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Econ 191A

10 March 2011

Scarring of Graduating during a Recession across Different Skill Groups

1. Introduction

The short-term effect of entering into the labor market during a time of recession are intuitive, the results of it across different job markets captured by the wage curve in various papers.¹ The consequences of entering the job market during recession are even more detrimental for new graduates—with neither prior job experiences nor connections to the industry that their cohorts have acquired. Opportunities are limited to a significantly smaller pool of candidates as firms' budgets for job trainings and recruitments diminish. As the demand in the labor market decreases, the newly graduated may experience mismatching of jobs—opting to obtain job experiences, however mismatched it may be, instead of waiting for a better-fitted position. In addition, the limited amount of job openings would increase the likelihood and the duration of unemployment upon graduation, both of which would have a dramatic impact on the future earnings of the individuals (Gregory and Jukes). Should job experiences outweighs the benefits of graduating in a good economy, the scarring (the lasting, negative effect) of graduating in poor economic conditions should be non-observable in the long-term. If otherwise, the impact of it would be long-termed and significant even decades after their debut into the labor market.

However, since the required skill sets and the job conditions for the skilled and unskilled

¹ Blachflower and Oswald find using both United States and United Kingdom data the evidences of a wage curve—where higher unemployment rates results in lower pay—which Bratsberg and Turunen's paper, amongst others, later confirms.

workers differ, it is possible that the effect of unemployment rate at the time of graduation of differ in magnitudes and durations. For example, since the job training that goes into skilled work are often more specific to the position itself, it is likely that knowledge and experience that the worker acquired cannot be transferred to another job, which would negate the advantage of graduating early over their contemporaries. Additionally, since companies are aware of the possibilities of overqualified workers transferring to better fit and higher paying jobs in the future, during a recession, firms prefer to use their diminished resources on workers already within the firm (or those with previous experiences in the same area of work) rather than employing the new, high-skilled labors (Majumdar). By comparison, low-skilled jobs are generally less job-specific and the skills needed less time-consuming to impart unto newcomers. Therefore it is likely that the benefits a low-skilled worker gain from additional experiences over their cohorts graduating in a better economy would hold. Disregarding the other factors for the moment, this suggests that the magnitude of the impact from entering the labor market during a recession may be different between low-skilled and high- skilled workers.

The adverse effect of recession on job searching and unemployment on future earning is well-documented. Less explored is the subcategory of the impact of market shocks on first time entrants. This paper elaborates on Lisa Kahn's "The Long-Term Labor Market Consequences of Graduating from College in a Bad Economy." As the title of the paper suggests, Kahn limits her attention to graduates from college with at least a B.S. or B.A. degree.² Kahn, using U.S. data³ and an augmented Mincer earnings function, finds in addition to the increase in further educational attainment during recession, a negative correlation between the national unemployment rate and occupation prestige and, a negative correlation between the national and

² The data Kahn used presents degrees including and not limited to: junior associates, masters, PhDs, MDs and various other professional degrees. The former is not included in her regression whereas the latter are included.

³ National Longitudinal Survey of Youth (NLSY79), spanning at the time of her paper, from 1979 to 2006.

state unemployment rates at the time of the individual's graduation and wage rates that persists years into the future.

In this paper, I investigate the differences between high-skilled and low-skilled workers in magnitude and duration of scarring from graduating during a recession. Rather than just the general negative effect of unemployment rate on wages (which has been well-established), I intend to get a sense of how long the effect would last. Using the model Lisa Kahn presents in the paper, I study the long-term impact that the unemployment rate at the time of graduation has on the future wages of high-skilled and low-skilled labors. In addition, drawing inspiration from Bachmann, Bauer, and David's work with the German data⁴, I specify within the high-skilled laborers, the different levels of education acquired, differentiating between white-collared workers and professionals. In doing so, I divided the labor market into an approximation of three skill-levels—low, high, and professionals⁵.

I chose to utilize the National Longitudinal Survey of Youth (NLSY79) for my purpose. The NLSY79 follows individuals (from age 14 to 22 at the time of the first survey in 1979) from 1979 through the present (though the data available goes up to 2008) and includes their hourly wage rate, year of graduation, and highest degree obtained. I limit the samples to white, single males to eliminate possible racial or gender biases. The sample includes only civilians to limit confounding variables that may impact wage earnings. In my initial phase, I attempt to replicate Lisa Kahn's results, regressing wages on unemployment rate at the time of college graduation only. After acquiring results that supports Kahn's conclusion, I expand the data to include additional groups of cohorts and observations from recent surveys, which previously were

⁴ In their paper—"Labor Market Entry Conditions, Wages and Job Mobility"—contrary to most papers presently available, rather than leaving the labor group unspecified or low-skilled and high-skilled, they divided the skill groups into three: low-, medium-, and high-skilled.

⁵ For this paper, I define "low-skilled" as those with high school education, "high-skilled" as the group of graduates with *only* B.A. or B.S. degree and "professionals" as those with advanced and/or professional degrees.

unavailable, and run the regressions again, separating the high-skilled workers into the “educated” and “overeducated”⁶ groups and execute a regression for each. To allow for better comparison, however, I run a final set of regression, limiting the years of graduation to 1979 to 1989.

My results support Kahn’s conclusions and are consistent with previous studies done on the subject. Following Lisa Kahn’s steps as described in her paper,⁷ I find a statistically significant wage loss of approximately 6% for every increase in unemployment rate at the time of graduation for the aggregated high-skilled group.⁸ And as in Kahn’s paper, the impact of the graduation unemployment rate decreases gradually over time, falling from 6% in wage loss to 2%, though it remains significant. In almost all of my regressions, I find a significant negative correlation between the unemployment at the time of their graduation and wages as well as persistent and statistically significant scarring that lasts well after a decade. The exceptions to the trend are the regressions with sample limited to high school graduates and those with advanced degrees. As anticipated, the magnitude of the effect is smaller for high school graduates at 3.6% to 4.7% wage loss for every percent point increase of unemployment rate to the 4% to near 7%⁹ of the college graduates, though still significant. The long-term trend for low-skilled group shows a faster rate of the negative impact fading and after a decade of experience. For the group with advanced degrees, the unemployment rate at graduation appears to have a positive impact on wages (although this is statistically significant only for one set of data) and this effect persists

⁶ “Educated” is defined as those that received a B.A. or B.S. “Overeducated” is defined as those who earned advanced or professional degrees. “College graduates” are an aggregation of both these subcategories (those with at least a B.A. or B.S.).

⁷ The comparisons of coefficients in this paper are strictly to the OLS estimators made by using national unemployment rates only from Lisa Kahn’s paper. This is not to be confused with the IV estimators or the estimators made from regressing state unemployment rates.

⁸ The group of graduates with *at least* a B.A. or B.S. degree (defined as “college graduates” here) will be referred to as “aggregated high-skilled” workers.

⁹ These are given as ranges since regressions are run for both graduates from 1979 to 1989 and 1979 to 1991.

well past the initial entry. That is, after a decade of experience, the increase in one percent point in unemployment rate suggests a 1% wage gain.

This paper aims to add to the growing collection of literature on the long-term effect of fluctuations of markets on new graduates. Recent interest has given rise to several papers examining this very topic. Aside from Kahn's paper, a Canadian study by Oreopoulos, von Wachter, and Heiz following the progress of a college's graduates over the span of 17 years indicates that the negative effect of graduating during a recession persists for close to a decade after the debut entrance into labor market.

A related study that also looks at the effect of the initial wage differences on a worker's mobility decision and whether or not the job changes do reduce the wage gaps using German data (Bachmann, Bauer, and David). They use the initial wage differences (either positive or negative gaps to the average wage) as an indicator of the market condition when the labor first entered the market and followed the careers of the individuals for duration of five years. From the probit model, they find that the economic condition at the time of the individual's initial entrance is negatively correlated with the chances of the worker choosing to job change (example, an individual with a negative wage gap would be more likely to opt to switch jobs). This result is held constant across the different types of transitions (employment to non-participation, employment to unemployment, and employment to another employment relationship), and in addition, those with lower initial wages tend to be more mobile than those with higher at the beginning of their careers. Another conclusion from the probit model worth noting is that the frequency of these job changes decreases with experience. The results of change in wages as experience increases is supports all previous studies- with experience, the wage differences decreases in similar patterns across all skill groups—defined in the paper as

high-skilled, medium-skilled, and low-skilled. A new observation from the paper that I will draw on to explain my results is that job mobility is associated with a decrease in the wage gaps. This result is emphasized by the outcome that the group shown the least convergence in wages at the end of the five years period is the low-skilled laborer group that chose to stay with their first job.

The organization of the rest of the paper is as follows. Section 2 elaborates on the theory behind this empirical study. The dataset and model that I use to run my regressions are described in Section 3. Section 4 holds the results from the regressions of following Kahn's steps as well as from the regressions on the extended data. And finally, Section 5 discusses in more detail the results from Section 4.

2. Theory on impact of unemployment rates

Studies have suggested the negative effect of graduating during an unfavorable economy can affect the wage rates of the individuals throughout their career. The connection made by these studies is clear: the initial wages that an individual begin with impacts the wages they will subsequently earn in their following careers (whether or not they change jobs). Therefore in a market where the bargaining powers of wages are skewed toward the employers, the wage that the individual would receive during a recession would be lower than in better economic times. The effect is captured by Blanchflower and Oswald in an augmented Mincerian earnings equation with unemployment rate for an individual's local market. However, as Bachmann, Bauer, and David indicate in their study, there is a high rate of job changes for those that begins with a lower-than-average wages of their skill-group, which leads to a gradual convergence of wages in each respective group. So although human capital theory indicates that the skills cannot be transferred when the individual changes employment, the study suggests that the experiences

lost in those few years of job mismatch would not leave a persistent effect on the future wages of the individuals.

However, it can be that should the cohorts that graduated during a recession opt to change their jobs, they would be competing for the same jobs as those recently graduated as well as the experienced workers who have been previously trained in similar sectors. Assuming that the skills are not transferable, as most high-skilled positions are not, they would not be holding any advantages over the newly graduated with no market experience. Rather, they would be facing the disadvantage of an overcrowded labor market and holding less bargaining power when negotiating their wages. This reasoning is supported by Genda and Kurosawa's paper, in which they conclude that graduating in the recession does increase the probability of unemployment in the future even after the country's economy has recovered. For the workers that fail to acquire to obtain a job (and decide to remain in the labor force), the period of unemployment early in their career may send a negative signal to their future employers, which could discount the wage rates that they would have otherwise received.

On the differences in the labor market between the high-skilled and low-skilled workers, while it is true that the jobs of low-skilled workers require less job-specific and intensive training, it is also important to note that the increase in supply of skilled labors would lower the wages of the unskilled workers (Kiley). If the market becomes flooded with high-skilled workers because of the limited availability of job opening, the low-skilled workers would be faced with lower wages, and therefore the scarring of high unemployment rate in the year of their graduation would be more persistent than their high-skilled cohorts. However, it is possible that since low-skilled jobs often do not require as much training that goes into the high-skilled jobs, low-skilled workers that entered during a "bad" job market would be able to catch up to their

cohorts faster than it would take for their high-skilled counterparts.

3. Data and Model

As mentioned above, the data used is the National Longitudinal Survey of Youth (NLSY79), which follows a group of individuals from the age 14 to 22 at the time of the first interview in 1979 up to the present, with the data gathered from 2008 as the most recent survey released. For all my regressions, I restrict the samples to white males to avoid biases that might be caused by gender or race discriminations. All those that served or are in military services are also exempted to minimize confounding variables that would affect wage earnings. These restrictions are imposed on all of the samples used.

I begin my research by attempting to reproduce Kahn's results. Rather than using the additional surveys available to me, I limit myself to using what was available in 2006. To find the impact of unemployment rate on wage loss for aggregated high-skilled workers, I use the "highest degree obtained" variable from the NLSY79 data to differentiate skill levels. Since my goal is to find the effect on the aggregated high-skilled workers group, I include only those that received *at least* a B.A. or B.S. degree and graduated in the year 1979 to 1989. This gives me at least 17 years worth of observations for the entire sample and includes three different recessions in the range of years that the sample graduated in. Finally, I adjust the wages with the Consumer Price Index by the dollars value in 2000.

Following the examples of similar researches mentioned in the introduction, I will use a modification of the Mincer Earnings model:

$$\ln[w(s, x)] = \alpha_0 + \rho_s s + \beta_0 x + \beta_1 x^2 + \varepsilon$$

Where the independent variable is log wage and the dependent variables, s is schooling and x ,

work experience. The parameter ρ_s then stands for the “rate of return to schooling.” I will use a modified version of the model that Kahn used in her paper of the long-term consequences of graduating during a recession.¹⁰

$$\begin{aligned} depvar_{it} = & \alpha_0 + \lambda_1 UEGrad_i + \lambda_2 UEGrad \times Exp_{it} + \alpha AFQT_i + \gamma' Y_t + \delta_1 Exp_{it} \\ & + \delta_2 Exp_{it}^2 + u_{it} \end{aligned}$$

Here, the dependent variable is log wage. The independent variables are mostly the same as the Mincer Earnings function above. $UEGrad^{11}$ is defined as the unemployment rate at the time of graduation (from their highest level of education) and exp the years of potential experience¹² that individual i has at year t . To control for individual effect as well as a measure of ability, the age-adjusted¹³ $AFQT$ (the Army Forces Qualifying Test) scores are included in the regression. Y is the fixed year variable, where each year that the survey is taken is captured by a dummy variable. λ_1 is the effect of unemployment rate at the time of graduation on log wage. The effect over time is captured over time by the interaction between unemployment rate and potential experience, noted here as λ_2 .

After acquiring the results from following Kahn’s steps (which are in the next section), I extend the data to include surveys up to 2008 and add in graduates from 1990 and 1991 in the years of graduation for the sample. This gives me graduating years that span from 1979 to 1991 and an additional period of recession. Just as before, there is 17 years of observable potential experience for all individuals in the sample. I divide the sample into low-skilled and aggregated high-skilled groups. The low-skilled workers are defined as those who received a high school

¹⁰ This is essentially her regression for her OLS estimators of national unemployment rate.

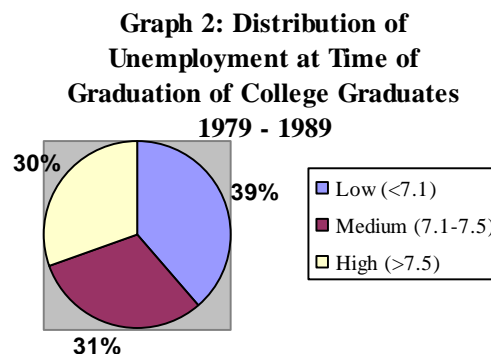
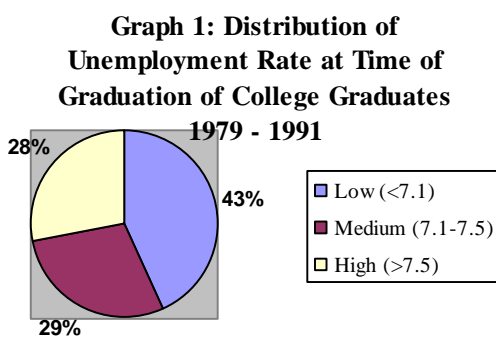
¹¹ The unemployment rate used in this is the national unemployment rate on the Bureau of Labor Statistics site.

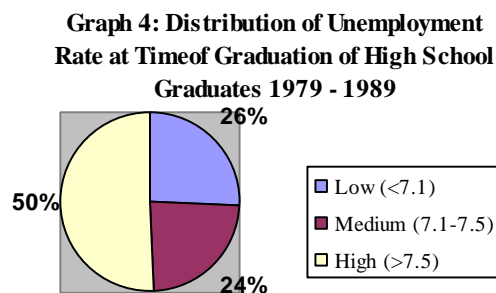
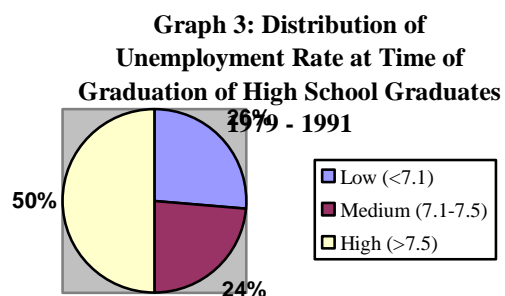
¹² This is referred to as potential experience as it counts the numbers of years since the individual has finished their schooling.

¹³ The age-adjusted AFQT scores are constructed as they were in Kahn’s paper—standardized by subtracting the age-specific mean and dividing by the age-specific standard deviation.

diploma as their highest degree received and aggregated high-skilled group as those who received at least a B.A. or B.S. After running the regressions for both, I further specify within the aggregated high-skilled groups the high-skilled and the professionals, limiting those only with B.A. or B.S. degrees for the former group and those with advanced and/or professional degrees for the latter. The results of these regressions are in Section 4.2.

Finally, I restrict the years of graduation to 1979 to 1989 again. With the surveys that I have access to, there are 19 years of observable information for all the individuals in the sample. I again run regressions for both the low-skilled group and aggregated high-skilled group, and then for the high-skilled and professional groups. It should be noted here that after 1994, the survey changed from being taken annually to being taken once every other year, but should not affect the overall conclusion, especially for those drawn from the aggregated high-skilled regression and the specified high-skilled and professional regressions since the distribution of their cohorts (graduating in low, medium, and high rates of unemployment) are approximately evenly split as shown in Graph 1 and Graph 2. The distribution for the low-skilled group, however, is skewed toward the higher rates of unemployment (Graph 3 and Graph 4). This will be taken into account when drawing my conclusion.





There are various endogenous factors that I fail to capture with this model, with “age” being the most cause for concern. As I have not instrumented for age, it is possible that there could be confounding variables. However, in Kahn’s paper, the estimators of the OLS and IV regressions are similar (though with the OLS estimator biased downward) and equally significant. Therefore, the estimators should still be a good approximate of the scarring effect. In fact, the R-squared value from these regressions indicates that the model does explain a decent amount of variation found in log wage. An interesting note—the wage of the low-skilled group varies much more than that of the general high-skilled groups, so a smaller R-squared value is to be expected for these regressions.

4. Results

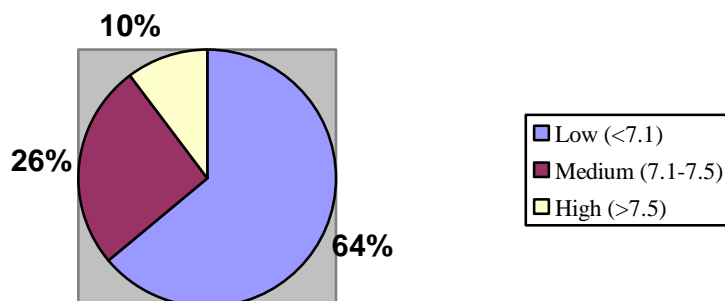
I find results that are consistent with what the U.S., Canadian, Swedish, and similar studies have obtained. In all of the groups and regressions, there is a statistically significant wage loss that is correlated with the unemployment rate at the time of individual’s graduation. For the long-term results in specific, I find that all of the regressions with college graduates (from both sets of extended data as well as Kahn’s data) yield similar results in the rate at which the scarring fade over time. All results indicate that the scarring effect last long after the individual’s initial

debut into the labor market and are statistically significant even after 15 years of experience. For both the low-skilled regressions, the wage loss from graduating in a bad economy has a lower magnitude than that of the high-skilled groups as well as a faster rate of scarring fading. However, this lower magnitude may be associated with the uneven sizes of individuals for each graduation unemployment rates level. As seen in Graph 3 and Graph 4, there is a higher distribution of those with graduation years during years of higher unemployment rate.

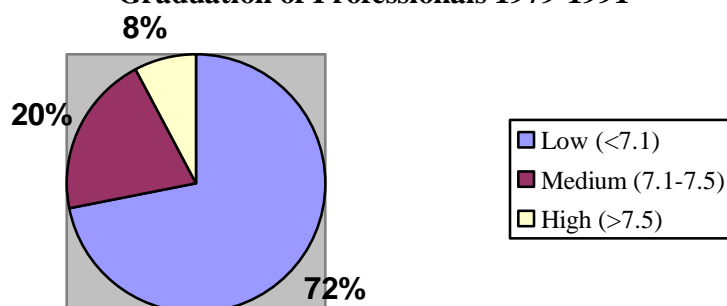
In contrast to the rest of the regressions and groups, where the unemployment rate negatively impacts the individual's wage earnings, for the professionals, it appears that there is a positive correlation (however it is only significant for the graduation group from 1971 to 1991). This means that the higher the unemployment rate was at the time of the individual's graduation, the higher the wage gain they have over their cohorts. For the long-term effect, the trend of this group differs from the others as well. Rather than the magnitude of the scarring decreasing over time, it increases instead, suggesting that as the individual gains years of experience, their wage gains over their cohorts who graduated into a good job market would increase. Just as all the long-term results from the other groups, the effect (although it is positive in this case as opposed to the negative of the others) appears to last well after the initial entry into the workforce (however, they are at a relatively less significant level). For the professional group with graduates from 1971 to 1989, the coefficients essentially suggest that the unemployment rate at the time of their graduation does not affect the wage earnings of these individuals.

However, the distribution of the professional group is not as evenly distributed as that of the college graduates, with the numbers of individuals that graduated during high unemployment rate as the smallest of the three unemployment groups (shown in Group 5 and Group 6) and the numbers of observations in this skill group is much smaller than that of all the other groups.

Graph 5: Distribution of Unemployment Rate at Graduation of Professionals 1979-1989



Graph 6: Distribution of Unemployment Rate at Graduation of Professionals 1979-1991



Since the variance and distribution of these samples are compromised, even with a fairly good R-squared value and statistically significant coefficients, the conclusions drawn from these regressions should be taken with a grain of salt.

Table 1 and Table 2 list the coefficients of all of the regressions: Lisa Kahn's, the sample including graduation years from 1979 to 1991, and the sample including graduation years from 1979 to 1989. The specific scarring from the unemployment rate at the time of the individual's graduation will be discussed in further detail in Sections 4.1 – 4.3.

4.1 Results from Replicating Kahn's Steps

The results from my attempts to reproduce Kahn's results are listed under Table 3. Just as

Kahn's paper, only those who received at least a B.A. or a B.S. are included in the sample. Kahn finds, from the same regression and same data, a percentage point increase in unemployment rate at graduation leads to a wage loss of 5.9% at the 5% significance level.

Panel A consists of the coefficients from running the regression. I find that for every percentage point increase in unemployment rate at an individual's graduation, there is a wage loss of 6.0% at the 1% significance level. The minor discrepancies in the estimators can be attributed to the error when organizing the data, but the difference of <0.1% should not be cause for concern. With each passing year, the scarring effect decreases by 0.3%, which, again, is similar to Kahn's 0.2%. This suggests that the wages will converge eventually, just as Bachmann, Bauer, and David suggest.

To see how long it would take for the convergence to occur, I continue following Kahn's steps. The long-term results are found under Panel B and the results are consistent with Kahn's results. Kahn finds that although the impact does lessen over the years (after 15 years, the effect is 0.26% at a 10% significance level), the effect persists at a 1% significance for a decade after initial entry into the job market. Again, I find a trend supported by Kahn's results. The scarring does fade gradually over the decade, with a 0.2% impact on the 15th year at a significance level of 5%. However, for the first decade, the effect of graduating during a recession or time of high unemployment rate means a statistically significant negative impact on the wage earnings for the individual relative to their cohorts.

4.2 Results from Individuals Graduating Between 1979-1991

Table 4 contains the results from restricting the sample to all that graduated between 1979 and 1991. Again, Panel A describes the estimators of regression and the long-term effect estimated

with the coefficients obtained is under Panel B. The table is divided into four parts and records the results from the group of graduates from 1979 to 1991 in their respective skill groups: low-skilled group, aggregated high-skilled group, high-skilled group, and professional group. Keeping in mind that there is an uneven concentration of individuals graduating during a period of high unemployment rate for the low-skilled group, I find a slightly lower effect of scarring in both the short-term and the long-term.

When I isolate low-skilled laborers as a group, with every increase in percentage point of unemployment rate comes a 3.6% wage loss that is significant at the 1% level. This gap closes at 0.4% a year. This suggests that for the low-skilled group, the gap in earnings between those that graduated during a bad job market and those that graduated during a good job market closes faster than that of the high-skilled groups. The fitted effect results in Panel B support this assumption. It takes approximately a decade for the initial negative effect to fade completely.¹⁴ However, rather than the impact from the unemployment rate fading and staying statistically insignificant, the results of the following years suggest that after the gap closes, low-skilled workers that entered the market during high unemployment rate not only catch up but overcome the advantages that their more timely cohorts might have had on them. Suppose that the distribution of the low-skilled group does not affect the regression significantly, this indicates that my earlier hypothesis of the transferability of the low-skilled workers' experiences.¹⁵

For the aggregated high-skilled group, the wage loss is 4.6% at a 1% significance level and the rate at which it dissipates appears to be 1% (though not statistically significant). These results are markedly different from the previous regression on the same skill-level whose results

¹⁴ The wage loss is at 0.6% in the 10th year. However, this number is not statistically significant by any interpretation.

¹⁵ Taking Bachmann, Bauer, and David's paper into account, this might mean that a good deal of job changing takes place once the economy recovers.

were reported in the previous section. But the trend of the long-term effects appears to be similar to that of the previous regression, except for the fact that the effect of debuting in a bad job market are persistent well after a decade. However, this discrepancy can be explained by the disproportional division of low, medium, and high unemployment rates in the sample. Recall from Graph 1, nearly half of the individuals in the sample graduated in periods of low unemployment rate, which probably skewed the OLS estimator.

Kahn mentions in her results that when restricting the sample to those that obtained only a B.A. or a B.S., the wage equation is similar in magnitude, significance and persistence to when aggregated with advanced and/or professional degrees. The results of my regression are in the fourth column of Table 3. Surprisingly, the effect of the unemployment rate is closer to that of the one derived from the previous regression (with data up to 2006 and graduates from 1979 to 1989) at 6.5% wage loss, and is larger than the resulted unemployment rate effect of the aggregated high-skilled group. Once again, it is significant at the 1% level, but the long-term trend is more similar to that of the aggregated high-skill group. With the effect fading at 0.1% (though, again, not significant), the effect persists even after 15 years.

The results from the professional group contradict what one would have intuitively expected. There is a 12.7% wage gain at a 1% significance level. Because there is a positive effect, rather having the gap close, there is a significant increase in the gap between those that graduated during high unemployment rate and those that graduated during low unemployment rate, with the advantage going to the individuals that graduating during a high unemployment rate. This means as the years of experience increase, those that graduated in unfavorable economic market would have an increase in wage gains over those that graduated those that did not.

The addition of a recession year as well as the uneven distribution of unemployment rates yields results that sometimes run against intuition, though the general trend appears to be the

same for most groups: The impact of the unemployment rates is negative on earnings, and the effect of it can continue years after the individual's initial entry.

4.3 Results from Individuals Graduating Between 1979-1989

However, to see if the results would be different with a more even distribution of unemployment rates, I restrict the graduation years once more to 1979 to 1989. In doing so, there are two major differences in the outcome. The effect of unemployment rate for the college group is much closer to that of the original estimator and for the professional group, the effect is no longer significant. The results from this set of regressions are listed under Table 5

Once again, the low-skilled group seems to be less impacted by entering during a poor job market when compared to their cohorts of other skill levels. The average wage loss for this skill level is 4.7% for every percentage point increase in unemployment rate at time of graduation. Like all the estimators of the effect thus far, this is significant at the 1% level. Its long-term trend is similar to the low-skilled group in the previous section. The effect of unemployment rate deteriorates at 0.4% for each year after the initial entry (which is also significant at the 1% level). The estimators predict that in approximately a decade, the individuals' wages of this skill group that graduated during high unemployment rates would catch up with those that graduated in better job markets. In the years following the closing of the gap, however, the individuals that graduated during high unemployment rates not only maintained that catch-up, but are predicted to continue to hold a higher wage than those that graduated in periods of better market.

The results of the aggregated high-skilled group are in the third column of Table 5. This time, the effect of unemployment rate runs closer to that of the results that I received from following Kahn's steps. The average effect of unemployment is 6.9% wage loss at a 1%

significance level, fading at a 0.2% with each year pass; although in this case, the fading of the scarring is not statistically significant.¹⁶ The long-term results under Panel B shows that like the two regressions reported previously, there appears to be a gradual convergence of wages. However, because the initial difference in wages is larger than either regressions previously estimated for the same skill level, in this case, at the end of the 19 years, there is still a statistically significant wage loss of 3.9%. It should be noted here that since this sample only includes those that graduated from 1979-1989, this is essentially the same group of individuals that I use to estimate the results from Section 4.1 with. The extension of the wage records to 2008 as opposed to 2006 along can be attributed as the cause for the differences in estimators.

When running the regression with the high-skilled group, I obtain results that support Kahn's conclusion that when regressing with a sample of only B.A./B.S., the results are similar to when the advanced and/or professional graduates are also included in the sample (as it should, since the sample of individuals are essentially the same as the ones that she uses for her regression). The regression yields a statistically significant average wage loss of 6.7% initially that fades at 0.1% with each year of experience. I find that in the long-run, as all previous results have shown, there the effect is persistent. Although contrary to the results in Section 4.1, I find that the effect seems to linger longer. There is a slower recovery from the scarring with my sample, with the estimated wage loss at 4.7% for every percentage point increase in unemployment rate at the time of graduation at the end of the 19 years.

The results from the professional group are in the last column of Table 5. The average wage difference is a 6.6% gain for a percentage point increase in unemployment rate at graduation and this gap would increase by 0.7% each year after the individual's debut into the

¹⁶ This result is actually more similar to Kahn's findings. Her results are average wage loss of 6.2% (at 5% significance level), with the effect of it dissipating at 0.2% (not statistically significant).

job market. However, this estimator is not statistically significant. This means that it is possible that the unemployment rate at the time of the individual's graduation has no bearings on earnings for those with an advanced and/or professional degree. The long-term effect of the scarring indicates that there is an increase in the wage gap over time, but the significance levels of these fitted effects are not as significant as those estimated of the other groups. The reasoning here can be explained intuitively: The efforts and investments required for an advanced or professional degree limits the number of individuals who could successfully obtain the degree.¹⁷ Since there are relatively few professionals in the market at any time, the demand for them should not be as reactive to the economic environment as those with only a B.A. or B.S. degree, therefore the professionals applying for jobs would still have some bargaining power. An alternative explanation could be that these jobs are specific and necessary (i.e. doctors, lawyers, etc), so even in a recession, those with the skills needed for these positions would still be in demand.

5. Conclusion

The results that I find are slightly varied across different sets of regressions, but there is a general trend. As a whole, they support the findings from Kahn's paper—graduating into the labor market at a time of high unemployment rate has a negative impact on wages and this scarring can last years well after the initial entry. The story behind this effect can be pieced together with support of previous studies. Papers have illustrated that those that start off their careers at a lower wages tend to keep those lower wages. (Kondo, and Bachman, Bauer and David) This can be attributed to the fact that the wages offered by employers are based on the preceding wages. Other studies mentioned earlier suggest that those that graduated during the recession have

¹⁷ This is reflected in the data. The professionals group is much smaller than the other groups and is a very small portion of the entire sample.

higher chances of having periods of unemployment. (Collier) This may give the potential employers erroneous signals about the ability and productivity of the individual, leading to them to offer discounted wages. The fixed effect indicate that the wages do converge eventually, although it appears it would more than two decades for the wages to converge completely for the aggregated high-skilled and the high-skilled group. However, there are two groups that do not conform to this conclusion: the low-skilled group and the professional group.

For the low-skilled group, in both sets of regressions, we see a smaller magnitude in the impact from the unemployment rate at the time of graduation and when predicting the fixed effect, there is a convergence at approximately the 10th year. In addition, for both the 1979 to 1991 and 1979 to 1989 groups, the negative effect of graduating during a recession is overwhelmed by the interaction term of experience and unemployment rate. This implies that after the 10th year, those that graduated during a recession have a wage gain over their cohorts. The results here supports my theory that for the low-skilled group, because the trainings for their jobs is easier to acquire and faster to learn, the individuals that graduated during a period of recession should be able to trade jobs to obtain higher wages once the economy is in a better state. It can also be that for the individuals that graduated during a bad economy, they are more familiar with rough situations so it stands to reason that they would have the incentive to improve their earnings be it by changing jobs or competing for better positions.

However, as the coefficients are close to that of the aggregated high-skilled group and taking into consideration that the distributions of the unemployment rate at graduation are skewed toward that of the high unemployment rate, I cannot rule out that it may be possible there is not a significant difference between the unemployment rate effect of low-skilled and high-skilled groups and the apparent difference in magnitudes of the effect is caused by the lack of an

even distribution.

Likewise, for the professional group, there uneven distribution of the unemployment rates makes it difficult to determine if there is an absolute difference between the impact on this skill group and that of the other skill-levels. I have reported two significantly different estimators, with only the one of the graduates graduating from 1979 to 1991 to be statistically significant. It is possible that due to the small numbers of observations of this group (the number of individuals totaling around 60 to 80 for both regressions), the additional two years of cohorts can have a large impact on the estimators. For both samples, we see a positive impact from the unemployment rate rather than a negative effect. This suggests for at least one of the samples, the higher unemployment rate is at the time of their graduation, the more wage gain they have. An explanation can be found in the smaller group of professionals graduating during periods of high unemployment rate.¹⁸ Since the jobs that these professionals hold are usually in high demand regardless of the current economy conditions, they have greater bargaining power and can afford to ask for higher initial wages. And naturally, since they began their careers with higher wages, they would keep this gain over their cohorts. The same reasoning can be used to explain the second result for the same skill level. For the second regression, the effect of the unemployment rate is not significant. It is possible that since the demand for professionals are always there, the fluctuations of the job market should not affect them as much as they do for the other skill groups.

A further attempt should be made to obtain sets of data in which the low-skilled workers and professionals samples have equal distributions of low, medium, and high unemployment rates. This would allow for a more precise measurement of the effect of unemployment rates at

¹⁸ The distribution of unemployment rates in this sample can be found in Graph 9. The numbers of individuals graduating during high unemployment rates are visibly smaller than that of the other skill levels.

the time of their graduations. In addition, although there have been papers and research done on fitting variations of the earnings function to different countries, there has been only a few that has followed the individuals of the sample long enough to construct a long-run picture of the effect. In piecing together a long-term idea of the unemployment rate effect, we can obtain a better, clearer picture of the international job market.

As is, I can conclude that there appears to be a difference in magnitude and duration between these skill groups with the high-skilled (with only a B.A./B.S. degree) as the highest negatively impacted group and the professionals as the least affected with the effect of unemployment rates at graduating implying wage gains rather than wage losses. For me, the advice I would give to my classmates and to myself is: "Don't leave for the real world yet."

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Table 1: Full Regressions Done from Lisa Kahn's Model and the 1979-1991 Graduation Year Extension

Graduation Years	1979-1989	1979-1991			
	LK Regression	Low-Skilled	Aggregated High-Skilled	Specified High-Skilled	
Education Level	At least B.A./B.S.	High School Diploma	At least B.A./B.S.	At least B.A./B.S.	Advanced and/or Professional
EUGrad	-0.060** [0.010]	-0.036** [0.006]	-0.046** [0.10]	0.065** [0.10]	0.127** [0.031]
EUGrad*Exp	0.003** [0.001]	0.004** [0.0004]	0.001 [0.001]	0.001 [0.001]	0.002 [0.003]
AFQT	0.118** [0.008]	0.095** [0.005]	0.086** [0.008]	0.050** [0.008]	0.177** [0.025]
Exp	0.053** [0.006]	-0.008 [0.006]	0.049** [0.005]	0.064** [0.006]	-0.013 [0.020]
Exp ²	-0.001** [0.0002]	0.0005** [0.0002]	-0.001** [0.0002]	-0.001** [0.0002]	0.00001 [0.001]
Constant	7.463** [0.111]	6.981** [0.030]	7.474** [0.111]	7.359 [0.0002]	7.223** [0.308]
Observations	7767	12908	7931	6267	1664
R-Squared	0.334	0.205	0.319	0.335	0.346

+10% statistically significant. *5% statistically significant. **1% statistically significant.

Table 2: Full Regressions Done from 1979-1989 Graduation Year Extension

Graduation Years	1979-1989			
	Low-Skilled	Aggregated High-Skilled	Specified High-Skilled	
Education Level	High School Diploma	At least B.A./B.S.	At least B.A./B.S.	Advanced and/or Professional
EUGrad	-0.047** [0.006]	-0.069** [0.10]	-0.067** [0.010]	0.066 [0.77]
EUGrad*Exp	0.004** [0.001]	0.002+ [0.001]	0.001 [0.001]	0.007 [0.006]
AFQT	0.097** [0.005]	0.092** [0.008]	0.054** [0.008]	0.243** [0.029]
Exp	-0.026** [0.007]	0.063** [0.006]	0.072 [0.006]	-0.012 [0.031]
Exp ²	0.001** [0.0002]	-0.001** [0.0002]	-0.001 [0.0002]	-0.001 [0.002]
Constant	7.035** [0.052]	7.599** [0.104]	7.388** [0.109]	6.686** [0.863]
Observations	12788	7385	6071	1314
R-Squared	0.204	0.334	0.351	0.361

Table 3: Log Wage¹ Regression Results (Using Lisa Kahn's Data²)
 White Males with at Least a BA/BS graduating between 1979-1989

A: Regression Coefficients	
College Unemployment Rate	-0.060**
	[0.010]
College*Exp ³	0.003**
	[0.001]
B: Fixed Effects for Selected Years of Experience	
Years After College:	
1	-0.060
	[0.010]**
5	-0.047
	[0.007]**
10	-0.033
	[0.007]**
15	-0.020
	[0.009]*
Observations	7767
R-Squared	0.334

¹ Deflated to 2000 currency

² The data she used was the NLSY79, with surveys from 1979 to 2006. I replicated by only using data up to 2006 as well.

³ Where "exp" is years of potential experience.

Table 4: Log Wage Regression Results
White Males Graduating Between 1979-1991

Education Level	High School	College	BA/BS	College Specified ¹
				Advanced/Professional Degree
A: Regression Coefficients				
College	-0.036**	-0.046**	-0.065**	0.127**
Unemployment Rate	[0.006]	[0.010]	[0.010]	[0.031]
College*Exp	0.004**	0.001	0.001	0.003
	[0.0004]	[0.001]	[0.001]	[0.003]
B: Fitted Effects for Selected Years of Experience				
Years After College:				
1	-0.033	-0.046	-0.064	0.130
	[0.005]**	[0.010]**	[0.010]**	[0.029]**
5	-0.019	-0.043	-0.059	0.131
	[0.004]**	[0.001]**	[0.008]**	[0.026]**
10	-0.001	-0.039	-0.052	0.156
	[0.004]	[0.007]**	[0.007]**	[0.029]**
15	0.017	-0.036	-0.046	0.171
	[0.005]**	[0.009]**	[0.008]**	[0.038]**
17	0.024	-0.035	-0.044	0.177
	[0.005]**	[0.010]**	[0.009]**	[0.042]**
Observations	12908	7931	6267	1664
R-Squared	0.205	0.319	0.338	0.346

¹ "Aggregated high-skilled" workers.

Table 5: Log Wage Regression Results
White Males Graduating Between 1979-1989

Education Level	High School	College	BA/BS	College Specified
				Advanced/Professional Degrees
A: Regression Coefficients				
College	-0.047**	-0.069**	-0.067**	0.066
Unemployment Rate	[0.006]	[0.010]	[0.010]	[0.077]
College*Exp	0.004**	0.002	0.001	0.007
	[0.0005]	[0.001]	[0.001]	[0.006]
B: Fitted Effects for Selected Years of Experience				
Years After College:				
1	-0.043	-0.067	-0.066	0.073
	[0.006]**	[0.010]**	[0.010]**	[0.073]
5	-0.027	-0.061	-0.062	0.101
	[0.005]**	[0.008]**	[0.008]**	[0.058]
10	-0.006	-0.053	-0.056	0.137
	[0.004]	[0.007]**	[0.007]**	[0.057]** ¹
15	0.015	-0.045	-0.051	0.172
	[0.005]**	[0.009]**	[0.008]**	[0.059]**
17	0.023	-0.042	-0.049	0.186
	[0.006]**	[0.010]**	[0.009]**	[0.066]**
19	0.031	-0.039	-0.047	0.200
	[0.007]**	[0.012]**	[0.010]**	[0.074]**
Observations	12788	7385	6071	1314
R-Squared	0.204	0.334	0.351	0.361

¹ It should be noted that the p-values of these fitted effects are very close to 0.010.