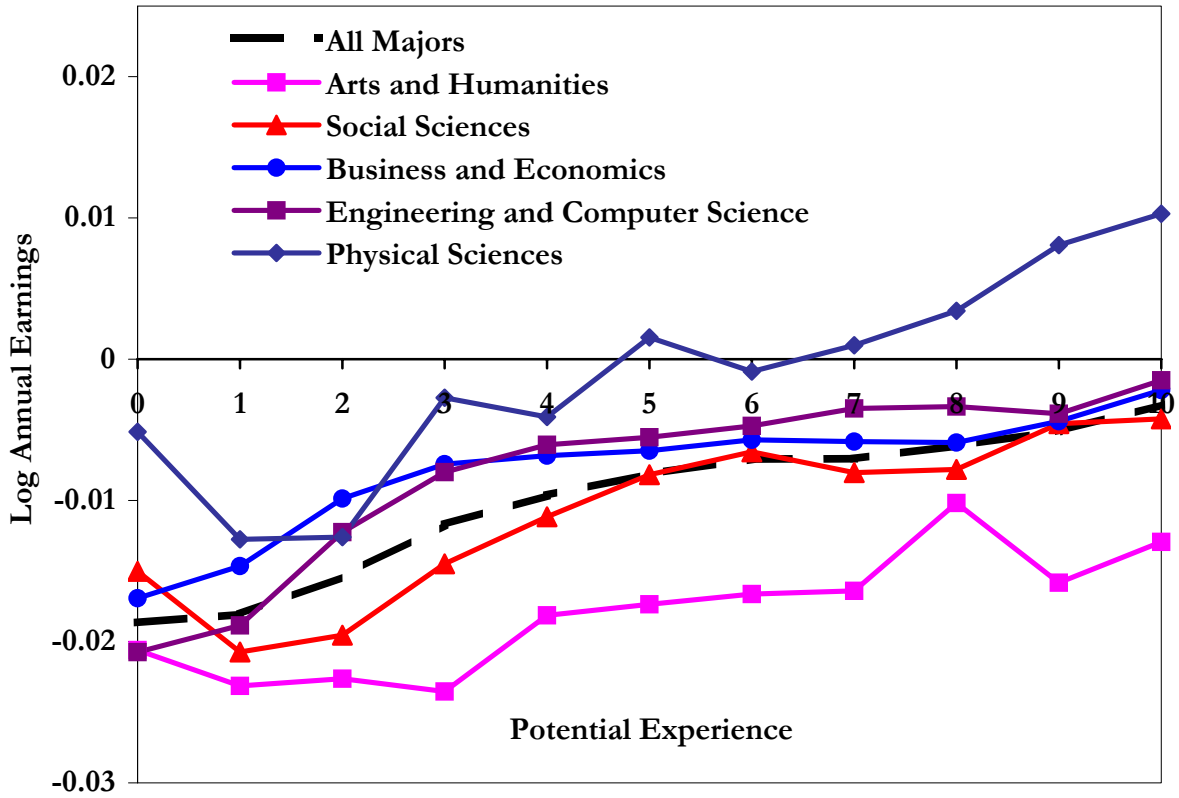| Outcome Variable		All Graduates	Position in Average Annual Earnings by Colleges		
			Bottom Third	Middle Third	Top Third
Annual Earnings	Drop	-0.0183	-0.0212	-0.0202	-0.0165
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Slope	0.0020	0.0015	0.0017	0.0024
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Fade	0.0015	0.0011	0.0013	0.0018
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Average Firm Median Log Earnings	Drop	-0.0094	-0.0097	-0.0140	-0.0092
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Slope	0.0010	0.0007	0.0010	0.0012
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Fade	0.0007	0.0003	0.0006	0.0009
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Average Firm Employment	Drop	-0.0104	0.0347	-0.0177	-0.0245
		(0.0000)	(0.0003)	(0.0001)	(0.0000)
	Slope	0.0021	0.0019	0.0020	0.0034
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Fade	0.0016	0.0001	0.0020	0.0028
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Fraction Changed Employer	Jump	0.0032	0.0023	0.0021	0.0061
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Slope	0.0002	-0.0004	0.0007	0.0002
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Fade	0.0001	0.0000	0.0004	-0.0001
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Fraction Left 1st Employer	Drop	0.0030	-0.0018	0.0027	0.0067
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Slope	-0.0002	0.0004	0.0001	-0.0009
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Fade	-0.0001	0.0004	0.0000	-0.0006
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
Fraction Zero Earnings	Drop	0.0013	0.0016	0.0012	0.0012
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Slope	-0.0003	-0.0002	-0.0002	-0.0003
		(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Fade	-0.0002	-0.0001	-0.0001	-0.0002
		(0.0000)	(0.0000)	(0.0000)	(0.0000)

Notes: Coefficients from separate regression models. The initial loss (DROP) is the effect of unemployment at graduation (UR) at experience zero and one, the first phase of the catch up (SLOPE) is the coefficient on the interaction of UR with linear experience for experience years two to six, and the second phase (FADE) of the catch up is same interaction for experience years seven to ten.

Appendix Table G2: Heterogeneity in Initial Loss and Reversion by Major of Study

Outcome Variable		All Graduates	Classification of Major							
			Arts and Humanities	Social Sciences	Other	Physical Sciences	Teachers	Business and Economics	Engineering and Computer Science	Health Sciences
Fraction in Sample			10.09	13.86	13.6	10.06	3.55	26.34	21.37	1.13
Average Log Annual Earnings			9.51	9.69	9.78	9.9	9.94	9.96	10.19	10.25
Annual Earnings	Drop	-0.0183	-0.0228	-0.0194	-0.0182	-0.0106	-0.0218	-0.0146	-0.0180	-0.0098
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)
	Slope	0.0020	0.0009	0.0020	0.0019	0.0019	0.0026	0.0017	0.0025	-0.0003
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Fade	0.0015	0.0010	0.0015	0.0017	0.0019	0.0022	0.0012	0.0018	0.0001
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Average Firm Median Log Earnings	Drop	-0.0093	-0.0085	-0.0064	-0.0099	-0.0112	-0.0146	-0.0062	-0.0086	0.0014
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)
	Slope	0.0010	0.0002	0.0010	0.0007	0.0014	0.0009	0.0008	0.0016	-0.0004
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Fade	0.0007	0.0001	0.0008	0.0005	0.0008	0.0004	0.0006	0.0010	-0.0002
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Fraction Left 1st Employer	Drop	0.0030	-0.0015	-0.0007	0.0026	0.0031	0.0093	0.0021	0.0079	-0.0022
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Slope	-0.0002	0.0009	0.0006	-0.0001	-0.0003	-0.0007	-0.0001	-0.0014	0.0000
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Fade	-0.0001	0.0003	0.0003	0.0000	-0.0001	-0.0003	-0.0001	-0.0009	0.0002
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Fraction Zero Earnings	Drop	0.0013	0.0018	0.0011	0.0013	0.0017	0.0008	0.0004	0.0019	0.0074
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Slope	-0.0003	0.0001	-0.0002	-0.0002	-0.0003	-0.0001	-0.0003	-0.0005	0.0001
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
	Fade	-0.0002	-0.0001	-0.0001	-0.0001	-0.0002	-0.0001	-0.0001	-0.0003	-0.0002
		(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Notes: Coefficients from separate regression models. The initial loss (DROP) is the effect of unemployment at graduation (UR) at experience zero and one, the first phase of the catch up (SLOPE) is the coefficient on the interaction of UR with linear experience for experience years two to six, and the second phase (FADE) of the catch up is same interaction for experience years seven to ten.

Appendix Figure G2: Effect of Unemployment Rate at Graduation on Deciles of Distribution of Annual Real Earnings, Male College Graduates

Experience
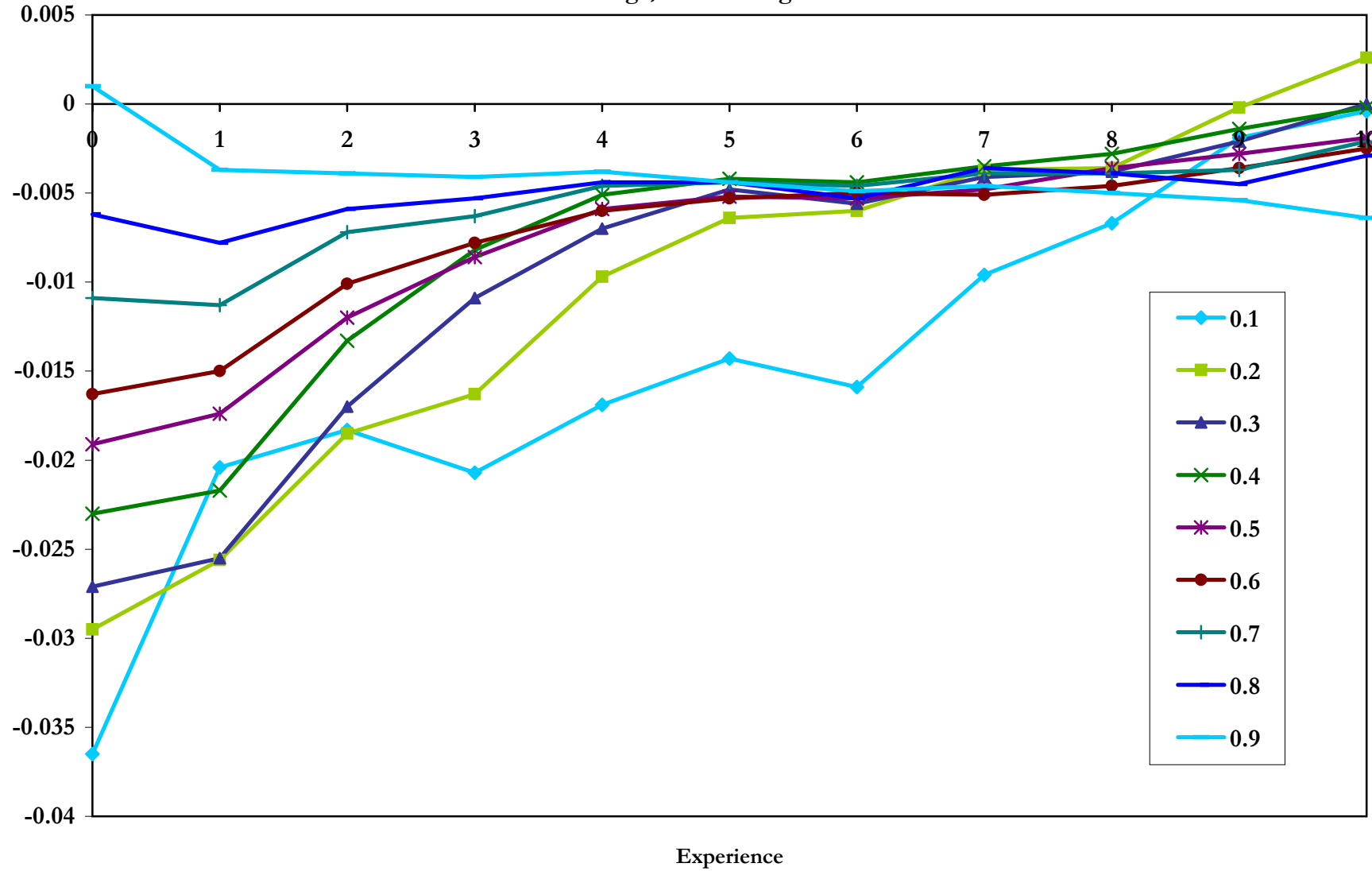
Appendix G (Part 2): Quantile Regressions

We also examined whether the negative effects from graduating in a recession differ for college graduates over different parts of the income distribution using quantile regression. The main results consist of OLS coefficient estimates for the effects of the initial entry unemployment rate on log annual earnings. These coefficients indicate the expected change in the average log wage from a one point increase in the initial unemployment rate over different experience levels. In comparison, Appendix Figure G1 shows the expected change in the log wage at each decile along the earnings distribution from a one point increase in the initial unemployment rate, also over different experience levels. These coefficients come from estimating the same regression model as before, but using quantile regressions for each decile instead of ordinary least squares.

The pattern in Appendix Figure G1 clearly reveals that differences in unemployment conditions at time of entry into the labor market affect the bottom part of the earnings distribution more than the top part. The catch-up process occurs everywhere so that after 10 years in the labor market, the earnings distribution looks the same regardless of initial economic conditions. But those in the lower part of the distribution suffer larger and longer earnings losses. At the 10th percentile in the earnings distribution, for example, a 5 percentage point increase in the initial unemployment rate (about a two standard deviation increase) decreases earnings by about 18 percent in the first year in the labor market. Five years later, earnings are still 7.5 percent lower. This gap eventually fades to zero, but not until the tenth year. Each higher earnings decile is less affected by initial unemployment conditions. The 90th percentile in the earnings distribution one year out is only about 2.5 percent lower from a 5 percentage point increase in the initial unemployment rate. While individuals in the upper part of the income distribution appear partially protected by the influences of the initial unemployment rate in the first five years, this does not translate to greater protection six to ten years out. The catch-up process occurs most strongly over the lower deciles. By the sixth year, the lingering effects from the initial unemployment rate on log earnings are about the same for all deciles except the lowest, and they fade to about zero by the tenth year.

Appendix Table H1: Effect of Unemployment Rate on Duration of College -- National, Regional, and Predicted

	All Workers			Workers D>=0		
	Fraction D>=0	Fraction D not equal 0	Fraction D outside -1,1	Fraction D >0	Fraction D >1	Fraction D >2
Average	0.67	0.68	0.36	0.36	0.14	0.06
Panel A: National, All Workers						
Unemployment Rate	0.0007	-0.0031	-0.0028	-0.0032	-0.0022	0.0001
	[0.0041]	[0.0018]*	[0.0022]	[0.0038]	[0.0027]	[0.0013]
N	1514	1514	1514	957	957	957
R^2	0.01	0	0	0.01	0.01	0
Panel B: Regional, All Workers						
Unemployment Rate	-0.0022	0.0057	0.0046	0.0063	0.005	0.0027
	[0.0028]	[0.0022]**	[0.0023]*	[0.0032]*	[0.0023]**	[0.0011]**
N	1514	1514	1514	957	957	957
R^2	0.06	0.02	0.04	0.04	0.03	0.02
Panel C: Regional, Predicted UR, All Workers						
Unemployment Rate	-0.0021	0.0024	0.0003	0.0029	-0.0007	-0.0009
	[0.0130]	[0.0063]	[0.0087]	[0.0045]	[0.0018]	[0.0019]
N	1489	1489	1489	932	932	932
R^2	0.12	0.04	0.09	0.6	0.7	0.59

Panel D: Distribution of Actual and Predicted Durations and Deviations in Years

Years	Actual Duration	Predicted Duration	Difference Between Actual and Predicted (D)	
1	0.18	0.05	-3<=	0.10
2	0.13	0.01	-2	0.12
3	0.19	0.29	-1	0.11
4	0.30	0.60	0	0.32
5	0.17	0.05	1	0.22
6	0.04	0.00	2	0.08
7	0.01	0.00	>=3	0.06

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table H2: Distribution of Years of College Among All Entrants and in Graduate Sample

Years of College	Entire Sample (Some College)			Graduates (Actual ≥ Predicted Year)	
	N	Percent		N	Percent
1	30,420	17.03		818	0.69
2	21,922	12.27		3,474	2.92
3	34,745	19.45		23,953	20.13
4	53,803	30.12		52,973	44.53
5	30,172	16.89		30,160	25.35
6	6,200	3.47		6,197	5.21
7	1,391	0.78		1,388	1.17
Total Exiting College	178,653	100		118,963	100

Appendix Table H3: Effect of Unemployment Rate on Duration of College -- National, Regional, and Predicted

	Years Until BA	Fraction Above Grade	Fraction < 4 Years	Fraction > 4 Years	In Graduate Sample	Difference (D)
Panel A: National, All Workers						
Unemployment Rate	0.007	-0.0019	-0.0018	0.001	0.0012	-0.0006
	[0.0138]	[0.0039]	[0.0039]	[0.0025]	[0.0043]	[0.0157]
N	1591	1591	1591	1591	1591	1591
R²	0.01	0.02	0.01	0.02	0.01	0.02
Panel B: Regional, All Workers						
Unemployment Rate	0.0072	0.0046	0.0003	0.0041	-0.0032	0.0034
	[0.0074]	[0.0028]	[0.0024]	[0.0020]**	[0.0028]	[0.0108]
N	1591	1591	1591	1591	1591	1591
R²	0.08	0.05	0.06	0.09	0.09	0.06
Panel C: Regional, Predicted UR, All Workers						
Unemployment Rate	0.0001	-0.0003	0.0019	0.0025	-0.0048	-0.0042
	[0.0410]	[0.0101]	[0.0115]	[0.0081]	[0.0112]	[0.0523]
N	1566	1566	1566	1566	1566	1566
R²	0.14	0.07	0.15	0.1	0.16	0.11
Panel D: National, D>=0						
Unemployment Rate	0.0062	-0.0025	-0.0012	0.0017	0.0001	-0.0052
	[0.0063]	[0.0043]	[0.0010]	[0.0025]	[0.0014]	[0.0082]
N	955	955	955	955	955	955
R²	0.01	0.02	0.04	0.01	0	0.01
Panel E: Regional, D>=0						
Unemployment Rate	0.011	0.0083	-0.0002	0.0061	-0.0007	0.0157
	[0.0052]**	[0.0035]**	[0.0009]	[0.0027]**	[0.0015]	[0.0065]**
N	955	955	955	955	955	955
R²	0.22	0.04	0.27	0.15	0.38	0.04
Panel F: Regional, Predicted UR, D>=0						
Unemployment Rate	0.006	0.0024	-0.0001	0.0042	-0.0002	0
	[0.0042]	[0.0038]	[0.0008]	[0.0026]	[0.0016]	[0.0000]***
N	930	930	930	930	930	930
R²	0.83	0.64	0.46	0.71	0.54	1

Note: The sample includes males in Canada leaving university between 1976 and 1995. 'D' indicates the difference between the actual year left and the predicted year of graduation based on year of entry and program. The dependent variable is indicated in the column heading. The national model regresses the dependent variable on the youth unemployment rate in the country at the year of college exit, plus province of residence fixed effects, and a linear or quadratic graduation cohort trend. The regional model regresses log annual earnings on the youth unemployment rate in the province of first residence, plus province of residence fixed effects, and year of graduation fixed effects. One, two, and three asterix indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels respectively. See text for more details.

Appendix Table H4: Effect of Unemployment Rate at Time of Predicted Graduation on Log Real Earnings by Potential Experience (Reduced Form) and Instrumental Variable Estimates, Regional Model

Model	Specification			
	Reduced Form		Instrumental Variables	
D>=0?	No	Yes	No	Yes
	(1)	(2)	(3)	(4)
First Stage Coefficient	---	---	0.8841	0.8984
	---	---	[0.0502]***	[0.0391]***
Experience Year				
0	-0.0119	-0.0134	-0.0162	-0.0186
	[0.0023]***	[0.0023]***	[0.0030]***	[0.0034]***
1	-0.0154	-0.0134	-0.0215	-0.0179
	[0.0030]***	[0.0024]***	[0.0041]***	[0.0033]***
2	-0.0145	-0.0114	-0.0204	-0.0147
	[0.0030]***	[0.0021]***	[0.0042]***	[0.0028]***
3	-0.0117	-0.0086	-0.0165	-0.0106
	[0.0027]***	[0.0019]***	[0.0038]***	[0.0024]***
4	-0.0093	-0.0072	-0.013	-0.0086
	[0.0025]***	[0.0019]***	[0.0035]***	[0.0023]***
5	-0.0068	-0.0059	-0.0093	-0.0069
	[0.0024]***	[0.0017]***	[0.0034]***	[0.0021]***
6	-0.0054	-0.0045	-0.0072	-0.0053
	[0.0027]**	[0.0019]**	[0.0038]*	[0.0024]**
7	-0.0059	-0.0046	-0.0079	-0.0058
	[0.0026]**	[0.0018]**	[0.0036]**	[0.0023]**
8	-0.0053	-0.0045	-0.0073	-0.0061
	[0.0024]**	[0.0018]**	[0.0034]**	[0.0023]***
9	-0.0046	-0.0041	-0.0065	-0.0056
	[0.0024]*	[0.0020]**	[0.0034]*	[0.0024]**
10	-0.0027	-0.003	-0.0043	-0.0044
	[0.0025]	[0.0020]	[0.0034]	[0.0024]*
Constant	6.9933	8.7117	7.0555	8.7857
	[0.1012]***	[0.0668]***	[0.0981]***	[0.1075]***
N	14223	8495	14223	8495
R-squared	0.92	0.95	0.92	0.95

Note: The sample includes males in Canada leaving university between 1976 and 1995. 'D' indicates the difference between the actual year left and the predicted year of graduation based on year of entry and program. The reduced form model regresses log annual earnings on the predicted youth unemployment rate in the province of first residence when D=0, interacted with experience years 0 to 10, plus province of residence fixed effects, experience fixed effects, and year of graduation fixed effects. The instrumental variable model regresses log annual earnings on the instrumented youth unemployment rate in the province of first residence, interacted with experience years 0 to 10, plus province of residence fixed effects, experience fixed effects, and year of graduation fixed effects. One, two, and three asterix indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels respectively. See text for more details.

Appendix Table I1: Accounting for Sources of Catch-Up After Early Unemployment Exposure at the Cell-Level, Graduates Only

Exp. Year	Based on Year-State-Cohort Cells				Based on Year-State-Cohort-Skill Group Cells			
	Basic Model	With UR History	With Firm Quality	With Firm Quality and UR History	Basic Model	With UR History	With Firm Quality	With Firm Quality and UR History
1	-0.0177 [0.0026]***	-0.016 [0.0027]***	-0.0107 [0.0023]***	-0.0085 [0.0023]***	-0.0177 [0.0026]***	-0.0162 [0.0027]***	-0.0089 [0.0021]***	-0.0078 [0.0022]***
2	-0.0181 [0.0021]***	-0.017 [0.0024]***	-0.0092 [0.0017]***	-0.0083 [0.0019]***	-0.0181 [0.0021]***	-0.0171 [0.0024]***	-0.0059 [0.0016]***	-0.0057 [0.0018]***
3	-0.0169 [0.0019]***	-0.0155 [0.0024]***	-0.0095 [0.0015]***	-0.0083 [0.0021]***	-0.0168 [0.0018]***	-0.0157 [0.0024]***	-0.0069 [0.0014]***	-0.0066 [0.0020]***
4	-0.0134 [0.0017]***	-0.0111 [0.0022]***	-0.0083 [0.0015]***	-0.0065 [0.0019]***	-0.0134 [0.0017]***	-0.0112 [0.0022]***	-0.0062 [0.0014]***	-0.0048 [0.0019]**
5	-0.0113 [0.0016]***	-0.0077 [0.0022]***	-0.0074 [0.0013]***	-0.0043 [0.0019]**	-0.0113 [0.0015]***	-0.008 [0.0022]***	-0.006 [0.0014]***	-0.0033 [0.0018]*
6	-0.0095 [0.0015]***	-0.006 [0.0024]**	-0.0068 [0.0013]***	-0.0026 [0.0019]	-0.0095 [0.0014]***	-0.0063 [0.0024]***	-0.0053 [0.0013]***	-0.0016 [0.0017]
7	-0.0087 [0.0016]***	-0.0028 [0.0029]	-0.0052 [0.0013]***	0.0007 [0.0019]	-0.0087 [0.0016]***	-0.0036 [0.0028]	-0.0033 [0.0013]***	0.0017 [0.0017]
8	-0.0085 [0.0017]***	-0.0034 [0.0030]	-0.0044 [0.0013]***	0 [0.0022]	-0.0085 [0.0017]***	-0.0041 [0.0029]	-0.0024 [0.0012]**	0.0009 [0.0020]
9	-0.0075 [0.0017]***	-0.0028 [0.0028]	-0.0034 [0.0013]**	-0.0012 [0.0021]	-0.0075 [0.0017]***	-0.0035 [0.0027]	-0.0013 [0.0012]	-0.0007 [0.0019]
10	-0.0062 [0.0018]***	-0.0015 [0.0028]	-0.0027 [0.0014]*	-0.0017 [0.0023]	-0.0062 [0.0017]***	-0.002 [0.0027]	-0.001 [0.0012]	-0.0014 [0.0021]

Notes: Regressions in columns 1 to 4 at level of graduation cohort, state of first residence, state of current residence, and calendar year. Columns 5 to 8 add interaction with predicted earnings at time of graduation. All regressions include dummies for graduation cohort, state of residence at graduation, state of current residence, calendar year, and experience. Where appropriate, we also include skill-group dummies. The analysis is replicated by skill-group in the Appendix. All regressions weighted by cell size. Standard errors clustered at cohort-state of first residence level.

Appendix Table I2: Accounting for Sources of Catch-Up After Early Unemployment Exposure At the Cell Level, Separately By Skill Group, Graduates Only

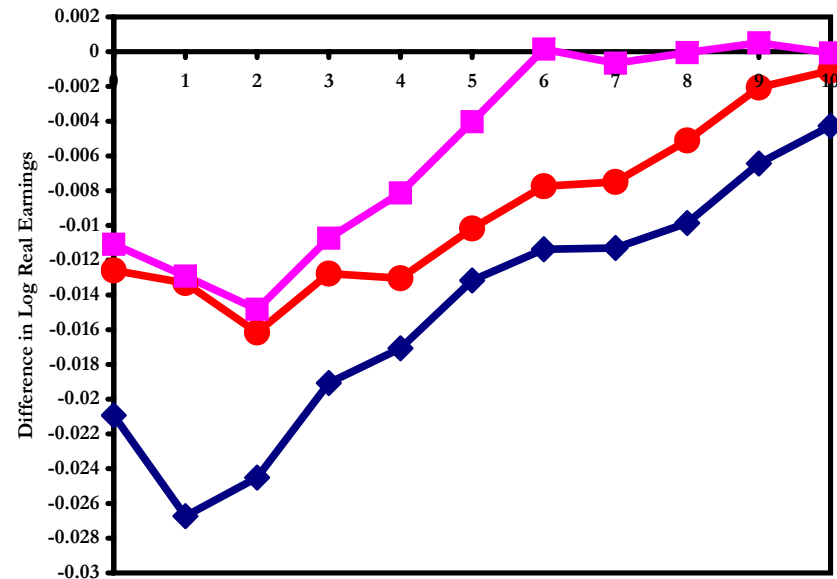| Exp. Year	Top 20% Predicted Earnings				Middle 20% Predicted Earnings				Bottom 20% Predicted Earnings			
	Basic Model	With UR History	With Firm Quality	With Firm Quality and UR History	Basic Model	With UR History	With Firm Quality	With Firm Quality and UR History	Basic Model	With UR History	With Firm Quality	With Firm Quality and UR History
1	-0.013	-0.011	-0.0026	-0.0016	-0.0209	-0.0194	-0.0126	-0.0111	-0.0228	-0.0252	-0.0179	-0.0209
	[0.0039]***	[0.0039]***	[0.0042]	[0.0042]	[0.0040]**	[0.0041]**	[0.0036]**	[0.0038]***	[0.0065]**	[0.0072]**	[0.0056]**	[0.0064]***
2	-0.0136	-0.012	-0.0068	-0.0061	-0.0267	-0.0261	-0.0133	-0.0129	-0.0295	-0.0324	-0.0234	-0.0269
	[0.0025]***	[0.0026]***	[0.0028]**	[0.0029]**	[0.0038]**	[0.0038]**	[0.0033]**	[0.0034]***	[0.0064]**	[0.0067]**	[0.0052]**	[0.0056]***
3	-0.0093	-0.009	-0.005	-0.0052	-0.0245	-0.0224	-0.0162	-0.0148	-0.0256	-0.0313	-0.0193	-0.0255
	[0.0022]***	[0.0029]***	[0.0021]**	[0.0029]*	[0.0032]**	[0.0039]**	[0.0030]**	[0.0037]***	[0.0056]**	[0.0060]**	[0.0044]**	[0.0052]***
4	-0.0046	-0.005	-0.0031	-0.0039	-0.0191	-0.016	-0.0128	-0.0107	-0.021	-0.0247	-0.0169	-0.0192
	[0.0019]**	[0.0025]*	[0.0020]	[0.0025]	[0.0030]**	[0.0036]**	[0.0027]**	[0.0031]***	[0.0055]**	[0.0054]**	[0.0045]**	[0.0043]***
5	-0.0047	-0.005	-0.0043	-0.0046	-0.0171	-0.0124	-0.013	-0.0081	-0.0142	-0.0184	-0.0104	-0.0126
	[0.0020]**	[0.0028]*	[0.0019]**	[0.0025]*	[0.0025]**	[0.0033]**	[0.0024]**	[0.0030]***	[0.0054]**	[0.0064]**	[0.0047]**	[0.0055]**
6	-0.0045	-0.005	-0.0041	-0.0053	-0.0132	-0.0085	-0.0102	-0.004	-0.0134	-0.0195	-0.0077	-0.0128
	[0.0019]**	[0.0027]*	[0.0018]**	[0.0026]**	[0.0025]**	[0.0033]**	[0.0023]**	[0.0029]	[0.0050]**	[0.0054]**	[0.0040]*	[0.0046]***
7	-0.0049	-0.002	-0.0041	-0.0023	-0.0114	-0.0044	-0.0077	0.0002	-0.0128	-0.0175	-0.0057	-0.0078
	[0.0019]***	[0.0032]	[0.0017]**	[0.0030]	[0.0027]**	[0.0038]	[0.0024]**	[0.0031]	[0.0056]**	[0.0068]**	[0.0047]	[0.0059]
8	-0.0047	-0.001	-0.0041	-0.0023	-0.0113	-0.0045	-0.0075	-0.0007	-0.0121	-0.0127	-0.0076	-0.0052
	[0.0020]**	[0.0035]	[0.0018]**	[0.0034]	[0.0030]**	[0.0045]	[0.0024]**	[0.0035]	[0.0055]**	[0.0068]*	[0.0045]*	[0.0059]
9	-0.0046	0.000	-0.0036	-0.0024	-0.0099	-0.0037	-0.0051	-0.0001	-0.0107	-0.0121	-0.0049	-0.0042
	[0.0021]**	[0.0033]	[0.0019]*	[0.0031]	[0.0029]**	[0.0040]	[0.0024]**	[0.0034]	[0.0054]*	[0.0068]*	[0.0044]	[0.0057]
10	-0.004	0.000	-0.0034	-0.0029	-0.0064	-0.0022	-0.0021	0.0005	-0.018	-0.0175	-0.0109	-0.0109
	[0.0021]*	[0.0032]	[0.0019]*	[0.0033]	[0.0031]**	[0.0039]	[0.0025]	[0.0032]	[0.0069]**	[0.0068]**	[0.0057]*	[0.0060]*

Notes: Regression at level of graduation cohort, state of first residence, and calendar year. All regressions weighted by cell size. Standard errors clustered at cohort-state of first residence level. See notes to Appendix Table I1 and text.

Appendix Figure I1: Sources of Catch-Up After Early Unemployment Exposure by Skill-Group, Cell Level Models
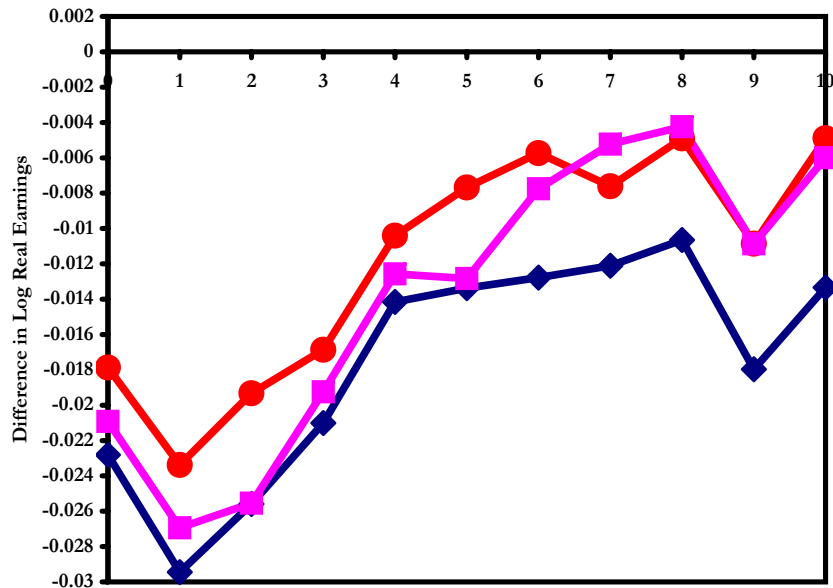
Panel A: Top 20% of Predicted Earnings at Graduation
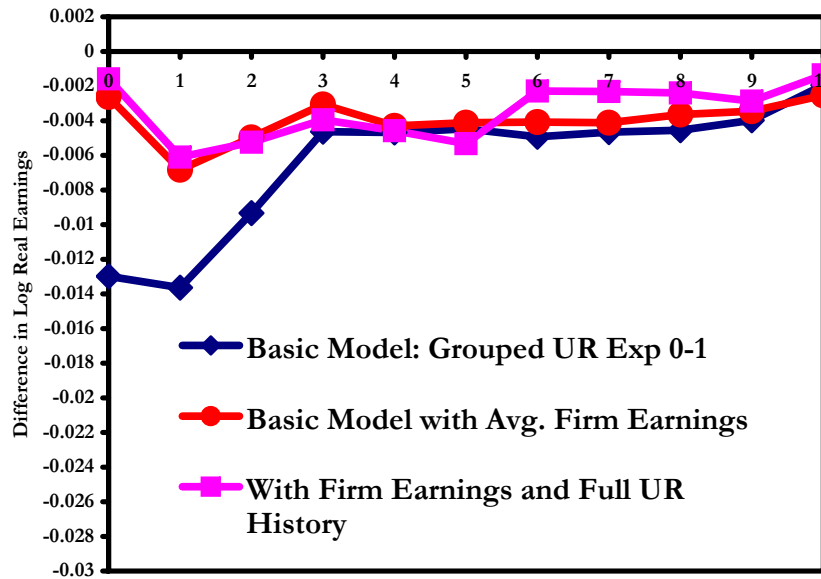
Panel B: Middle 20% of Predicted Earnings at Graduation

Panel C: Bottom 20% of Predicted Earnings at Graduation

Legend:
- Basic Model: Grouped UR Exp 0-1
- Basic Model with Avg. Firm Earnings
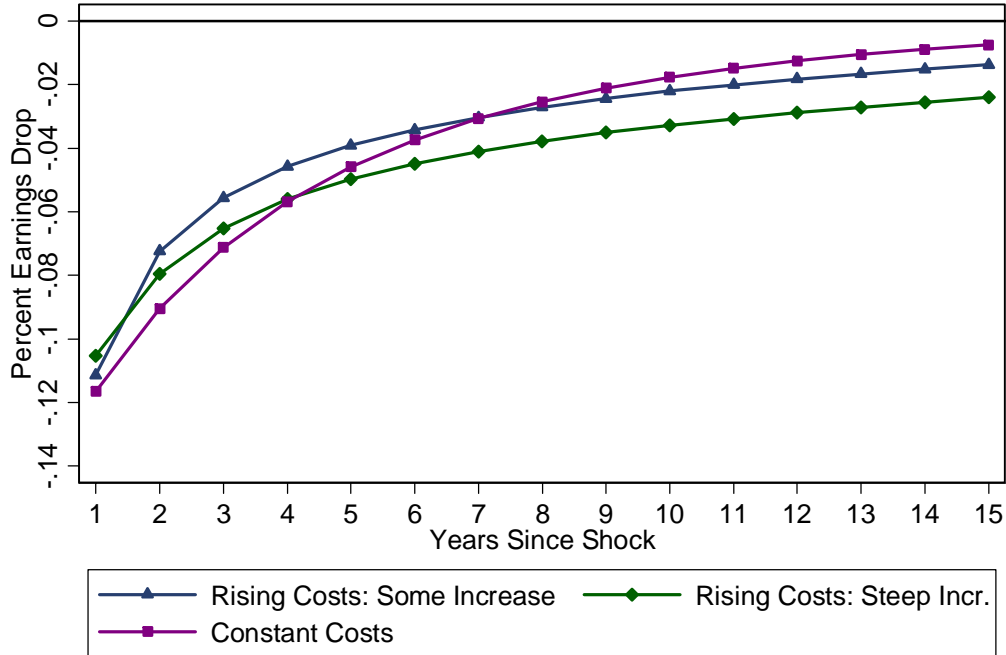- With Firm Earnings and Full UR History

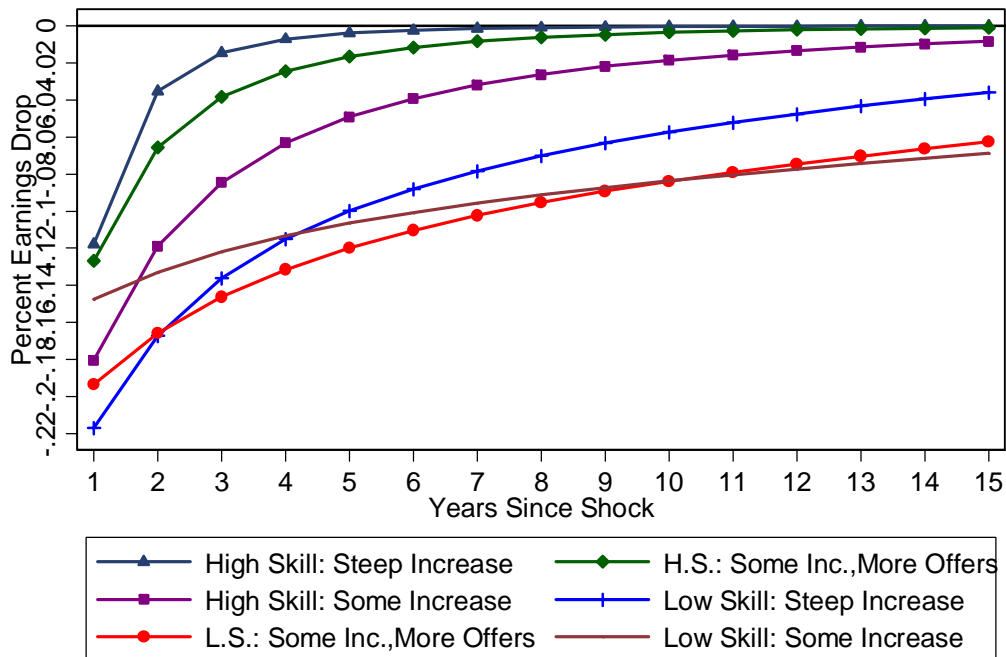Notes: See notes of Figure 8 and discussion in text.

Appendix Figure J1: Simulation of Predicted Effect of Decline in Initial Hiring Rate at Good Firms on Earnings in our Model of Endogenous Job Search

Panel A: Effect of Age-Dependent Costs on Average Earnings Losses

Panel B: Effect of Alternative Assumptions on Earnings Losses by Skill Group

Notes: See discussion in Sensitivity Appendix E.