The Permanent and Transitory Effects of Graduating in a Recession

An Analysis of Earnings and Job Mobility using Matched Employer-Employee Data[1]

Phil Oreopoulos
University of Toronto and National Bureau of Economic Research
oreo@economics.utoronto.ca

Till von Wachter
Columbia University and Institute for the Study of Labor
vw2112@columbia.edu

Andrew Heisz
Statistics Canada
andrew.heisz@statcan.ca

PRELIMINARY – COMMENTS WELCOME

Abstract

Do recessions reduce long term career prospects of recent college graduates? We examine this question for a large sample of Canadian college graduates matched to their income tax records and data on each employer from 1982 to 1999. Young graduates entering the labor market in a recession suffer significant initial earnings losses that eventually fade after 8 to 10 years. This result is robust to controls for potential endogeneity of graduation date, differences in average cohort earnings, selective employment, and controls for dynamic effects persistent local labor market conditions. While entering the labor market in a recession has little impact on overall employment, we find important responses of mobility across firms and industries. Moreover, our data show that workers starting at low-paying smaller firms, catch up by moving to higher-paying larger firms. Time intensive search for better employers or sequential sorting due to initial mismatch appear key channels of catch-up of initial wage losses from adverse early labor market conditions.

[1] We would also like to thank David Card, Ken Chay, Pierre-Andre' Chiappori, Bentley McLeod, Daniel Parent, Mike Riordan and participants at Seminars in UC Berkeley, Cornell, UCLA, Stanford, Columbia University, the Bank of Italy, and Tor' Vergata for helpful comments. All remaining errors are our own.

1. Introduction

The early career phase is important for a worker's success as mature labor market participants. In the first 10 years of work, individuals experience 70% of overall wage growth, change jobs frequently, and find a career occupation and employer. During this formative period, young workers are particularly at risk of adverse events. Young workers lose most in recessions (Blanchflower and Oswald 1994), are very likely to lose their jobs (Farber 2003), and have a high risk of becoming unemployed (Ryan 2001). Thus, entering the labor market in a depressed economic environment may permanently lower earnings and career chances. A small recent literature indeed suggests that young workers suffer persistent effects by events outside of their control.[2] However, while several economic models of career development offer guidance with respect to the long-term effects of early career conditions, there is little systematic evidence about the actual consequences of adverse initial labor market conditions on the evolution of young workers' careers.

The current paper examines how unemployment conditions in the local labor market in the very first years of an individual's work history affects two key aspects of careers, earnings and mobility, over the course of the first ten years of labor market experience. After documenting the effects of an early labor market shock on standard career outcomes, the paper uses detailed information on workers' employers matched to each individual wage observation to characterize the impact of adverse early shocks on the type of young workers' employers. Thereby, it uses detailed administrative panel data to address several empirical challenges, such as selective labor market entry, selective non-employment, and the presence of continuing aggregate shocks correlated with early labor market conditions. The lack of empirical studies of the long term effects of early labor market conditions may be due to the high data requirements such an endeavor faces.

[2] For example, Kletzer and Fairlie (2002) and Von Wachter and Bender (forthcoming) discuss persistent effects of early job losses, Devereux (2003) analyzes path-dependence in wage shocks, and Kahn (2004) follows the career outcomes of college graduates entering the labor market in the 1982 recession.

Standard models of wage determination predict earnings should only depend on current labor market conditions.[3] Persistent effects of early labor market conditions should only arise due to a correlation of early and current market conditions. However, several models of career determination imply persistent effects of temporary negative conditions that are concentrated at the time of labor market entry. A standard model of human capital growth suggests individuals accumulate experience while working. Temporary spells of non-employment would initially lower human capital accumulation and thereby earnings growth, but workers would catch up if the economy goes back to normal as long as there are decreasing marginal returns. Similarly, negative and persistent effects of early labor market conditions arise if firms create fewer jobs in recessions that offer 'learning-by-doing,' as suggested by Okun (1973) and extended by Gibbons and Waldman (2004).[4] However, the human capital model does not explain why workers would stay in low level or low growth jobs as the economy improves.[5]

The notion of mobility across jobs with different attributes lies at the heart of job search theory (e.g., Burdett 1978, Mortensen 1977). As documented by Topel and Ward (1992), a model of job search reconciles steep wage-experience profiles with high job mobility in early careers. Even if the wage offer distribution only worsens temporarily, time intensive search implies that wages take time to catch up to average levels. The catch-up process involves a high degree of job mobility and wage gains should be concentrated at job changes rather than accruing on the job as human capital theory would predict.

Another form of frictions that generates observationally similar trajectories of job changes and wage increases is that of imperfectly observed ability and employer learning. In an environment

[3] This may occur due to temporary adjustment processes, as in a standard neo-classical model with flexible (but possibly slow) wage adjustment. It could also arise within a neo-classical model augmented with an explicit equilibrium relationship between wages and unemployment. A complete model of regional wage and employment adjustment with and without unemployment is outlined in Blanchard and Katz (1992).

[4] If workers pay for training by wage cuts (Mincer 1974) and jobs offer different degrees of learning (Rosen 1972), then earnings trajectories may also be affected by changes in the availability of jobs in the economy. For example, if the amount of 'learning' jobs declines, then wage trajectory should be characterized by higher entry wages and lower growth rates.

[5] Careers may also entail the accumulation of firm specific capital (e.g., Becker 1964) or industry specific capital (e.g., Neal 1995). If early labor market conditions lead to increased job mobility, workers may initially accumulate less specific human capital, and catch up by finding stable employment in a firm or industry.

of comparative advantage, worker switch towards jobs with which they form a better match as the market learns about their true ability by observing workers' output. If adverse labor market increase the amount of 'noise' contained in output histories, the degree of initial mismatch may be higher for workers entering the labor market in recessions.[6] Gibbons, Katz, Lemieux, and Parent (2002) provide evidence in favor of such a model at the industry level. Results presented by Abowd, Creecy, and Kramarz (2003) based on correlation of worker and firm fixed effects in wage equations suggest sorting is weak at the firm level.[7] A similar pattern of mismatch could arise if firms and industries have differential pattern of job creation. For example, McLaughlin and Bils (2001) show that industries paying higher wages have more pro-cyclical rates of job creation. If high wage workers should work at high wage firms in equilibrium, the initial mismatch reduces wages until sequential sorting closes the gap.

Firm characteristics have traditionally played a small role in the analysis of workers' careers. However, a recent increase in the availability of firm and worker data has brought to light a large degree of heterogeneity among employers in both wage levels as well as turnover rates. Careers may simply consist in search for a firm that pays high wages or offers a better career environment in terms of wage growth or job stability. If high-paying jobs are located in firms with particular compensation policies, and if good jobs are more expensive (e.g., because they involve rents), then it is likely that employment at good firms is pro-cyclical as the results of McLaughlin and Bils (2001) suggest at the industry level. In this case, early labor market conditions may affect wages by reducing employment at good employers, and catch up involves transitions towards better firms.

Although little is known about the role firm attributes play in career development, a large theoretical literature examines careers within firms arising from long-term incentive contracts,

[6] Note that learning in this model is symmetric across employers. Asymmetric learning could explain persistent wage losses if employers cannot tell workers entering in a recession apart from more lucky entrants. While this is a realistic scenario for single event such as a job loss, it is harder to argue this should be the case for events at the market level. In either case, as long as learning is continuous, wage losses are likely to be persistent but temporary. Whether 'catch up' occurs on or between jobs depends on the process of wage determination.
[7] However, as Gibbons et al. (2002) and Von Wachter and Bender (forthcoming) point out, worker fixed effects may not be a valid strategy for young workers whose earnings history is not yet a complete function of earnings.

insurance provision, or internal labor markets.[8] A smaller but influential empirical literature has suggested that external labor market shocks persist within firms (Beaudry and DiNardo 1992, Baker, Gibbs, and Holmstrom 1994). This could be explained by insurance contracts or due to job assignment (Gibbons and Waldman 2004). Since such effects are more likely to occur at firms paying wage premiums, it implies that the gains from getting a job at a 'good' firm may be reduced for workers entering these firms in recessions. While the existence of wage premiums could explain a lack of mobility, persistent effects within firms would raise the question of how workers respond to contracts or job assignment by moving employers. Partly due to lack of appropriate data, the literature on within-firm careers tends to ignore the external market setting that is constituent of the more standard models of career development.[9]

A rich set of models of career determination is available to interpret the evolution of careers following early labor market conditions.[10] In contrast, few papers try to estimate the long-term effect of entering the labor market in a recession on career outcomes. While the existing literature suggests events at the individual level have persistent effects (e.g., Kletzer and Fairlie 2002, Devereux 2003, Von Wachter and Bender forthcoming), no comprehensive study of the effect of early conditions at the market level on long-term career development exists. Moreover, due to data constraints, most papers addressing the dynamic effect of labor market shocks look over a horizon of three to five years. Two papers most closely related to ours are Waggoner (2004) who documents the effect of unemployment in U.S. states on regional mobility; Kahn (2005) compares the long-term labor market outcomes of college graduates entering the labor market around the 1982 recessions.

We contribute to this question by analyzing the career trajectories of Canadian college graduates entering the labor market over 20 years using longitudinal matched worker-firm level data drawn from income tax records. Detailed administrative information on the exact date of labor

[8] See Gibbons and Waldman (1999) for an overview.
[9] An exception is Beaudry and DiNardo (1992) who argue that the pattern of correlation of wages with past unemployment rates suggests workers have insurance contracts that are adjusted to external market conditions by bargaining. A similar process could arise in a model of on the job search and bargaining.
[10] Most of the models discussed predict persistent but fading effects of early shocks. Some of the mechanisms suggested could, in their extreme form, imply more long lasting effects.

market entry, the expected duration of college, as well as the region of residence allows us to isolate the effect of an unexpected change in the rate of unemployment at the regional level free of various important confounding factors. Using this data, we ask several questions that will help to shed light on the factors determining the evolution of young workers' careers. How long does the effect of an initial shock last? How much of it is explained by the persistence of local labor market conditions? Do workers stay in school longer to shelter an unlucky beginning of their career? Does wage adjustment occur within or between jobs? What is the role of firms in explaining initial wage losses? Do workers starting at better firms lose less or are their wage losses more persistent?

In the next section we outline the empirical strategy we use to address these questions, and our approach to deal with selective labor market entry, selective labor force participation, and the presence of continuing aggregate shocks. Then we describe the nature of our data that combines administrative information from Canadian universities, income tax records, and employers' payroll tax records. The main results, discussed in the fourth section, are followed by a detailed sensitivity analysis addressing among others the question of selection and omitted variable bias. The fifth section analyses the effect of early unemployment rates on the incidence and gains of job and industry mobility. The sections six and seven analyze the role of firm outcomes (such as firm size and average firm wage), as well as the role of the first employer. The last section concludes.

2. Empirical Strategy

2.1. Basic Earnings Model

To measure the long-term effects on earnings of starting to work in a recession, our main specification exploits cyclical variation in unemployment rates for young workers at the regional level. Our data allow us to observe a large sample of workers from the end of their first college degree every year for ten years into their careers. In our main specifications, we follow 20 cohorts entering from 1976 to 1995 in ten regions and analyze their annual earnings drawn from income tax records. The model of log annual earnings we use is a variation of a standard human capital earnings function,

$$\log w_{icrt} = \alpha + \phi_t + \theta_r + \chi_c + \gamma_e + \beta_e UR_{cr0} + \lambda X_{icrt} + u_{icrt}$$

where θ_c, χ_c, γ_e, and ϕ_t represent unrestricted fixed effects for first region of residence, year of graduation, potential labor market experience and calendar year. The unemployment rate is measured at the time of graduation and the region of first residence (UR_{cr0}). The coefficients β_e on the interaction of potential experience with the unemployment rate in the year of college graduation are the main effects of interest. Since our sample includes only men who attended college and our key independent variable varies only at the regional level and over time, we collapse individual level data at the cohort-year-initial region level and work only with the cell means weighted by cell sizes. The only individual characteristics we could include are the actual duration of college and age. Instead of including years of college in an individual level model, we split the sample between workers who graduated and all workers with some college. Working with the cell level data greatly facilitated our analysis. The cell level model we work on which most of the estimates in this paper are based on can be written as

$$\log \overline{w}_{crt} = \alpha + \phi_t + \theta_r + \gamma_e + \beta_e UR_{cr0} + \chi_c + u_{crt} \qquad (2)$$

To account for group specific error-components, we cluster standard errors are at the cohort-region level. As it is well known, cohort, potential experience, and year effects cannot be identified separately without an additional restriction on cohort effects is needed. Since we are mainly interested in experience effects and in their change over the business cycle, we simply drop one additional cohort effect from the regression.[11]

Relative to standard wage regressions, our model includes fixed effects for year of graduation, fixed effects for first province of residence, and an interaction between unemployment at graduation and experience. The province fixed effects control for permanent differences in mean wages across provinces and ensure that we estimate effects of initial labor market conditions from changes in unemployment rates at the provincial level. Cohort effects control for permanent differences in earnings of different graduation years at the national level. That earnings may

[11] We could have chosen to restrict cohort effects to sum to zero (as suggested by Deaton 1997). This alternative does not alter our estimates of the experience profile. Of course, the resulting cohort effects differ.

permanently differ across cohorts has been noted in previous research (e.g., Welch 1979, Card and Lemieux 2001). Such differences may arise due to variation in cohort sizes, different average ability across cohorts, or changing education quality. Cohort effects also eliminate effects due to national time series variation in unemployment rates that is common across provinces. Thus, the changes in experience profiles (β_e) we estimate are identified by province-cohort-specific variation in unemployment rates. The last and most important modification is the interaction between the provincial unemployment rate at time of labor market entry and experience. As we show below, the effects of initial unemployment rates would introduce province-specific cohort effects. Since unemployment rates are auto-regressive, a simple model with province-cohort-effects would be mis-specified as it would capture a summary of the entire profile of the effect of the initial unemployment rate. Instead, the experience-interaction allows for the initial cohort-effects to fade as workers progress through the labor market.

At experience year zero our regression estimates the effects on earnings from current unemployment rates in region of residence plus region and year fixed effects. This specification is familiar from the wage-curve literature.[12] We extend this basic model to allow for dynamic effects of unemployment rates in a particular moment of a worker's career. Thereby, we introduce the notion of "aggregate market history" as a potential determinant of earnings. Since the wage-curve literature has shown that current unemployment rates affect workers of all ages, and current unemployment rates may correlate with initial unemployment, a natural extension of our basic model is to control for the unemployment rate in the current region of residence at each experience level. Since, as we show below, there is a strong experience gradient in the effect of current unemployment rates on wages, we interact current unemployment with experience as well

$$\log \overline{w}_{crt} = \alpha + \phi_t + \theta_r + \chi_c + \gamma_e + \beta_e UR_{cr0} + \pi_e UR_{se} + u_{crt},$$

where UR_{se} denotes the unemployment in the current region (s) at the given experience level (e).

[12] However, unlike the wage-curve literature, the main focus of our paper is to estimate the long-term effects on earnings of temporary unemployment rate shocks rather than uncovering an equilibrium relationship between wage levels and unemployment rates.

This simple extension assumes that only the unemployment rate at the time of labor market entry has dynamic effects on wages. However, unemployment rates affecting earnings at later experience years may also have persistent effects on earnings. A more complete dynamic model would therefore allow for dynamic effects of the aggregate unemployment rate a worker was exposed to at each in experience year (e) in the relevant region (r_e), denoted by $UR_{r_e e}$. Note that this unemployment rate will differ for different graduation cohorts. Denote the effect on wages in experience year e from the unemployment rate at experience year 0 (1,2,3,4,…) by $\beta_{e,0}$ ($\beta_{e,1}, \beta_{e,2}, \beta_{e,3}, ...$). Dropping other regressors and the region subscripts on the unemployment rates for simplicity, the dynamic part of the complete dynamic model can be written as

$$\begin{aligned}
\overline{\log w}_{\text{crt}} = &... + 1(\exp = 0)\beta_{0,0}UR_0 \\
&+ 1(\exp = 1)\left[\beta_{1,0}UR_0 + \beta_{0,1}UR1\right] \\
&+ 1(\exp = 2)\left[\beta_{2,0}UR_0 + \beta_{1,1}UR_1 + \beta_{0,2}UR_2\right] \\
&+ 1(\exp = 3)\left[\beta_{3,0}UR_0 + \beta_{2,1}UR_1 + \beta_{1,2}UR_2 + \beta_{0,3}UR_3\right] \\
&+ 1(\exp = 4)\left[\beta_{4,0}UR_0 + \beta_{3,1}UR_1 + \beta_{2,2}UR_2 + ... + \beta_{0,4}UR_4\right] \\
&+ \dots \\
&+ 1(\exp = 9)\left[\beta_{9,0}UR_0 + \beta_{8,1}UR_1 + \beta_{7,2}UR_2 + ... + \beta_{0,9}UR_9\right] \\
&+ 1(\exp = 10)\left[\beta_{10,0}UR_0 + \beta_{9,1}UR_1 + \beta_{8,2}UR_2 + ... + \beta_{0,10}UR_{10}\right]
\end{aligned}$$

or more succinctly as

$$\log \overline{w}_{crt} = \phi_t + \theta_r + \chi_c + \gamma_e + \beta_{e,0}UR_{cr0} + \beta_{e,1}UR_{r_1 1} + \beta_{e,2}UR_{r_2 2} + ... + \beta_{e,10}UR_{r_{10} 10} + u_{crt}.$$

This more complex model helps us to interpret the parameter estimates of our baseline specification that excludes any sort of dynamics. If this model is correct, the simple regression that omits control variables for subsequent unemployment rates after labor market entry captures the average change in earnings from graduating in a recession given the *regular evolution of the regional unemployment rate faced afterwards*. The simple regression estimates the effects from graduating in different times in the business cycle. The full dynamic regression estimates the effect of the transitory component of the

initial unemployment condition. The simple model with only the unemployment rate at college exit estimates the dynamic effect of the first unemployment rate *plus* the weighted sum of the effect of unemployment rates a worker faces in his career. The omitted variable bias of the coefficients on the first unemployment rates is

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

The bias is increasing at a declining rate with the lag of the effect e, since (i) the correlation of unemployment is high for short periods but drops of pretty quickly and (ii) the effect of unemployment on earnings declines with experience. This pattern will become apparent in some of the results presented in the empirical section.

The time series process of unemployment is often characterized as an AR(2) with high persistence of the first lag. (Some prefer to model it as ARIMA(1,1,0), but often a prior of stationary is invoked to distinguish a persistent AR(2) from the similar non-stationary process.) In this case, the first two leads of unemployment (i.e., unemployment at experience years one and two) should remove omitted variable bias from the dynamic effect of the unemployment rate at experience zero. We estimate the full dynamic model including unemployment rates at all periods fully interacted with experience dummies, as well as a more restricted model with only two additional unemployment rates, and as expected they give similar results. However, while the effect of the early unemployment rate turns out to be remarkably stable, given the high persistence of unemployment innovations it is difficult to separately identify dynamic effects of unemployment rates at adjacent experience years. We therefore also consider a restricted model in which we constrain the effects of unemployment to be the same in groups of experience years.[13] 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

[13] Instead of imposing restriction across experience years, we have also experimented with more parametric models of the decay of the initial effect of unemployment. While an exponential rate of decay is rejected by the data, the dynamic behavior of unemployment rate effects could be capture reasonably well by a fourth order polynomial in the time of the shock. However, this approach doesn't solve the problems inherent in the data – too persistent unemployment shocks and too few cohorts at older ages.

constrained to be equal).[14] 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 grouped model 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. 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. 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. To further analyze to what extent initial labor market conditions are special, we also analyze the experience gradient in the effect of current unemployment rates. These results help to benchmark our analysis to results in the wage-curve literature.

Dynamic issues aside, our main estimates are identified by changes in provincial unemployment rates at time of graduation net of province and year of graduation cohort fixed effects. This identification strategy is valid if there are no unobserved characteristics correlated with the initial unemployment rate that vary with experience. Factors varying only at the cohort-region dimension affect the level of initial losses, but not the pattern of reversion we estimate. A standard concern in the analysis of real wage cyclicality is how the decomposition of workers changes with business conditions. If the least able workers exit the labor market, observed real wage movements understate changes in labor costs (e.g., Bils 1985). In our case, the labor force exit of less able workers would lead to an *understatement* of any negative effect of unemployment rates on wages, and our estimates would represent a lower bound (however, if worse workers reenter the labor market with a time lag, it would lead us to over-estimate persistence). As we show below, initial

[14] The single year specification generates similar estimates, but larger standard errors.

unemployment rates have small effects on the propensity to temporarily exit our earnings sample due to unemployment or non-employment. To address the problem of selective labor force participation, we carry out a number of specification checks. First, we reestimate our models using a sample of workers with positive earnings in each period. Second, for a sub-sample of workers who ever filed an income tax return from their parents' home we have been able to add a measure of average lifetime earnings of fathers. Since fathers' earnings potential has is positively correlated with sons' earnings potential, we use this measure to further assess the importance of selective labor market participation. Third, two groups of people are not in our sample: clearly, those who never file an income tax return; in addition, to focus on a sample of men with stable labor force attachment, we drop those who permanently stop filing taxes at any point in time. Since both of these groups may contain workers who emigrate (mainly to the U.S.) for economic reasons, it may be affected by early unemployment rates as well. We therefore analyzed average father's income of permanent exits. In addition, we compare our main results including those who permanently stop filing.

Another possibility how unobserved individual characteristics might correlate with unemployment rates at college exit is if more able students remain in college longer to wait for 'better times'. This would overestimate the initial negative effect and underestimate the degree of persistence. This is unlikely to affect our analyses of persistent effects because the process of reversion of initial losses takes too long to be explained by lagged entry of more able workers. A detailed analysis of college duration in response to unemployment rates at actual and predicted time of graduation suggests there are only small increases in the duration of college in response to unemployment rates for our preferred sample. To address the problem directly, we use information on the date of entry into college and official degree duration to construct predicted graduation dates for all graduates in our sample. We then use the unemployment rate in the *predicted* year of graduation as an alternative source of variation to identify the long-term effect of initial labor market conditions. We present two sets of estimates based on this additional measure. First, we show basic OLS estimates corresponding to equations (1) and (2). We refer to these estimates as 'reduced form'

estimates. The second set of estimates presents instrumental variable estimates using the unemployment rate at the predicted date of graduation as an instrument of the unemployment rate at actual graduation. In the former case, the relevant shocksaffecting career choices are taken to be the unemployment rates at time of expected graduation. In the latter case, it is the unemployment rate at the time of actual exit. Since the case can be made for either approach, we present both.[15]

Another important question is to what extent our results are driven by regional mobility. While mobility across provinces is lower in Canada than the U.S., it is a potentially important channel through which reversion in losses occurs. Note that including the history of aggregate unemployment rates partially controls for the degree of reversion explained by moves to economically vibrant provinces. To further examine the role of moves to high wage provinces, we also include fixed effects for current province of residence, as well as current province of residence interacted with year effects. These two controls should capture beneficial effects from regional mobility towards better macroeconomic conditions. However, even absent an improvement in the macroeconomic environment, provincial mobility might be beneficial due to the wider scope for good job matches. Thus, we analyze the incidence and returns to provincial mobility directly as an outcome. To gauge more directly to what extent the reversion we observe is simply due to regional mobility, we also present estimates based on variation of unemployment rates at the national level. Variation at the national level represents shocks affecting the entire labor market whose effect is unmitigated by inter-regional mobility.[16]

2.2. Analysis of Job and Industry Mobility

[15] Note that if the graduation date is endogenous, so are potential labor market experience and initial cohort effects. We have estimated a series of reduced form models with predicted cohort effects and predicted experience with little additional insight. If we chose to instrument actual experience or cohort effects with predicted experience or cohort effects, the results become unstable.

[16] The national model we estimate is

$$\log \overline{w}_{ct} = \alpha + \phi_t + \gamma_e + \beta_e UR_{c0} + \chi_0 c + \chi_1 c^2 + u_{ct}, \quad (1)$$

where the dependent variable is real earnings, and ϕ_t and γ_e represent calendar year and potential labor market experience effects, respectively. The national model includes either linear or quadratic cohort trends, since unrestricted cohort effects are not identified.

Since initial labor market conditions will affect wages through multiple channels, the estimated coefficients in the regression of log earnings represent 'reduced form' effects of the initial unemployment rate on earnings-experience profiles. We cannot identify the effect of the separate channels because each is in itself affected by choices made by the worker and by his possibly unobservable characteristics. However, we can provide an assessment on their importance by directly analyzing the impact of unemployment rate on the channels themselves. The variables we examine as outcomes include receipt of unemployment insurance, filing income taxes with zero earnings, not filing, and mobility across provinces. Two additional main channels through which wage losses and reversion can occur is through changes in jobs and industry. Thus, we analyze the effect of initial unemployment on the incidence of mobility by estimating our main model of the dynamic effects of initial unemployment with various measures of mobility as dependent variable. The measures we consider are a change in workers' main employers across years, as well as a change in industry at the one, two, and three digit level.[17]

We follow the approach by Topel and Ward (1992) by characterizing the average association of job and industry mobility with wage growth. Topel and Ward (1992) established that about 30-50% of initial wage growth occurs at job changes, and we confirm similar results for Canada.[18] We then estimate simple descriptive models of wage growth as a function of initial unemployment rates where initial unemployment is interacted with mover status. These models, ran either pooled or fully interacted at the individual level,

$$\Delta \log w_{icrt} = \alpha + \phi_t + \theta_r + \chi_c + \gamma_e + \beta_e UR_{cr0} + \lambda Move_{icrt} + \delta Move_{icrt} UR_{cr0} + u_{icrt},$$

estimate the difference δ in the effect of initial unemployment rates on wage growth by different mover status (indexed by the *Move*-dummy). While these parameter estimates have no causal

[17] In defining our mobility measures, we have to take 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. Neither definition substantially alters our results.

[18] This is a stable pattern across countries (Giuliano and Von Wachter (2004) report very similar numbers for France and Germany).

interpretation, they capture the importance of job change in the dynamic pattern of unemployment rate effects by showing whether the correlation of job change and job mobility increases for workers experiencing adverse initial conditions.

2.3. Analysis of Firm Outcomes

We take advantage of our employer-employee matched data to further characterize the evolution of young workers' careers. We do this by constructing measures of average characteristics of each employer, and merge these to the individual level data using workers' employer identification numbers reported on tax returns. These firm characteristics are again used as left hand side variables in our main model. Thereby we estimate the potential contribution of change employer characteristics on the changing effects of early unemployment conditions on earnings. The characteristics we consider are log median earnings, total payroll, and total number of employees, all calculated as average over the entire period of existence of the firm for all employees (not only workers with college education) controlling for aggregate year and region effects.

If more able workers are sorted into better firms, the wage measures do not necessarily capture the fixed firm component in pay rates, but a more inclusive measure of 'firm quality'.Results by Abowd et al. (2003) suggest that this correlation may be weak.[19] Although we cannot include worker and firm fixed effects due to the substantial number of firms.

We also explore how the estimated wage effects change after controlling for first employer after college exit. If workers simply search for better firms, then a large fraction of initial wage losses should fade when we compare workers starting at the same firm in different cyclical conditions. Thus, we include fixed effects for the initial firm (and the initial industry) in our main regression model. Clearly, we do not expect the results to fade completely, as there are likely important wage changes occurring at the market level. However, a large role for initial firm fixed effects underscores the role of heterogeneity in firm wages as an underlying source of initial wage losses. Since some models also predict that experience profiles might be affected by the first employer, we also include

[19] In future work, we plan to calculate firm averages net of worker fixed effects.

an interaction of initial firm fixed effects and experience effects, effectively allowing for firm specific experience profiles.[20]

To further analyze the role of the first employer, we would also like to separately estimate the dynamic effects of initial unemployment rates by different firm types. To do so, we choose a threshold for 'high-quality' or large firms and collapse the data at the cohort-year-region-high-quality employers. The model we estimate then is

$$\log \overline{w}_{crtf} = \alpha + \phi_t + \theta_r + \gamma_e + \beta_e UR_{cr0} + \pi_e \Gamma_{crof} UR_{cr0} + \chi_c + \lambda_{ef} + u_{crtf}, \qquad (3)$$

where Γ_{crof} represents a dummy of workers starting to work at a large or high paying firm. If careers evolve *between* firms, we would expect workers starting their careers in high quality establishments to be less affected by initial unemployment rates than workers starting in low quality establishments. However, if careers evolve *within* firms, then changes in contracting, job assignment, or training over the business cycle might lead workers starting at large firms to be worse off relative to workers starting in small firms. If not in terms of the level of starting wages, we might expect their wages to grow slower due to the presence of firm-entry cohort effects. On the other hand, workers starting at small firms may switch jobs more often, and thus are likely to improve their situation more frequently. Thus, while the overall benefit of starting in large firm may be positive (the sum of the main experience effects and the interaction effects with unemployment rates is higher), the relative loss in a recession could be larger.

Again, the probability of starting to work at a 'high quality' employer may be correlated with workers' ability, and the degree of selectivity might be affected by early unemployment rates. Since we have insufficient measures of ability in the data set, Γ_{crof} is likely to be correlated with omitted variables. To address this problem, we have included control functions in the fraction of workers starting to work at 'high quality' firms. Similarly, we have included average fathers' income as control

[20] In future work, we plan to control for worker fixed effects to address a potential change in the degree of selectivity into firms across the business cycle. At present, we limit ourselves to discuss the potential direction of the bias below.

function. Neither affect our results, and are available upon request. Since these methods only imperfectly control for selection, we note that if large firms reduce hiring over-proportionately in recessions, and more able workers were sorted into larger firms, average ability at all firms increases. Although, the direction of the bias from selective hiring is not clear, we suspect our estimates would tend to underestimate the negative effect of starting at a large firm.

3. Canadian Administrative Data and the Evolution of Careers

3.1. Data and Sample

Our results are based on three confidential data sets collected and compiled by Statistics Canada. First, we use administrative information for Canadian college students and college graduates from 1976 to 1995 reported by individual higher education institutions to Statistics Canada. The data [known as the University Student Information System (USIS)] contain individual information on type of degree, major of study, graduation date, date of entry, official degree duration, college identifier, and province of residence. As described in the Appendix, we drop small colleges who report on an irregular basis and students with very long degree durations. A few colleges failed to include individual identifiers, which prevented Statistics Canada from matching to the other administrative datasets. We also dropped these individuals, leaving in the dataset about 70% of all students that attended post-secondary school over this 20 year period.

Canadian post secondary institutions offer bachelor programs of various durations (from one to five years), with the modal year of four. Several individuals obtain multiple college degrees or obtain graduate degrees. To generate a uniform sample with a common definition of labor market entry, we focus for our base case on the effect of recessions at the end of the *first* exit from college and exclude workers obtaining higher degrees from our sample. Since early recessions do not affect the probability of obtaining a graduate degree, this does not affect our results.[21] The first columns of Table 1 tabulate measures of degree duration and years of college. Even within this relatively

[21] We have experimented with other definitions of the relevant date of labor market entry (such as last degree or last degree of continuous education), with little effect on the results. In the sensitivity analysis, we also show results using a sample that includes workers obtaining a post-graduate degree.

homogeneous sample, only 68% of college students graduate, there is a wide heterogeneity in years of education, and a substantial fraction of students leave college before and after the predicted year of graduation. To obtain a more homogeneous sample of workers with BA degree, we consider a second sample of workers who left college on or above expected year of graduation. To do so, we calculate the difference (D) between actual and predicted graduation year, and keep only workers with non-negative difference. The right columns of Table 1 show characteristics for that sample. Among the sample of workers on or above grade, 89% actually graduate (measured as an entry in a separate administrative file containing only graduated students). Since despite the use of administrative data there is likely to still be some measurement error in actual graduation in our data, excluding college dropouts leads us to focus on a more homogenous group of workers with better measured graduation date. Thereby, we are also sure of picking up the effect of early unemployment rather than the drop out decision. Undergraduates are unlikely to finish early or drop out because of labor market conditions, and we find evidence of this in our data. Dropping early leavers leaves us with a clearner homogeneous sample of mostly college graduates.

In a second step, we merge data from college records to information from annual income tax records using tax payer identification numbers starting in 1982. From tax records we obtain annual earnings, province of residence, an employer identification number (at the establishment level), and whether an individual receives unemployment benefits, reports zero earnings, or does not file an income tax report in a given year. As discussed above, the employer identification number can be used to create measures of annual employment transitions between employers and industries. To assign the unemployment rate at the time of graduation, we have to choose a relevant province of residence. We settled for the province of first residence as the relevant labor market for young college graduates. The alternative, province of college, gives similar results.[22]

[22] Appendix Figure 1 compares the effect of the two choices for our main estimates. With choice of province of college as the relevant labor market, the unemployment rate at experience year zero fails to pick up some effects of the unemployment rate at experience year one that are absorbed if we choose province of first residence as relevant market. This leads us to believe that province of first college has a stronger measurement error than province of first residence. If we group 0-1 together, the results of the two choices are

Finally, we match this employer-employee dataset to establishment characteristics from firm-level data. Over the panel between 1983 and 1999, we calculate average firm size,,average median wage, and total payroll taken at the establishment level, with year fixed effects taken out. All firm characteristics refer to permanent attributes so that they remain unchanged across the individual panel (i.e., an individual's firm characteristics can change only if she moves employers).

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 labour market entry (1976-1995). In the empirical analysis, we also report alternative results with subsets of cohorts. Appendix Tables 1A and 1B 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). One can see the increase in college attendance in Canada by reading down the rows. There is variation in sample sizes (notably in 1994) that is due to reporting patterns of some larger schools. However, excluding these schools does not affect our results.

As further described in the Data Appendix, we impose some additional basic sample restrictions and limit the degree of missing observations on earnings. In particular, we drop workers who permanently stop filing taxes with the purpose of removing individuals who stopped being recorded annually because they left the country, obtained a new personal identification number, entered the underground economy, or their file was simply miscoded along the way. We would not want to count these later years as zero earnings, and we would not want to include the initial earnings of these individuals in our analysis. However, as we show in our sensitivity analysis, doing so does not change the results. In addition to these workers, we also miss earnings information on workers who never file income taxes. The propensity of being in either of these groups of workers is affected

indistinguishable. An examination of the incidence and gains of province mobility below leads us to believe that selective mobility from province of college to province of first residence is small.

by the initial unemployment rate. To assess the degree of selectivity this may induce in our results, we use information on father's earnings. Father's earnings can be merged onto the data for workers who ever filed an income tax return at the address of his parents. For about 55% of our sample we can merge average lifetime real annual earnings for their father. To make sure this sub-sample is comparable to the whole sample, we reran the main specification on this subgroup, with little difference in results. Although emigration as response to early unemployment rates might have been correlated with individual's earnings capacity, there is no correlation between permanent drop from our sample and father's income.

3.2. Experience-Profiles in Canada and the US

Panel A of Table 2A shows average longitudinal experience profiles over the entire sample of male Canadian college graduates (both for the full sample, as well as for those graduating on or above grade). Panel B shows cross-sectional profiles for similarly defined variables for U.S. workers with at least some college (14 to 18 years) and with 16 or more years of college (in the columns labeled 'on or above' grade). We have kept experience year zero for Canada, which is the year of graduation. Since many do not spent the full first year working, for comparison purposes with the U.S. we focus on experience years 1 to 10.[23] The profiles shown in the table also average over cohort-changes in age-earnings profiles, which are subject of the main analysis of this paper.

Average annual real earnings in our sample on grow at about 10% for each of the first 10 experience years. Despite the different sources of data, wage profiles for annual real earnings in Canada and the US are very similar. From the first to the tenth year of potential experience, wages grow 110% in the U.S. for the full sample, and 100% in Canada (for those on or above grade, the

[23] These profiles average over different graduation cohorts and provinces, and should not be interpreted as experience profiles To assess the potential role of cohort effects, we re-estimated these experience profiles including province, year and cohort fixed effects. Since experience, year, and cohort fixed effects cannot be separately identified, we drop an additional cohort effect. This does not affect the estimated experience profile. Overall, simple average experience profiles tend to over-state growth of earnings over a ten year horizon by 5-10% due to the presence of cohort effects.

numbers are 118% vs. 90%).[24] The US profile has higher variance because of differences in sample sizes, the overall slope is also very similar in both countries.[25]

The comparison of incidence of unemployment is more difficult, since the US unemployment rate measured by the Current Population Survey is based on a different concept than either "zero earnings" on a tax record, the receipt of UI benefits, or non-filing of taxes. If we sum the series for 'zero earnings' and 'missing income tax record', the level of so defined 'non-employment' in Canada is initially lower than the non-participation rate of the US, partially because we exclude permanent non-filers from our sample, but remains higher as the US series falls. Since those filing with 'zero earnings' often receive other forms of assistance programs, we also added UI receipt to zero earnings and compared it to US unemployment. The difference is only slightly higher initially, but remains high as US unemployment falls. The difference is 1.4 points for experience years 1 to 5, and 1.8 for years 5 to 10. This is comparable to differences in unemployment rates at the national level for the entire economy that were 2% on average in the 1980s and 3% in the 1990s.[26]

The fraction of year-to-year job changes in Canada, shown in Columns 4 and 8, respectively, is initially quite high and declines rapidly with experience. On the one hand, an annual measure is likely to underestimate turnover. On the other hand, administrative measures can induce some noise due to the misreporting of employer identification numbers. To gauge these figures, we have constructed series for job change by potential experience in the U.S. using the Current Population Survey. The series is based on the fraction of workers with one year of tenure from the CPS' tenure, mobility, and pension supplements from 1979 to 2000. An experience profile of job change based on the fraction of workers holding more than a single job from the March Demographic Supplement of

[24] If we scale earnings in experience year zero by a factor of two to account for the fact that most workers graduate and June and can thus work at most half a year, Canadians experience some additional wage growth from year zero to year one making growth more similar to the U.S. (the levels in year zero would be 9.12 and 9.23 for the two samples).

[25] The levels between countries are not comparable, since the Canadian series is expressed in Canadian Dollars. Both series are expressed in 1984 price levels. Note that the difference among the two samples is much larger in Canada than the US. This may be due partially to top-coding in CPS data.

[26] The difference across countries in our sample is smaller partially due to measurement, partially due to the focus on highly educated workers, but also due to the fact of higher initial instability and a steeper gradient for young workers in the U.S. A similar pattern observed for the US vis-à-vis other industrialized countries as well, see Giuliano and von Wachter (2004).

the CPS as suggested by Farber (1999) is very similar. The approximate measure for the US finds similar patterns, albeit initially the rate of job change is not as high and has a weaker gradient.

One reason why measured job mobility in Canada is higher than in the US may be due to the treatment of missing employer identifiers. However, missing employer identifier is very rare in our data. After filling in single missing employer identifiers with the lagged value, the current series in Table 2A treats transition from a missing employer id to a valid employer id as a job change. As an alternative series, we have estimated the fraction of job mobility occurring between valid firm identifiers. A closer examination of the possible patterns of missing identifiers reveals that the original measure tends to overstate and the alternative measure tends to understate job mobility, but that the measures are very similar. The two series never differ by more than one percentage point.

Panel A of Table 2B shows additional measures of job, industry, and regional mobility based on our panel sample for workers on or above grade (the graduate sample).[27] As found by others, mobility between industry plays is high for young workers. It is about five percentage points lower than firm mobility, indicating that a high fraction of firm changes also involve industry changes. Note that there is surprisingly little difference between industry changes at the two and three digit level, while one digit industry changes are somewhat rarer. Again, a replication of the series of changes in two-digit industries with a more conservative treatment of missing values suggests this is not due to higher incidence of missing values for industry. The high degree of industry mobility would be consistent with matching processes that emphasize both choices of firms and careers (e.g., Neal 1995) or sequential sorting of workers into industries (Gibbons, Katz, Lemieux, and Parent 2002). Panel A also show the fraction of workers who left the firm and industry the held upon labor market entry (at experience year zero). After 10 years in the labor market, about 80% of college workers left their initial firm in Canada, where most of this change occurs within the first five experience years. Since this measures mobility starting in experience year zero, it might overstate mobility out of the first stable job, consistent with a high degree of initial 'job shopping' as emphasized by Topel and

[27] The same numbers for all workers exiting college is shown in Appendix Table 2.

Ward (1992). Similarly, about 65% of workers change their first 2-digit industry within the first five years.[28]

Panel A also shows mobility rates between provinces and relative to the initial province. Province mobility rates are much lower than job mobility rates and have a much weaker experience gradient. After 5 years, 13% of college graduates have left their first province of residence. These numbers a magnitude lower than numbers reported by age in Waggoner (2004, Table 1) for the U.S.. Using the Census, Waggoner reports that about 25% of 25-30 year olds have moved out of the state of birth, while 30% of 36 to 40 year olds have moved, with the middle age group somewhere in between, depending on the census year. Although these numbers are for all education groups, they indicate a different degree of regional mobility in Canada and the U.S..

Panel B of Table 2B shows the average experience profiles in firm size, median firm wage, as well as firm average payroll for Canadian college graduates.[29] A clear experience gradient is visible in all our measures of firm 'quality.' For workers in the graduate sample, on average, firm size (measured by the within-firm average controlling for year and region effects) increases 34% from experience year one to year 10 (ignoring the year zero of partial work). These increases are in part driven by outliers – the fraction of workers at firms larger than 500 workers grows by 3.6 points. That firm size is only one measure correlated with average wages firms pay is shown in the remaining columns of the table. On average, median firm wages increase 23% within the first ten years in the labor market (relative to experience year one). The increase in average log payroll is approximately the sum of the rates of change in average firm size and average firm wages – thus the increases are partly skewed due to very large firm sizes (a total 49%).

As shown in Appendix Table 3 these experience-gradients in firm size are present in weaker form in the U.S. as well. The table shows measures of firm size obtained from supplements to the CPS. Although the estimates are noisy due to relatively small sample sizes, the average increase in

[28] Note that these measures might be somewhat overstated due consecutive missing values that are currently not 'filled in' with previous firm or industry information.
[29] Again, the numbers for all workers exiting college is shown in Appendix Table 2.

firm size for all workers with 13 to 18 years of schooling is about 40% (but only about 10-15% for those with 16-18 years). The fraction of workers at firms of at least 500 workers increases about 5-6 points (1-2 points) on average for the 13-18 (16-18) years of schooling sample. To account for the noisy nature of the data, we have fit various trend lines in experience through these proportions; the results suggest similar gradients that are somewhat higher gradient for the US for both samples cases. Note that the level of firm size seems to be higher in Canada than in the U.S., something not borne out for the entire population. However, the origin of firm size measures is different, and the similarity of gradients makes us confident that we have picked up a relevant feature of early career growth.[30]

To summarize, consistent with previous results in the literature, the first years of the careers of young male Canadian college graduates are characterized by steep wage growth (consistent with Mincer 1974, Murphy and Welch 1990, Card 1999), frequent job changes (as shown for the U.S. by Topel and Ward 1992), initially unstable labor force attachment (Ryan 2001, Gardecki and Neumark 1998), high interregional mobility (Waggoner 2004), and frequent industry changes (McCall 1990, Neal 1995). In addition, we have documented an experience gradient in average size and average wages paid by employers. Male Canadian graduates tend to move to better paying and larger firms the longer they stay in the labor market. A similar pattern is also present in the U.S., a feature rarely noted in the literature on career profiles (perhaps due to a lack of available data).[31] Since larger firms appear to pay higher wages and high-wage firms may pay rents, the patterns are consistent with a simple pattern of time intensive job search. This is further discussed below.

The time series of unemployment rates at the provincial level minus the provincial average are shown in Figure 1. There are important changes in unemployment rates that are common to all provinces and thus will work for our national specification. In particular, Canada experienced two

[30] We confirmed the firm size distributions obtained from the US with data published by the Census Bureau. The census data was also used to obtain average firm sizes within the five firm size categories reported in the CPS, and the log of firm size we used is based on this approximated measure.
[31] An exception is Fox (2004) who analyzes the age distribution in firms grouped in three size classes using data from the Survey of Income and Program Participation (SIPP).

major recessions in the early 1980s and 1990s that increased young workers' unemployment rates for certain years by more than seven percentage points.[32] Figure 1 also displays a high degree of regional heterogeneity. Panel A of Appendix Table 4 in the shows summary statistics. The standard deviation of the demeaned provincial rate is 3%. Consistent with the Canadian experience during the period of our sample, we will treat an increase of unemployment rates of 5 percentage points (or about two standard deviations) as a typical large recession. Appendix Table 4, Panel B also shows the distribution of our sample between provinces and the mean and standard deviation of unemployment across Canadian provinces. The sample of students differs across provinces because of population differences and college representation. We address this by including initial province fixed effects (and sometimes also current province fixed effects). Since unemployment shocks are of similar magnitude across provinces, it is unlikely that a single province determines our results. For example, the average magnitude of unemployment changes in our largest province, Ontario, is representative of shocks across all Canadian regions.[33]

College enrollment rates in Canada increased continuously since the early 1980s, and cohort sizes of 20 to 24 year olds have consistently declined.[34] This has led to an increase in the availability of college educated workers also reflected in our sample sizes.[35] At the same time, it has reduced labor force participation of workers age 20-24 relative to more mature workers. Although most of these changes occur in a smooth fashion, they may lead to cohort effects arising from different quality of college, changes in relative supply, or average cohort ability. While we take out cohort fixed effects in our national analysis, some of the mentioned changes could induce cohort effects at the provincial level, or influence labor market conditions relevant for young graduates. As long as these changes do not affect experience-profiles but are stable at the cohort-province level the dynamic

[32] The picture shows unemployment rates for 15 to 24 year olds. Using unemployment rates defined for workers age 20 to 24 or for college graduates only does not substantially alter the pattern of unemployment over time or across regions, nor does it affect our results.
[33] If we regress provincial unemployment rates on year and province dummies, the R2 is 0.89 (stable for different time periods or for different measures of unemployment rate).
[34] See for example Card and Lemieux (1997) or Beaudry, Lemieux, and Parent (2000).
[35] The sample sizes by graduation cohort and experience year is shown in Appendix Table 1A. Note that our sample also changes because of changes in reporting patterns across colleges.

component of our estimates is still valid. Moreover, the correlation between unemployment rates for young and old workers is high and has remained stable (despite a persistent mean difference). Thus, enrollment and population trends appear to not have substantially affected the variation in unemployment rates that as initial shocks identify our estimates. This may be because college graduates are a small fraction of the overall labor force and because year-to-year cyclical labor market conditions move at a higher frequency than population and enrolment trends. To make sure we pick up mainly effects occurring due to demand conditions, we also use the unemployment rate for all workers as measure of initial labor market shock. To assess the role of participation changes, we also replicated our results using region-cohort variation in the employment-population-ratio for 15 to 24 year olds.

4. The Persistent Effect of Initial Labor Market Conditions on Earnings

Figure 2A shows average earnings-experience profiles of the graduation cohorts in our data together with their entry wage at experience one (their first full year of work) and the average wage for 'mature' workers (workers with 5 to 10 years of experience).[36] One can clearly see differences in starting wages across graduation cohorts at the national level. These differences lead to average differences in cohort earnings. Thus, as found by others, if we were to add cohort effects in a simple earnings recession, they significantly improve the fit of the model. However, the figure also shows a clear pattern of convergence, i.e., initial differences in starting conditions appear to fade over time. Cohort effects appear to have a time-varying component, or, as noted by Beaudry and Green (2001), experience profiles vary across cohorts. There exists a strong correlation between starting wages and initial unemployment rate conditions, which persists into higher experience years but slowly fades over time. This is shown in Figure 2B, which graphs national unemployment rates for young workers with wages at different years of experience by graduation cohort (both expressed as deviations from

[36] Graduation cohorts 1976 and 1994 have lower and higher average earnings then the rest of the sample, respectively, due to variation in college reporting rates (Appendix Table 1A shows the respective decline and increase in sample sizes). In the regression models, this is accounted for by cohort fixed effects, in the figures these two cohorts are dropped.

their means across cohorts). The correlations in Figure 2B strongly suggest that part of the initial but fading earnings differences in Figure 2A are driven by variation in initial labor market conditions.

This correlation is exploited in Table 3, which shows the long-term effect of national unemployment rates on log real earnings, controlling for year and experience effects and linear or quadratic cohort trends. Column (1) and (4) show the shift in experience profiles due to an unemployment shock in experience year zero including a linear cohort trend for all workers with some college and those in the graduate sample, respectively. Standard errors are clustered at the level of graduation cohort to allow for group level error terms. The results suggest a strong initial effect that persists but fades after about five years in the labor market.

4.1. Main Regional Models

Our main results are drawn from regional models that include cohort effects as well as effects for initial province of residence as described in Section 2. These results are identified from Statistics Canada's youth unemployment rate, measured for individuals in the labor market between ages 15 to 24.[37] . The shifts in experience profiles due to an initial provincial unemployment shock are shown in Column 3 for all workers (with at least some college) and Column6 for the graduate sample. The initial effects are similar in size to those from the national model, but starting at experience year four, the regional estimates remain more persistent, and converge to zero only after 10 experience years. Although estimates for the graduates are slightly more precise, there is little difference in the point estimates for graduates and all workers. This is apparent in Figure 3. It does not appear that those with a college degree fare better than the full sample.

There are several reasons why the national results may not match up exactly with the regional results. They may diverge because of cohort effects. For example, increases in enrollment rates may have reduced the average ability or quality of education of cohorts entering since the mid-1980s, disproportionately affecting the lower experience years of our sample. Similarly, older cohorts

[37] The proxy for economic conditions most closely corresponded with our sample's age range. Unemployment rate estimates for older post-secondary graduates were too imprecisely measured to work with. Results from using the unemployment rate among all labor force participants, or from using the employment rate are very similar to those presented here.

are over-represented for later experience years, and may have higher average ability. However, trends in sizes of birth-cohorts and in the cohort-specific returns to education would work the other way. Moreover, while we do find a rotation in the profile, we do not find any significant shift that would indicate a strong correlation of initial unemployment rates at the national level with changing unobserved cohort characteristics. National estimates may also be more strongly affected by measurement error problems due to mis-assignment of the relevant initial labor market shock. A priori, the geographical extension of the relevant labor market is not clear for college graduates. However, inter-regional mobility is less common in Canada than in the U.S. even among English speaking provinces. Despite high mobility, even in the U.S., most college graduates tend to work within a single state. Thus, the relevant labor market shock is at the regional level, an effect only partially absorbed by the national unemployment rate. Lower mobility (and as we will see below, lower gains to mobility) also explains why results from the national model are not larger than the regional model. Similarly, as shown below, it does not appear that the regional results are driven by more persistent unemployment shocks.

As discussed in Section 2, in the presence of continuing exposure to adverse labor market conditions, these estimates represent a summary of the earnings losses the average worker can expect due to entry in a depressed labor market. With an increase in unemployment of 5 percentage points -- roughly a shift from boom to recession – annual wages are about 9 percent lower in the first year after college, still 4 percent lower after 5 years out, and about 2 percent lower 9 years out. Overall, we view the regional and national results as telling a consistent story. Graduating during a recession leads to significantly lower earnings at the beginning of an individual's labor market, but the gap converges to zero within five to eight years after graduation. These results are consistent with estimates presented by Devereux (2003) who finds among a sample of workers from all ages that half of a wage-shock, instrumented by local unemployment conditions, is still present after about five years.

The results are also consistent with previous evidence on the impact of unemployment on wages in Canada. Blanchflower and Oswald (1994) obtain a coefficient for log annual earnings on province unemployment controlling for region and year fixed effects for a representative sample of Canadian workers of -.013 (Table 8.3). This is very similar to what we find for male college graduates, despite the fact that their sample includes a range of individual characteristics. They also report an elasticity of -.065 for workers with university degrees derived from the same regression model. The elasticity for workers less than age 25 is -.169 (Table 8.4). If we divide our estimated coefficients by the average unemployment rate (14%), we obtain an elasticity of -.11 to -.13 for our younger sample of graduates.[38] The corresponding results for the U.S. are an elasticity of -.102 for all workers, -.064 for workers with at least 13 years of schooling, and -.192 for workers age 25 or less.[39] These results are very similar to what we obtain from our sample of Canadian college graduates.

The entry into a depressed labor market leaves only temporary scars, but not a permanent effect on lifetime income. How large this effect is for a given cohort depends on the strength of the initial unemployment rate,[40] as well as on the life-time exposure of a cohort to unemployment. Since due to the cyclical nature of unemployment, life-time unemployment exposure is partially determined by the timing of entry, the fortunes of cohorts may differ. The profiles shown in Figure 3 and Table 3 combine a large number of cohorts to average out such cohort differences. Although we do not have data on life-time exposure to unemployment conditions, below we try to control for some of these differences directly. To assess whether the average profiles are driven by single 'unlucky'

[38] Blanchflower and Oswald use data from 1973, 1980, 1987, and 1988. They also report results by Thomas Lemieux (Table 8.5) of a coefficient of -.0096 (an elasticity of -.096 in his sample) using data on annual earnings from 1980, 1985, and 1987 and equally weighting provinces. If observations are weighted by province size, the elasticity is between -.12 and -.14.

[39] See Tables 4.5 and 4.18. The dependent variable is log annual earnings from the March CPS (1963-1987), the regressions include demographic variables as well as year and region fixed effects. Unemployment rates enter at the level of 21 regions.

[40] Note that there is no apparent non-linearity in the effect of early unemployment on earnings. Appendix Figure 2 graphs the residuals from a regression of log annual earnings on cohort, year, and region fixed effects against the residuals of the same regression with provincial unemployment on the left hand side. The Figure shows the scatter plot and a corresponding predicted line from a univariate regression model for four different experience years. The size of the circle is proportional to the number of people in a cohort-region-experience cell. The figures show a negative decreasing correlation that appears to be driven by regular and smooth pattern in the data. No strong non-linearity or threshold effect is apparent from the data.

cohorts, Figure 4 shows the same estimate for several cohort groups. While some differences across cohorts are apparent in the size of the initial shock and the speed of reversion, overall the patterns of initial loss and reversion are very similar across cohorts.[41]

The results in Figure 4 and Table 3 are robust to a variety of sensitivity checks. First, the choice of the measure of an initial shock tries to balance the effects of measurement error due to mis-measurement of the initial shock with the effects of sampling error and the potential of correlation with cohort characteristics. To counter the concern that unemployment rate for young workers may be affected by cohort characteristics, we also replicated our results with the unemployment rate for all workers (Appendix Figure 1, Panel A shows the effect at a comparable shock of two standard deviations). This made no difference. To address that unemployment may be an imperfect measure of actual labor market conditions because of changing institutional arrangements we used the employment population rates for workers age 15 to 25 (or men only). As shown in Appendix Figure 1, Panel A, this led to slightly more persistent results, perhaps due to stronger time series correlation of employment-population rates. To try to obtain a shock more targeted to the group of workers in our sample, we also used the unemployment rate for young men instead of that for all young workers, again with no difference in results. Unfortunately, alternative measures based on young college graduates only proved to be too noisy in several of the smaller provinces and led to attenuated results. For the larger provinces, our results were confirmed even for this very narrow measure. Our results do not seem to be driven by any particular measure of labor market conditions.

Second, a potential concern may be that we define the "initial" period to be the year of college graduation. Since there is little guidance from theory, we could also have defined the critical "initial" period to be the first two or the first three years. We obtain an empirical answer to this question when we analyze the effect of unemployment rates at different experience years. There is a clear difference between shocks occurring in the very first years and shocks for mature workers.

[41] It is hard from the picture to identify 'loser' and 'winner' cohorts, partially because for some cohort groups the number of cohorts available to estimate the effect beyond 7 years becomes small.

Another concern is whether persistent adverse conditions in the early years matter more than a single shock. To address this question, Appendix Figure 1, Panel B compares the effect of average unemployment rates in experience year zero, 0 to 1, 0 to 2, and 0 to 3. Since unemployment history is based on current province of residence, which is a variable on the income tax data, complete unemployment histories are available only for cohorts entering after 1981. As shown in Figure 4, these have more persistent effects than the full set of cohorts used in Table 3. While high average unemployment in the early years tends to make the effects more persistent, it does not appear that the effects captured in the main models are driven by periods of extended unemployment. The driving force behind our main results is the shock in the very years after entry into the labor market. This is corroborated by the results in 4.3., which shows that the effects of initial shocks persist even after controlling for individuals' full unemployment histories.[42] Moreover, there we show that there are significant differences in the shocks experienced in experience years 0-1 and 2-3.

We have tried various other sample and specification choices, none of which substantially affected our results. Considering all college students who enter the labor market (and not solely focusing on bachelor programs) has no effects on our results (Appendix Figure 3). This result implies there cannot be very large changes in selection into advanced degree programs due to unemployment. We also tried various ways of excluding workers with repeatedly missing wages, and find little effect on our results (Appendix Figure 4 shows the results with those who permanently stop filing included).[43] We have re-estimated all of our results using the province of college as the region for the relevant initial shock with no basic change in our results (As shown in Appendix

[42] However, in results not shown, we find that once full unemployment histories are included, the effect of a high average unemployment rate in years 0 to 3 becomes more negative persistent than the effects of average shocks in 0-1 and 0-2 (which remain similar). With dynamics, all three shocks experience complete catch up.
[43] We also used the sample of workers with a valid match to their father's income to assess the degree of selective exclusion due to non-filing. Although having a valid match to father's earnings is affected by initial unemployment, perhaps through an effect on regional mobility, if we replicate Table 3 using only those with a valid match the results are very similar as for all workers. We conclude that workers with a valid father's income match are similar to the entire sample. We then regressed average father's lifetime income and "stopped filing", with insignificant and small slopes.

Figure 1, Panel C the results for earnings are marginally weaker initially but as persistent).[44] Part of the reason why national results show more persistent effects of initial labor market conditions on wages might be that workers are 'stuck' in persistently slack regional labor markets. To address this possibility, we also included current province by current year fixed effects (shown in Appendix Figure 1, Panel C), which barely show any differences in the results. This is also a first indicator that mobility towards provinces with higher wages is not a strong source of catch-up in our sample.

Our basic results are robust to a wide variety of choices of specification and sample. The remainder of this section addresses three additional, perhaps more fundamental concerns. First, we address the question of selective college graduation. Second, we analyze the impact of the initial shock while controlling for effects an individual's labor market 'history.' Third, we consider the role of selective entry and exit with experience from our earnings sample.

4.2. Accounting for Selective College Graduation

Table 1 (Panel A) describes the average duration of college and the propensity of workers to graduate before or after duration of the degree. There is a large degree of heterogeneity in the duration of college in our sample, partly driven by the availability of three year B.A. degrees in some provinces, partly by high drop out rates. The upper panel shows how among all workers 26% graduate above grade (30% graduate below grade) and only 63%). The fraction that graduates is 89% in the sample of workers who are on or above grade, consistent with our presumption that these are most comparable to American workers with a college degree. However, we find that 40% of these workers are above grade, by an average of 0.86 years. As expected, Panel A shows how most of the deviations from the expected degree date are of one and two years (i.e., only about 20% graduate more than 2 years before or after their graduation date).

[44] This is likely due to measurement error, since in this case the shock in the province of residence at experience year one has very strong effects. If we group experience years zero and one together, the effects are very similar. While there may be a concern about selective mobility based on the unemployment shock in the province of college, we feel the effect of measurement error due to the mis-assignment of initial province is larger. This is supported by relatively low incidence and gains from regional mobility.

Leaving college may be a function of the business cycle.[45] If the incentive or the ability to postpone exit in tough times (or the incentive to leave prematurely in good times) is concentrated among particular types of workers, this may bias our results. As discussed in Section 2, the bias might be a positive or negative. The persistent but temporary effects found in the previous sections indicate it is unlikely that the pattern is driven by gradual entry of workers of a particular type. If cohort ability is permanently affected by selective graduation patterns correlated with the unemployment rate at graduation, we would have expected to see permanent effects in our results. Nevertheless, in this section we address this question directly by analyzing the effect of unemployment rates on college duration and by controlling for the potential bias directly.

Table 4 shows the effect of various unemployment rates on our basic measures of college duration (Appendix Table 5 provides additional detail). If workers postpone college exit in recessions, we would expect that the unemployment rate in the year of *predicted graduation* is positively related to college duration. The year of predicted graduation is simply the date of entry plus the official duration of the particular degree in years (or plus four if missing). Similarly, since workers with shorter durations are more likely to be able to further postpone entry labor market entrants in a recession are more likely to have longer durations. Thus, the current unemployment rate should also vary positively with average duration. Table 4 shows the effects for the national and regional unemployment rates, as well as for predicted regional rates for all workers and for those at least on grade. We see no significant correlations for at the national level or for the 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. In particular, the fraction of workers above grade rises by half a percent. For a five percent change in unemployment rates, this

[45] 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 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.

would imply an increase of 2.5 percentage points (10% relative to the 0.26 average shown in Table 1). While this is not negligible, it is not large either, and the results for other measures are rather spotty.

Panels D to F of Table 4 show the same specifications for those workers on or above grade (Appendix Table 5 shows how the probability of being on-grade is unrelated to unemployment). The effects are small and insignificant for the national sample. While there are no significant effects of unemployment at predicted time of graduation, unemployment rates at actual graduation show more consistently significant albeit small effects. A five point shock to unemployment implies about an increase of four percentage points in the probability of being above grade, a 10% increase relative to a mean of 40%, and a 0.05 increase in average years of college (corresponding to three weeks or 1.4% relative to a mean of 4.11 years).[46] Overall, these results suggest that a small fraction of workers who are barely on or above grade tend to extend their stay in college by one or two years (Appendix Table 5 suggests that for this sample the probability of being above grade 1-3 years is raised marginally).[47] The fact that unemployment at predicted graduation matters less suggests this works primarily off of workers who are already beyond grade. Consistently, the fact that the results are weak for the full sample and the fact that being on or above grade is not affected (Appendix Table 5) indicates that students overall do not make significant attempts to avoid leaving school in a recession by delaying a program or enrolling in a new one.[48]

A final approach to directly address endogenous college exit is to instrument exit year with predicted exit year at the start of college. Predicted year of exit is a valid instrument for actual year if

[46] The time spent above grade rises by 31 days (=5*.017*365), a 10% increase relative to the mean shown in Table 1 (=.86*365).

[47] 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.

[48] 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.

college entry and remains uncorrelated with unemployment rates in the year of predicted exit, and if these rates correlate with unemployment rates at actual exit. Since the unemployment rate at predicted graduation could in itself be viewed as the relevant 'shock' to workers' careers, we present and discuss both reduced form and instrumental variable (IV) estimates.

Table 5 presents the reduced form estimates of the interactions of potential labor market experience for the same specifications as in Table 3 (OLS). The resulting coefficients are significantly smaller, less persistent, and less significant at the national level. The coefficients at the regional level are either unchanged (for those on/above grade) or slightly more negative (for all workers). These results are not surprising, given that correlation of unemployment rates at the national level is much weaker than at the regional level. It is unlikely that the smaller effects at the national level are driven by selective entry, since we had seen none of it in Panel A and D of Table 4. Table 6 shows the IV results with the coefficients on the instrument from the corresponding first stage. At the national level, the first stage is not very strong (albeit significant) for either specification.[49] The resulting IV estimates show effects of initial recessions on wages that are similar in magnitude to OLS estimates until about the fourth experience year (although not all effects are significantly different from zero). However, catch up is now slightly faster and has occurred by the sixth year after college exit.

For the regional models in Columns (3) and (4), we see very high first stage coefficients, albeit significantly different from one. Together with the reduced form estimates in Table 5, the 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.[50] These results confirm the OLS estimates. We see slightly faster convergence of IV at the national level, the IV results are very similar at the regional level. The point estimates of reduced form and IV are shown in Figure 5 for the regional model together with the corresponding OLS

[49] Note that the t-statistics are just below 3.3, the cut-off point for weak instruments suggested by Stock and Watson (1997) and Stock and Yogo (2004).

[50] 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.

estimates. While the reduced form estimates are now more persistent than OLS, the IV estimates exhibit the same pattern of initial loss and convergence. The results are perhaps not surprising, given that regional correlation in unemployment shocks is high even after controlling for province fixed effects. However, we believe the exclusion restriction of the instrumental variable approach to be valid. This is buttressed by results that unemployment rates at predicted graduation hardly correlate with college duration. 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.

4.3. 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. Another estimate of interest is the long-term impact of an isolated temporary variation of labor market conditions, holding all else constant. Isolating the effect of an initial shock for individuals entering the full-time labor market for the first time is interesting because it is this effect that would help to assess the implications of different models of career determination. Second, this effect could be compared to similar shocks at later experience years to benchmark the degree by which in initial labor market shock at the time of initial entry into the labor market has a larger effect.

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 (the analysis of all cohorts is in Appendix). As discussed above, we cannot precisely estimate the dynamic effects of shocks in later cohorts. As discussed in Section 2, as

the solution to this problem we have grouped unemployment rates in two year experience groups, and interacted the average unemployment within the groups with unrestricted experience dummies.

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)).[51] 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 Appendix Figure 5. (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. The pattern in the figure and the fact that unemployment rates appear to be well characterized by an AR(2) suggests that the inclusion of two to three lags should suffice in absorb most of omitted variable bias.

Table 7 shows a series of models with augmented controls for unemployment history, each interacted with experience. The table shows the basecase regional model with the graduate sample for two sets of cohorts 1982 to 1995.[52] To compare similarly defined unemployment shocks, all models include current province fixed effects.[53] The parameter estimates are graphed in Figure 6A. The first model includes the unemployment rate at the current experience year interacted with experience dummies, without additional labor market history. This corresponds to the augmented wage-curve model of Section 2. As expected given the discussion in the previous paragraph, this has some small initial effects for experience years one to three, but little thereafter. Given that each of these

[51] 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).

[52] Appendix Table 6 and Appendix Figure 6 show the results for all cohorts (1976-1995). In these models, the unemployment history for the pre-82 graduation cohorts is omitted.

[53] As shown in Appendix Figure 1 and discussed in Section 3, this has little bearing on our original results.

unemployment rates has itself a potentially dynamic effect, the next model includes interactions of these unemployment rates with experience effects.

The first model, shown in Column 3 of Table 7 and in Figure 6A only includes dynamic effects of unemployment rates occurring in experience years one to three. The results shows an increasing spread in the two estimates that flattens out after experience year 5, exactly as predicted by the omitted variable bias calculations in Section 2. At each experience year the worker is exposed to more 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 below in Table 8) and the correlation with unemployment fades or becomes 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). 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, to better gauge the pattern of catch up and reversion in the presence of dynamic controls for unemployment history, we now turn to the grouped model. Figure 6B shows the effect of the baseline effect of a shock at experience zero plus the effect of the average unemployment in experience years zero and one without any additional controls for market history. As discussed in the previous section, they are very similar. The figure then shows the model with fully interacted controls for grouped unemployment history (although the results are similar when the controls for additional unemployment shocks are left completely unrestricted). 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. The fact that the estimates are more persistent than in the baseline model in Figure 3 derives from the fact that we use a different

range of cohorts. 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 6).[54]

Figure 6B also shows the dynamic effect of a shock occurring at experience years two to three from the grouped model with full history controls (the coefficient estimates are shown in Column 8 of Table 7). To make the dynamic pattern comparable with that of the first group, the figure graphs the coefficients relative to the time of the shock (i.e., experience zero now relates to the moment of the shock). The effect is about a third smaller for the first years of its occurrence, after which the magnitude of the shocks in 2-3 and 0-1 converges (i.e., after five years they are about the same order of magnitude). While the effect at experience years 2-3 is much smaller than the initial effect, it is also quite persistent, and our period is too short to observe complete reversion (although the point estimates are insignificant after 4-6 years). Unfortunately our sample of cohorts is small at later experience years, such that the cohort variation shown in Figure 4 does not allow us to estimate the average dynamic effects of shocks at later experience years (instead, we tend to pick up effects from single cohorts and sampling variation). However, inspection of the data leads us to believe that the dynamic effects for shocks at later experience years (five an up) is smaller.

To explore this further and put the magnitude of the shock in the initial period into further perspective, Table 8 analyzes the experience profile in the effect of unemployment rates on wages. To make our estimates comparable with the previous literature, we show estimates for both the level and the natural logarithm of unemployment rates. The upper panel considers groups 0-1 and 2-3 with unemployment rates for workers age 15 to 24, the lower panel considers the effect of unemployment rates for all workers on all five experience groups. Since the standard deviation of unemployment rates among different age groups differ, we also show the effects at a two standard deviation shock. The first rows of Panel A and B show the effect of unemployment without

[54] Appendix Figure also shows the necessity for grouping in when including history controls; while the effect unemployment at experience year zero fades quickly with unrestricted dynamic history controls, the grouped model shows a stable pattern.

experience interaction. To be comparable with the literature, all models also control for current province fixed effects. The elasticities in Column 5 essentially replicate the results typically found in wage-curve estimates. Columns 1 and 2 contain the estimates on the level and the effect at a two standard deviation shock. Note that these effects are smaller than those found in the rest of the paper since they average the effects over all experience groups and all time horizons.

The next rows of the table then present separate effects by experience groups. We consider the estimates for experience groups separately, a pooled model without dynamic effects, and a pooled model with fully dynamic effects (this model corresponds to the model used in Table 7). The table makes three basic points. First, in all estimates there is an important experience gradient in the effect of current unemployment rates (Panel B). Second, this gradient strengthens in the pooled models and is strongest with dynamic controls (e.g., Panel B Columns 4 and 8). On the one hand, without an experience interaction the single effect captures an average of all future effects instead of the true concurrent effect. If unemployment shocks at different experience years have different gradients, this leads to an understatement of differences across early and mature experience years. On the other hand, omitting the history of other shocks may lead to an overstatement of effects due to omitted variable bias. Third, and most importantly, the initial effects in early experience years are the strongest across all groups. Unemployment conditions in the local labor market matter three to four times as much for labor market entrants then for young workers who already progressed into their career by a few years. The difference between the shock at 0-1 and 2-3 is also understated without accounting for dynamic profiles and omitted variable bias.

The exceptional nature of unemployment shocks in the very early career phase is also shown in graphically Appendix Figure 7 at the national unemployment rates for all graduation cohorts. The figure replicates the negative correlation between unemployment rates and the demeaned earnings at labor market entry shown in Figure 2B. In addition, it shows the correlation of unemployment in the same calendar year for workers at higher experience year. At the national level, too, the exceptional status of unemployment rate shocks for very early experience years is apparent. Labor market

entrants are particularly hurt by initial market conditions, and the effects are especially long lasting. The next sections examine through which channels these adverse early starting conditions affect the career development of young college graduates.

4.4. Temporary Non-Employment and Selectivity Bias

Workers' early careers are not only characterized by high wage growth, but also by variable initial labor force attachment (as shown in Table 2). Under a human capital model, individuals not working lose time during which they acquire skills and knowledge that make them more productive. Thus, if entering the labor market in a recession reduces time worked, this might be a channel through which earnings are affected even in the medium run. Moreover, if unemployment rates affect participation, we might be concerned that our wage-estimates of the previous sections are estimated from a selected sample. The last concern with the base estimates we address is the potential of selective non-employment in driving part of the dynamic catch up pattern we observe in Figure 3. In addition, we try to gauge the potential effect of time worked on the reduction in annual earnings we observe.

In fact, initial unemployment conditions affect the propensity of exiting our sample temporarily. Table 9 replicates the same results as in Table 3 using the fraction of workers claiming unemployment insurance benefits, the fraction of workers filing taxes with zero earnings, and the fraction of workers not filing taxes in a given year. The point estimates are shown in Figure 7A. Table 9 shows an initially significant increase in fraction zero earnings and the fraction of unemployment insurance (UI) claimants that fades within three to four experience years.[55] The effects are numerically small. An increase of unemployment rates of five percentage points leads to about a 0.5 percentage point increase in the fraction claiming UI at low experience years. Although this effect is non-negligible if compared to the total fraction of claimants (about 23%, see the fractions in Table 2), the actual increase in instability is small. The same holds for the fraction filing

[55] The fraction of missing earnings (those not filing) rises only in the year of college exit, during which most graduates only work part of the time.

zero earnings. Note that the effects are very similar for the sample of workers on or above grade (D>=0); while numerically slightly smaller, they are compared to lower averages.[56]

To gauge the importance of these numbers, add the fraction workers reporting zero earnings and the fraction UI claimants for the group on or above grade. In the first year in the labor market, a five percentage point increase in unemployment would induce an increase in this measure of 'time not spent working' of about 1 percentage point. If the typical length of a spell of non-employment were 3 months, then the expected amount of time lost would be 0.03 months (0.01 times 3). If the typical spell length were 6 (12) months, the expected time lost would be 0.06 (0.12) months, or about 2 to 4 days. These back of the envelope calculations suggest that the loss of experience due to labor market entry in recessions is not very large for the average college graduate.

Although male college graduates are indeed a group of workers with very high labor force attachment, the cross-sectional experience gradient of weeks worked from census data reveals that in the first three to four years of there is still some heterogeneity in work patterns that stabilizes afterwards.[57]

The pattern of temporary absence from the sample appears to short for selective entry and exit into employment to explain a significant amount of the catch-up we observe. As a first indicator that the patterns of non-employment we observe are not correlated with omitted worker characteristics, Table 9 shows the effect of initial unemployment rates on average father's income at the cell level. If there were substantial changes in the earnings potential across cells, we should see a gradient, which does not appear to be the case. To assess the effect of selective employment directly, we also replicated our main estimates for workers who work with positive earnings in every period. The results are shown in Appendix Figure 4 (Panel B) and Appendix Table 7. Although we see a

[56] Table 9 also displays a pattern of 'overshooting' after experience year 7 some measures that would imply workers who had initially higher instability become more stable later relative to their more lucky counterparts. One could think of various hypothetical explanations of such a phenomenon. However, although the estimates are statistically significant and non-negligible relative to very low baselines, they are numerically very small and never above 0.2 percentage points.

[57] The profile remains stable after year four at a mean of 46 weeks, a 30th percentile of 50 weeks and a median of 52 weeks.

small shift for the sample of graduates, the changes are well within two standard errors of the original OLS estimates. In neither sample do we see a substantial reduction in the size of the estimates. There does not appear to be strongly selective entry or exit from our sample. As mentioned above 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 4). It does not appear that workers who move out of the country earn on average higher or lower wages. Similarly, those who never appear in our earnings data and may migrate to the U.S. are unlikely to be selected.[58]

5. Mobility across Firms, Industries, and Regions

Job search has been a favorite explanation for both high wage growth and high job mobility in young workers' careers (e.g., Topel and Ward 1992, Manning 2002). However, not much is known about the causal determinants of job mobility and search. 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, 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. We obtain estimates of the causal effect of early labor market conditions on the annual propensity of job change.

Figure 8 graphs the effects of initial unemployment rates on the probability of changing employers for a 5 percentage point increase in regional unemployment rate. Initially, the rate of job change increases by about 1.5 percentage points (depending on the sample), and then gradually declines until it is not significantly different from the baseline in experience year 8 to 9. Table 10 shows the coefficient estimates of the effect of unemployment rates at time of college exit for various measures of job mobility during the first ten experience years for the regional model estimated for all workers and for the graduate sample. Overall, the increase in mobility is slightly larger for those in the graduate sample (D>=0), and significantly larger, but shorter lived at the national level (a 5 percentage point point increase in the unemployment rate implies increases in firm mobility of 2-2.5

[58] To check this directly, we regressed "never present" on father's earnings, finding no correlation.

percentage points). Overall, the results in Table 10 yield a persistent increase in mobility relative to the baseline of about 4-5% (see Table 2A).

To gauge the magnitude of these effects, consider the reductions in job change with labor market experience apparent in Table 2A. Between experience year 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. Overall, although we do not have a directly comparable set of estimates we can use as benchmark, we believe these numbers suggest that the effect of initial unemployment rate conditions on job mobility is well within the range of other determinants of mobility found in the literature.

Table 10 also reports effects on the cumulative fraction of workers who left the initial employer, as well as the propensity of change among 1-digit industry classes. Not surprisingly, while the effects on the rate of job change in columns (1) and (5) decline, the cumulated rate of departure from the 1st employer in columns (2) and (6) increases permanently by about .3 to .5 percentage points. Perhaps more interestingly and more surprisingly is the fact that the effect of an early unemployment rate on the frequency of 2-digit industry changes is as high as the frequency of changes in employers (see the two panels of Figure 8). Even mobility across 1-digit industries is relatively high (the coefficients are about three quarters the size of the coefficients for the 2-digit case in Table 10). This may either mean that the distinction among industries is meaningless in our sample, or that in addition to job shopping workers also actively search for a match with the 'right'

industry. Several models of job search of younger workers would predict such a pattern (e.g., Neal 1995 or McCall 1990).[59]

To what extent does the increased job and industry mobility contribute to the reversion of losses seen in Figure 3? Clearly, the initial increase and gradual fading of mobility-responses with experience follow similar patterns as the change in the experience-earnings gradient. As suggested by a large literature mobility is selective and endogenous itself, and thus absent an instrument for mobility we 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, Table 11A 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 the same as Table 7 of Topel and Ward's (1992) seminal paper – 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's Table 7 (cumulated changes at job moves account for 50%, 30%, and 20-25% in experience years 0-2.5, 2.5-5, and 5-7, respectively). These results are also remarkably similar to what is found by Giuliano and von Wachter (2004) for the association between wage growth and job changes using panel data from France and Germany.

[59] Ninety-two percent of workers in our sample match to an employer in every year, and 6 percent are not matched for only one year. We tested the sensitivity of the mobility results with alternative treatments of missing firms to identify a change in employment. In our base case, workers move if they change from one employer to a missing employer and from a missing employer to an identifiable firm. We have looked at alternative assumptions, such as counting a switch to missing and a subsequent firm as moving only once. The results under alternative scenarios remain generally the same.

Overall, job moves are strongly correlated with earnings growth, and so are changes in industries. In both cases, earnings growth at mobility is about double the growth for stayers from experience years 1 to 5, and then 1.5 times the growth of stayers thereafter. On average, a job change is associated with a wage gain of 24% from experience years 2 to 5 (experience year one, includes transitions from job with half a year to jobs with a full year of earnings and thus is overstated). These gains are higher than those found by Topel and Ward (1992), but they look at all workers and at quarterly earnings data. As shown below, the 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. If one took an increase in earnings of 25% as a typical gain associated with a job change, then a 1.5 point increase in job changes could explain about a quarter to a fifth of the reversion of initial losses. This effect declines to about a tenth after experience year two. Thus, job and industry mobility have the potential to explain an important fraction of the decay of initial job losses. 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, Table 11B presents models of the effect of initial unemployment rates on the rate of earnings growth by mover status. Average annual earnings growth can be decomposed into

$$\overline{\Delta \log(earnings)} = \Pr\{mover\}\overline{\Delta \log(earnings \mid mover)} + (1 - \Pr\{mover\})\overline{\Delta \log(earnings \mid stayer)},$$

where *mover* and *stayer* refers to worker changing job and workers staying on the job, respectively. Table 10 presents the true effect of early unemployment shocks on the probability of moving. Due to selection into mover status, we cannot obtain a similar 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 Table 11A, the goal of Table 11B is to assess whether the association of earnings growth and job mobility strengthens for workers entering the labor market in a recession. For comparison, the table also shows the same estimates for wage growth of those not moving. Column (1) shows that the overall effect on job changes is of similar

magnitude but slightly more persistent than the corresponding level estimates. This is 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.

Columns 2 and 3 confirms the suspicion that the correlation between earnings growth and job mobility rises in recessions, such that the average earnings gains in Table 11A 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. Note that this entails no statement as to the causal effect of a job move, since movers might be of different average ability than stayers. Columns 4 and 5 suggest that earnings gains at moves across industries are less precisely estimates, but follow a similar pattern. In column 6 and 7, the table compares the effect of initial unemployment rates on the gains from regional mobility by experience. 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 is consistent with the fact that average earnings growth for region movers and stayers is quite similar, as shown in the last columns of Table.

We explore whether the higher employer mobility for workers entering the job market in recessions corresponds with higher regional mobility across provinces. Table 12 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 only sample in columns 1 to 2 and 5 to 6 respectively. Since this measure of the business cycle is at the national level, individuals entering the labor force likely face similar conditions in other provinces. The results here suggest no inter-provincial mobility response from differences in overall economic conditions. For the regression models identifying regional economic shocks, however, we

do observe initially higher 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. 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.

The insignificant effects of national unemployment at college exit on provincial mobility suggest that the declining wage gap between those graduating in a recession and those in a boom is clearly not driven by mobility across provinces. The same is true for local shocks. The results in Table 12 show some individuals escape local labor market shocks by leaving to another rprovince. In aggregate, one quarter of our sample moves. The main pattern of a catch-up in wages over time for individuals that began the labor market in a recession occurs within provinces. Figure 8 interacts the initial unemployment rate and experience profiles for the group of provincial movers and non-movers, based on initial province at time of labor market entry. While this analyses conditions on the selective samples of movers and non-movers, it is worth pointing out that our base case results are replicated among the sample that does not move across provinces. The catch-up is somewhat quicker among movers, but this could be a product of other characteristics associated with this group.

Overall, we interpret these results to suggest that job and industry mobility are important factors in behind the reversion of initial losses due to an initial unemployment shock. However, our measures of the average gains from these moves were imperfect, such that we could only hint at the total role of job changes in the response to adverse early market conditions. The next section aims at providing additional evidence for the scope and type of job changes.

6. Changes in Employer Characteristics

Within a search model, workers look for 'better' jobs drawn from a given wage-offer distribution over time. Although this wage distribution varies with workers' skill levels, job search requires that even within skill categories wages vary for because some firms pay more, but not for everyone. It is well known that there is a great deal of heterogeneity in the wages firms pay (e.g., Groshen 1991). A recent literature based on large matched employer-employee data sets and advanced computational techniques suggests that an important fraction of that variation cannot be explained by differences in workers' human capital or by firm characteristics alone (e.g., Abowd, Creecy, and Kramarz 2002). Thus, search for 'better' jobs also means search for more attractive firms. Among others, attractive firms tend to pay higher wages (unexplained by workers' human capital). Moreover, larger firms tend to pay wage premiums (e.g, Idson and Oi 1999). Thus, workers may be searching for larger firms as well. That job matches with larger firms are more stable has been suggested, among others, by Topel and Ward (1992).

Firms' pay differentials may lead to different hiring strategies. For example, better paying and larger firms may try to hire the most able workers. Since human capital increases with experience, workers should, on average, transit to larger firms with time in the labor market.[60] This idea has been recently exploited by Fox (2003), who suggests that larger firms have an interest in hiring more able white collar workers due to increasing span of control. If experience increases human capital, older workers should be over-represented in larger firms. Similarly, high-wage employers may have an interest to hire the most able workers if their wage is not purely a function of skill levels.[61]

If early labor market conditions affect job opportunities of labor market entrants, they are likely to also have an impact on the quality of the firm at which workers start their career. That better paying industries have pro-cyclical hiring patterns has been shown by Bils and McLaughlin (2001). Similar patterns are likely to hold for better paying or large firms. To see this directly, Figure 9 and Table 13 show the effects of early labor market conditions on the average firm sizes and average firm

[60] Topel and Ward (1992) show that conditional on the wage those with more experience tend to switch jobs more often

[61] Note that Abowd, Creecy, and Kramarz (2002) find that firm wage premiums are *negatively* correlated with individual workers' fixed effects, see the discussion in Section 2.

wages by experience year. Table 13 again shows results using regional unemployment shocks and for two samples. There seems to be only a small reduction in initial firm size that fades relatively quickly (for the graduate sample in Column 5, a 5 percentage point recession reduces firm size by 4-5% in the first years, but the effect is not significant). For all workers, the effect even becomes significantly positive after five years of experience (but note that the results for the national specification in Appendix Table 9 indicate much larger negative effects). As the remaining columns and Figure 9 shows, there are much larger effects on the average median (log) wage of a worker's first employers. Column 7 suggests that 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 (ranging from -.092 initially, to -.059 after 3 years and -.0365 after 7 years for the graduate sample) 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 Table 2B. 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). 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. 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. Thus, overall, the effect of recessions on firm quality has the potential to explain an important part of workers' wage losses due to a bad initial start.

It appears that a considerable part of earnings losses can be explained by the start of the work life in lower paying firms. Over time, affected workers improve their relative position vis-à-vis other more lucky workers by switching to more well-paying establishments. These moves entail switches across industries and across regions, 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. The remainder of the paper then tries to be more specific about the decomposition of losses in earnings among effects working through firm-wages and through workers' individual wages.

7. Careers Within and Between Firms

To further describe the career moves that lead to the catch-up up pattern observed in Figure 3, we next assess the role of the initial employer in ensuing career outcomes. The results in the previous section in particular suggest that workers might lose initially due to access to firms that pay less and perhaps offers a less favorable career environment. To do so, we first include fixed effects for the first employer in the basic regression model, and also interact these fixed effects with unrestricted experience profiles. We thereby try to assess the potential contribution of permanent differences in wages of initial firms to the initial loss in earnings. The interaction with experience allows for shifts in experience profiles related to the choice of the first employer to account for heterogeneity in training or learning opportunities across firms. Second, we analyze the effects of initial labor market conditions separately for workers starting to work at low and high paying firms. Again, the goal is to see whether it is access to good employers that matters that can explain part of the effects of initial unemployment shocks. These results should also provide additional insight into the potential gain in mobility between firms and thereby complement the descriptive evidence discussed at the end of Section 5.

The difficulty in examining the different channels through which early labor market conditions affect earnings consists in the fact that these same conditions may change the degree of selectivity of workers into job change or firm type. Although more precise statements need a formal

model, consider the case in which workers sort themselves into firms by comparative advantage. If productivity shocks affect workers ability proportionately, larger firms will stop hiring disproportionately, and increase the ability threshold at which workers are hired. Average ability at all firms increases, and thus one cannot compare the outcome of workers starting in large or high-paying firms in a boom vs. in a recession. Similarly, one cannot compare workers hired at the same firm at different points in the business cycle. Thus, we have to pay special attention when interacting early unemployment rates with measures of firm size, or when including first firm fixed effects into the model.[62]

Keeping this caveat in mind, we consider the potential role of the very first employer a worker faces. If all that happens is that workers search for rents, controlling for initial firm fixed effects should eliminate losses. The results, shown in Figure 10 (and Appendix Table 10), suggest that wage losses for workers starting in a recession at a given firm relative to workers starting at better times are about 60-70% of original losses initially, and then decline to about 60% and fade completely after year seven. Thus, 30-40% of losses are driven by the choice of the initial firm alone. There are important persistent effects left for workers starting at the same firm. This is not surprising since part of the effect is driven by external labor market conditions. In addition, the empirical and theoretical literature that suggests firms may have pro-cyclical job assignment (e.g., Okun 1973, Devereux 2003, Gibbons and Waldman 2004) or write contracts based on external market conditions (e.g., Beaudry and DiNardo 1992). These mechanisms should be particularly relevant for larger and high paying firms, and this is addressed next. Note that including an interaction with initial firm and experience effects does further reduce the initial earnings loss, but not by much. Thus, it does not appear that choice of initial employer is associated with different growth paths. It is, however, associated with different wages. Effects of first industry at the 2-digit level explain an important part of the initial wage differences. Thus, there appear to be both moves between firms and industries

[62] Similarly, any application of the "conditioning approach" is likely to be problematic in this occasion. Note that this is more problematic with outcomes that change every period, and possibly a smaller problem with initial outcomes (such as starting firm or firm type) if the unemployment rate shock introduces some random variation into the sorting process.

that tend to reduce earnings in bad times. Note that if average ability of hires changes over the cycle within firms, we suspect that we underestimate the within firm effect.

To analyze the effect of the first employer on career outcomes in interaction with early unemployment rates, we start by showing a set of correlations and then we interpret their possible bias because of selection. As discussed in Section 2, we are interested in whether workers starting at larger or better firms in a recession experience different losses than workers starting at smaller firms. Search between firms or sorting would imply the losses are smaller, whereas firm-based careers imply that losses may be larger due to firm-specific path dependence. However, suppose that more able workers sort into higher paying firms or that, more generally, the average ability of new hires is countercyclical (as suggested by Bils 1985), and that high-wage firms reduce hiring over-proportionately to low-wage firms. Then average ability at high wage firms would increase more than at low wage firms. Consequently, we suspect that the result would underestimate the true loss-differential from starting at a high-wage firm. The same argument suggests within-firm losses obtained from estimates with fixed-effects for the first firm would tend to under-estimate losses.

To control for changing selection bias, we follow two approaches. First, we re-run our models at the cohort-region-year level and included an interaction of the fraction of workers who started at large firms with early unemployment rate (with coefficients varying by experience). Since cohort ability is constant, the fraction of workers at large firms cannot correlate with ability. Since propensity of starting at large high-wage firms is affected by the early unemployment rate, the cell-level estimator is essentially identified by a non-linear function of early unemployment rates. An alternative is to control for changes in selectivity by approximating a control function through polynomials of the probability of starting to work at high-paying or large firms. Thus, we included the fraction of workers who started to work at a 'good' firm interacted with dummy for firm quality and experience dummies as control functions, and experimented with different degrees of polynomials. In all cases these cell-based controls for selection hardly affected our results.

Results for the basic models without selection controls are shown in Table 14 and Figure 11. Table and Figure show the base-line coefficients (representing effects of early recessions for workers starting at small firms, as defined by the column headers), as well as the coefficient on the interaction between early unemployment rate, experience, and a dummy for the 'quality' of a worker's *first* employer. The coefficients are only shown for the regional sample of workers on or above grade. Since the models also include a main effect for firm 'quality' interacted for experience, these slopes capture the difference in earnings losses due to an initial unemployment shock of workers starting at a 'good' employer relative to those starting at a 'bad' employer, while taking into account the average difference in wages between the two. Thus, the effect is relative to similar workers at the same firm type for both groups of workers. The early-recession effect on wages for those starting to work at high-paying firms in addition to the baseline effect is zero initially. However, after 5 years, these estimates turn significantly negative. Thus, the losses due to a recession are similar for those starting at high-paying employers initially, and then become larger over time. The differences for a 5 percentage point difference in unemployment are non-negligible; in the case for high-median wage firms, the loss is 2-3% larger from experience years 6 to 10.[63] For large firms, the losses are instead initially more negative and the difference fades over time.

Thus, it appears that workers starting at smaller/worse firms catch-up more quickly from a possibly larger initial effect. Note that this does not mean that it does not pay to start to work at a large firm, since the regressions control for a firm-quality dummy interacted with experience. Thus, it workers that start at large firms still benefit, on average, relative to a small firm. The gains, however, are lower for those starting to work in a recession. In other words, the gain from working at a large firm for a worker in a recession cohort is higher if he enters the firm later in his career. These estimates are consistent if early unemployment rates do not change the difference in average ability of entrants into different firm types. As discussed above, we suspect that more selective hiring would

[63] Note that the baseline and interaction coefficients do not sum to those for the sample shown in Table 2 since the sample of workers matched to their firms is smaller. Thus, the initial effect on the baseline of a 5 point increase in unemployment is 7.4% instead of 8.5%, etc.

tend to increase the average ability of hires at large firms more strongly; however, without a model it is hard to put a more specific prior on the nature of the bias. None of the selection controls we tried, at least at the cell level, significantly affected the results shown in the figure.

8. Conclusion

We have estimated the long term effects of entering the labor market in a recession for a large sample of Canadian men leaving college whose earnings, employers, and career outcomes we tracked for ten years into their careers. The effects are quite robust to the many alternative specifications we tried. Our main results suggest that the average worker graduating college in a recession faces very persistent earnings losses that last six to eight years into a worker's career. On average, a two standard deviation increase in the unemployment rate (roughly comparing the difference between those exiting college in a bust versus boom) leads to an initial wage gap of about 10 percent. This gap declines relatively slowly, and fades to zero after about the eighth year. Controlling for unemployment rate conditions after the first year of labor market entry, we also conclude that virtually all of the wage deficit can be attributed to the unemployment rate variation in the very first year after leaving school.

In the second part of the paper, we analyzed the possible sources of these losses, and how workers that graduate in a recession eventually seem to catch-up to their counterparts that graduate in a boom. As with earlier studies, we find young workers' careers are associated with steep wage growth, high job mobility, high regional mobility, unstable job attachment, and a transition from smaller to larger establishments. Corresponding to the declining wage gap from disparate unemployment conditions at time of labor market entry, we also find initial, but declining, effects of early recessions on mobility across regions, jobs, and industries. Job and industry mobility rise initially and decline very gradually in response to an initial adverse shock, implying considerable initial losses in the effectiveness of job search for those exiting college in a recession compared to 'lucky' workers. Calibrating the effects of job search using estimates on average wage gains of moving by experience

and mover status, we find that increased job search can explain up to 30% of the reversion in initial wage losses.

Consistent with a pattern of increased productive job mobility, we find that recessions lead workers to start at employers that are on average smaller and pay less. Possibly due to a lack of information on firms, few papers document that workers seem to face experience profiles in firm-size and average firm-wages. We document this pattern, compare it to similar data for the US, and show that declines in the size and average wages of first employers of young college graduates could explain about 30 to 40% of initial wages losses from starting a career in a recession. Similarly, the results suggest that an important part of the catch-up process involves moves towards larger, better paying establishments. Thus labor market entry in bad times may lead to worse job placement or mis-matches of workers into firms, and workers catch-up by searching for or sorting themselves into better establishments.

Data Appendix

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.[64] All information in the USIS are 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-

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

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 student did not have an IDcode (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.

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. 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.[65] 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

[65] 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.

subtracted the mean amounts for each year before averaging. Both methods produced similar results.[66] 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. 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.

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

References

Abowd, John, Francis Kramarz, and David Margolis (1999). 'High Wage Workers and High Wage Firms.' *Econometrica* 67(2): 411-45.

Abowd, John, Robert Creecy, and Francis Kramarz (2002). 'Computing Person and Firm Effects Using Linked Longitudinal Employer-Employee Data.' Cornell, mimeo.

Anderson, Patricia M. and Bruce D. Meyer (1994). 'The Extent and Consequences of Job Turnover.' *Brookings Papers on Economic Activity. Microeconomics*: 177-236.

Baker, George, Michael Gibbs, and Bengt Holmstrom (1994). 'The Wage Policy of a Firm.' *Quarterly Journal of Economics* 109: 881-919.

Beaudry, Paul and John DiNardo (1992). 'The Effect of Implicit Contracts on the Movements of Wages over the Business Cycle' *Journal of Political Economy:* 99(4).

Beaudry, Paul and David Green (2000). 'Cohort patterns in Canadian earnings: assessing the role of skill premia and inequality trends.' *Canadian Journal of Economics* 33 (4): 907-936.

Beaudry, Paul, Thomas Lemieux, and Daniel Parent (2000). 'What is Happening in the Youth Labor Market in Canada?' *Canadian Public Policy*, XXVI Supplement 1.

Becker, G., *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education,* New York: Columbia University Press, (1964)

Bils,M..J.(1985) "Real Wages over the business cycle: Evidence From Panel Data*", Journal of Political Economy,* 666-689.

Blanchflower, David G. and Andrew J. Oswald (1994). *The Wage Curve*. Cambridge, MA and London: MIT Press.

Blanchard, Olivier and Lawrence Katz (1992). 'Regional Evolutions.' *Brookings Papers on Economic Activity*, 1: 1992, pp. 1-75

Bowlus, Audra J., (1995). "Matching workers and jobs: Cyclical Fluctuations in Match Quality",*Journal of Labor Economics,* 13, 335-350.

Burdett, Kenneth (1978). 'A Theory of Employee Job Search and Quit Rates.' *American Economic Review* 68(1): 212-20.

Card, David, and Thomas Lemieux (1997). 'Adapting to Circumstances: The Evolution of Work, School, and Living Arrangements Among North Amercian Youth.' NBER Working Paper No. 6142.

Card, David, and Thomas Lemieux (2000). 'Drop Out and Enrollment Trends in the Post-War Period: What Went Wrong in the 1970s?' NBER Working Paper No. 7658.

Card, David, and Thomas Lemieux (2001). 'Can Falling Supply Explain The Rising Return To College for Younger Men? A Cohort Analysis.' *Quarterly Journal of Economics*, May.

Card, David, "The Returns to Education," In: D. Card and O. Ashenfelter, Ed., *Handbook of Labor Economics*, Vol.III, Amsterdam: North-Holland, (1999).

Davidson, R., and J.G. Mackinnon (1989) "Testing for consistency using artificial regressions,"*Econometric Theory,* 4, 363-84.

Deaton, Angus (2000). *The Analysis of Household Surveys.* Johns Hopkins University Press.

Devereux, Paul (2002). 'The Importance of Obtaining a High-Paying Job." Mimeo, UCLA.

Devereux, Paul (2003). "Cyclical Quality Adjustment in the Labor Market." Mimeo, UCLA.

Doeringer, Peter and Michael Piore (1971). *Internal Labor Markets and Manpower Analysis*. Lexington, MA: D. C. Heath and Company.

Ellwood, David (1982). 'Teenage Unemployment: Permanent Scars or Temporary Blemishes?' In: Freeman, Richard and David Wise (eds.) *The Youth Labor Market Problem: its Nature, Causes and Consequences*. Chicago: U. Chicago Press.

Farber, Henry (1994). 'The Analysis of Interfirm Worker Mobility.' *Journal of Labor Economics* 12: 554-93.

Farber, Henry (1997). 'The Changing Face of Job. Loss in the United States, 1981-1995.' *Brookings Papers on Economic Activity: Microeconomic.s*

Farber, Henry (1999). 'Mobility and Stability: The Dynamics of Job Change in Labor Markets.' *The Handbook of Labor Economics*, Orley Ashenfelter and David Card (eds.) Vol 3, Elsevier Science

Farber, Henry (2003). 'Job Loss in the United States, 1981-2001.' IRS Working Paper No. 471 Princeton University.

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.

Fox, Jeremy (2004). 'Employer-Size Wage Gaps, Testing Worker Preferences and Talents Explanations.' Chicago, mimeo.

Gardecki, Rosella and David Neumark (1998). 'Order from Chaos? Effects of Early Labor Market Experiences on Adult Labor Market Outcomes.' *Industrial and Labor Relations Review* 51(2): 299-322.

Gibbons, Robert and Michael Waldman (1999a). 'A Theory of Wage and Promotion Dynamics Inside Firms.' *Quarterly Journal of Economics* 114: 1321-58.

Gibbons, Robert and Michael Waldman (1999b). "Careers in Organizations: Theory and Evidence", in O. Ashenfelter and D. Card (eds.), *Handbook of Labor Economics*, Volume 3, North-Holland, 1999, pp. 2373-2437

Gibbons, Robert and Michael Waldman (2004). 'Task-Specific Human Capital.' *AEA Papers and Proceedings* May, pp. 203-207.

Giuliano, Paola and Till v. Wachter (2004). 'Does a Four Fold Does a Four-Fold Higher Unemployment Rate Make a Difference? Wage Growth and Job Mobility of Young Workers in France and Germany.' Columbia University, mimeo.

Gibbons, Robert and Michael Waldman (2002). "Task-Specific Human Capital." *American Economic Review, Papers and Proceedings,* 94, May, pp. 203-207

Gibbons, Robert, Lawrence Katz, Thomas Lemieux and Daniel Parent (2002). 'Comparative Advantage, Learning, and Sectoral Wage Determination.' NBER Working Paper No. 8889.

Groshen, Erica L. (1991). 'Sources of Inter-Industry Wage Dispersion: How Much Do Employers Matter?' *Quarterly Journal of Economics* 106(3): 869-84.

Kahn, Lisa (2005). 'The Long-Term Effects of Graduating from College in Bad Economy.' Mimeo, Harvard University.

Kletzer, Lori G. and Robert W. Fairlie (2001). 'The Long-Term Costs of Job Displacement for Young Adult Workers.' University of California Santa Cruz. Mimeo.

Koop, Gary and Simon Potter (1999). "Dynamic Asymmetries in U.S. Unemployment.' Journal of Business and Economics Statistics 17 (3) pp.298-318

Jacobson, Louis, Robert LaLonde and Daniel Sullivan (1992). 'Earnings Losses of Displaced Workers.' *American Economic Review* 83(4): 685-709.

Machin, Stephen and Alan Manning (1999). 'The Causes and Consequences in Long-Term Unemployment in Europe.' In: O. Ashenfelter and D. Card (eds.) *Handbook of labor economics*. Volume 3A. Amsterdam, New York, and Oxford: Elsevier Science.

Manning, A. *Monopsony in Motion: Imperfect Competition in Labor Markets*. Princeton: Princeton University Press (2002)

McLaughlin, Kenneth J. and Mark J. Bils (2001). "Inter-Industry Mobility and the Cyclical Upgrading of Labor" *Journal of Labor Economics*.

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

Mincer, J., *Schooling, Experience, and Earnings*. Cambridge, MA: National Bureau of Economic Research, (1974)

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.

Murphy, Kevin M. and Finis Welch (1990). 'Empirical Age-Earnings Profiles.' *Journal of Labor Economics* 8(2): 202-229.

Neal, Derek (1995). "Industry-Specific Human Capital: Evidence From Displaced Workers," *Journal of Labor Economics*, October, vol. 13: 653-77.

Neumark, David (1998). 'Youth Labor Market in the U.S.: Shopping Around vs. Staying Put.' NBER Working Paper No. 6581.

Oi, Walter Y. and Todd L. Idson (1999). 'Firm Size and Wages.' In: O. Ashenfelter and D. Card (eds.) *Handbook of labor economics*. Volume 3A. Amsterdam, New York, and Oxford: Elsevier Science.

Okun, Arthur M. (1973). 'Upward Mobility in a High-Pressure Economy.' *Brookings Papers of Economic Activity* 1: 207-52.

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

Rosen, Sherwin (1972). 'Learning and Experience in the Labor Market.' *Journal of Human Resources* 7(3).

Ryan, Paul (2001). 'The School-To-Work Transition: A Cross-National Perspective.' *Journal of Economic Literature* 39 (March): 34-92.

Topel, Robert and Michael Ward (1992). 'Job Mobility and the Careers of Young Men.' *Quarterly Journal of Economics* 107(2): 439-479.

von Wachter, Till (2001b). 'The Persistence of Bad Luck – Long Term Effects on Earnings of Beginning to Work in a Recession.' University of California Berkeley. Mimeo.

Von Wachter, Till and Stefan Bender (forthcoming) "At the Right Place at the Wrong Time: The Role of Firms and Luck in Young Workers' Careers," *American Economic Review*.

Waggoner, Abigail (2004). "Making their Own Luck: Educational Differences in the Migration Responses of Young Workers to Local Labor Market Conditions." Harvard, mimeo.

Table 1: 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: Years of College

Number of Years	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	178,653	100	118,963	100

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

Table 2A: Experience Profiles in Wages, 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	0.34	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	0.010	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 (Current Population Survey 1994-1996)								
Year of Exp.	**Average Log Earnings**	**Fraction Unem-ployed**	**Frac. Not in Labor Force**	**Fraction Changed Firm[a]**	**Average Log Earnings**	**Fraction Unem-ployed**	**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: See text and Data Appendix.

Table 2B: 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	0.307	0.351	0.363	0.040	0.398	0.31	0.35	0.052
2	0.219	0.256	0.269	0.029	0.557	0.42	0.48	0.086
3	0.185	0.219	0.232	0.027	0.649	0.48	0.56	0.104
4	0.162	0.194	0.206	0.024	0.708	0.52	0.61	0.115
5	0.141	0.168	0.181	0.021	0.744	0.55	0.64	0.124
6	0.126	0.151	0.163	0.020	0.768	0.56	0.66	0.133
7	0.112	0.134	0.145	0.015	0.783	0.57	0.67	0.138
8	0.104	0.124	0.134	0.012	0.798	0.58	0.68	0.143
9	0.098	0.117	0.128	0.011	0.812	0.59	0.69	0.147
10	0.097	0.116	0.126	0.009	0.827	0.60	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	6.95	27738	0.73	0.59	0.54	0.34	0.63	5.95
1	6.95	26657	0.74	0.59	0.53	0.33	0.71	6.01
2	7.04	28619	0.75	0.61	0.55	0.33	0.77	6.15
3	7.08	29822	0.75	0.61	0.55	0.34	0.81	6.23
4	7.08	30231	0.75	0.61	0.55	0.34	0.85	6.26
5	7.14	31410	0.76	0.62	0.56	0.35	0.87	6.35
6	7.18	33235	0.76	0.62	0.56	0.36	0.89	6.41
7	7.20	34141	0.76	0.63	0.56	0.36	0.91	6.46
8	7.21	34951	0.76	0.63	0.57	0.37	0.92	6.49
9	7.22	35204	0.76	0.63	0.57	0.37	0.93	6.50
10	7.21	35716	0.76	0.63	0.57	0.37	0.94	6.50

Figure 1: Unemployment Rates Ages 14-24 for Canada and Provinces 1976-2000

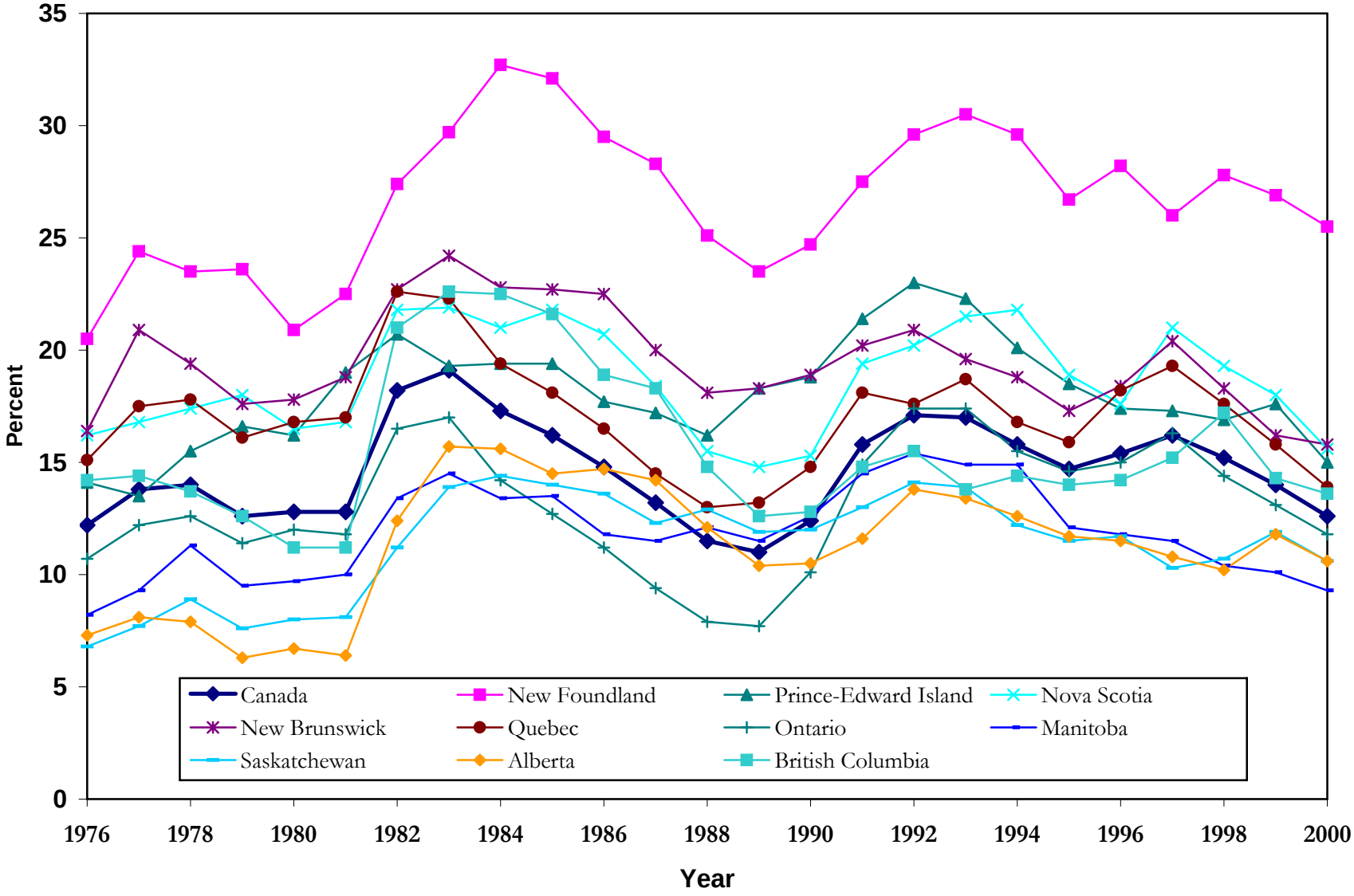


Figure 2A: Mature Workers' Earnings, Entry Level Earnings, and Experience Profiles by Graduation Year

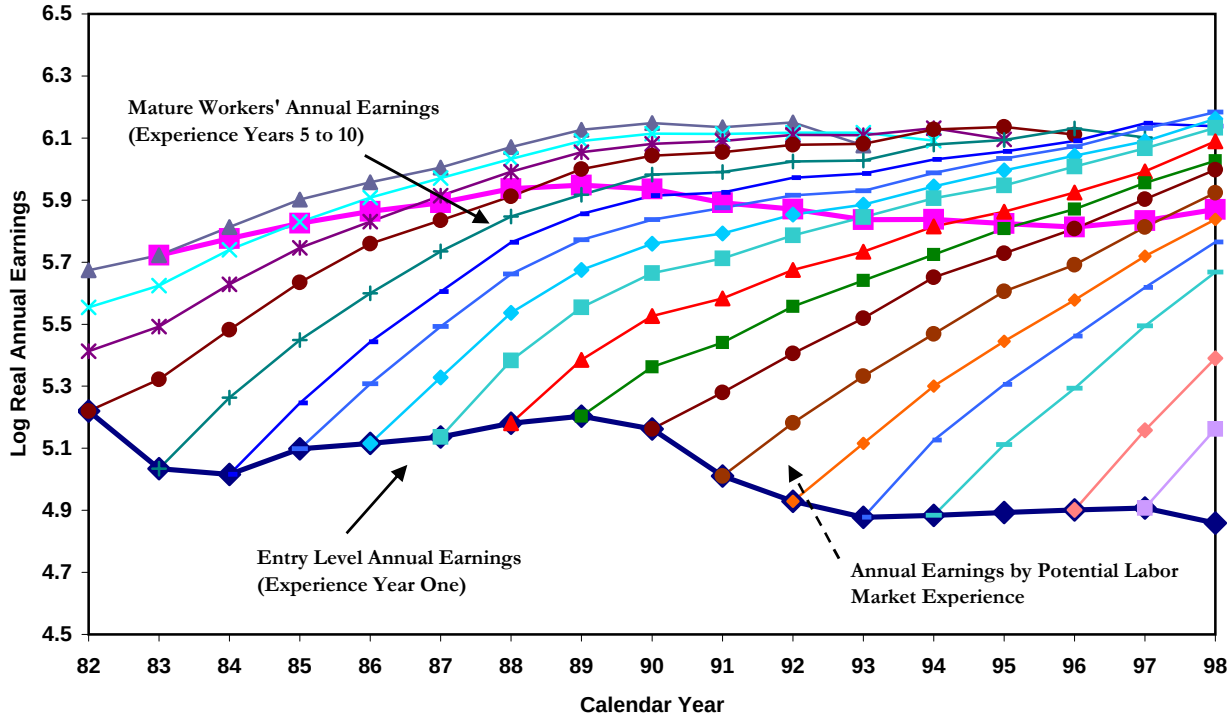


Figure 2B: Earnings By Experience Year For Cohorts Entering Labor Market 1978 to 1993

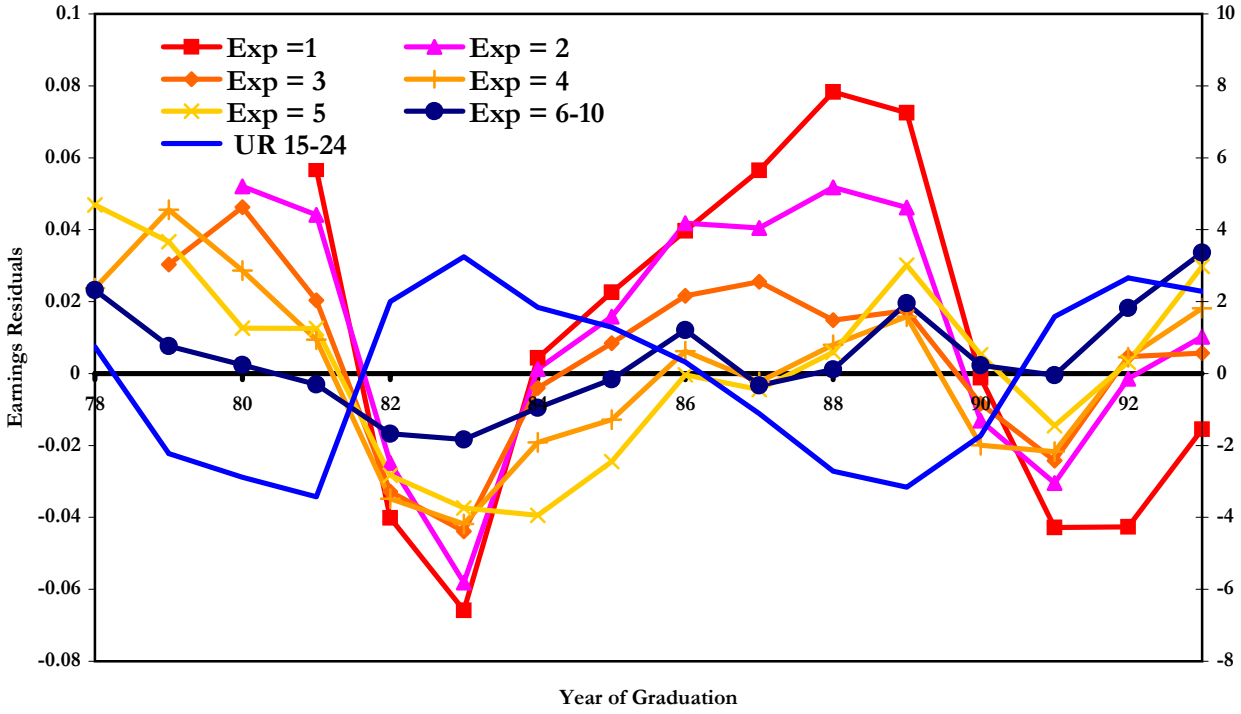


Table 3: Effect of Unemployment Rate at time of Graduation on Log Real Earnings by Potential Experience

	Specification					
National/Regional	**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	-0.021	-0.0224	-0.0168	-0.0231	-0.0232	-0.0184
	[0.0047]***	[0.0039]***	[0.0026]***	[0.0036]***	[0.0036]***	[0.0023]***
1	-0.0177	-0.0187	-0.0195	-0.0168	-0.0169	-0.0177
	[0.0052]***	[0.0028]***	[0.0024]***	[0.0049]***	[0.0026]***	[0.0020]***
2	-0.0128	-0.0137	-0.0169	-0.0116	-0.012	-0.0155
	[0.0033]***	[0.0026]***	[0.0023]***	[0.0030]***	[0.0021]***	[0.0019]***
3	-0.0084	-0.0089	-0.0124	-0.006	-0.0066	-0.0118
	[0.0022]***	[0.0022]***	[0.0022]***	[0.0022]**	[0.0015]***	[0.0017]***
4	-0.0061	-0.006	-0.0097	-0.0036	-0.004	-0.01
	[0.0024]**	[0.0026]**	[0.0020]***	[0.0028]	[0.0021]*	[0.0016]***
5	-0.0065	-0.0055	-0.0076	-0.0035	-0.0032	-0.0082
	[0.0029]**	[0.0020]**	[0.0020]***	[0.0024]	[0.0015]**	[0.0016]***
6	-0.0027	-0.0023	-0.0067	-0.0018	-0.0012	-0.0074
	[0.0032]	[0.0020]	[0.0021]***	[0.0027]	[0.0018]	[0.0017]***
7	-0.003	-0.0027	-0.0066	-0.0019	-0.001	-0.0073
	[0.0043]	[0.0023]	[0.0021]***	[0.0034]	[0.0018]	[0.0017]***
8	-0.0001	0.0002	-0.0048	-0.0008	0.0006	-0.0064
	[0.0049]	[0.0028]	[0.0020]**	[0.0034]	[0.0016]	[0.0016]***
9	0.0035	0.0038	-0.0041	0.0021	0.0038	-0.0055
	[0.0047]	[0.0027]	[0.0020]**	[0.0033]	[0.0017]**	[0.0017]***
10	0.0066	0.0051	-0.0023	0.0047	0.0049	-0.0036
	[0.0048]	[0.0028]*	[0.0020]	[0.0034]	[0.0022]**	[0.0017]**
Constant	7.3951	-3.6341	8.7366	7.673	-2.0294	9.0053
	[0.2568]***	[2.3893]	[0.1000]***	[0.2092]***	[0.8027]**	[0.0655]***
N	51071	51071	51071	29956	29956	29956
R-squared	0.71	0.72	0.75	0.87	0.87	0.89

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. Sample sizes reflect cell sample sizes after collapsing the micro data by graduation cohort, province of residence in each year of graduation, and experience year. The national model regresses log annual earnings on the youth unemployment rate in the country at the year of college exit, interacted with experience years 0 to 10, plus province of residence fixed effects, experience 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, interacted with experience years 0 to 10, plus province of residence fixed effects, experience fixed effects, and year of graduation fixed effects. The coefficients shown are the unemployment rate at college exit and experience interactions. One, two, and three asterix indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels respectively. See text for more details.

Figure 3: Effect of Unemployment Rate at Time of Graduation on Log Real Earnings, National and Regional Models, Some College (All) and Graduate Sample (Cohorts 1976-1995)

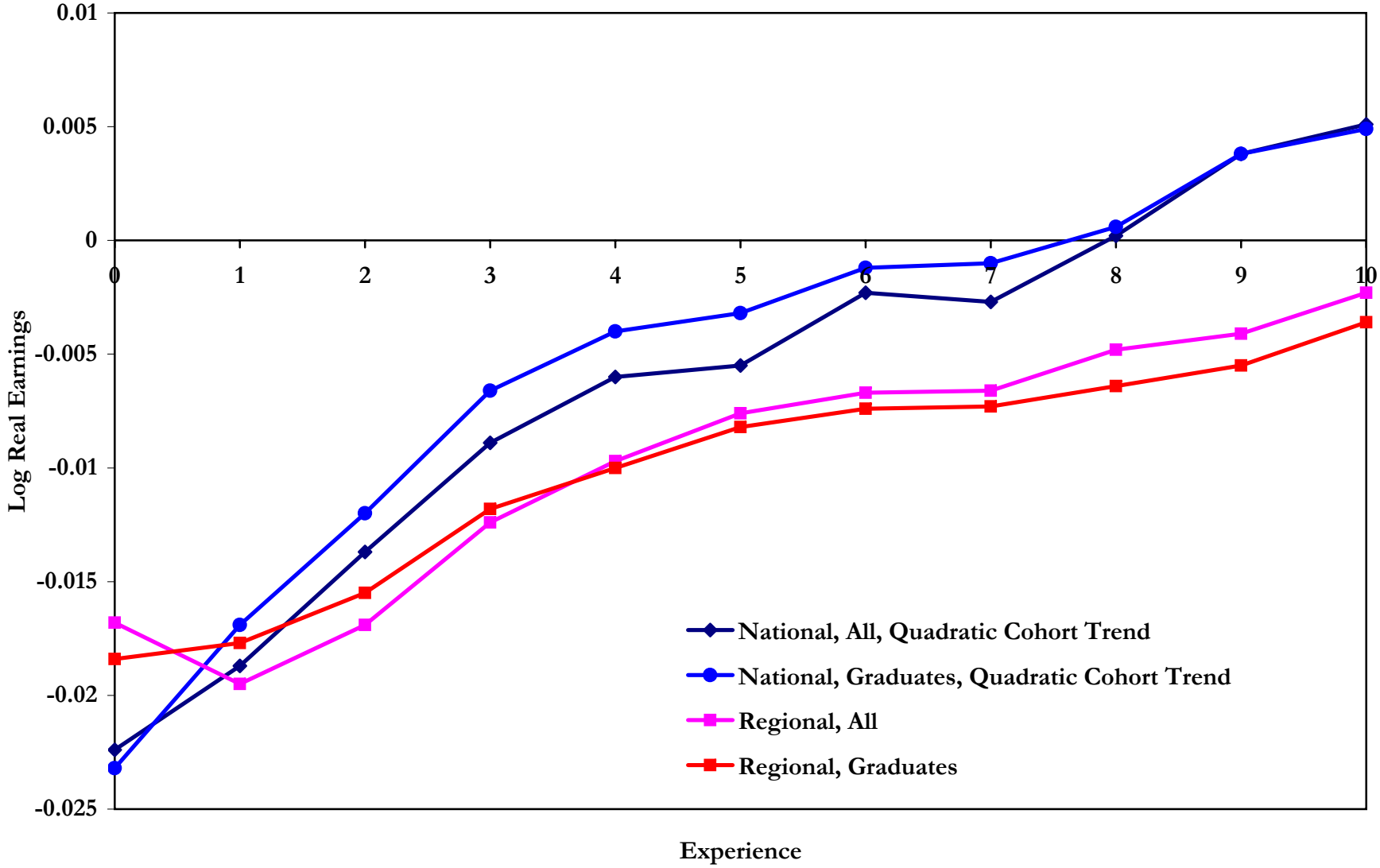


Figure 4: Effect of Unemployment Rate at Time of Graduation on Log Real Earnings for Different Cohort Groups, Regional Model, Graduate Sample

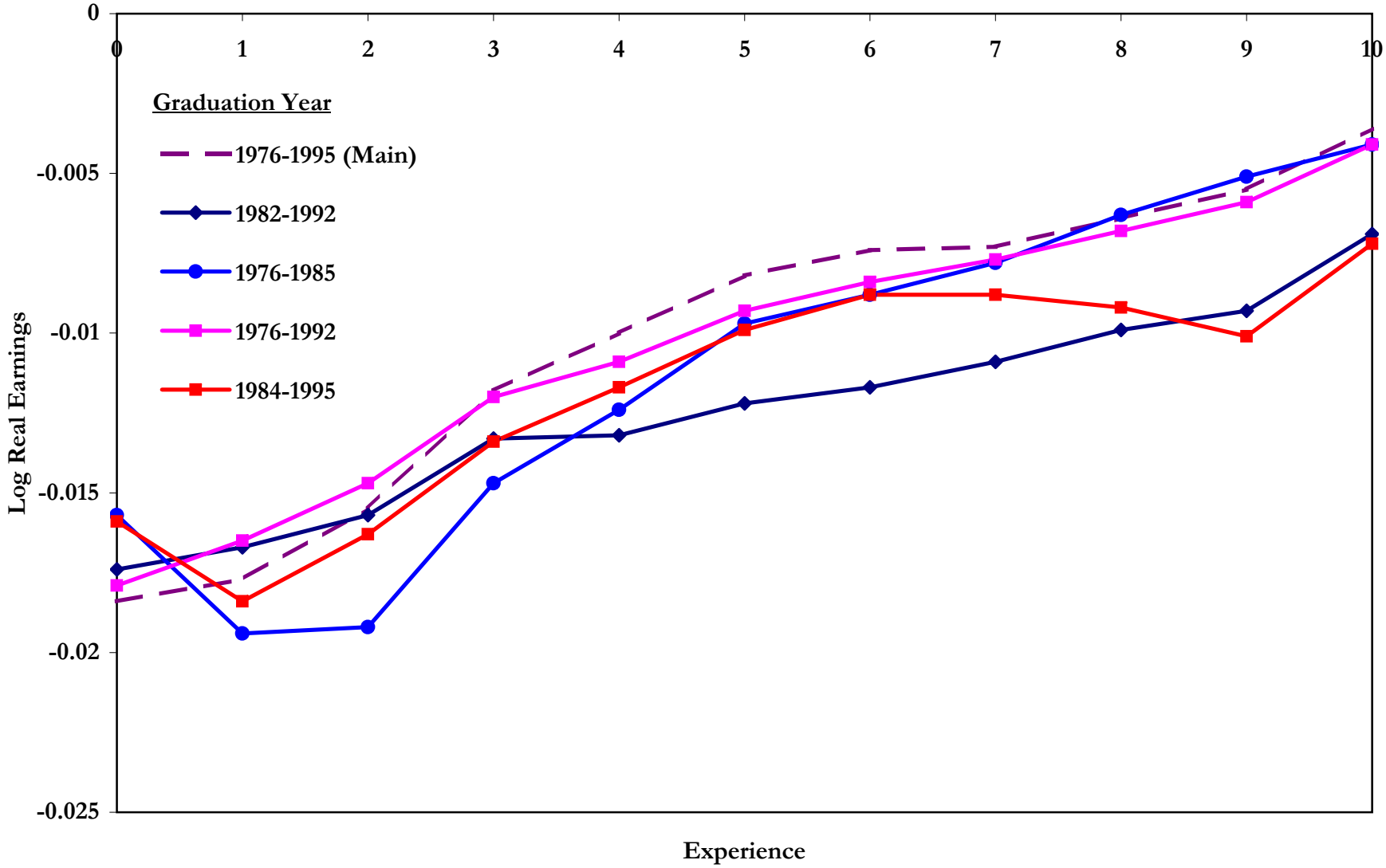


Table 4: Effect of Unemployment Rate on Duration of College -- National, Regional, and Predicted

	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	1602	1602	1602	1602	1602	1602
R^2	0.01	0.02	0.01	0.02	0.01	0.02
Panel B: Regional, All Workers						
Unemployment Rate	0.0065	0.0047	0.0008	0.0041	-0.0033	0.0045
	[0.0073]	[0.0028]*	[0.0024]	[0.0020]**	[0.0028]	[0.0107]
N	1602	1602	1602	1602	1602	1602
R^2	0.07	0.05	0.06	0.09	0.09	0.06
Panel C: Regional, Predicted UR, All Workers						
Unemployment Rate	-0.002	-0.0001	0.003	0.0025	-0.0053	-0.0056
	[0.0406]	[0.0100]	[0.0114]	[0.0081]	[0.0111]	[0.0520]
N	1577	1577	1577	1577	1577	1577
R^2	0.13	0.07	0.15	0.1	0.15	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	960	960	960	960	960	960
R^2	0.01	0.02	0.04	0.01	0	0.01
Panel E: Regional, D>=0						
Unemployment Rate	0.011	0.0085	-0.0001	0.0059	-0.0005	0.017
	[0.0051]**	[0.0034]**	[0.0008]	[0.0026]**	[0.0015]	[0.0062]***
N	960	960	960	960	960	960
R^2	0.22	0.04	0.27	0.15	0.37	0.04
Panel F: Regional, Predicted UR, D>=0						
Unemployment Rate	0.0056	0.0024	0	0.0039	-0.0002	0
	[0.0041]	[0.0038]	[0.0008]	[0.0026]	[0.0016]	[0.0000]***
N	935	935	935	935	935	935
R^2	0.83	0.64	0.46	0.71	0.53	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.

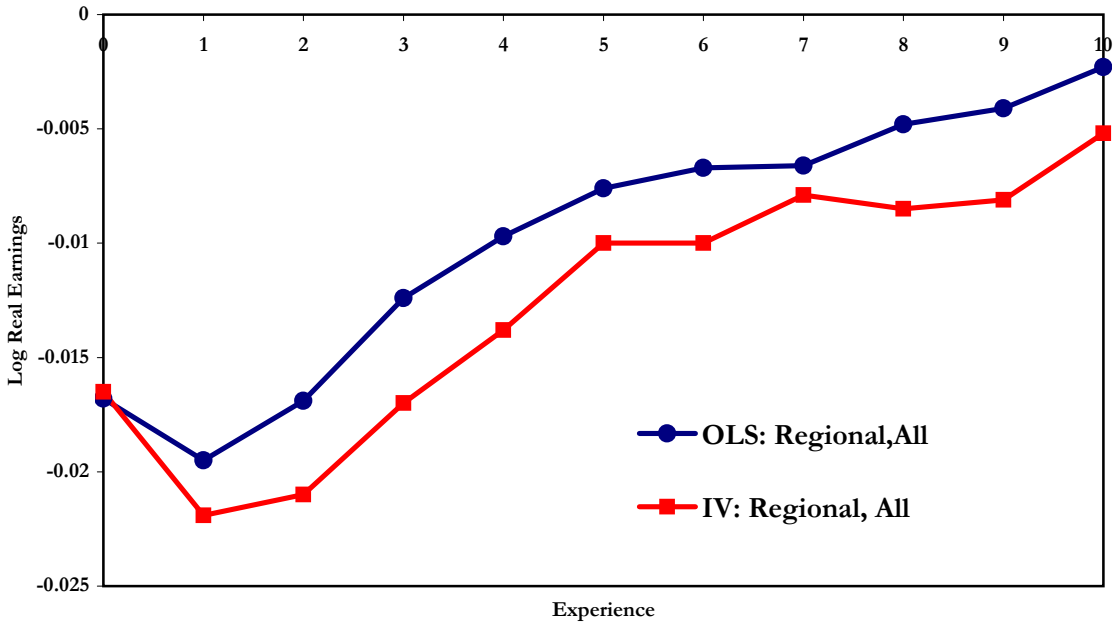
Table 5: Effect of Unemployment Rate at Time of Predicted Graduation on Log Real Earnings by Potential Experience [Reduced Form]

	Specification					
National/Regional	**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	-0.0104	-0.0086	-0.012	-0.0136	-0.0145	-0.0131
	[0.0043]**	[0.0044]*	[0.0023]***	[0.0049]**	[0.0045]***	[0.0023]***
1	-0.0083	-0.0076	-0.0157	-0.0099	-0.0105	-0.013
	[0.0111]	[0.0107]	[0.0029]***	[0.0054]*	[0.0042]**	[0.0023]***
2	-0.0079	-0.0078	-0.0148	-0.0074	-0.0075	-0.0114
	[0.0111]	[0.0110]	[0.0029]***	[0.0038]*	[0.0033]**	[0.0021]***
3	-0.0064	-0.0064	-0.012	-0.0047	-0.0044	-0.0085
	[0.0092]	[0.0091]	[0.0026]***	[0.0030]	[0.0025]*	[0.0019]***
4	-0.0042	-0.0041	-0.0098	-0.0041	-0.0033	-0.0074
	[0.0074]	[0.0072]	[0.0025]***	[0.0027]	[0.0027]	[0.0018]***
5	-0.0021	-0.002	-0.0072	-0.0036	-0.0027	-0.0058
	[0.0061]	[0.0057]	[0.0024]***	[0.0021]	[0.0025]	[0.0017]***
6	0	-0.0004	-0.0058	-0.001	-0.0007	-0.0046
	[0.0060]	[0.0055]	[0.0026]**	[0.0032]	[0.0032]	[0.0019]**
7	-0.0023	-0.0025	-0.0062	-0.0001	-0.0003	-0.0046
	[0.0061]	[0.0053]	[0.0025]**	[0.0043]	[0.0035]	[0.0018]**
8	-0.0043	-0.0044	-0.0057	-0.0007	-0.0016	-0.0047
	[0.0055]	[0.0046]	[0.0024]**	[0.0044]	[0.0031]	[0.0018]***
9	-0.0027	-0.0034	-0.0051	0.0016	-0.0004	-0.0045
	[0.0061]	[0.0049]	[0.0024]**	[0.0051]	[0.0033]	[0.0019]**
10	0.0007	-0.0016	-0.0033	0.0043	0	-0.0034
	[0.0067]	[0.0049]	[0.0025]	[0.0059]	[0.0034]	[0.0020]*
Constant	18.5428	6.7537	6.9522	10.3976	-0.4689	8.9252
	[0.2568]***	[2.3893]	[0.1000]***	[0.2092]***	[0.8027]**	[0.0655]***
N	14346	14346	14346	8571	8571	8571
R-squared	0.89	0.89	0.92	0.93	0.93	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 national model regresses log annual earnings on the predicted youth unemployment rate in the country when D=0 and interacted with experience years 0 to 10, plus province of residence fixed effects, experience fixed effects, and a linear or quadratic graduation cohort trend. The regional 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. One, two, and three asterix indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels respectively. See text for more details.

Figure 5: Instrumental Variable, OLS, and Reduced Form Estimates of the Effect of the Unemployment Rate at Time of Graduation on Log Real Earnings - Regional Models

Panel A: Graduate Sample



Panel B: Graduate Sample

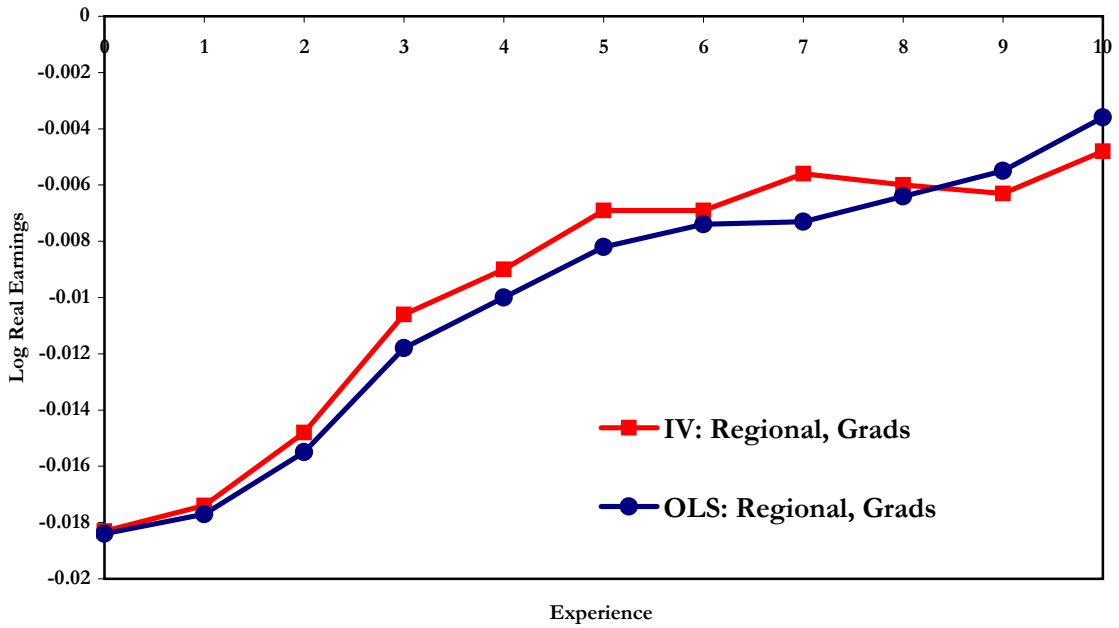


Table 6: Instrumental Variable Estimates of Effect of Unemployment Rate at Time of Graduation on Log Real Earnings by Potential Experience [IV]

	Specification					
National/Regional	**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)**
First Stage Coefficient	0.1661	0.134	0.8812	0.1733	0.1206	0.8983
	[0.0612]**	[0.0456]***	[0.0476]***	[0.0692]**	[0.0494]**	[0.0377]***
Experience Year						
0	-0.0217	-0.0183	-0.0165	-0.0267	-0.0283	-0.0183
	[0.0069]***	[0.0065]**	[0.0029]***	[0.0113]**	[0.0108]**	[0.0033]***
1	-0.0201	-0.0183	-0.0219	-0.018	-0.0184	-0.0174
	[0.0247]	[0.0236]	[0.0040]***	[0.0101]*	[0.0083]**	[0.0031]***
2	-0.0189	-0.0184	-0.021	-0.0108	-0.0101	-0.0148
	[0.0267]	[0.0264]	[0.0041]***	[0.0058]*	[0.0051]*	[0.0027]***
3	-0.0138	-0.0138	-0.017	-0.0044	-0.003	-0.0106
	[0.0224]	[0.0225]	[0.0038]***	[0.0035]	[0.0032]	[0.0024]***
4	-0.0073	-0.007	-0.0138	-0.0027	-0.0008	-0.009
	[0.0174]	[0.0177]	[0.0035]***	[0.0042]	[0.0044]	[0.0023]***
5	-0.0014	-0.0013	-0.01	-0.0021	-0.0006	-0.0069
	[0.0133]	[0.0134]	[0.0034]***	[0.0044]	[0.0046]	[0.0021]***
6	0.0033	0.0025	-0.0079	0.0005	0.0006	-0.0056
	[0.0122]	[0.0116]	[0.0038]**	[0.0055]	[0.0049]	[0.0024]**
7	-0.0013	-0.002	-0.0085	0.0002	-0.001	-0.006
	[0.0128]	[0.0114]	[0.0036]**	[0.0066]	[0.0049]	[0.0022]***
8	-0.0067	-0.0072	-0.0081	-0.0024	-0.0046	-0.0063
	[0.0128]	[0.0113]	[0.0034]**	[0.0064]	[0.0044]	[0.0023]***
9	-0.0052	-0.0067	-0.0074	0	-0.0032	-0.0061
	[0.0133]	[0.0116]	[0.0034]**	[0.0063]	[0.0041]	[0.0024]**
10	-0.0003	-0.0047	-0.0052	0.0035	-0.0022	-0.0048
	[0.0132]	[0.0105]	[0.0034]	[0.0071]	[0.0037]	[0.0024]**
Constant	18.7352	6.8896	7.025	10.67	0.0114	9.0287
	[0.2953]***	[1.3535]***	[0.0947]***	[0.4797]***	[0.8738]	[0.0810]***
N	50720	50720	50720	29605	29605	29605
R-squared	0.83	0.84	0.86	0.87	0.87	0.89

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 national model regresses log annual earnings on the youth unemployment rate in the country, instrumented with unemployment rate at the predicted year of graduation, interacted with experience years 0 to 10, plus province of residence fixed effects, experience fixed effects, and a linear or quadratic graduation cohort trend. The regional 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.

Figure 6A: Effect of Unemployment Rate at Time of Graduation on Log Real Earnings With Controls for Unemployment Rate History: 1982-1995 Cohorts, Graduate Sample

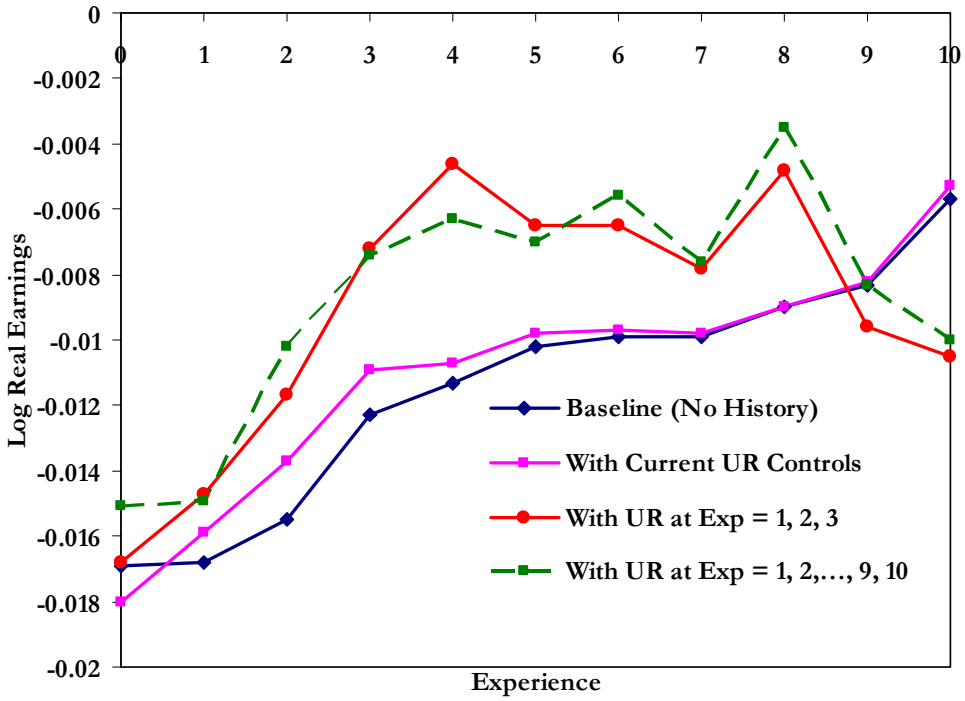


Figure 6B: Grouped Model of Effect of Unemployment Rate at Time of Graduation on Log Real Earnings With Controls for Unemployment Rate History: 1982-1995 Cohorts, Graduates

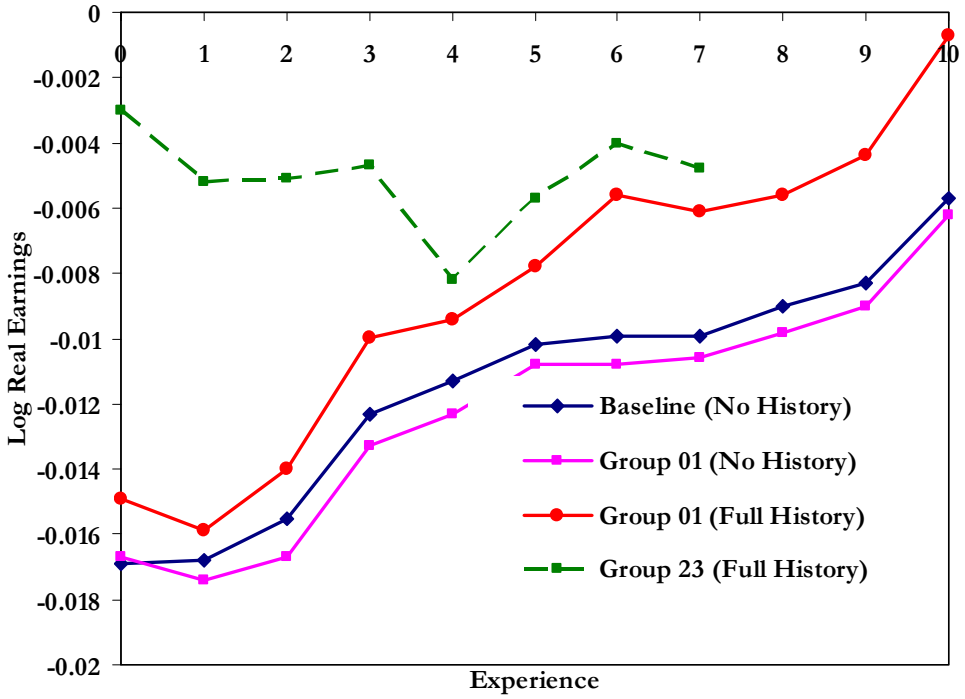


Table 7: Effect of Unemployment Rate at time of Graduation With Controls for UR History, Basic and Grouped Model - Graduate Sample, Regional Model, Cohorts 1982-1995

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	-0.0169	-0.018	-0.0168	-0.0151	-0.0169	-0.0167	-0.0149	---
	[0.0027]***	[0.0028]***	[0.0026]***	[0.0028]***	[0.0027]***	[0.0030]***	[0.0031]***	---
1	-0.0168	-0.0159	-0.0147	-0.0149	-0.0168	-0.0174	-0.0159	---
	[0.0024]***	[0.0041]***	[0.0039]***	[0.0041]***	[0.0024]***	[0.0023]***	[0.0025]***	---
2	-0.0155	-0.0137	-0.0117	-0.0102	-0.0155	-0.0167	-0.014	-0.003
	[0.0021]***	[0.0023]***	[0.0037]***	[0.0037]***	[0.0021]***	[0.0020]***	[0.0024]***	[0.0022]
3	-0.0123	-0.0109	-0.0072	-0.0074	-0.0123	-0.0133	-0.01	-0.0052
	[0.0019]***	[0.0019]***	[0.0033]**	[0.0031]**	[0.0019]***	[0.0018]***	[0.0023]***	[0.0022]**
4	-0.0113	-0.0107	-0.0046	-0.0063	-0.0113	-0.0123	-0.0094	-0.0051
	[0.0018]***	[0.0018]***	[0.0034]	[0.0032]*	[0.0018]***	[0.0018]***	[0.0023]***	[0.0028]*
5	-0.0102	-0.0098	-0.0065	-0.007	-0.0102	-0.0108	-0.0078	-0.0047
	[0.0018]***	[0.0018]***	[0.0039]*	[0.0037]*	[0.0018]***	[0.0017]***	[0.0026]***	[0.0038]
6	-0.0099	-0.0097	-0.0065	-0.0056	-0.0099	-0.0108	-0.0056	-0.0082
	[0.0019]***	[0.0019]***	[0.0046]	[0.0041]	[0.0019]***	[0.0019]***	[0.0030]*	[0.0042]*
7	-0.0099	-0.0098	-0.0078	-0.0076	-0.0099	-0.0106	-0.0061	-0.0057
	[0.0019]***	[0.0019]***	[0.0040]*	[0.0037]**	[0.0019]***	[0.0020]***	[0.0031]*	[0.0040]
8	-0.009	-0.009	-0.0048	-0.0035	-0.009	-0.0098	-0.0056	-0.004
	[0.0018]***	[0.0018]***	[0.0040]	[0.0034]	[0.0018]***	[0.0020]***	[0.0030]*	[0.0040]
9	-0.0083	-0.0082	-0.0096	-0.0083	-0.0083	-0.009	-0.0044	-0.0048
	[0.0019]***	[0.0019]***	[0.0042]**	[0.0032]**	[0.0019]***	[0.0020]***	[0.0033]	[0.0048]
10	-0.0057	-0.0053	-0.0105	-0.01	-0.0057	-0.0062	-0.0007	-0.0057
	[0.0021]***	[0.0021]**	[0.0042]**	[0.0040]**	[0.0021]***	[0.0023]***	[0.0037]	[0.0051]
Constant	9.1577	9.1973	9.198	9.1671	9.1577	9.1712	9.1606	---
	[0.0908]***	[0.0956]***	[0.0897]***	[0.0964]***	[0.0908]***	[0.0960]***	[0.1046]***	---
N	8049	8049	8049	7488	8049	8049	7818	---
R^2	0.96	0.96	0.96	0.96	0.96	0.96	0.96	---

Note: The sample includes males in Canada graduating university (with D>=0) between 1982 and 1995 . Sample sizes reflect cell sample sizes after collapsing the micro data by graduation cohort, province of residence in each year of graduation, and experience year. The national model regresses log annual earnings on the youth unemployment rate in the country, instrumented with the youth unemployment rate in the province of first residence (the columns indicate whether this rate is averaged over the first 1 to 3 years), interacted with experience years 0 to 10, plus province of residence fixed effects, experience fixed effects, and year of graduation fixed effects. The columns indicate additional controls for experience interacted with later unemployment rates. One, two, and three asterix indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels respectively. See text for more details.

Table 8: Effect of Unemployment Rates on Log Annual Earnings by Experience-Groups, With and Without Controls for Unemployment Rate History: Regional Graduate Sample, Cohorts 1982-1995

Experience Years	Base Model	Base Model at Two SD of UR	Pooled Exerience Groups	Pooled Model With History	Base Model	Pooled Exerience Groups	Pooled Model With History
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A:	**UR at 15-24**				**log(UR) at 15-24**		
All Workers	-0.007	-0.031	-	-	-0.090	-	-
	(0.002)	-	-	-	(0.025)	-	-
0,1	-0.009	-0.061	-0.007	-0.015	-0.137	-0.097	-0.195
	(0.003)	-	(0.003)	(0.003)	(0.036)	(0.039)	(0.043)
2,3	-0.009	-0.076	-0.006	-0.003	-0.135	-0.082	-0.058
	(0.002)	-	(0.001)	(0.002)	(0.028)	(0.018)	(0.027)
Panel B:	**UR All Workers**				**log(UR) All Workers**		
All Workers	-0.015	-0.047	-	-	-0.116	-	-
	(0.003)	-	-	-	(0.024)	-	-
0,1	-0.013	-0.055	-0.007	-0.021	-0.122	-0.069	-0.192
	(0.004)	-	(0.004)	(0.005)	(0.036)	(0.034)	(0.043)
2,3	-0.012	-0.063	-0.005	-0.002	-0.116	-0.049	-0.042
	(0.003)	-	(0.002)	(0.004)	(0.028)	(0.020)	(0.032)
4,5	-0.007	-0.036	-0.003	-0.003	-0.060	-0.027	-0.038
	(0.002)	-	(0.002)	(0.004)	(0.022)	(0.019)	(0.034)
6,7	-0.005	-0.028	-0.005	-0.006	-0.057	-0.041	-0.067
	(0.002)	-	(0.002)	(0.006)	(0.021)	(0.023)	(0.049)
8,9	-0.001	-0.007	-0.003	-0.006	-0.035	-0.025	-0.059
	(0.002)	-	(0.003)	(0.006)	(0.024)	(0.033)	(0.059)

Note: The sample includes males in Canada graduating university (with D>=0) between 1982 and 1995 . The model regresses log annual earnings on the unemployment rate in the province of first residence (the pooled model is averaged over the first 2 years of experience), interacted with 2-year grouped experience years between 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.

Figure 7A: Effect of Unemployment Rate at Time of Graduation on Zero Earnings, on UI, and Missing - Regional Models, Graduate Sample, Cohorts 1976-1995

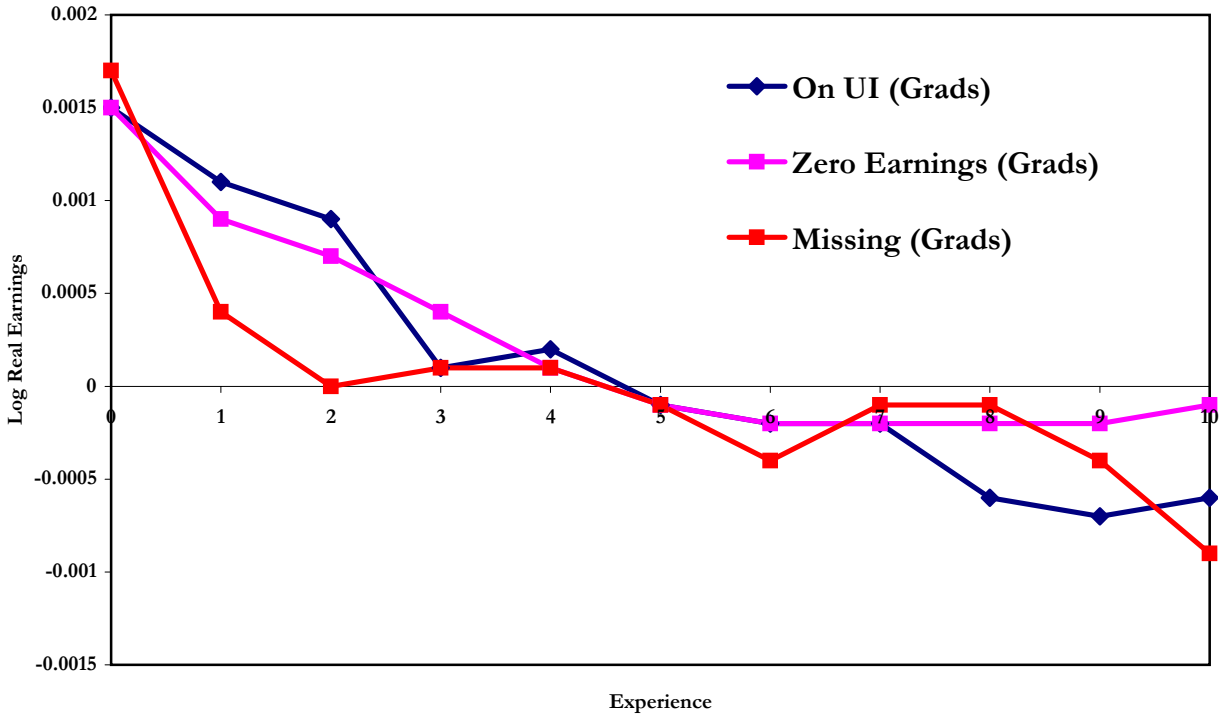


Figure 7B: Effect of Unemployment Rate at Time of Graduation on Provincial Mobility - Regional Models, Graduate Sample, Cohorts 1976-1995

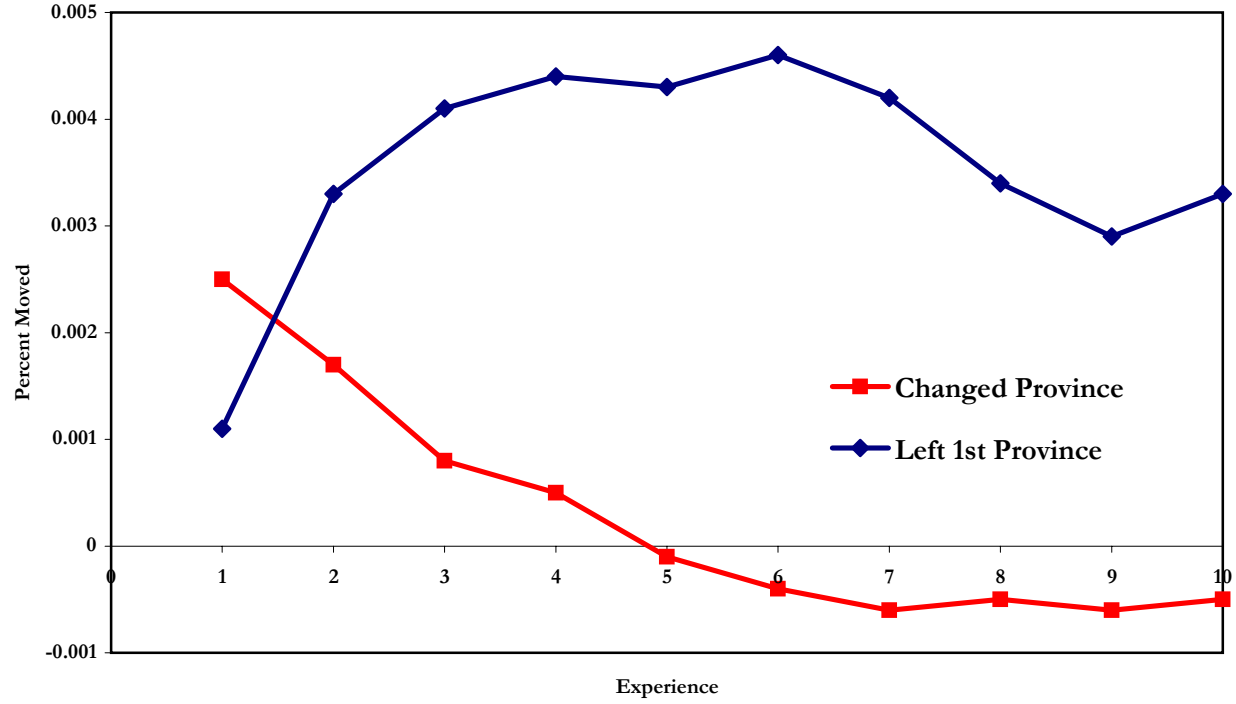


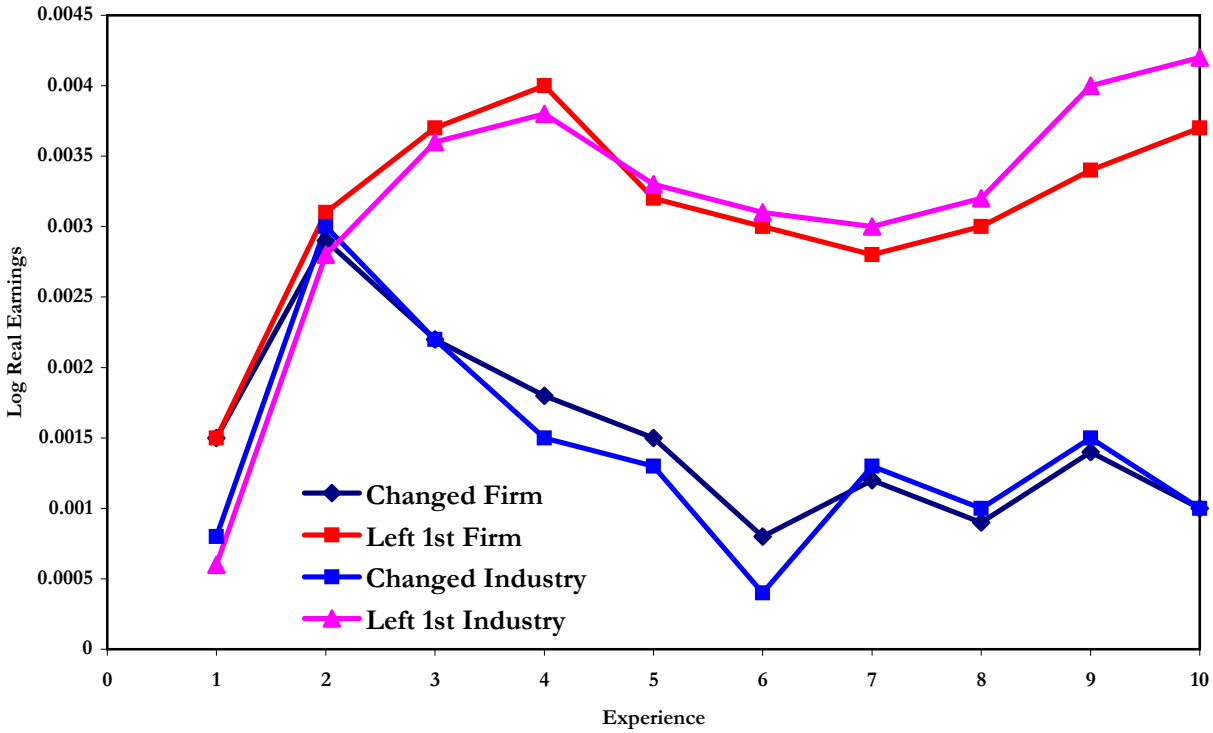
Table 9: Effect of Unemployment Rate at time of Graduation on Labor Force Participation

	Specification							
Area	Regional				Regional			
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	0.001	0.002	-0.0001	-0.0022	0.0015	0.0015	0.0015	-0.0007
	[0.0003]***	[0.0006]***	[0.0003]	[0.0029]	[0.0003]***	[0.0005]***	[0.0003]***	[0.0037]
1	0.0008	0.0006	0.0012	-0.0018	0.0009	0.0003	0.0011	0.0003
	[0.0002]***	[0.0004]	[0.0003]***	[0.0029]	[0.0002]***	[0.0003]	[0.0002]***	[0.0040]
2	0.0009	-0.0002	0.0012	-0.0019	0.0007	-0.0001	0.0009	0.0002
	[0.0002]***	[0.0003]	[0.0003]***	[0.0029]	[0.0002]***	[0.0003]	[0.0002]***	[0.0040]
3	0.0004	-0.0003	0.0003	-0.0017	0.0003	0.0001	0.0001	0.0003
	[0.0002]**	[0.0003]	[0.0003]	[0.0029]	[0.0002]	[0.0003]	[0.0002]	[0.0040]
4	0.0002	-0.0004	0.0002	-0.0017	0.0001	0.0001	0.0002	0.0002
	[0.0002]	[0.0003]*	[0.0002]	[0.0029]	[0.0002]	[0.0002]	[0.0002]	[0.0040]
5	0	-0.0005	-0.0004	-0.0019	-0.0001	0	-0.0001	-0.0001
	[0.0002]	[0.0003]*	[0.0002]*	[0.0029]	[0.0002]	[0.0003]	[0.0002]	[0.0040]
6	0	-0.0009	-0.0004	-0.0022	-0.0002	-0.0004	-0.0002	-0.0003
	[0.0002]	[0.0002]***	[0.0002]**	[0.0029]	[0.0002]	[0.0003]	[0.0002]	[0.0040]
7	-0.0001	-0.0005	-0.0004	-0.0022	-0.0001	-0.0001	-0.0002	-0.0002
	[0.0002]	[0.0002]**	[0.0002]*	[0.0030]	[0.0002]	[0.0002]	[0.0002]	[0.0042]
8	-0.0002	-0.0005	-0.0008	-0.0025	-0.0002	-0.0001	-0.0006	-0.0005
	[0.0002]	[0.0002]*	[0.0002]***	[0.0030]	[0.0002]	[0.0003]	[0.0002]***	[0.0043]
9	-0.0002	-0.0007	-0.001	-0.0029	-0.0002	-0.0003	-0.0007	-0.001
	[0.0002]	[0.0002]***	[0.0002]***	[0.0030]	[0.0002]	[0.0002]	[0.0002]***	[0.0043]
10	-0.0001	-0.0011	-0.0009	-0.0025	-0.0001	-0.0008	-0.0006	-0.0005
	[0.0002]	[0.0003]***	[0.0002]***	[0.0030]	[0.0002]	[0.0003]***	[0.0002]***	[0.0043]
Constant	0.0349	-0.0056	34417.595	0.0838	7.2428	0.7391	0.6091	0.7692
	[0.0114]***	[0.0036]	4,671.5840]**	[0.0099]***	[0.1824]***	[0.0215]***	[0.0264]***	[0.0183]***
N	14530	14530	14098	14530	8510	8510	8510	8510
R^2	0.35	0.27	0.35	0.33	0.53	0.45	0.45	0.41

Note: The sample includes males in Canada leaving university between 1976 and 1995. The national model regresses outcomes indicated in the columns on the youth unemployment rate in the country at the year of college exit, interacted with experience years 0 to 10, plus province of residence fixed effects, experience fixed effects, and a linear or quadratic graduation cohort trend. The regional model regresses these same outcomes 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. The coefficients shown are the unemployment rate at college exit and experience interactions. One, two, and three asterix indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels respectively. See text for more details.

Figure 8: Effect of Unemployment Rate at Time of Graduation on Job and Insutry Mobility: Regional Models, Cohorts 1976-1995

Panel A: All Workers



Panel B: Graduate Sample

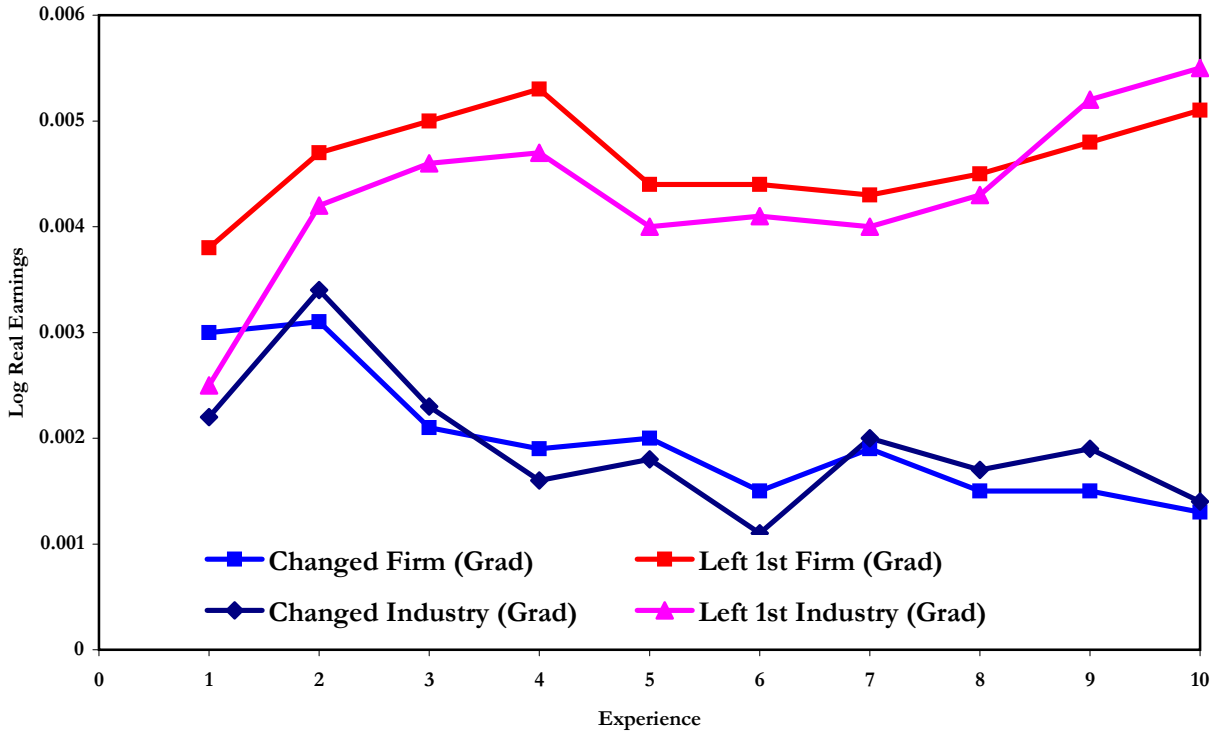


Table 10: Effect of Unemployment Rate at time of Graduation on Job and Industry Mobility

	Specification							
Area	**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								
0	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
1	0.0015	0.0008	0.0015	0.0006	0.0030	0.0022	0.0038	0.0025
	[0.0007]*	[0.0007]	[0.0009]*	[0.0009]	[0.0007]***	[0.0007]***	[0.0010]***	[0.0011]**
2	0.0029	0.003	0.0031	0.0028	0.0031	0.0034	0.0047	0.0042
	[0.0007]***	[0.0007]***	[0.0010]***	[0.0010]***	[0.0006]***	[0.0006]***	[0.0011]***	[0.0011]***
3	0.0022	0.0022	0.0037	0.0036	0.0021	0.0023	0.005	0.0046
	[0.0007]***	[0.0006]***	[0.0008]***	[0.0008]***	[0.0006]***	[0.0005]***	[0.0009]***	[0.0009]***
4	0.0018	0.0015	0.004	0.0038	0.0019	0.0016	0.0053	0.0047
	[0.0007]**	[0.0007]**	[0.0008]***	[0.0008]***	[0.0006]***	[0.0006]**	[0.0009]***	[0.0009]***
5	0.0015	0.0013	0.0032	0.0033	0.002	0.0018	0.0044	0.004
	[0.0007]**	[0.0006]**	[0.0009]***	[0.0009]***	[0.0005]***	[0.0005]***	[0.0010]***	[0.0010]***
6	0.0008	0.0004	0.003	0.0031	0.0015	0.0011	0.0044	0.0041
	[0.0006]	[0.0006]	[0.0009]***	[0.0009]***	[0.0005]***	[0.0005]**	[0.0010]***	[0.0010]***
7	0.0012	0.0013	0.0028	0.003	0.0019	0.002	0.0043	0.004
	[0.0007]*	[0.0007]*	[0.0009]***	[0.0009]***	[0.0006]***	[0.0006]***	[0.0010]***	[0.0010]***
8	0.0009	0.001	0.003	0.0032	0.0015	0.0017	0.0045	0.0043
	[0.0009]	[0.0008]	[0.0010]***	[0.0009]***	[0.0008]**	[0.0007]**	[0.0011]***	[0.0011]***
9	0.0014	0.0015	0.0034	0.004	0.0015	0.0019	0.0048	0.0052
	[0.0011]	[0.0010]	[0.0009]***	[0.0009]***	[0.0010]	[0.0009]**	[0.0010]***	[0.0010]***
10	0.001	0.001	0.0037	0.0042	0.0013	0.0014	0.0051	0.0055
	[0.0011]	[0.0010]	[0.0009]***	[0.0009]***	[0.0011]	[0.0011]	[0.0010]***	[0.0010]***
Constant	0.2256	0.1903	0.1186	0.7452	0.3901	0.3539	0.274	0.1937
	[0.0351]***	[0.0303]***	[0.0302]***	[0.0346]***	[0.0191]***	[0.0235]***	[0.0341]***	[0.0360]***
N	9732	9713	9707	9694	6036	6034	6014	5924
R^2	0.63	0.69	0.69	0.8	0.84	0.84	0.88	0.66

Note: Columns indicate the firm or industry mobility variable used as the dependent variable. Each model regresses these outcomes 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. The coefficients shown are the unemployment rate at college exit and experience interactions. One, two, and three asterix indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels respectively. See text for more details.

Table 11A: Average Wage Growth for Stayers and Movers Between Firms, Industries, and Provinces -- Regional Model, Cohorts 1976-1995

		Marginal Wage Growth by Movers Status					
	Overall Earnings Growth	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	0.4849	0.4588	0.4582	0.4587	0.5211	0.4663
2	0.2091	0.2716	0.1799	0.2838	0.18	0.2571	0.2067
3	0.178	0.2496	0.1496	0.2787	0.1499	0.2192	0.1757
4	0.1508	0.2281	0.1237	0.2388	0.1234	0.1827	0.1491
5	0.1212	0.193	0.1002	0.2164	0.1004	0.1401	0.1203
6	0.0919	0.1369	0.0807	0.1163	0.0809	0.0935	0.0918
7	0.081	0.1239	0.0713	0.1248	0.0714	0.1004	0.0801
8	0.0685	0.0934	0.0633	0.0594	0.0633	0.0694	0.0685
9	0.0594	0.0787	0.0556	0.0388	0.0557	0.0771	0.0587
10	0.0557	0.0768	0.0519	0.1007	0.0519	0.0766	0.055
Experience Year	**Panel B: Graduates**						
1	0.5571	0.5927	0.5362	0.5901	0.5362	0.5997	0.5549
2	0.2131	0.2843	0.1844	0.2725	0.1844	0.2386	0.2118
3	0.1561	0.2202	0.1343	0.2452	0.1345	0.1893	0.1543
4	0.1239	0.1844	0.1059	0.1577	0.1055	0.1272	0.1237
5	0.1033	0.1581	0.0894	0.1642	0.0897	0.1344	0.1019
6	0.082	0.1138	0.0749	0.0818	0.075	0.0779	0.0822
7	0.0754	0.1025	0.0698	0.0776	0.0698	0.0937	0.0746
8	0.0622	0.0848	0.0578	0.0353	0.0579	0.0592	0.0623
9	0.0553	0.07	0.0527	-0.0034	0.0527	0.069	0.0548
10	0.0517	0.0604	0.0502	0.0761	0.0503	0.0808	0.0507

Notes: Seet text.

Table 11B: Effect of Unemployment Rate at time of Graduation on Gains from Job, Industry, and Regional Mobility -- Regional Model for All Workers, Cohorts 1976-1995

		Marginal Effect on Wage Growth by Movers Status					
	Effect on Overall Earnings Growth	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	-0.0005	0.0019	-0.0026	0.008	-0.0026	0.0079	-0.0011
	[0.0019]	[0.0025]	[0.0017]	[0.0056]	[0.0017]	[0.0047]*	[0.0020]
2	0.0054	0.0057	0.0045	0.0093	0.0046	0.0069	0.005
	[0.0009]***	[0.0015]***	[0.0010]***	[0.0045]**	[0.0010]***	[0.0034]**	[0.0009]***
3	0.0066	0.0084	0.0058	0.0133	0.0058	0.0076	0.0064
	[0.0006]***	[0.0015]***	[0.0006]***	[0.0052]**	[0.0006]***	[0.0035]**	[0.0007]***
4	0.0045	0.0062	0.0039	0.0045	0.0039	-0.0053	0.0049
	[0.0007]***	[0.0017]***	[0.0005]***	[0.0048]	[0.0005]***	[0.0035]	[0.0007]***
5	0.0038	0.0077	0.0029	0.0061	0.0029	-0.0023	0.0042
	[0.0007]***	[0.0020]***	[0.0005]***	[0.0050]	[0.0005]***	[0.0033]	[0.0006]***
6	0.0025	0.0049	0.0024	0.0045	0.0024	-0.0068	0.003
	[0.0006]***	[0.0015]***	[0.0006]***	[0.0054]	[0.0006]***	[0.0036]*	[0.0006]***
7	0.0019	0.0022	0.002	0.0073	0.0019	-0.0019	0.0021
	[0.0007]***	[0.0020]	[0.0006]***	[0.0057]	[0.0006]***	[0.0040]	[0.0007]***
8	0.0031	0.0047	0.0029	0.0075	0.0029	0.0017	0.0032
	[0.0007]***	[0.0020]**	[0.0005]***	[0.0055]	[0.0005]***	[0.0041]	[0.0006]***
9	0.0018	-0.0008	0.0022	-0.0006	0.0023	-0.0024	0.002
	[0.0005]***	[0.0020]	[0.0004]***	[0.0064]	[0.0004]***	[0.0036]	[0.0006]***
10	0.0024	0.005	0.0021	0.0028	0.0022	-0.0037	0.0027
	[0.0008]***	[0.0019]**	[0.0006]***	[0.0062]	[0.0006]***	[0.0038]	[0.0007]***

Note: Columns indicate selected sample for the regression, among males in Canada graduating university (with D>=0) between 1976 and 1995. The regression model is annual increases in log 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. The coefficients shown are the unemployment rate at college exit and experience interactions. One, two, and three asterix indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels respectively. See text for more details.

Table 12: Effect of Unemployment Rate at time of Graduation on Province Mobility

	Specification							
Area	**National**		**Regional**		**National**		**Regional**	
D>=0?	**No**		**No**		**Yes**		**Yes**	
Outcome	**Fraction Changed Province**	**Fraction Left First Province**	**Fraction Changed Province**	**Fraction Left First Province**	**Fraction Changed Province**	**Fraction Left First Province**	**Fraction Changed Province**	**Fraction Left First Province**
	1	**2**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Experience Year								
0	-	-	-	-			-	-
	-	-	-	-			-	-
1	-0.0002	0.0003	0.0018	0.0001	0	0.0007	0.0023	0.001
	[0.0003]	[0.0005]	[0.0003]***	[0.0010]	[0.0003]	[0.0005]	[0.0004]***	[0.0010]
2	-0.0001	-0.0001	0.0014	0.002	0.0001	0.0003	0.0014	0.0029
	[0.0003]	[0.0006]	[0.0003]***	[0.0008]**	[0.0002]	[0.0006]	[0.0002]***	[0.0008]***
3	-0.0001	-0.0004	0.0008	0.003	0	-0.0001	0.0008	0.0036
	[0.0002]	[0.0005]	[0.0002]***	[0.0007]***	[0.0002]	[0.0005]	[0.0002]***	[0.0008]***
4	-0.0003	-0.0007	0.0001	0.0033	0	-0.0005	0.0001	0.0039
	[0.0003]	[0.0005]	[0.0002]	[0.0007]***	[0.0002]	[0.0005]	[0.0002]	[0.0008]***
5	-0.0002	-0.0008	-0.0004	0.0032	-0.0001	-0.0007	-0.0003	0.0038
	[0.0003]	[0.0006]	[0.0002]*	[0.0007]***	[0.0002]	[0.0006]	[0.0002]	[0.0008]***
6	0	-0.0005	-0.0005	0.003	0.0002	-0.0005	-0.0004	0.0036
	[0.0002]	[0.0007]	[0.0002]***	[0.0007]***	[0.0002]	[0.0006]	[0.0002]*	[0.0008]***
7	-0.0001	-0.0006	-0.0008	0.003	-0.0003	-0.0008	-0.0008	0.0035
	[0.0002]	[0.0007]	[0.0002]***	[0.0007]***	[0.0002]*	[0.0005]	[0.0002]***	[0.0008]***
8	0	-0.0002	-0.0008	0.003	-0.0001	-0.0003	-0.0008	0.0034
	[0.0002]	[0.0009]	[0.0002]***	[0.0008]***	[0.0003]	[0.0008]	[0.0003]***	[0.0008]***
9	-0.0001	-0.0004	-0.0009	0.0028	0.0001	-0.0003	-0.0008	0.0031
	[0.0003]	[0.0010]	[0.0002]***	[0.0008]***	[0.0002]	[0.0009]	[0.0003]***	[0.0008]***
10	-0.0001	-0.0006	-0.0006	0.0026	0	-0.0005	-0.0006	0.0031
	[0.0003]	[0.0010]	[0.0003]**	[0.0008]***	[0.0002]	[0.0008]	[0.0003]**	[0.0009]***
Constant	0.0089	-0.0292	0.0259	0.0486	0.006	-0.0399	0.0227	0.0305
	[0.0147]	[0.0408]	[0.0065]***	[0.0262]*	[0.0097]	[0.0315]	[0.0068]***	[0.0307]
N	9732	9732	9732	9732	5924	5924	5924	5924
R^2	0.2	0.11	0.34	0.61	0.23	0.13	0.37	0.66

Note: Columns indicate selected sample for the regression, among males in Canada graduating university (with D>=0) between 1976 and 1995. The regression model is annual increases in log 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. The coefficients shown are the unemployment rate at college exit and experience interactions. One, two, and three asterix indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels respectively. See text for more details.

Table 13: Effect of Unemployment Rate at time of Graduation on Firm Size and Firm Wages

	Specification							
Area	**Regional**				**Regional**			
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	-0.0061	-0.0013	-0.0106	-0.0147	-0.0085	-0.0016	-0.0095	-0.0175
	[0.0051]	[0.0008]*	[0.0013]***	[0.0058]**	[0.0051]*	[0.0008]**	[0.0014]***	[0.0058]***
1	-0.0081	-0.0016	-0.0106	-0.0185	-0.0108	-0.002	-0.0092	-0.0213
	[0.0051]	[0.0008]**	[0.0011]***	[0.0056]***	[0.0048]**	[0.0008]**	[0.0011]***	[0.0054]***
2	-0.003	-0.0012	-0.0073	-0.0104	-0.0078	-0.0019	-0.0071	-0.016
	[0.0049]	[0.0008]	[0.0012]***	[0.0055]*	[0.0050]	[0.0008]**	[0.0010]***	[0.0055]***
3	0.0025	-0.0003	-0.0056	-0.0032	-0.0025	-0.0011	-0.0055	-0.0095
	[0.0047]	[0.0008]	[0.0011]***	[0.0051]	[0.0047]	[0.0008]	[0.0011]***	[0.0052]*
4	0.0037	-0.0002	-0.0038	-0.0002	-0.0015	-0.0008	-0.0042	-0.0071
	[0.0048]	[0.0008]	[0.0011]***	[0.0053]	[0.0048]	[0.0008]	[0.0011]***	[0.0054]
5	0.0073	0.0001	-0.003	0.0048	0.0031	-0.0002	-0.0037	-0.0014
	[0.0048]	[0.0008]	[0.0011]***	[0.0053]	[0.0050]	[0.0008]	[0.0012]***	[0.0057]
6	0.0056	-0.0001	-0.0038	0.0021	0.0019	-0.0004	-0.0047	-0.0037
	[0.0048]	[0.0008]	[0.0012]***	[0.0053]	[0.0049]	[0.0008]	[0.0012]***	[0.0055]
7	0.0053	-0.0003	-0.0038	0.0018	0.0013	-0.0007	-0.0049	-0.0044
	[0.0050]	[0.0008]	[0.0012]***	[0.0056]	[0.0053]	[0.0009]	[0.0012]***	[0.0059]
8	0.0083	0.0001	-0.0029	0.0058	0.0029	-0.0004	-0.0043	-0.002
	[0.0051]	[0.0008]	[0.0012]**	[0.0057]	[0.0053]	[0.0008]	[0.0011]***	[0.0058]
9	0.0097	0.0003	-0.0019	0.0079	0.0043	-0.0001	-0.0034	0.0006
	[0.0051]*	[0.0008]	[0.0011]*	[0.0057]	[0.0054]	[0.0009]	[0.0011]***	[0.0062]
10	0.0129	0.0009	-0.0002	0.0128	0.0052	0.0002	-0.0018	0.003
	[0.0056]**	[0.0008]	[0.0013]	[0.0063]**	[0.0066]	[0.0010]	[0.0015]	[0.0075]
Constant	0.721	0.6469	6.2669	8.9277	0.6768	8.924	0.2457	0.3263
	[0.0258]***	[0.0538]***	[0.2496]***	[0.0073]***	[0.0434]***	[0.0084]***	[0.0392]***	[0.0197]***
N	14098	14098	14098	14042	8510	8483	5902	5915
R^2	0.27	0.53	0.4	0.4	0.75	0.43	0.79	0.8

Note: Columns indicate the firm quality variable used as the dependent variable. 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 national model regresses these outcomes on the youth unemployment rate in the country at the year of college exit, interacted with experience years 0 to 10, plus province of residence fixed effects, experience fixed effects, and a linear or quadratic graduation cohort trend. The regional model regresses these outcomes 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. The coefficients shown are the unemployment rate at college exit and experience interactions. One, two, and three asterix indicates statistical significance at the 10 percent, 5 percent, and 1 percent levels respectively. See text for more details.

Figure 9: Effect of Initial Unemployment Rate on Firm 'Quality' by Experience - Regional Sample, Graduates, All Cohorts

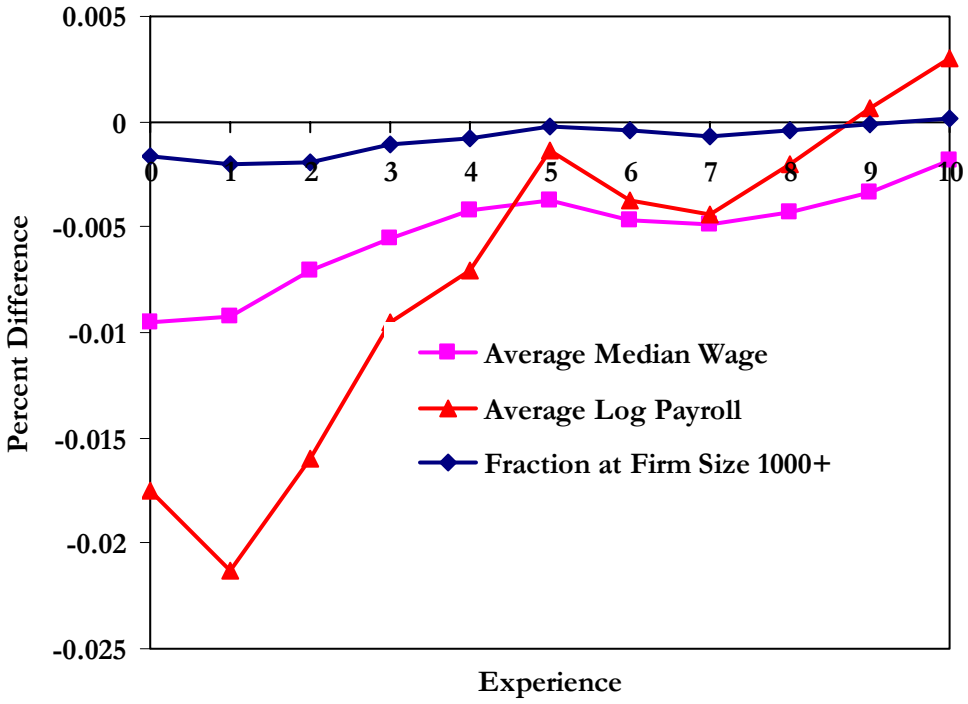
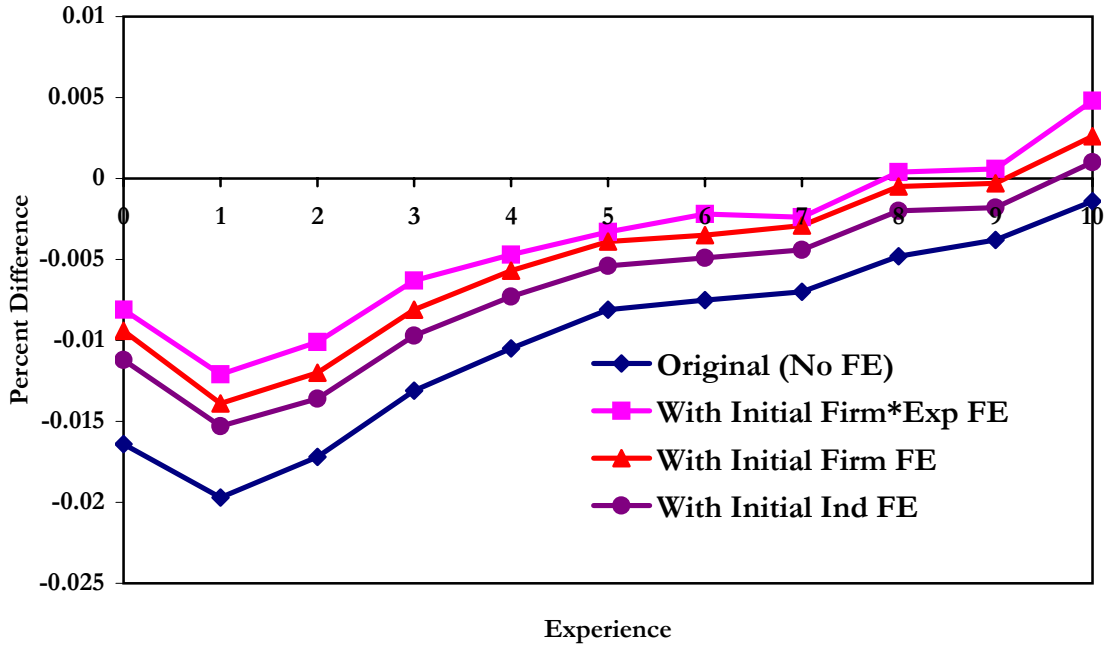


Figure 10: Effect of Initial Unemployment Rate Controlling for First Firm and Industry Fixed Effects Interacted With Experience - Regional Sample

Panel A: All Workers



Panel B: Graduate Sample

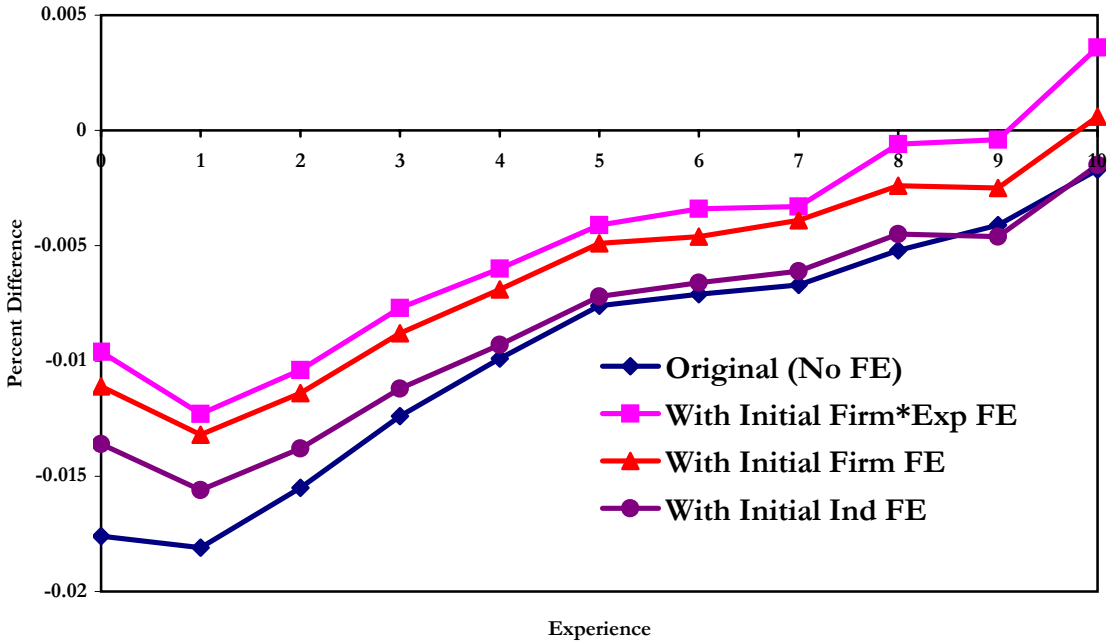


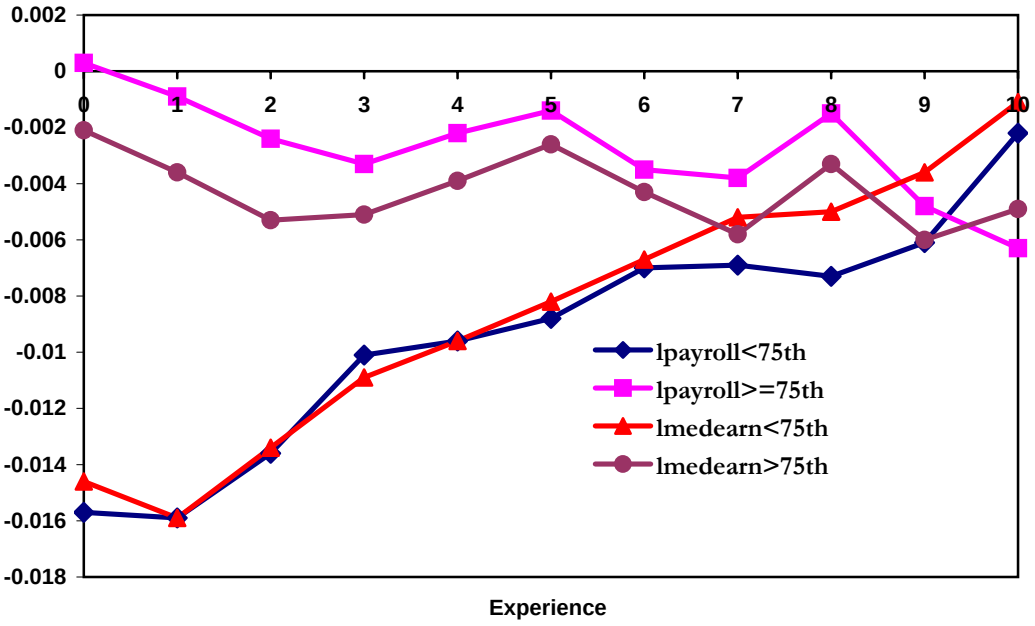
Table 14: Effect of Unemployment Rate at time of Graduation by Initial Firm Type - Regional Sample with D>=0

	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	
R^2	0.93		0.93		0.93		0.93	

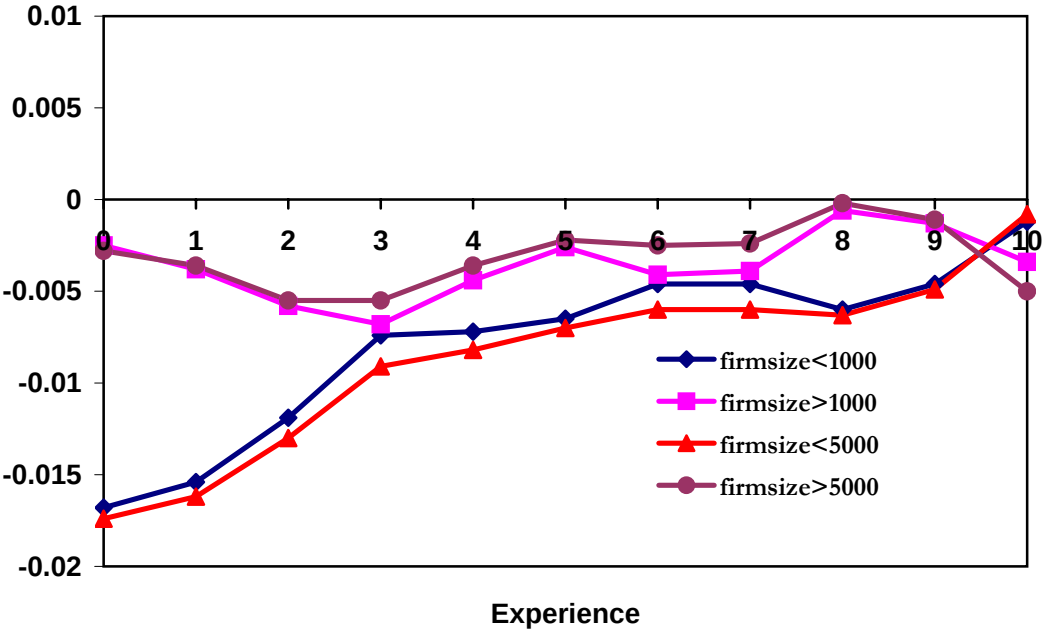
Note: Columns indicate the sample selected on for each regression. Each columns shows the unemployment rate and experience interactions from regressing log annual earnings on the youth unemployment rate in the youth unemployment rate in the province of first residence, interacted with experience years 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.

Figure 11: Effects of Initial Unemployment Rates on Wages by Initial Firm Type

Losses and Reversion by Payroll and Median Earning



Losses and Reversion by Firm Size



Appendix Table 1A. Sample Size by Graduation Cohort and Experience

Graduation Year	Years Since Graduation											
	0	1	2	3	4	5	6	7	8	9	10	Total
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 1B. Sample with Non-Missing Earnings by Graduation Cohort and Experience

Graduation Year	Years Since Graduation											
	0	1	2	3	4	5	6	7	8	9	10	Total
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 2: 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	0.328	0.373	0.385	0.041	0.422	0.33	0.37	0.052
2	0.252	0.292	0.305	0.032	0.585	0.45	0.51	0.084
3	0.216	0.251	0.264	0.031	0.676	0.51	0.59	0.105
4	0.191	0.225	0.238	0.029	0.735	0.56	0.64	0.115
5	0.165	0.194	0.207	0.024	0.771	0.59	0.67	0.125
6	0.143	0.169	0.182	0.024	0.79	0.60	0.69	0.135
7	0.127	0.150	0.161	0.019	0.805	0.61	0.70	0.141
8	0.114	0.135	0.146	0.013	0.819	0.62	0.71	0.145
9	0.108	0.128	0.139	0.013	0.83	0.63	0.72	0.150
10	0.104	0.123	0.133	0.010	0.843	0.64	0.74	0.153

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	6.77	27028	0.70	0.56	0.50	0.32	0.52	5.67
1	6.79	26481	0.71	0.56	0.51	0.31	0.60	5.74
2	6.87	28699	0.72	0.58	0.52	0.32	0.67	5.89
3	6.93	29924	0.73	0.58	0.52	0.33	0.72	6.00
4	6.93	30362	0.73	0.59	0.52	0.33	0.77	6.04
5	6.99	31406	0.73	0.59	0.53	0.34	0.81	6.13
6	7.04	33185	0.74	0.60	0.54	0.34	0.84	6.22
7	7.07	34179	0.74	0.60	0.54	0.35	0.86	6.27
8	7.10	35057	0.74	0.61	0.55	0.35	0.88	6.31
9	7.11	35426	0.74	0.61	0.55	0.36	0.89	6.34
10	7.11	35851	0.74	0.61	0.55	0.36	0.90	6.35

Appendix Table 3: Firm Size and Average Firm Wages Experience -- USA

	All Workers (Some College)				At Least 16 Years of Schooling			
Year of Experience	**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 4: Summary Statistics Unemployment Rates

A. Unemployment Rates Ages 15-24

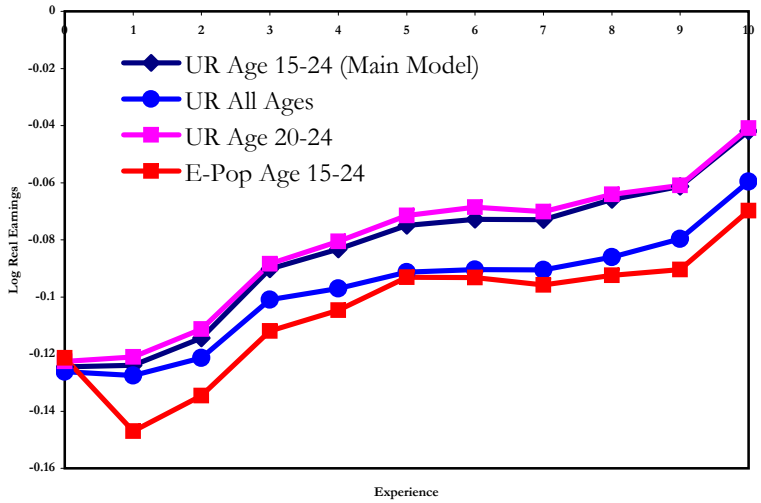
	Average	Standard Deviation	Maximum	Minimum
National	14.76	2.42	19.2	11.0
Province	14.13	3.98	32.7	6.3
National Detrended	0	2.41	4.53	-3.83
Province Demeaned	0	3.01	6.53	-7.12

B. Outcomes by Canadian Province

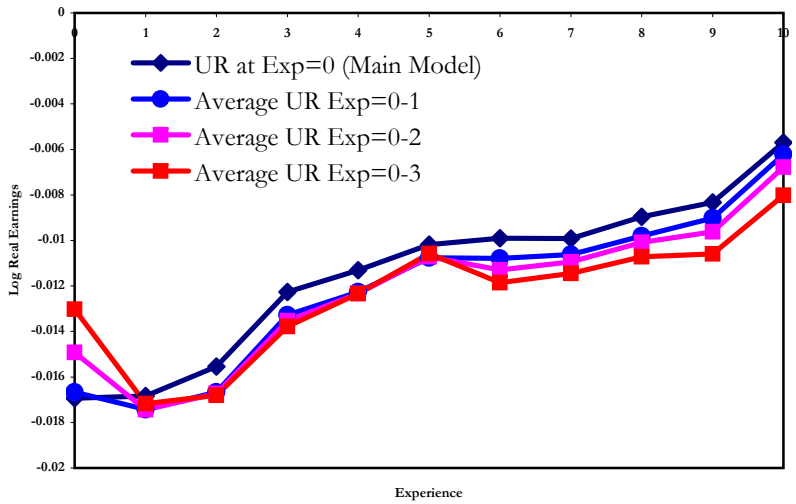
	Sample Size		Unemployment Rate	
	Frequency	Percent	Average	Standard Deviation
Nova Scotia	1,143	0.84	18.99	2.50
PEI	109	0.08	18.91	2.08
Newfoundland	2,535	1.86	27.11	3.51
New Brunswick	7,281	5.33	20.07	2.13
Quebec	10,472	7.66	17.20	2.60
Ontario	71,995	52.69	13.03	3.14
Manitoba	10,308	7.54	12.59	1.81
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

Appendix Figure 1: Effect of Unemployment Rate at Time of Graduation on Log Real Earnings: Regional Graduate Models for Cohort 1982-1995 (Unless Otherwise Noted)

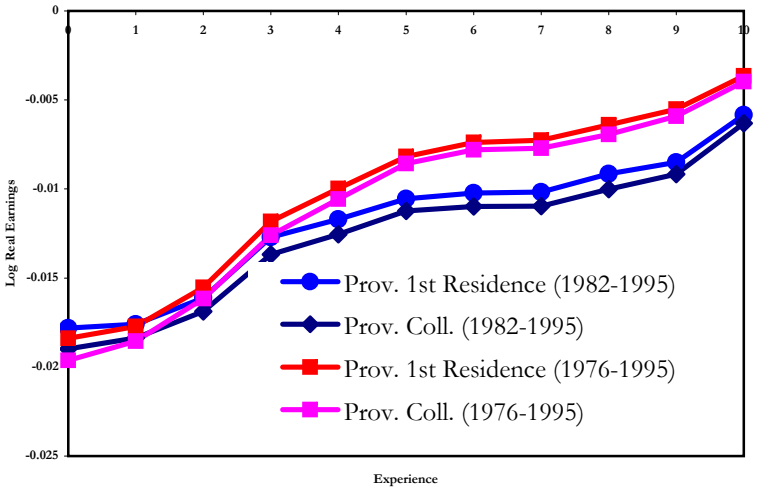
Panel A: Different Early Labor Market Conditions (2 Std.Dev. Shock)



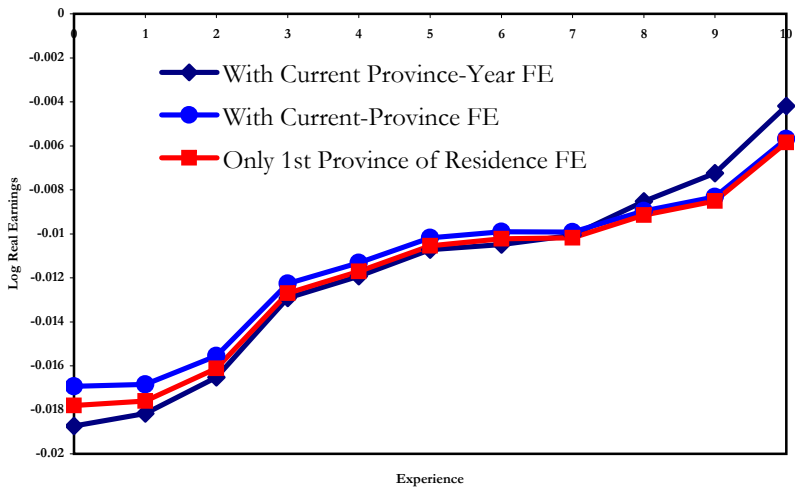
Panel B: Different Early Labor Market Horizons (Average UR)



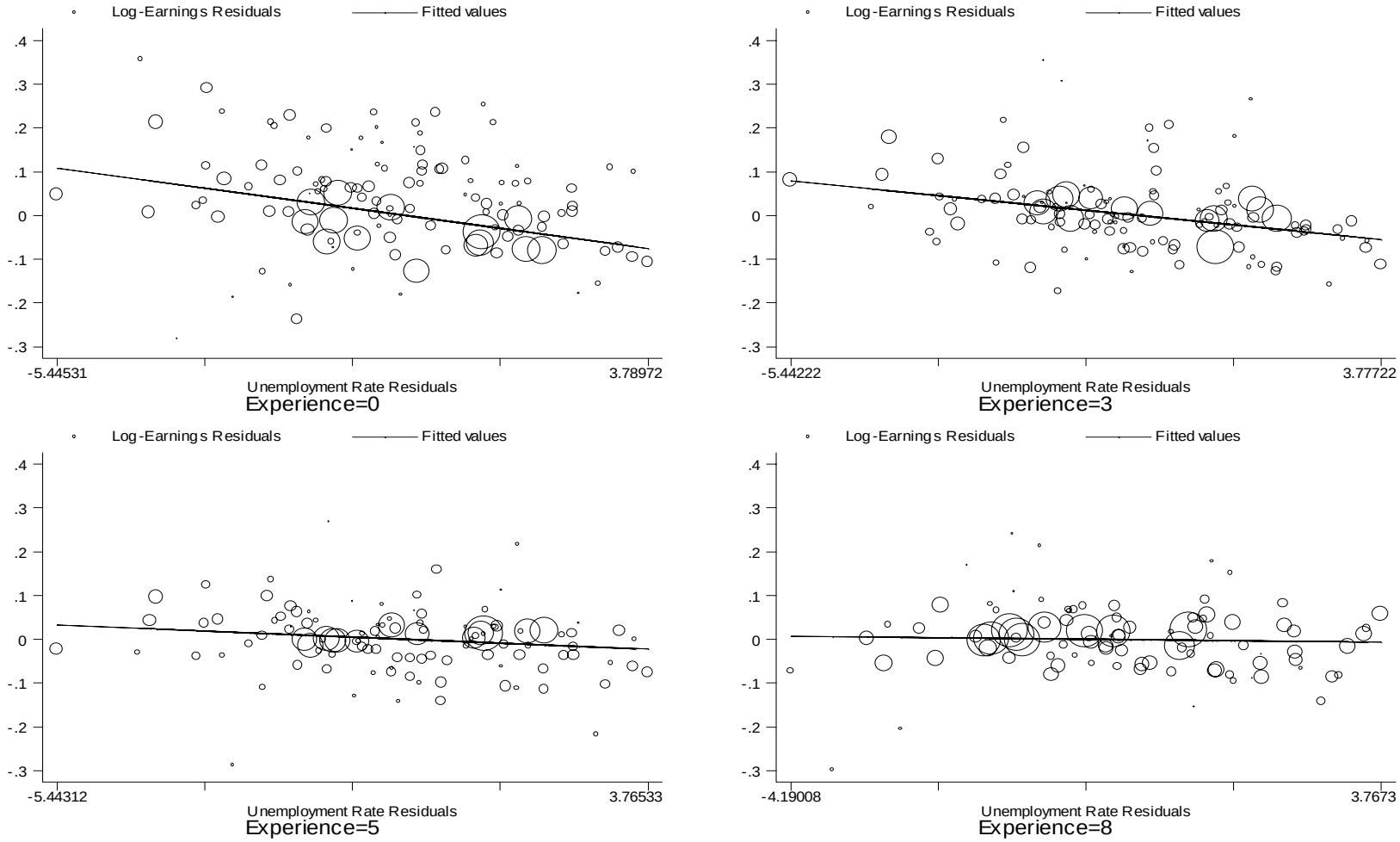
Panel C: Shock in Region of College vs. Region of First Residence



Panel D: Current Province and Current Province-Year Controls

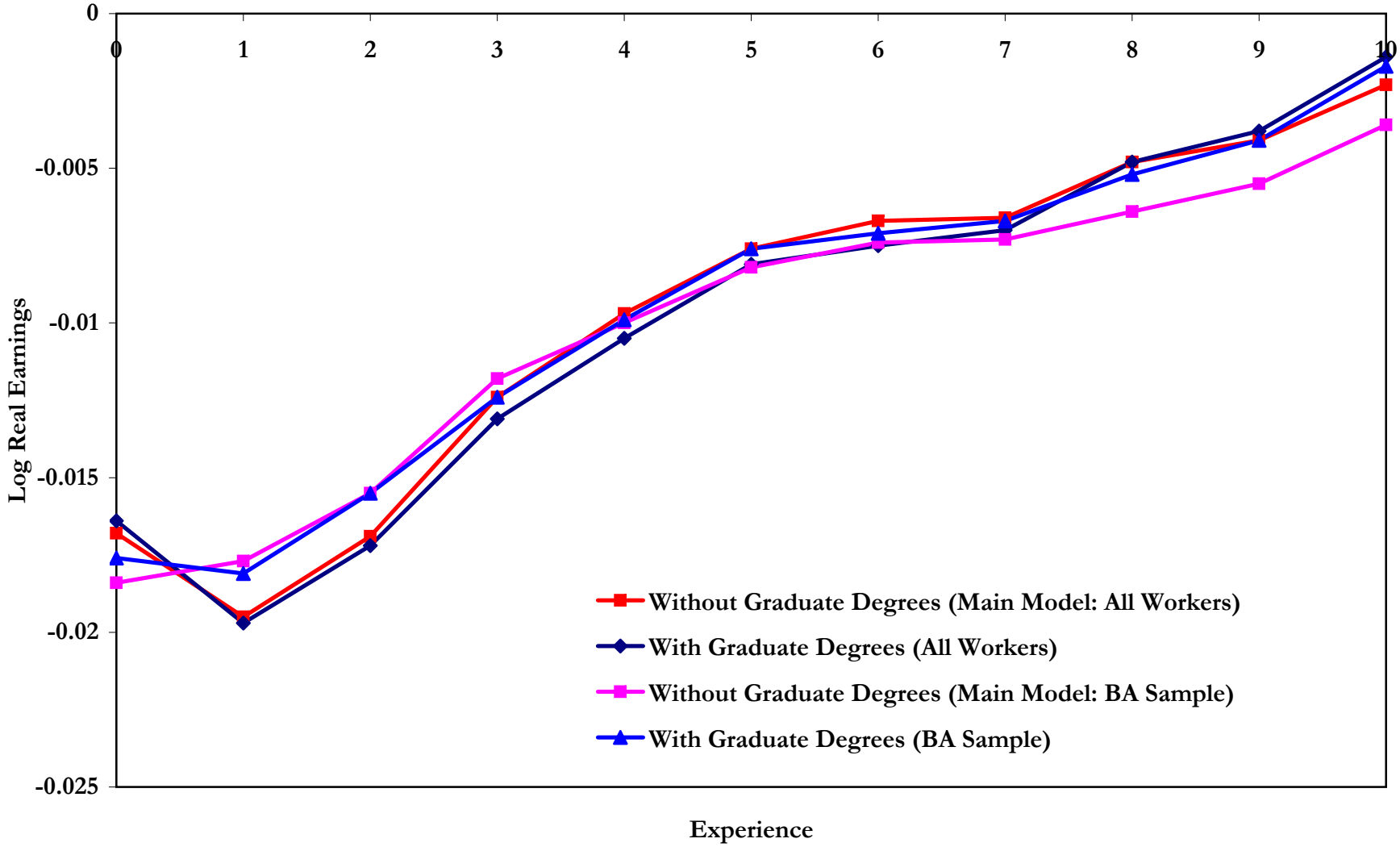


Appendix Figure 2: Residuals of Separate Regressions of Earnings and Unemployment Rates including Year, First Province, and Graduation Cohort Dummies, Plotted by Experience Year with Corresponding Regression Line



Notes: Circles correspond to cell sizes.

Appendix Figure 3: Effect of Unemployment Rate at Time of Graduation on Log Real Earnings Including Workers Obtaining Graduate Degrees (1976-1995): Regional Models, Some College (All) and Graduate Sample



Appendix Table 5: 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

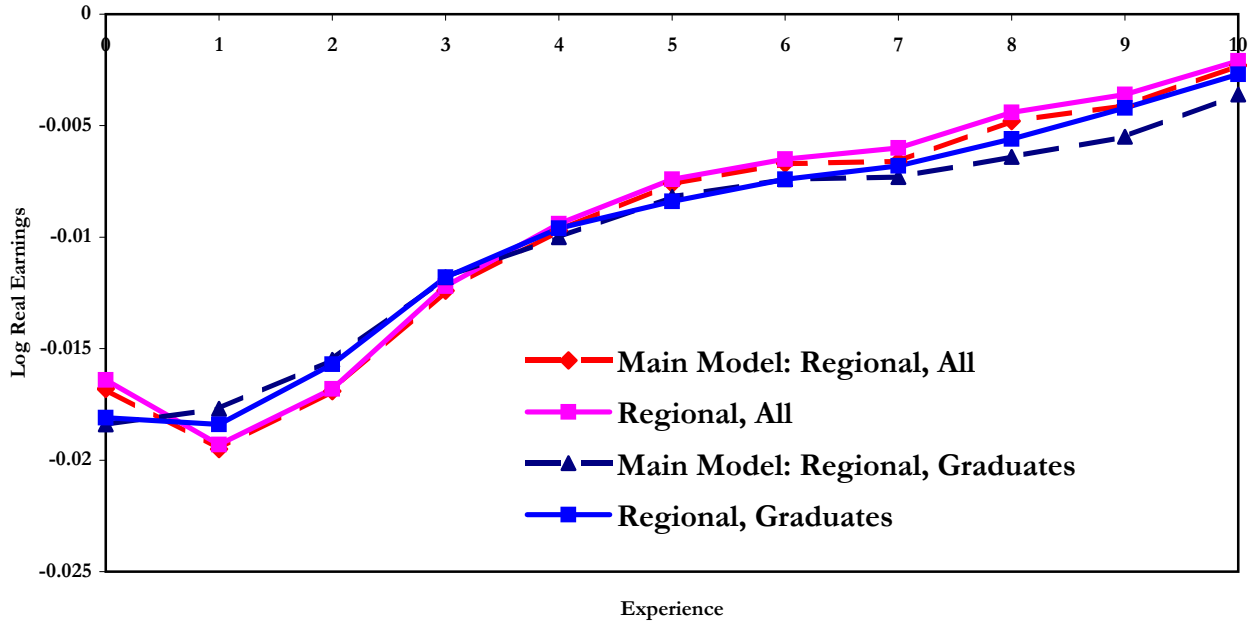
Years	Actual Duration	Predicted Duration	Difference Between Actual and Predicted (D)	
1	0.18	0.05	**-3<=**	0.10
2	0.13	0.01	**-2**	0.12
3	0.19	0.29	**-1**	0.11
4	0.30	0.60	**0**	0.32
5	0.17	0.05	**1**	0.22
6	0.04	0.00	**2**	0.08
7	0.01	0.00	**>=3**	0.06

Robust standard errors in brackets

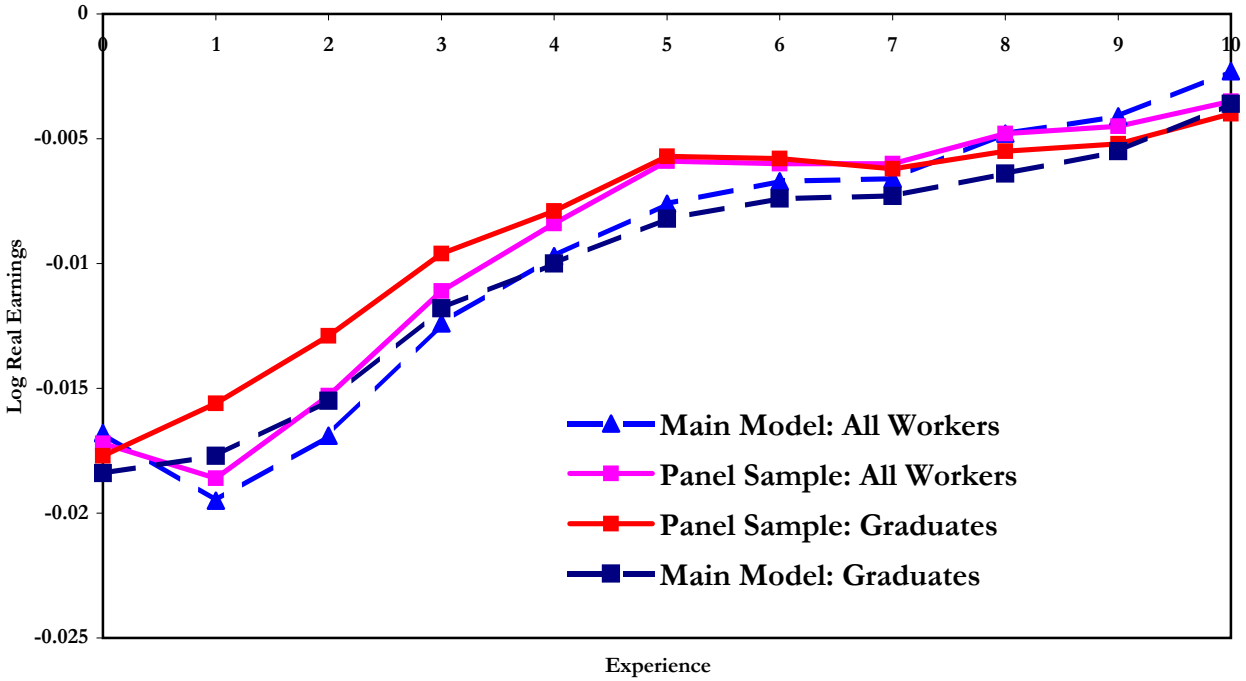
*** significant at 10%; ** significant at 5%; *** significant at 1%**

Appendix Figure 4: 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

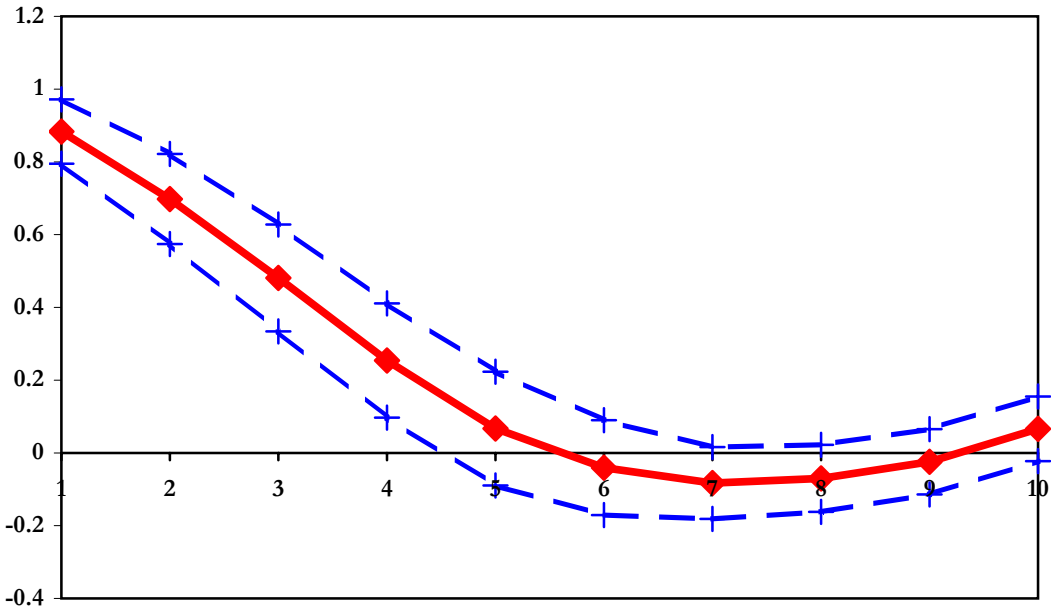


Panel B: Estimates for Workers Working Every Period

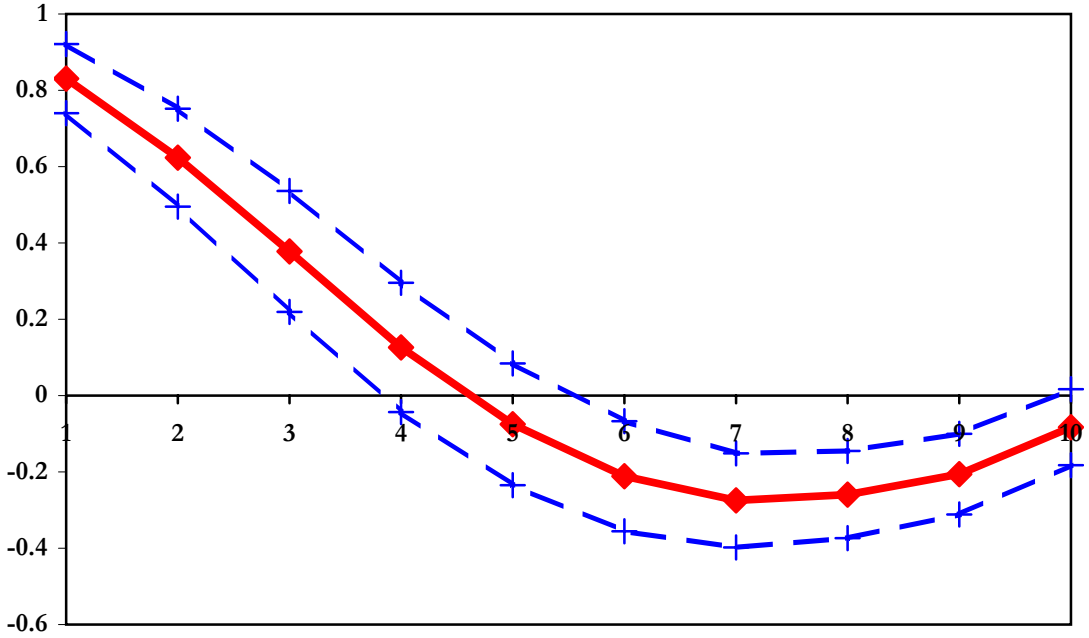


Appendix Figure 5: Auto-Covariance of Unemployment Rate at Ages 15-24, Regional Graduate Sample

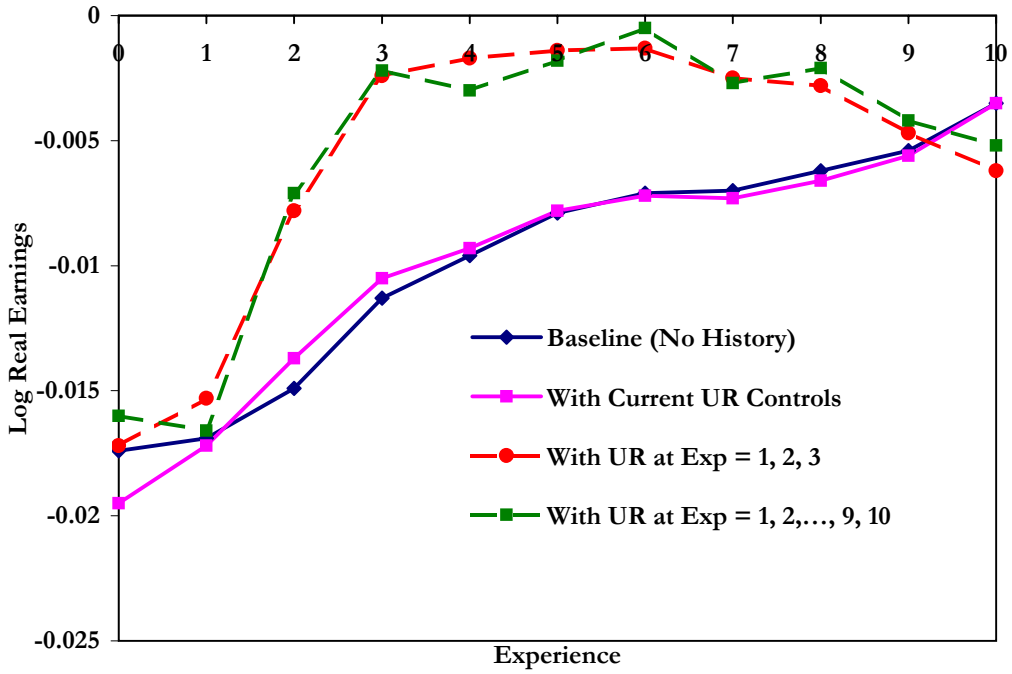
Panel A: Cohorts 1982-1995



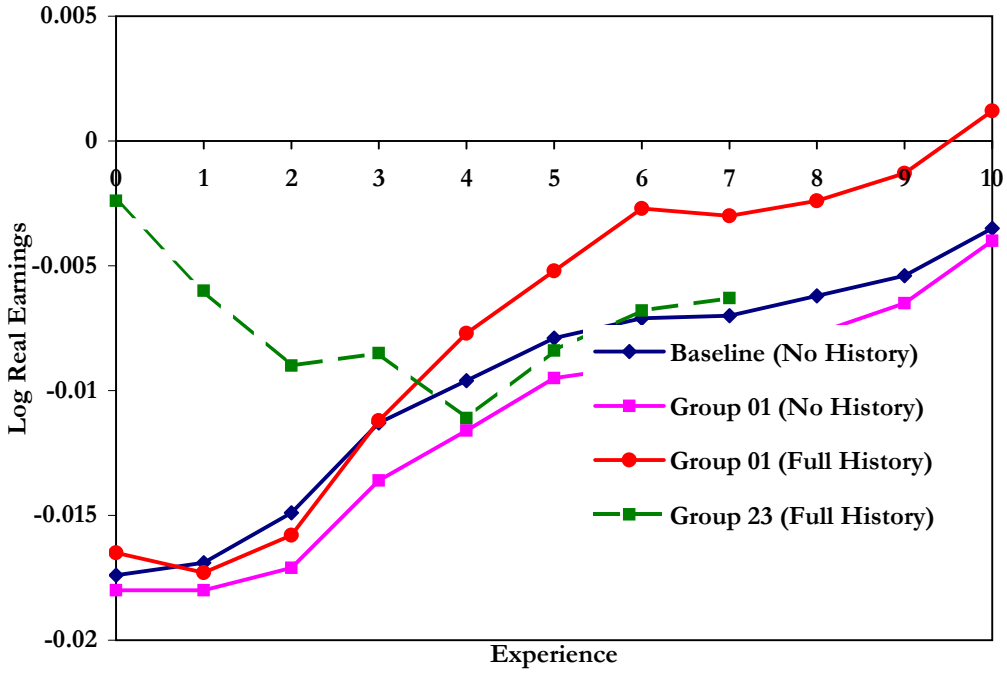
Panel B: Cohorts 1976-1995



Appendix Figure 6A: Effect of Unemployment Rate at Time of Graduation on Log Real Earnings With Controls for Unemployment Rate History: All Cohorts, Graduates



Appendix Figure 6B: Grouped Model of Effect of Unemployment Rate at Time of Graduation on Log Real Earnings With Controls for Unemployment Rate History: All Cohorts, Graduates



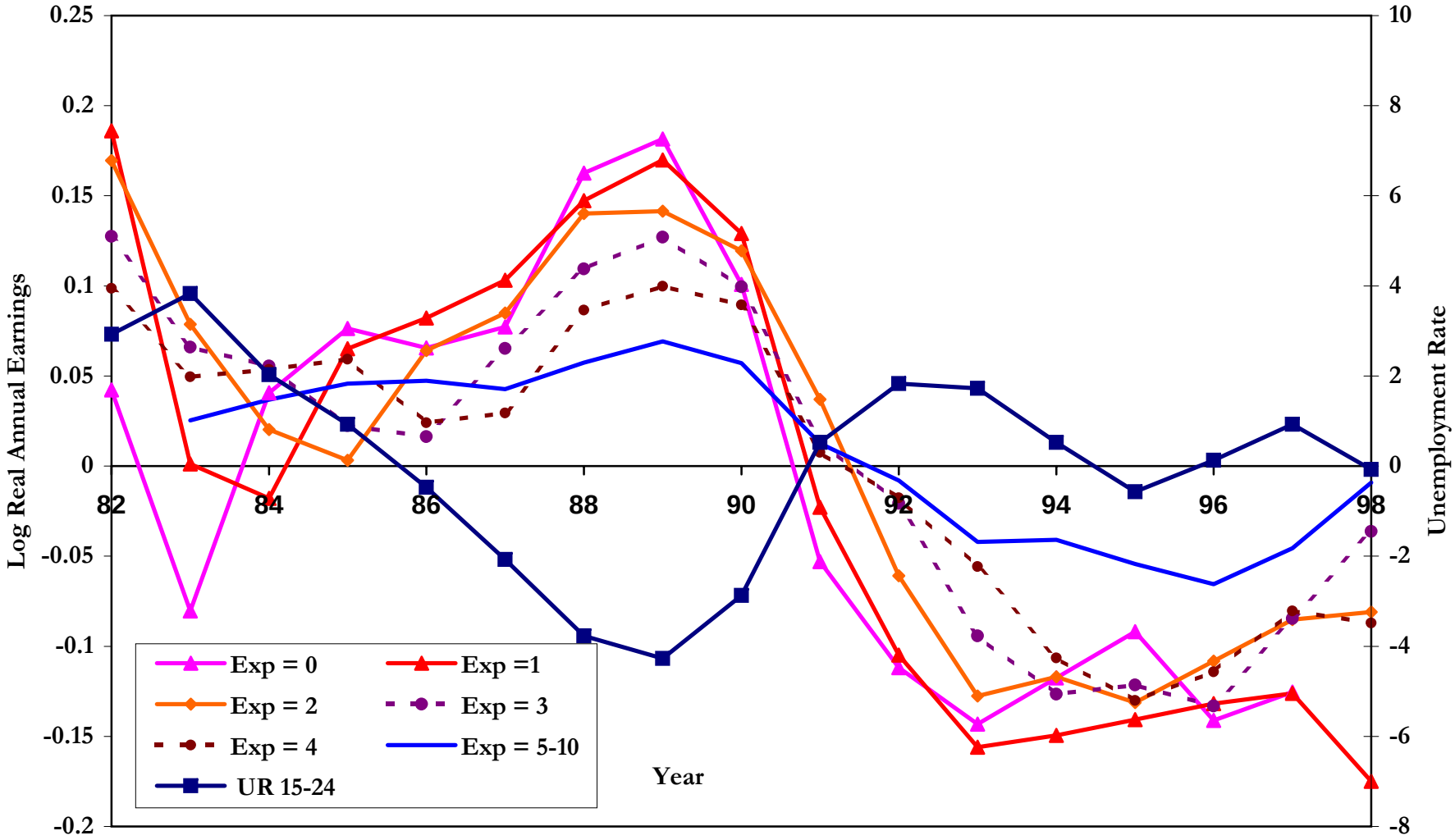
Appendix Table 6: Effect of Unemployment Rate at time of Graduation With Controls for UR History, Basic and Grouped Model - Graduate Sample, Regional Model, Cohorts 1982-1995

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	-0.0174	-0.0195	-0.0172	-0.016	-0.0174	-0.018	-0.0165	---
	[0.0024]***	[0.0026]***	[0.0022]***	[0.0024]***	[0.0024]***	[0.0026]***	[0.0028]***	---
1	-0.0169	-0.0172	-0.0153	-0.0166	-0.0169	-0.018	-0.0173	---
	[0.0021]***	[0.0036]***	[0.0032]***	[0.0034]***	[0.0021]***	[0.0020]***	[0.0023]***	---
2	-0.0149	-0.0137	-0.0078	-0.0071	-0.0149	-0.0171	-0.0158	-0.0024
	[0.0019]***	[0.0022]***	[0.0029]***	[0.0031]**	[0.0019]***	[0.0018]***	[0.0022]***	[0.0021]
3	-0.0113	-0.0105	-0.0024	-0.0022	-0.0113	-0.0136	-0.0112	-0.006
	[0.0017]***	[0.0017]***	[0.0025]	[0.0024]	[0.0017]***	[0.0017]***	[0.0021]***	[0.0022]***
4	-0.0096	-0.0093	-0.0017	-0.003	-0.0096	-0.0116	-0.0077	-0.009
	[0.0016]***	[0.0016]***	[0.0025]	[0.0023]	[0.0016]***	[0.0016]***	[0.0021]***	[0.0027]***
5	-0.0079	-0.0078	-0.0014	-0.0018	-0.0079	-0.0095	-0.0052	-0.0085
	[0.0016]***	[0.0016]***	[0.0029]	[0.0027]	[0.0016]***	[0.0015]***	[0.0023]**	[0.0032]***
6	-0.0071	-0.0072	-0.0013	-0.0005	-0.0071	-0.009	-0.0027	-0.0111
	[0.0017]***	[0.0017]***	[0.0032]	[0.0029]	[0.0017]***	[0.0016]***	[0.0028]	[0.0036]***
7	-0.007	-0.0073	-0.0025	-0.0027	-0.007	-0.0087	-0.003	-0.0084
	[0.0017]***	[0.0017]***	[0.0032]	[0.0028]	[0.0017]***	[0.0017]***	[0.0029]	[0.0037]**
8	-0.0062	-0.0066	-0.0028	-0.0021	-0.0062	-0.0077	-0.0024	-0.0068
	[0.0016]***	[0.0017]***	[0.0030]	[0.0026]	[0.0016]***	[0.0017]***	[0.0028]	[0.0039]*
9	-0.0054	-0.0056	-0.0047	-0.0042	-0.0054	-0.0065	-0.0013	-0.0063
	[0.0017]***	[0.0017]***	[0.0032]	[0.0026]	[0.0017]***	[0.0018]***	[0.0028]	[0.0039]
10	-0.0035	-0.0035	-0.0062	-0.0052	-0.0035	-0.004	0.0012	-0.0052
	[0.0017]**	[0.0017]**	[0.0027]**	[0.0025]**	[0.0017]**	[0.0019]**	[0.0027]	[0.0033]
Constant	8.9846	9.0609	9.0081	8.793	8.9846	9.0127	9.0332	---
	[0.0685]***	[0.0792]***	[0.0664]***	[0.0832]***	[0.0685]***	[0.0709]***	[0.0819]***	---
N	10214	10214	10214	9653	10214	10214	9983	---
R^2	0.96	0.96	0.96	0.96	0.96	0.96	0.96	---

Robust standard errors in brackets

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

Appendix Figure 7: Aggregate Unemployment and Wage Fluctuations by Experience-Level



Appendix Table 7: Effect of Unemployment Rate at time of Graduation on Log Real Earnings by Potential Experience for Workers with Positive Earnings Every Period (Panel Sample)

	Specification					
National/Regional	**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

Robust standard errors in brackets

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

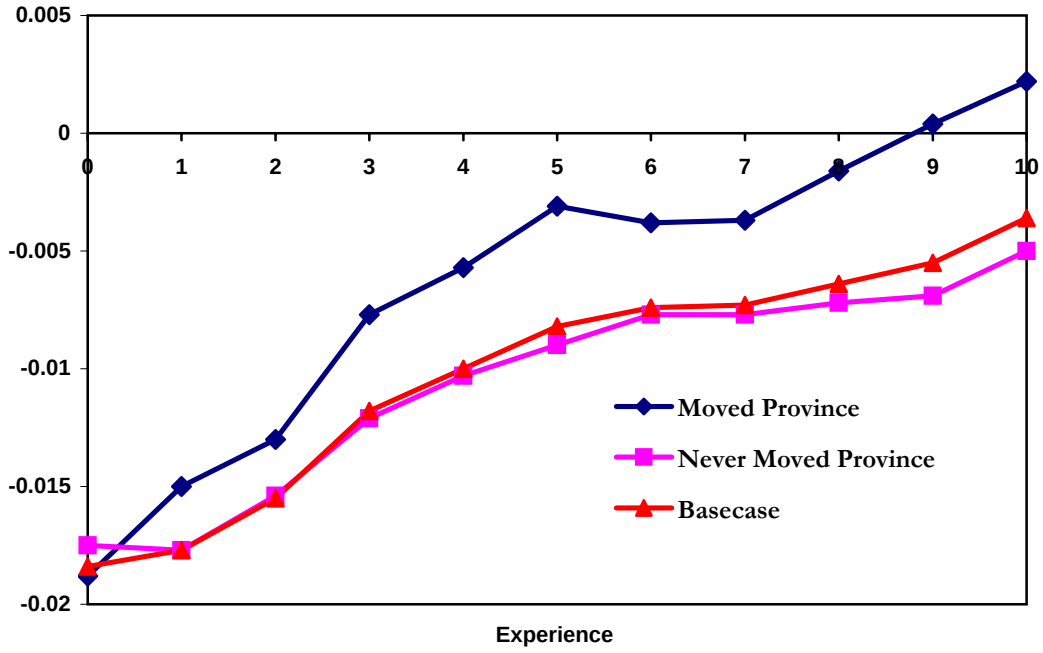
Appendix Table 8: Effect of Unemployment Rate at time of Graduation on Gains from Job, Industry, and Regional Mobility -- Regional Model for Graduates, Cohorts 1976-1995

		Marginal Effect on Wage Growth by Movers Status					
	Effect on Overall Earnings Growth	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	0.0028	0.0063	0.0003	0.0201	0.0003	0.0143	0.002
	[0.0019]	[0.0025]**	[0.0019]	[0.0064]***	[0.0019]	[0.0047]***	[0.0020]
2	0.0044	0.0046	0.0037	0.0086	0.0037	0.0032	0.0043
	[0.0010]***	[0.0018]***	[0.0010]***	[0.0068]	[0.0010]***	[0.0040]	[0.0010]***
3	0.0051	0.0067	0.0046	0.0159	0.0045	0.0017	0.0052
	[0.0006]***	[0.0017]***	[0.0006]***	[0.0065]**	[0.0006]***	[0.0038]	[0.0007]***
4	0.0032	0.0049	0.0029	0.0087	0.0028	-0.0041	0.0036
	[0.0007]***	[0.0021]**	[0.0006]***	[0.0062]	[0.0006]***	[0.0039]	[0.0007]***
5	0.003	0.0068	0.0022	0.0018	0.0022	-0.0042	0.0033
	[0.0006]***	[0.0020]***	[0.0005]***	[0.0066]	[0.0005]***	[0.0036]	[0.0006]***
6	0.0019	0.0045	0.0015	0.0004	0.0016	-0.0063	0.0023
	[0.0005]***	[0.0018]**	[0.0005]***	[0.0071]	[0.0006]***	[0.0041]	[0.0005]***
7	0.0015	0.0025	0.0014	0.0105	0.0013	0.0004	0.0016
	[0.0007]**	[0.0021]	[0.0006]**	[0.0075]	[0.0006]**	[0.0048]	[0.0007]**
8	0.0025	0.0037	0.002	0.0098	0.0021	0.0007	0.0026
	[0.0007]***	[0.0022]*	[0.0005]***	[0.0064]	[0.0005]***	[0.0040]	[0.0007]***
9	0.0019	0.0016	0.0017	0.0108	0.0017	-0.0006	0.002
	[0.0006]***	[0.0020]	[0.0005]***	[0.0089]	[0.0005]***	[0.0039]	[0.0006]***
10	0.0022	0.0052	0.0016	0.0009	0.0016	-0.0024	0.0025
	[0.0007]***	[0.0025]**	[0.0006]**	[0.0075]	[0.0006]**	[0.0040]	[0.0007]***
Constant	[0.0336]***	[0.0564]	[0.0198]***	[0.2596]**	[0.0221]***	[0.0944]	[0.0343]***
	31762	14188	17574	6481	18836	10120	21642
N	0	0	0	0	0	0	0
R-squared	0	0	0	0	0	0	0

Robust standard errors in brackets

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

Appendix Figure 8: Effects of Initial Unemployment Rates on Earnings For Workers Who Moved Province at Least Once and Those Who Never Moved



Appendix Table 9: 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	-0.0139	-0.0382	-0.0427	-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	-0.0348	-0.0054	-0.0075	-0.0431	-0.042	-0.0061	-0.0074	-0.0509
	[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	-0.0411
	[0.0064]***	[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	-0.0321
	[0.0053]***	[0.0008]***	[0.0016]***	[0.0061]***	[0.0063]***	[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	-0.0352	-0.0267	-0.0037	-0.0061	-0.0345
	[0.0049]***	[0.0008]***	[0.0023]***	[0.0061]***	[0.0048]***	[0.0008]***	[0.0022]**	[0.0059]***
7	-0.02	-0.0029	-0.0064	-0.0264	-0.0238	-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	-0.0227	-0.0027	-0.0051	-0.0282
	[0.0057]*	[0.0009]	[0.0031]	[0.0073]*	[0.0055]***	[0.0008]***	[0.0029]*	[0.0072]***
9	-0.0029	0.0002	0.0001	-0.0026	-0.0182	-0.0016	-0.0015	-0.0205
	[0.0080]	[0.0012]	[0.0031]	[0.0096]	[0.0076]**	[0.0012]	[0.0029]	[0.0091]**
10	0.0027	0.0016	0.0049	0.0069	-0.0116	0	0.003	-0.0097
	[0.0071]	[0.0011]	[0.0030]	[0.0092]	[0.0080]	[0.0012]	[0.0024]	[0.0096]
Constant	12.0748	1.2585	1.8379	11.9295	1.4748	13.2315	9.0888	0.0092
	[0.3682]***	[0.0570]***	[0.1540]***	[0.4772]***	[0.0410]***	[0.3755]***	[0.0244]***	[0.1236]
N	14098	14098	14098	14098	8510	8510	8483	5902
R^2	0.29	0.24	0.45	0.34	0.37	0.51	0.28	0.77

Robust standard errors in brackets

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

Appendix Table 10: Effect of Unemployment Rate at time of Graduation on Log Real Earnings Controlling for Firm and Industry Fixed Effects

	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

Robust standard errors in brackets

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

Appendix Table 11: Effect of UR at Time of Predicted Graduation on Log Weekly Wages and Log Weeks, Canadian Census 1981,9186,1991,1996

	Without Current Year FE			With Current Year FE		
Exp. Year	**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