LABOUR MARKET OUTCOMES FOR HIGH SCHOOL GRADUATES OF ONTARIO'S DOUBLE COHORT

by

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Abstract

In 2003, Ontario eliminated grade 13, bringing it in line with other provinces that ended high school at grade 12. This created a 'double cohort,' as Ontario's final cohort of grade 13 students and first cohort of grade 12 students graduated at the same time. This paper analyzes the effects of this policy change on those who graduated high school as members of the double cohort, addressing a lack of previous work done on the topic. Previous work suggests that there may be persistent effects of labour market conditions (and economic conditions in general) upon entry to the workforce by labourers. Application data from Ontario universities suggests that Ontario universities were able to accommodate the extra students, therefore this paper focused only on high school graduates with no post-secondary education. I find little evidence for any effect (transient or persistent) of being in the double cohort on wages, earnings, unemployment and weeks unemployed on the double cohort in general. I found only weak evidence suggesting that earnings are reduced, and unemployment is increased with every additional percentage point of unemployment upon graduation. Finally, I found strong evidence for a persistent decrease in wages and earnings for women who were members of the double cohort compared to all men, and women who were not members of the double cohort, suggesting a gendered impact of this policy change.

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I. Introduction

For decades, the education policy of Ontario was inconsistent with other provinces in terms of the number of years of high school. Historically, Ontario had 5 years of high school, while the large majority of provinces had 4, or had phased out a fifth year. In 2003, Ontario finally ended its fifth year, also known as grade 13. In doing so, it created a ‘double cohort,’ since two classes graduated, one, the final cohort graduating from grade 13 and one, the first cohort to graduate from grade 12.

This paper attempts to analyze the effects of this policy change on those who graduated high school with a graduating class almost double the size than they otherwise would have, had the phase out not occurred or occurred differently. The effects of this policy change have not been studied intensely in the academic literature. With the exception of one working paper, none of the research on this topic addresses the effect of the policy change on the labour market.

Previous work suggests that there may be persistent effects of labour market conditions (and economic conditions in general) upon entry to the workforce by labourers. This work uses labour market conditions during recessions and periods of high growth, which results in workers entering the labour market in periods where there are few high quality firms, or many, respectively. This paper attempts to see if there is a persistent effect on labour market outcomes for people entering the labour market with an unusually large group of other labourers entering the labour market.

First, I look at application data for Ontario universities and demonstrate that Ontario universities were able to accommodate the extra students. This information, combined with that from Oreopoulos et al (2012), which shows that wages for disadvantaged workers may never recover from entering the labour market in a depressed economy, leads me to focus on the effect of this policy change on high school graduates specifically. Second, I perform a simple regression to analyze the effect of being in the double cohort on wage, earnings, the probability of being unemployed, and weeks spent unemployed. I find little evidence for any effect on these labour market outcomes, let alone a persistent effect. I do, however, find some weak evidence that there may be a large impact of being a member of the double cohort on women. Third, I attempt to find a relationship between these labour market outcomes and the initial level of unemployment faced by high school graduates, but find only weak evidence suggesting that earnings are reduced, and unemployment is increased with every additional percentage point of unemployment upon graduation. Fourth, I show strong evidence for a persistent decrease in wages and earnings for women who were members of the double cohort compared to all men, and women who were not members of the double cohort.

In Section II, I discuss the policy change in more detail, and look at application data to Ontario universities. In Section III, I summarize important results from previous literature on the double cohort and the long-term effect of entry conditions on labour market outcomes. In Section IV, I discuss the data I use throughout this paper, as well as the methodology of the empirical analysis I perform. In Section V, I report the results of my work. Finally, in Section VI, I offer some concluding remarks.

II. Policy Change

In 2003, Ontario secondary schools finished a province wide phase-out of the Ontario Academic Credit (OAC), or fifth year of secondary school colloquially known as “grade thirteen.” This resulted in what is referred to as the “double cohort,” when the final cohort of OAC students graduated at the same time as the first cohort of four-year secondary students. This led to the then largest, high school graduating class Ontario has ever produced. While two classes graduated at one time, this does not mean that the cohort was truly twice the size as usual. The OAC gave students the opportunity to graduate early if they wished, by completing their required credits in four years, while students still sometimes choose to stay for a fifth year of secondary school. Media at the time reported cases of students in the last OAC cohort choosing to graduate early, or students in the first four-year program choosing to stay in high school an extra year to avoid the temporarily increased competition in university application and increase in labour market entrants.

Nevertheless, it is clear that most students chose to graduate under their standard secondary programs. This means that Ontario saw a massive one-off spike in students applying to post-secondary education programs, as well as a big increase in entrants to the high school graduate labour market.

The double cohort had the potential to seriously affect the educational attainment of this cohort. Students, who in any normal year may have been able to enter the university program of their choice, may have been forced to enter less competitive programs than the ones they preferred, or may have not been able to enter university at all. Students that did receive admittance may have predicted a tougher labour market in their fields of study upon graduation from university, and chosen to study in disciplines they predicted would have less competitive job markets. Though most students stayed in school for grade 13, the OAC was meant as an academic stream for those students going to university. Therefore, the final OAC cohort may have been more prepared for university than the first four-year cohort.

Fortunately, university administrators and the Ontario government reacted to the increase in students. In 2002, the government of Ontario announced it had increased its funding for pos-tsecondary institutions by around $100 million in response to revised enrolment projections due to the double cohort. In preparation for the double cohort, Universities, even those outside of Ontario, increased enrollments and opened more dormitory spaces for 1st year students, either by reallocating existing ones or acquiring more dormitories. These policy decisions may have lessened the impact on the education of the double cohort, and likely were actions that would have had to be taken in the future to handle Ontario's growing population.

By looking at general unemployment rates in Figure 1, one can see that there is something occurring for workers who are age 15-19 in Ontario in the year 2003. This is the year the double cohort graduates, and it is where unemployment for this group of Ontarians peaks. Meanwhile the unemployment rates for all Canadians and all Ontarians do not appear to change in a similar way.

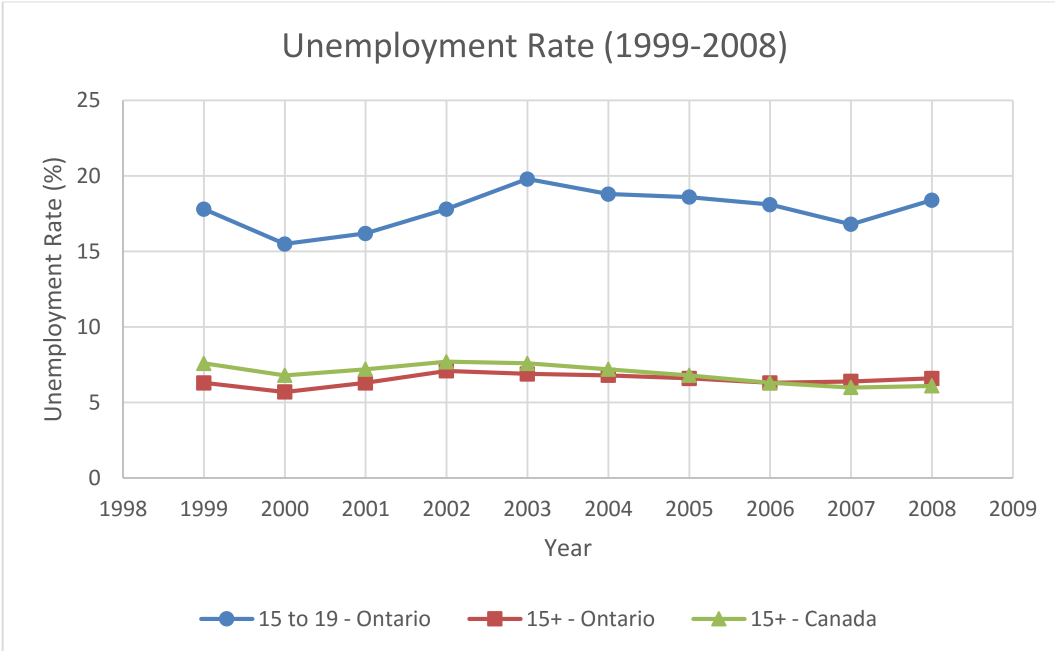

Figure 1 - Unemployment Rate (1999-2008)[1]

Figure 2 explores this further. By comparing the unemployment rate for workers aged 15-19 (the smallest age grouping that will include the double cohort) in Ontario and the rest of Canada, we see a divergence in 2003 between the unemployment rates. Before and after the double cohort, Ontario and the rest of Canada have similar trends (with different magnitudes) in the unemployment rate for this age group, but from 2002 to 2004 the Ontario group sees a sudden increase in unemployment.

[1] Statscan CANSIM data

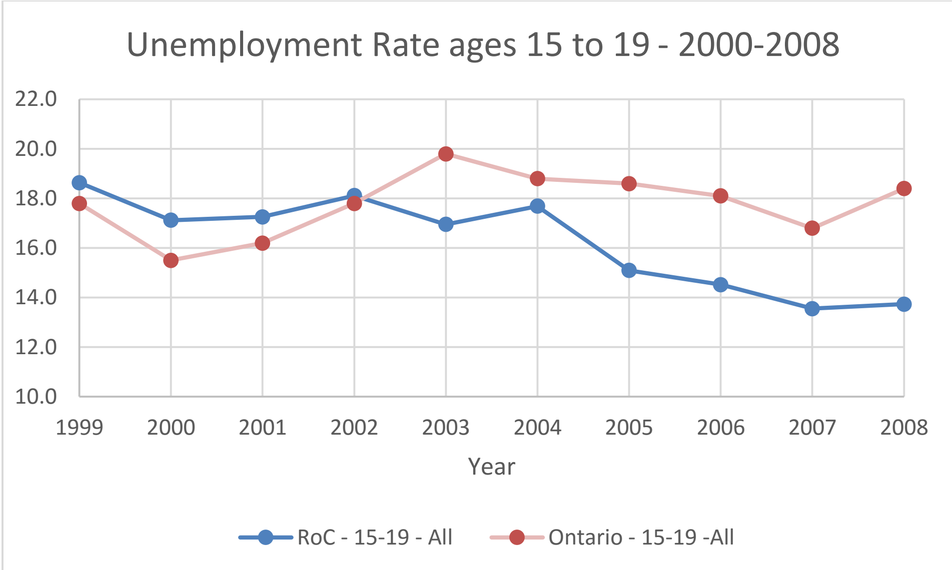

Figure 2 - Unemployment Rate 15-19[2]

Figure 3 shows that the unemployment rates both Ontarians and other Canadians have tended to follow similar trends for quite some time. The biggest exception is during the double cohort period, while there is another deviation after the Great Recession.

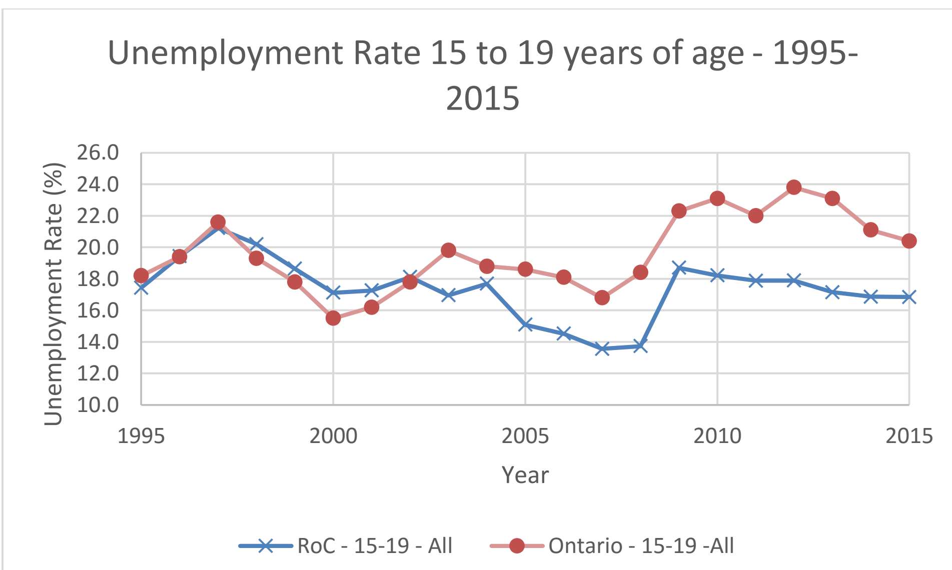

Figure 3 - Unemployment Rate 15-19 (20 years)[3]

[2] Statscan CANSIM data
[3] Statscan CANSIM data

Figure 4 shows the unemployment rate of Ontarians and other Canadians who have graduated high school and are between the age of 15 and 24. In this figure one can see a diverging trend between the two regions. Starting in 2003, Ontario sees a spike in unemployment for high school graduates, which persists until 2005. During that time the rest of Canada experiences a decline in unemployment for high school graduates of this age.

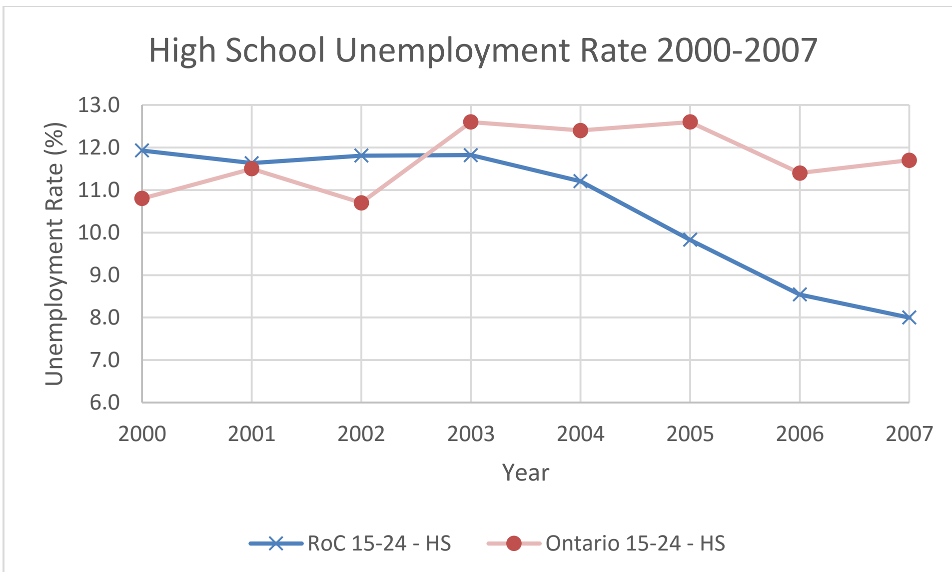

Figure 4 - High School Unemployment Rate[4]

Figure 5, shows the unemployment rate for university graduates aged 15 to 24. In any given year this should capture most recent university graduates. It is rare for anyone to graduate university before the age of 21 or after the age of 24, therefore any given year should show only the unemployment rates for recent graduates. In this case one can see little difference in the unemployment rate for university graduates in Ontario in the year we would expect the university bound double cohort to graduate (2007) and the unemployment rate in previous years. It could be argued that the level unemployment rate

[4] Statscan CANSIM data

in Ontario, relative to the decreasing rate for the rest of Canada, may indicate that something was increasing the unemployment rate relatively. However, this trend begins years before we would expect the effect of the double cohort in the labour market for recent university graduates.

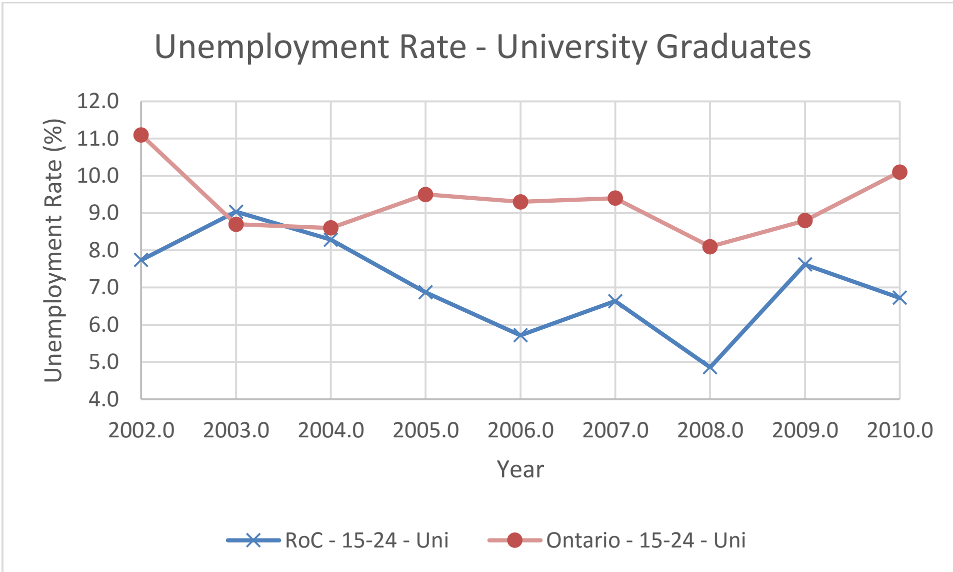

Figure 5 - Unemployment Rate - University Graduates[5]

Simply by looking at aggregated unemployment rates in Ontario one can see that graduates of the double cohort faced a more competitive labour market than classes before or after. The most plausible explanation for this is the difficulty for the local economy to absorb such a large increase of new workers. It is also clear that those who simply graduated from high school and began working seemed to have suffered more than others. The difference in unemployment for those with only a high school education was very clear, while there was no obvious effect of the double cohort on university graduates that could be clearly divined from the aggregated data. This suggests that workers with less education likely suffered more from the double cohort than those that

[5] Statscan CANSIM data

pursued more education. In a later subsection, one can find a more rigorous analysis of the effects of the double cohort on high school only graduates, as well as the persistence of this effect.

a. University Admissions

Although one might suspect that the labour market effects of the double cohort on university graduates may not have been economically large, there may have still been labour market effects on the students through the university admissions process. Some students who may otherwise have been admitted to university, may have been denied due to increased competition. This may have even affected earlier cohorts, if the best students of the double cohort decided to graduate early to avoid the increased competition. Students may have simply decided not to apply until later, decreasing lifetime wages by pushing back the period where they would earn a wage as a worker with a post-secondary degree. We know, however, that new funding was opened up for Ontario universities, and that the government worked to minimize the effect of the double cohort on university student. That being said, increasing funding and opening spaces in post-secondary institutions does not mean that all programs were increased equally. Some programs involve a significant cost to run, and it might take more time to increase spots for these programs. For example, expanding general arts or humanities programs might have cost additional money to hire new faculty, while expanding science and engineering programs would have had that cost, as well as added costs for expanding laboratory space and equipment. This may lead to a situation where students who in a normal year would have been admitted to the program of their choice, are instead admitted to other less desirable programs.

Figure 6 shows the number of applications to Ontario universities by Ontario secondary students, while Figure 7 shows the number of applicants to Ontario universities by Ontario secondary students, as well as the number of registered applicants, meaning the number of applicants that are admitted and enrol in Ontario Universities.

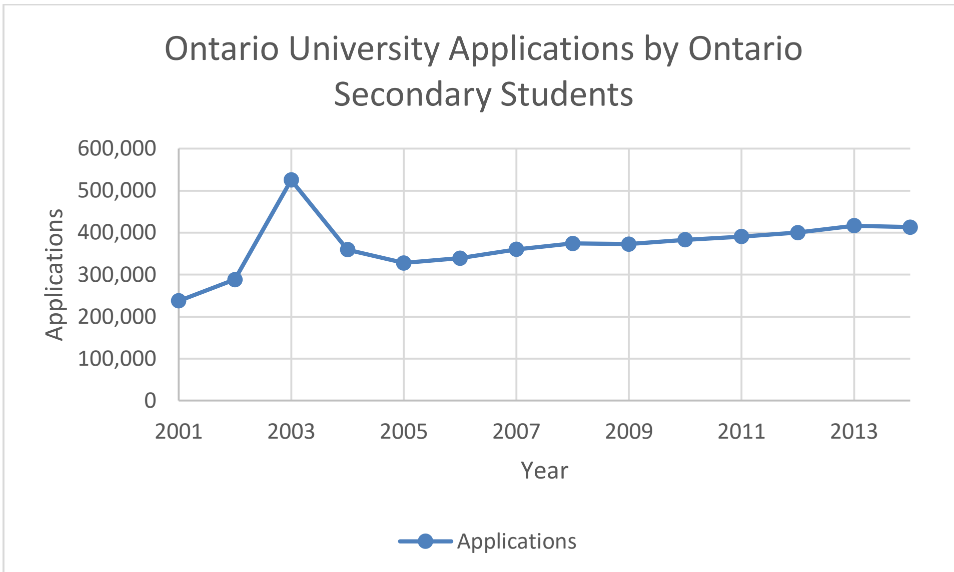

Figure 6 - OUAC Applications[6]

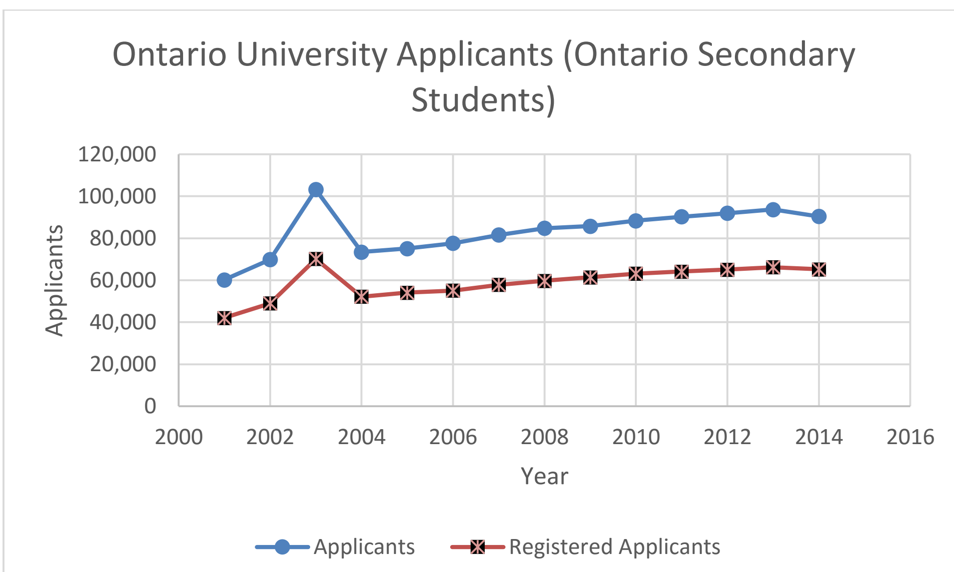

Figure 7 - OUAC Applicants[7]

[6] OUAC data
[7] OUAC data

As we can see, there is a very large spike in applications and smaller spikes in applicants and registered applicants for the year 2003, the year the double cohort graduated high school. This information on its own does tell us that 2003 was an anomalous year, but not much else. Figure 8 and Figure 9 are more informative. Figure 8 shows the ratio of Ontario secondary school applications to applicants and the ratio of Ontario secondary school applicants to registered applicants. Figure 9 shows the same ratio, but for other Canadian applicants, such as secondary students from other provinces.

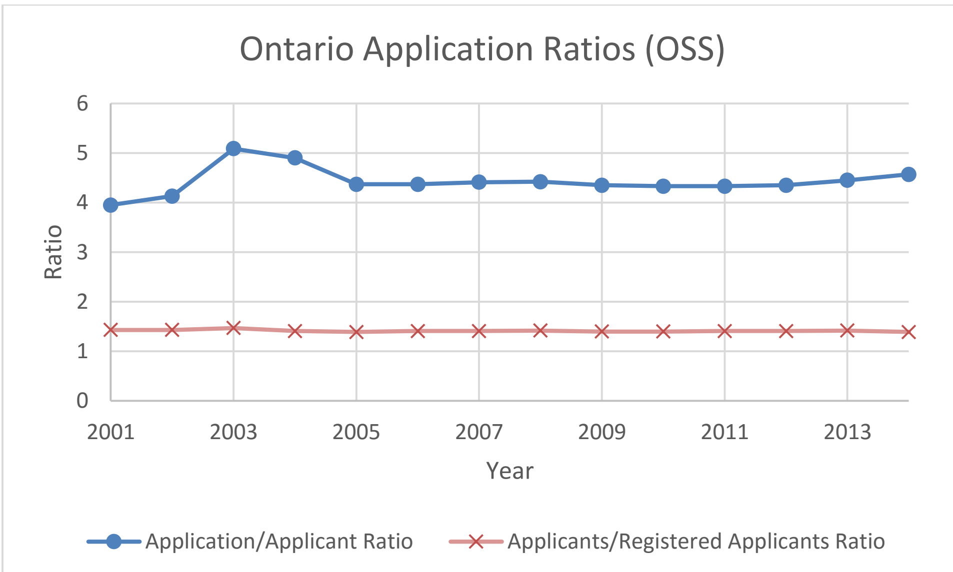

Figure 8 - Ontario Application Ratios (OSS)[8]

[8] OUAC data

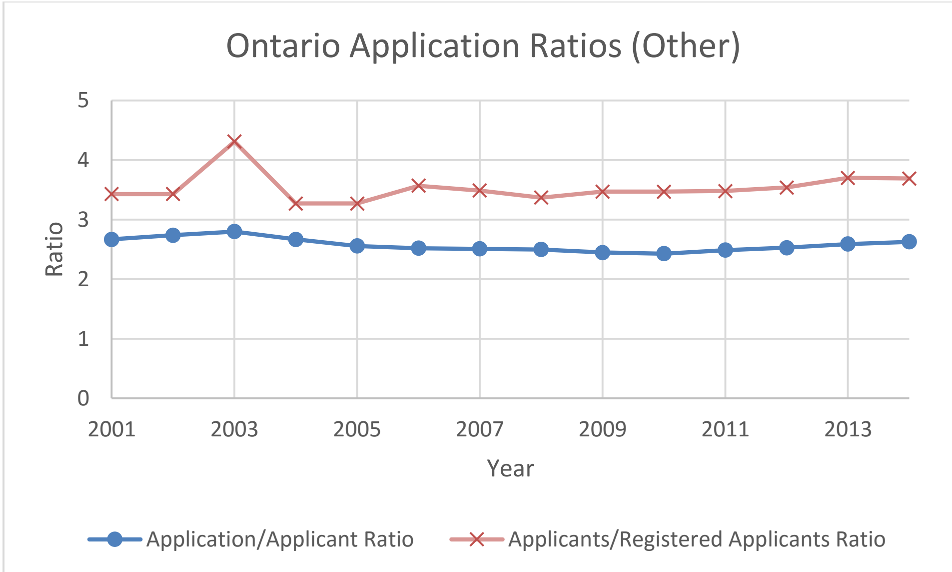

Figure 9 - Ontario Application Ratios (Other)[9]

In the case of Ontario students, the ratio of applicants to registered applicants barely changed, increasing by 0.04 in 2003. This suggests that Ontario was ready for the increase in university bound high schoolers from the double cohort, as the province's universities admitted essentially the same amount of Ontario secondary students per applicant. For each registered university student from an Ontario secondary school in 2003, there had been 1.47 applicants. Over time, this ratio averages around 1.40. The ratio that does change heavily is the of average number of applications per applicant. In 2001 and 2002, applicants averaged 3.95 and 4.13 applications respectively, while in 2003 and 2004 they averaged 5.09 and 4.9 applications respectively. This is nearly an increase of 1 application per applicant, and suggests that applicants, realizing competition for admission was greater, applied to programs or schools they would not have in previous years. These may have been either the same programs at lower ranked institutions, or less competitive programs at whatever institutions they had already

[9] OUAC data

planned to apply to. Being in a less competitive program or lower ranked school could lead to lower wages, and is a clear mechanism for poor labour prospects due to the double cohort. Unfortunately, it is difficult to be sure about exactly how students were changing behaviours, without access to individual data about application choices and option ranking.

The opposite is true with regards to out of province applicants. These applicants were likely not aware of the double cohort as Ontario students were, and they did not adjust their application behaviour to a significant degree. There was almost no change in the number of applications per applicant in 2003, while the number of applicant per each enrolled applicant rose from 3.43 the previous year to 4.31 in 2003. Therefore, out of province applicants did not change their behaviour, and suffered as a result.

I restrict the analysis to those who are working in Ontario, as the effect on out province students likely affected only very few people. In the case of university graduates, the data above suggests that the increase in the number of applicants to university was handled quite well. While this does not mean that no university students' labour outcomes were reduced, it does suggest that any reductions of labour outcomes would be related to program choices, and therefore hard to quantify. University programs are not always[10] completed in their predefined time period which suggests the labour market effects on university graduates will likely have been spread over multiple years. For this reason, I focus mostly on high school graduates in what follows.

[10] (or even likely to be)

III. Previous Literature

Surprisingly, there has been little academic work done analyzing the effects of this natural experiment. Krashinsky (2009) used the double cohort as an opportunity to study the labour market effects of an extra year of high school. Krashinksy finds that students of the four-year cohort have wages 10 percent lower than students of the five-year cohort. Krashinsky (2014) uses original survey data of double cohort students entering an introductory management course at the University of Toronto to show that four-year high school graduates of the double cohort scored one-half to one whole letter grade lower than the five-year high school graduates of the double cohort. Using differences in performance in two subjects, one where the amount of content covered by the curriculum was unchanged (Biology) and one where the amount of content covered by the Grade 12 curriculum was less than the Grade 13 curriculum (Mathematics), Morin (2007) calculates the value added of Grade 13 to university bound high school students to be around a 2.2 percentage point increase in university grades.

While most of the previous work studying the double cohort focuses on education, the primary concern of this paper is the effect of the double cohort on the labour market. Previous literature has found that there are persistent earnings declines for those workers who enter the labour market during periods of economic downturn, when the labour market is more competitive.

Oreopoulos et al. (2012), analyze long-term earnings declines that occur when students graduate from college during recessions. Oreopoulos et al. (2012) show that, during a typical recession, while there is an early decline in wages that lasts 10 years for the average graduate, there is heterogeneity in the long-term effects on graduates’ wages.

This paper shows that a typical recession leads to an initial loss of 9% of earnings, while this number halves in 5 years, and within 10 years the earnings loss disappears. This implies a loss of about 5 percent of cumulative earnings over 10 years. "Advantaged" graduates, who graduate from more prestigious colleges, or with more prestigious majors (and who may have more training or have higher ability) see only a cumulative loss of 2% of earnings, while "disadvantaged" graduates will see a cumulative loss of 8% of earnings. This paper posits that this loss occurs through the following mechanism. A negative labour market shock leads to more new workers taking jobs at poorer quality firms than they otherwise would have. As recovery occurs, advantaged graduates are able to catch up early, within two to four years, by being the first to switch to better firms, while average graduates switch later or the firms they are employed in recover and disadvantaged graduates find themselves permanently stuck in worse firms that pay lower wages, losing access to better employers. Oreopoulos et al. show these wage dynamics by calculating the effect of the regional unemployment rate when a graduate first graduates on earnings, using a Canadian employer-employee-matched dataset of 20 years of male college graduates which includes firm characteristics as well as college and major.

Oreopoulos et al is particularly relevant for its exploration of the different effects of a weak labour market on advantaged and disadvantaged workers. In particular, the fact the disadvantaged workers saw a more persistent earnings loss suggests that graduates in the double cohort that do not go to university may be relatively more adversely affected by a more competitive labour market.

Von Wachter and Bender (2004) estimate losses in wages that occur in the period of time between an apprenticeship and finding a new job that German youth experience when their time at their training firm ends. It is theorized that the unstructured transition between school and work leads to wage losses and lower development of human capital. This is in contrast to the idea that high job mobility among youth indicates a helpful job search. In times of recession, it has been shown that youth experience persistent wage losses, indicating that too much mobility may be harmful. That said, it may be that these losses are over estimated due to the fact that those who leave work are likely considered more expendable because they are lower-trained or lower-quality workers.

These losses may also understate the effects of this displacement, since high-type workers will benefit from job mobility. Von Wachter and Bender (2004) use data about all German apprenticeship graduates from 1992 to 1994 who are observed working within the first five years after they complete their training. As previously discussed, workers leave firms for different reasons. As a proxy for exogenous variation in firm demand for apprentices, the fraction of apprentices at the same firm who leave at the end of their training is used. This is needed to identify the causal effect of displacement from a firm. This fraction of apprentices retained are pooled together annually and with firm fixed effects, and are also used in an instrumental variable regression, as the instrument is orthogonal to permanent characteristics of the firm, and to adverse selection. This paper finds wage losses of 15% for young workers who are displaced, but these losses are reduced to zero within five years. This is additional evidence that labour market entry conditions have a large effect on wages, but suggests that there may not be lengthy persistence.

IV. Data and Methodology

a. Data

The unemployment rate data used in this paper comes from data tables which are part of the Canadian Socioeconomic Database. This includes general unemployment data, as well as unemployment data specific to certain age groups (ages 15-24 is the one used primarily in this paper) as well as unemployment rates broken down by educational attainment.

The university admissions data referenced in this paper is publically available data provided by the Ontario Universities' Application Centre (OUAC), an organization which manages the large majority of applications to undergraduate programs in Ontario.

The data used for more complex empirical analyses in this paper comes from the Survey of Labour and Income Dynamics (SLID). In this paper, I use annually collected data from the 2001 version of the Survey until the final SLID released in 2011. The SLID was meant as a source of cross-sectional data with a longitudinal component. Samples for the SLID are selected from the monthly Labour Force Survey (LFS). All individuals in Canada are to be represented in the sample, with the exception of residents in the Yukon, Northwest Territories, Nunavut, and persons living on Indian reserves. The SLID is comprised of two overlapping panels, each containing information on 17,000 households surveyed for six years. Each year, households are interviewed between January and March about the experience of the respondents in the labour market for the previous calendar year.

This dataset contains 130 variables, including personal characteristics such as gender, province of residence, household size, age, and detailed educational attainment.

Of particular interest is age. The SLID, unlike some other surveys which only report age range, reports the year of birth, making it possible to differentiate students who were educated before grade 13 was eliminated in Ontario, from students who were educated after. This also makes it possible to differentiate between those who graduated from grade 12 in the double cohort, and those who graduated from grade 13 in the double cohort. The dataset also contains, economic information, such as income and composite wage, information about the respondent's labour market experience such as unemployment status in any given month, the size of the respondent's workplace, time spent unemployed, and other things.

Some dummy variables needed to be generated from this data. One variable created indicates whether or not a given individual only graduated high school, and pursued no further education. Another important variable is a dummy variable that indicates whether or not a person was born in the double cohort, which includes those born in 1984 and 1985. There is unfortunately no variable to indicate when a person graduated; however, I assume that the large majority of people follow the standard path to graduation. This is not strictly true, and even now that grade 13 has been eliminated, some sources report that up to 15% of Ontario students take an extra year. However, it is likely closer to the truth for those who do not attend university (as there is much less potential benefit from extra schooling). Graduating early or late to avoid the double cohort could potentially bias results, but most likely this would bias the effect of the double cohort downward, implying that results here may be a lower limit for the effect of a large influx of labourers in to a local labour market.

In addition, I create a variable that represents years since graduation of high school. Since I cannot confirm what year a student graduates, this is once again based on birth year and the standard path the majority of students take through high school. This is unfortunately the best that can be done with these data. I also create an unemployment variable which is assigned a value of 1 if the respondent was unemployed in any month of the year, and 0 if not. This means that it is not exactly an unemployment rate, but a "probability of having been unemployed."

Potential variables of interest for dependant variables include wage (a composite wage constructed from all wages earned in any jobs that respondent had), overall earnings, weeks of unemployment, and a dummy variable indicating whether or not the respondent had been unemployed during the year. Weeks of unemployment is a useful measure of the depth of unemployment, while the unemployment dummy can be seen as a measure of the job security of a respondent.

Independent variables of major importance used throughout this paper include years of experience of full time work, sex, and province of residence. Unfortunately, this dataset does not include province of birth, or any data on migration within Canada. This inevitably leads to bias, as it is impossible to tell the difference between a respondent who currently lives in Ontario and graduated with the double cohort and a respondent who current lives in Ontario, was born in a double cohort year, but was educated outside of Ontario, migrating in to the Ontario labour market. This may lead to underestimates of the double cohort effect. Similarly, it is not possible to measure the effects of the double cohort on those educated in Ontario, but who migrated to other provinces. This could underestimate or overestimate the effect of the double cohort. Finally, although there is a dummy variable for being an immigrant, a large majority of respondents indicate they do not know whether or not they are immigrants indicating that it would be unwise to use this variable to remove those born in double cohort years, who may have immigrated to Ontario from outside of Canada. As the year of the SLID is further removed from the year of the double cohort, the less the data reflects the direct consequences of the end of grade 13 on the double cohort, and the results reflect a wider effect of those with similar characteristics in the Ontario labour market.

Figure 10 shows the average wage of a high school graduate 1 year after graduation. It is clear that the double cohort, which was one year removed from graduation in 2004, led to a slight decrease in wages, but there doesn't appear to be a very large persistent decrease for those who graduate in the future. Figure 11 meanwhile, shows a decrease in earnings, but it is unclear if this is related to the double cohort.

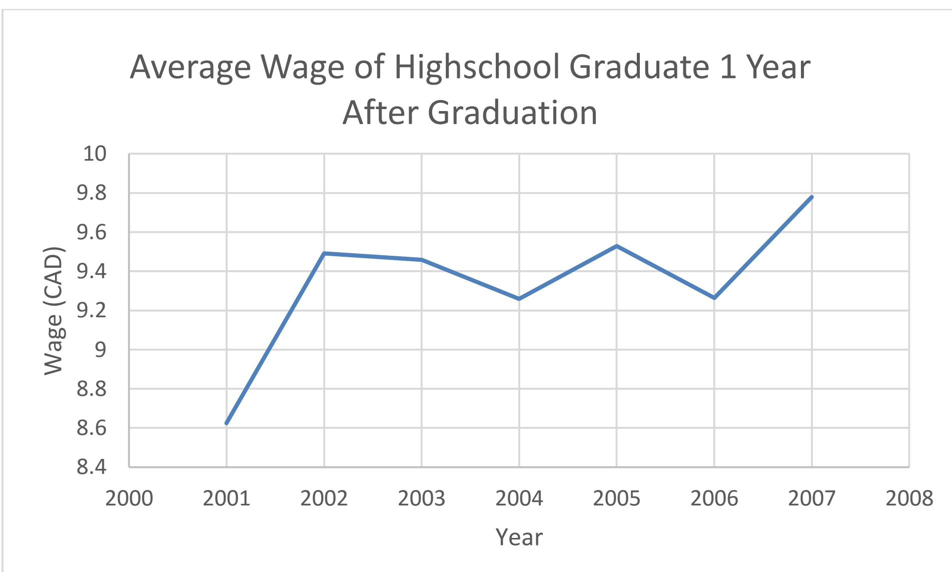

Figure 10 - Average Wage of HSG - 1 Year

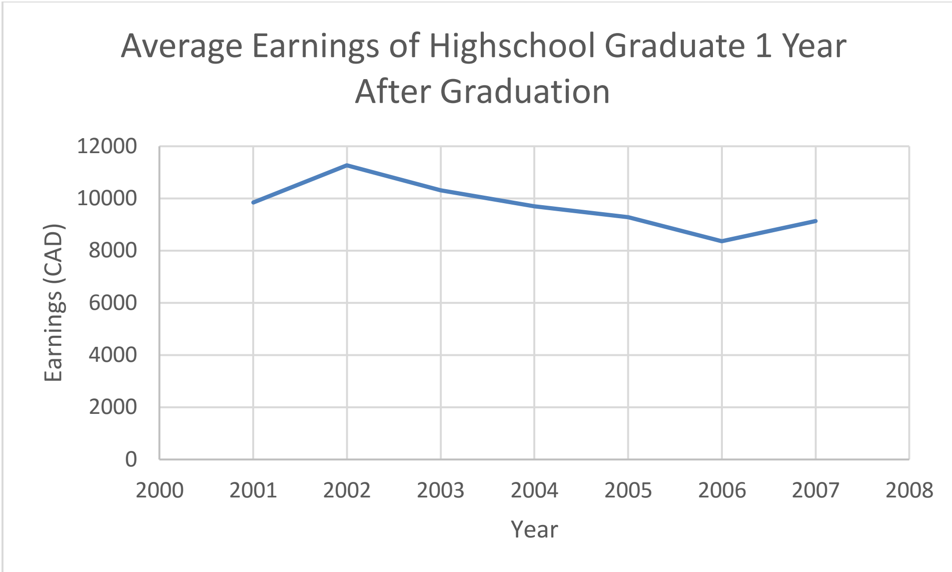

Figure 11 - Average Earnings of HSG - 1 Year

Figure 12, shows the probability of having been unemployed for a high school graduate 1 year after graduation. Here we see the exact opposite of what we might expect. The chance of being unemployed has dropped to a low in 2004. The same thing is seen for the depth of unemployment in Figure 13. The number of weeks of unemployment is at a low in 2003, increases in 2004, and increases for graduates after 2004.

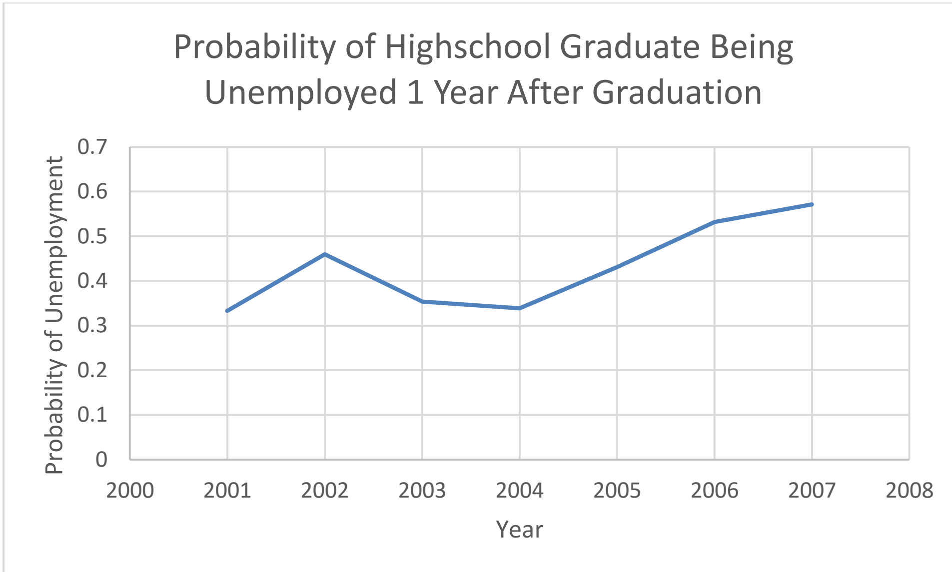

Figure 12 - Probability of HSG being unemployed - 1 year

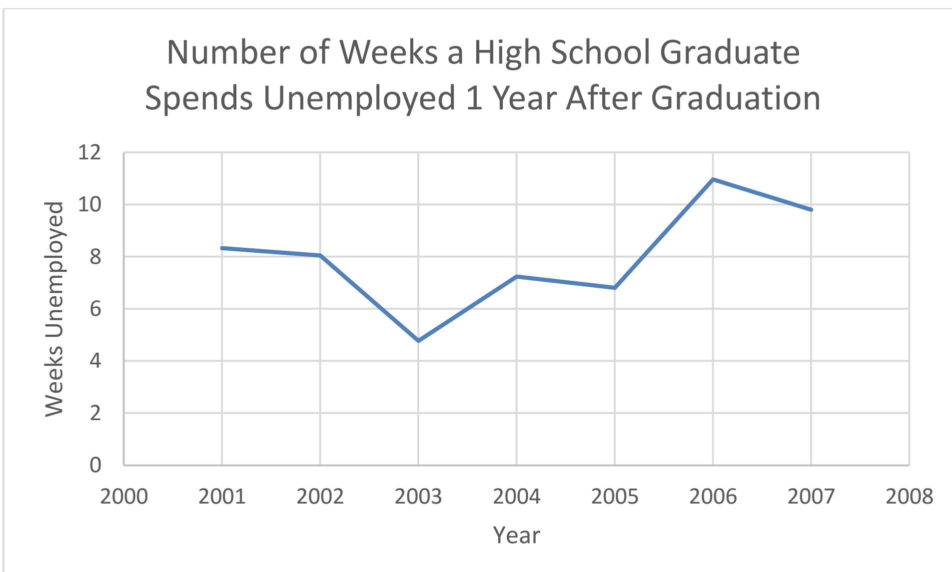

Figure 13 - Number of Weeks a HSG spends unemployed - 1 year

In theory, one might expect to see worse performance in the 1 year after graduation, but one might also suspect this is only temporary. The previous graphs suggest a minor effect on wages, and not much of an effect on unemployment. However, due to the proximity to graduation we might be suspicious of how well these average wages capture the situation. We also are curious about persistence. The graphs below show the same variables 5 years after graduation. In these graphs the double cohort are those 5 years removed from graduation in 2008. Figure 14 and Figure 15 show a small bump in wages and earnings, which is once again counterintuitive.

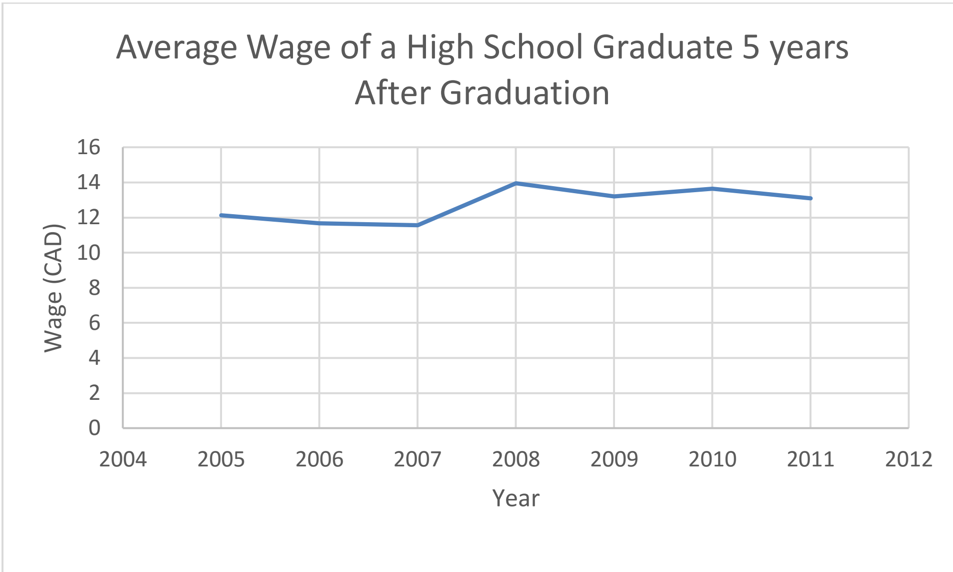

Figure 14 - Average Wage of a HSG - 5 Years

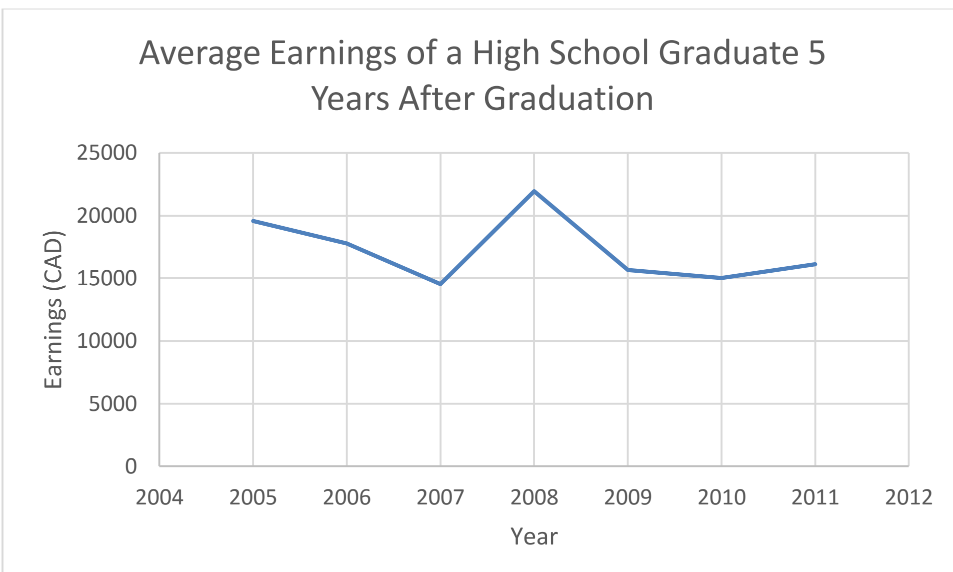

Figure 15 - Average Wage of a HSG - 5 Years

Below, Figure 16 and Figure 17 show unemployment and weeks unemployed. There are large peaks in 2008, suggesting that there may be persistent increases in unemployment and the depth of unemployment for those who graduated in 2003. This also shows that those who graduated after the double cohort had higher unemployment and depth of unemployment than those that came before.

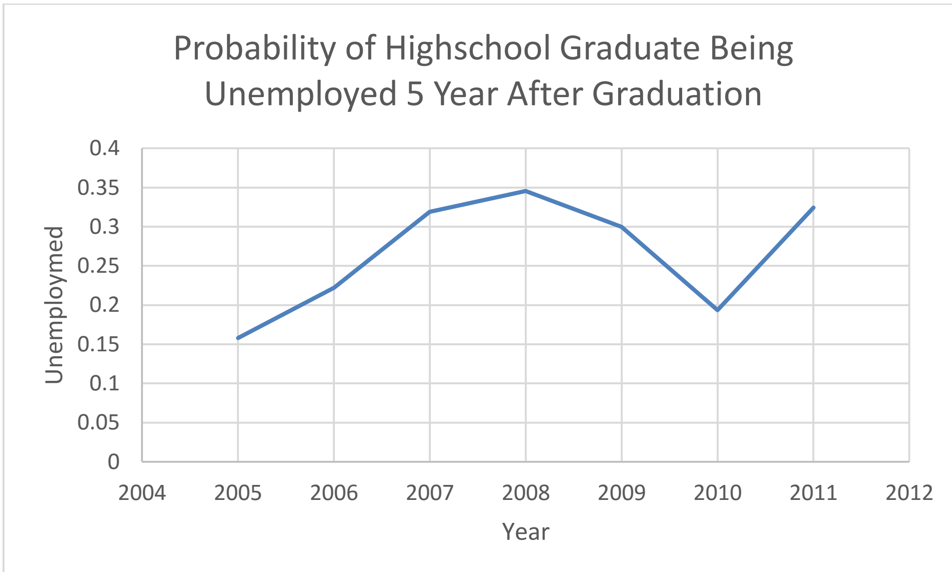

Figure 16 - Probability of HSG being unemployed - 5 Years

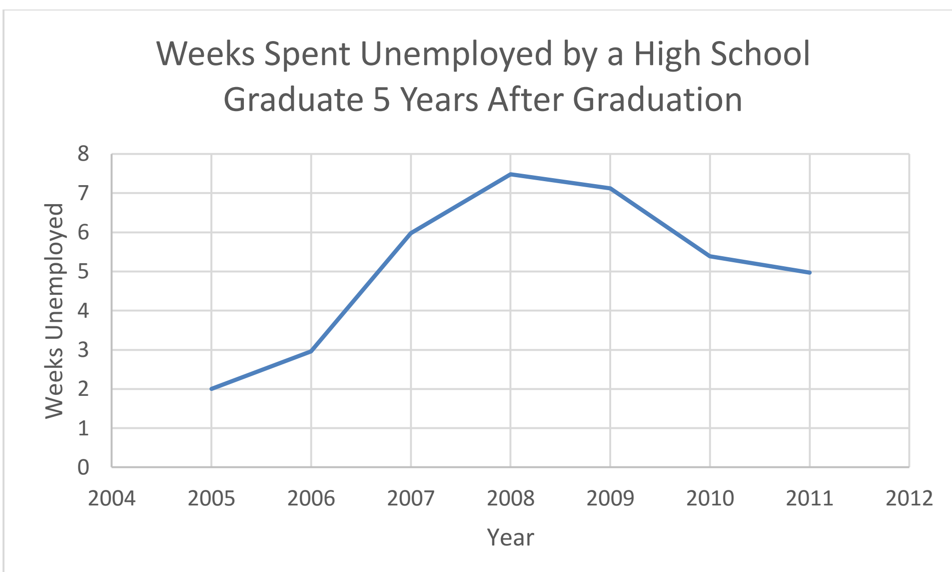

Figure 17 - Weeks Spent Unemployed by a HSG - 5 years

b. Methodology

1. Double Cohort Analysis

As stated before, it is clear that theory leads us to expect some negative labour market outcome for students graduating in the double cohort. One clue is the increase in the unemployment rate of young high school graduates at the time of the double cohort. This paper seeks to identify who was affected by this policy, in what ways were they affected, and whether or not these effects were persistent or transient.

The first econometric model used, a simple OLS regression, is shown in equation 1. For this model, only high school students were considered, only current residents of Ontario, and only people born in 1981, 1982, 1983, 1984. This allows for a consistent comparison between similar cohorts. All students born in these years graduated after the beginning of the reform which ended grade 13 and therefore underwent the same curriculum. All are graduates of the OAC grade 13 system. To look for persistence, I look at the results from between 1 year after graduation to 8 years after graduation.

Equation 1: $$Y_{it} = \gamma_t + \beta D + \delta X_i + \varepsilon_{it}$$

Here, Y is one of four economic indicators of labour outcomes: wage, earnings, whether or not the respondent was unemployed, and weeks unemployed for a given year since graduation. The letter γ is the average wage of an Ontario male high school graduate from 1981, 1982, and 1983 in a given year since graduation. The letter D is a dummy variable indicating if a person graduated with the double cohort, while β is the effect of being in the double cohort on Y. The variable X will be used to indicate individual characteristics, which for this first regression, simply means it is a dummy variable for gender. The subscript *i* indicates the individual respondent, while the subscript *t* indicates the years since graduation of that individual.

2. Labour Market Entry Unemployment Rate

In addition to this simple regression, I wish to see the effect of the first unemployment rate a worker faces when entering the market on their long term labour outcomes. Oreopoulos et al. used this technique to show a permanent loss in earnings for disadvantaged workers. It is useful to discover the effect of a percentage point change in initial unemployment rate on future labour outcomes, as this can be used to predict these effects in other situations. Oreopoulos et al. use data from periods of recessions, while the results from this paper will show the effect of a small increase in labour supply that effects a narrower group of labourers in the economy. The regression that specifies this relationship is shown in equation 2.

Equation 2: $$Y_{it} = \gamma_t + \beta u_i + \delta X_i + \varepsilon_{it}$$

Here, all subscripts and the variable Y retain the same meaning as before. The letter u is the unemployment the worker faces upon graduation, as a high school graduate between the ages of 15 and 24, therefore β is the effect of a 1 percentage point change in the unemployment rate when a graduate enters the labour market on Y. In this case, X takes the same meaning as before, but in an alternate regression, X is a vector containing a gender dummy and an experience variable that indicates years of full time work.

3. Gender Interaction

The third and final analysis performed is a regression which interacts gender with being a member of the double cohort.[11] It is possible that being a member of the double

[11] Here I look at those born after 1981 to avoid comparisons between cohorts that are quite different

cohort affected male and female labourers differently, and if so, an analysis without considering this difference might fail at capturing any effects of the double cohort. This regression restricts the sample to those born after 1981 but before 1985 to avoid comparing cohorts that may have large differences that are not accounted for in the analysis, and to avoid changes in curriculum and length of high school. The regression equation that specifies this relationship is shown in equation 3.

Equation 3: $$Y = \gamma + \beta_a A + \beta_b B + \beta_c C + \varepsilon$$

Here Y, as before, is the dependent variable (wage, earnings, unemployment or weeks unemployed). The constant γ is the value of the dependent variable for a male that was not part of the double cohort. The variable A is a dummy indicating whether or not a respondent is part of the double cohort and is male, the variable B is a dummy indicating whether or not the respondent is part of the double cohort and female, and the variable C is a dummy indicating whether or not the respondent is female and not part of the double cohort. The β's, whose subscripts match with the upper case variables, are the coefficients which indicate the added amount of the dependent variable these respondents have. The variable ε is the error.

V. Results

a. Double Cohort Analysis

This section of the essay discusses the results of the aforementioned regressions. I begin with the most basic regression, using the limited sample of those students within the grade 13 system, born in the 3 years before the elder group of double cohort was born. In Table 1[12], we see no clear indication of a persistent decrease in wages for the double cohort. No results are significant, and there is only a negative effect on wages in the short run. For earnings, however, there is some evidence of persistence. For most of the years after graduation, the double cohort experiences an earnings loss, however one year after graduation, and eight years after graduation there are statistically significant negative impacts on earnings for being in the double cohort. This is not a strong indication of persistence, as while most of the years in between show negative effects, not all do, and there is no statistical significance.

In terms of unemployment, Table 2[13] does not show a persistent increase in the chance of being unemployed. It does show an increase in unemployment in the latter years from being in the double cohort, but the results are not significant. In fact, 1 year after graduation, it shows a statistically significant decrease in unemployment. In terms of the depth of unemployment, the data shows little proof a persistent increase in weeks unemployed. Only in the eighth year after graduation does a statistically significant term appear. In the eighth year, there is a large increase in weeks unemployed, but before that there are no statistically significant results. The fact that past the 3rd year there are

12 See appendix
13 See appendix

consistently positive effects of the double cohort on weeks unemployed suggests persistence, but does not prove it.

These results do not clearly show whose labour outcomes are being affected by the double cohort. Figures 18 and 19 show the wages and unemployment broken down by sex in any given year for people who have graduated between 1 and 4 years ago. In 2003, the wages of graduates who have graduated between 1 to 4 years ago are slightly lower than before, indicating perhaps some effect on previous graduates, while in 2004 (1 year after the double cohort graduates) this number reaches a local minimum for female labourers. This suggests that negative effects of the double cohort may have a gendered distribution. A similar pattern can be seen in the unemployment graph. While the male unemployment seems to go down in the double cohort year, the female unemployment for labourers who graduated between 1 to 4 years earlier is at a local high. This adds to the evidence of a gendered distribution of the double cohorts' negative effects on the labour market.

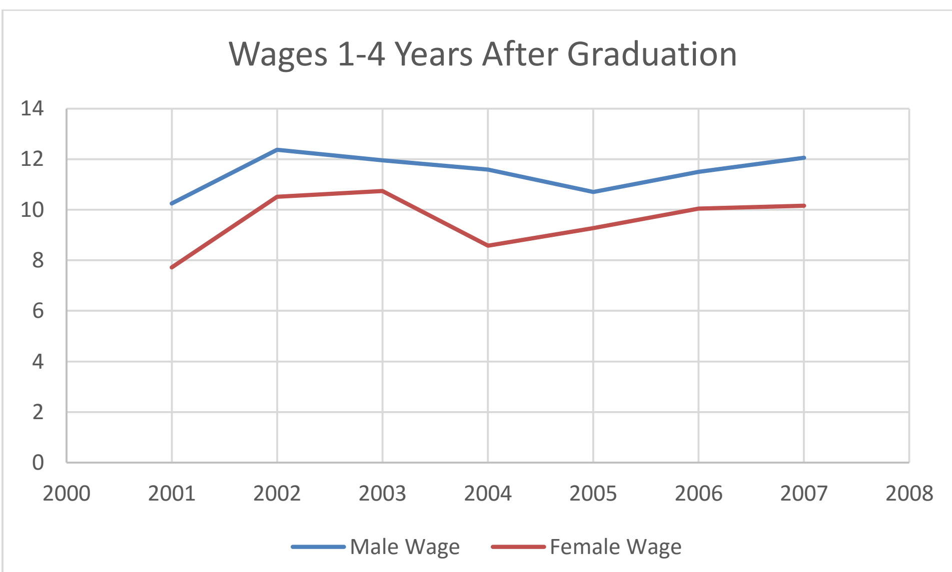

Figure 18 - Wages 1-4 Years After Graduation

Figure 19 - Unemployment 1-4 Years After Graduation

In the case of labourers who have graduated 5 to 9 years previously, Figures 20 and 21 show a pattern similar to the previous case, with more muted features. Once again, labourers' wage begins to drop after 2003. As before, the drop in wage for women is much steeper than that of men, but less than the previous case. As in the previous case, there is a large increase in unemployment for women. This is further evidence that the double cohort may have had a larger effect on women.

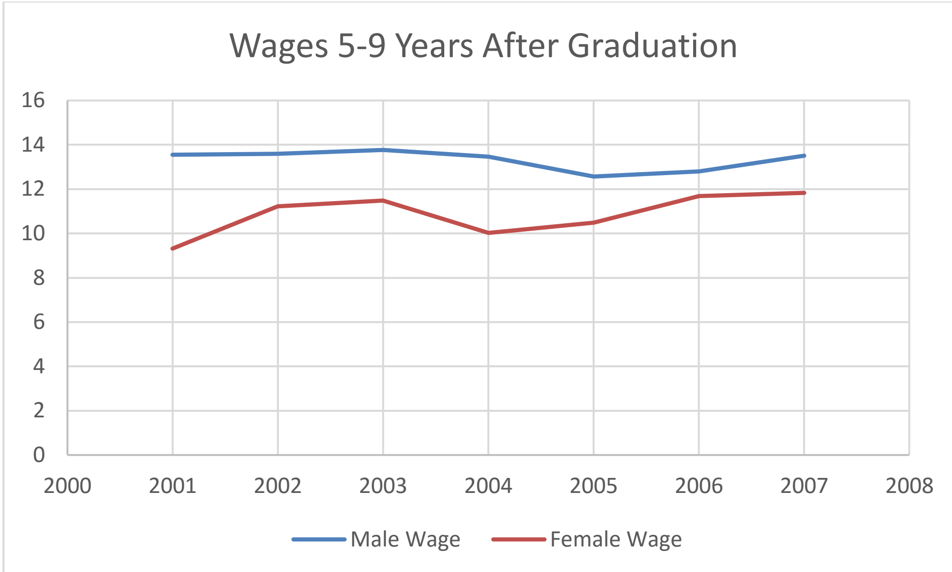

Figure 20 - Wages 5-9 Years After Graduation

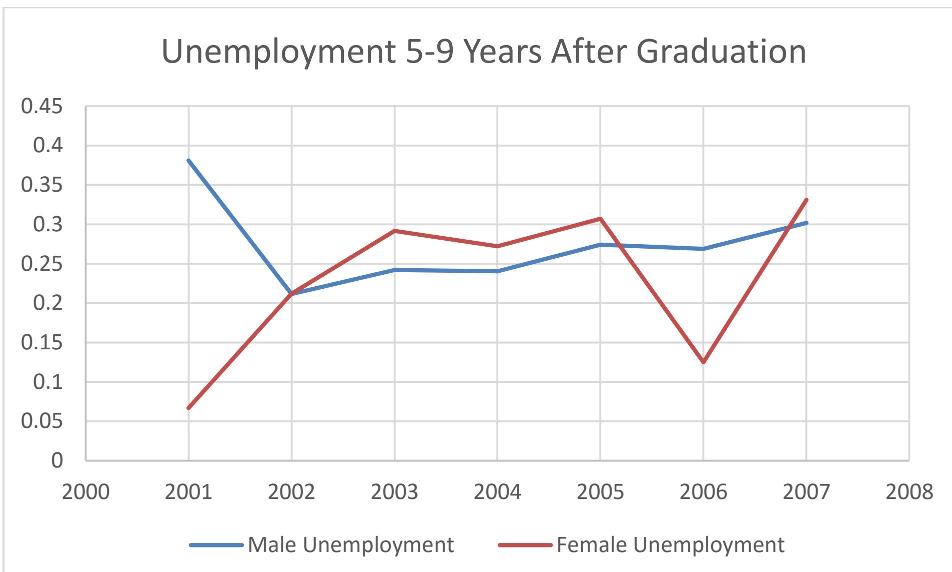

Figure 21 - Unemployment 5-9 Years After Graduation

Figures 22 and 23 show that in case of wages, there was no negative effect of the double cohort for those who had graduated 5 to 9 years previously. This is true for both genders. There is a steep increase in female unemployment between 2002 and 2004, indicating that even those in this education group may have been affected. Figures 25 and

26 show that workers of both genders who have graduated over 20 years prior did not see a large change in average wage or unemployment after the double cohort.[14]

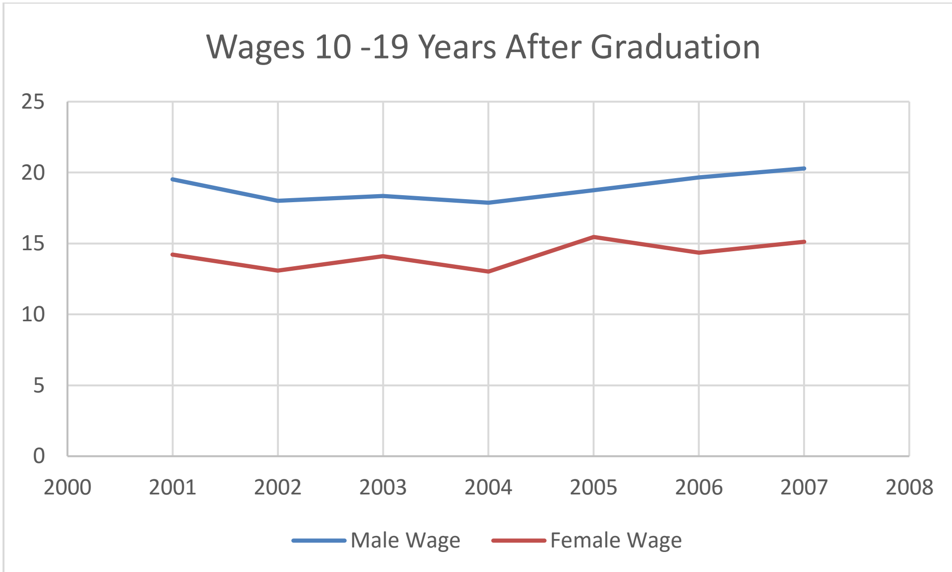

Figure 22 - Wages 10-19 Years After Graduation

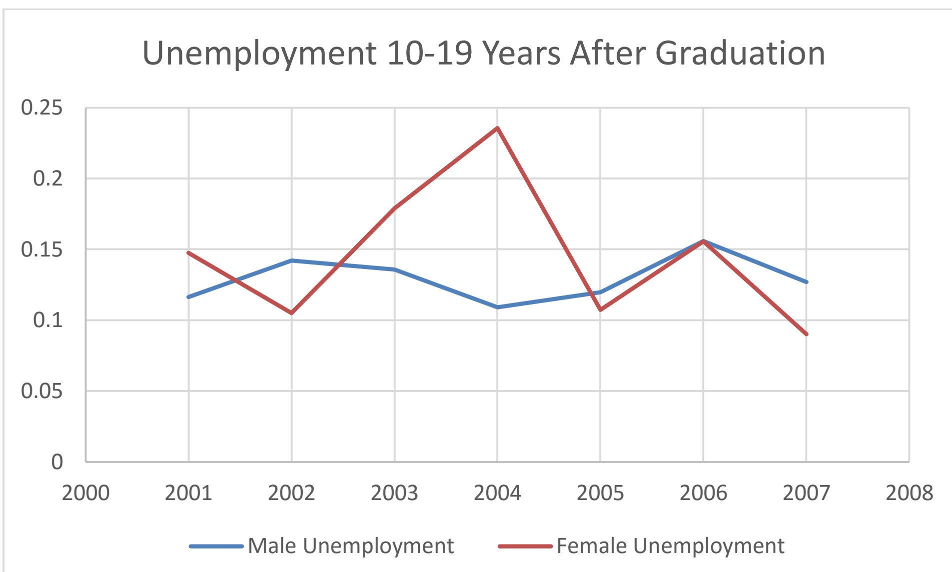

Figure 23 - Unemployment 10-19 Years After Graduation

[14] See appendix

b. Labour Market Entry Unemployment Rate

The second empirical analysis used in this paper shows how the unemployment rate of high school graduates aged 15 to 24 affects the future welfare of graduates. To achieve this, I regress the initial unemployment faced by high school graduates on wage, earnings, unemployment, and weeks unemployed.[15] Table 3 fails to show significant results of initial unemployment on wage. The results are mostly negative, though not for all years, and there is one statistically significant negative term in the sixth year after graduation. Therefore, we have only weak evidence that the initial unemployment rate has a persistent long term effect on wage. There is stronger evidence of a persistent negative effect of the initial unemployment rate on earnings. The coefficients for the effect of initial unemployment on earnings are all negative, with the exception of 5 years after. There are statistically significant results 1 year, 6 years, and 8 years after graduation that show a negative effect of initial unemployment rate throughout the career of a graduate. Figure 24 shows the earnings predicted by the results of this regression. The double cohort is clearly disadvantaged compared to others cohorts.

[15] In this case I use data from high school graduates born between 1981 and 1988

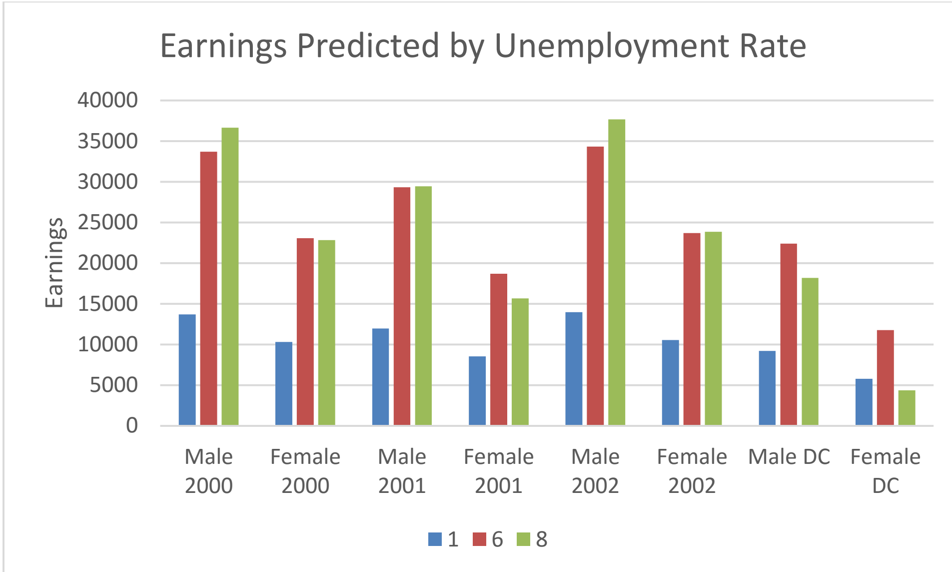

Figure 24 - Earnings Predicted by Unemployment Rate

Table 4 does not show convincing evidence of a persistent increase in the unemployment of the double cohort. There is one statistically significant positive term in the 6th year after graduation, but the other terms are insignificant and do not show a consistently negative or positive relationship between initial unemployment rate and future unemployment. The weeks of unemployment results are slightly stronger, but still mostly weak. The results are largely statistically insignificant but fairly consistent in the direction of the effect, showing that in most years after graduation, initial unemployment may slightly increase weeks unemployed. The results for six years and eight years after graduating are significant, and show an increase based on the initial unemployment rates faced.

c. Gender Interaction

The results of this regression can be seen in Table 5 and Table 6. Table 5 shows a clear negative impact on wages for being a female member of the double cohort. For every number of years since graduation, female members of the double cohort have lower wages than males who were not members of the double cohort, and males who were members of the double cohort. This is not the case when comparing female members of the double cohort to females who were not members of the double cohort, but for the 5 years where the coefficients for the female double cohort members were statistically significant, they were also more negative than that of the females who were not part of the double cohort. Essentially, there is a persistent decrease in wages for females who were part of the double cohort when compared to any other group, for the cases where there was statistical significance in the results. The results for earnings are similar. The coefficients for being female and part of the double cohort, female and not part of the double cohort, and male and not part of the double cohort are all statistically significant. For the first 7 years after graduation, being a female member of the double cohort is associated with lower earnings than being male or being a female respondent who was not part of the double cohort. This is strong evidence of a persistent negative effect of being part of the double cohort for female labourers with only a high school education. The results for male members of the double cohort are not significant, and they do not consistently earn less or greater than males who are not members of the double cohort.

Table 6 does not contain many statistically significant terms, nor is there even any consistent direction of effects. This means that in terms of unemployment and weeks unemployed these tables offer little evidence of anything. In terms of unemployment, there is almost no consistency. In terms of weeks unemployed, we see a statistically insignificant but persistent increase in weeks unemployed for being a female member of the double cohort, but it is not a consistently greater effect than being a female who was not part of the double cohort.

VI. Conclusion

In 2003, Ontario finally ended its fifth year of high school, or grade 13, creating a ‘double cohort’ since two classes graduated. This paper analyzed the effects of this policy change on those who graduated with a graduating class almost double the size than they otherwise would have, had the phase out not occurred or occurred differently.

Application data from Ontario universities suggests that Ontario universities were able to accommodate the extra students, therefore this paper focused only on high school graduates. I found little evidence for any effect (transient or persistent) of being in the double cohort on wages, earnings, unemployment and weeks unemployed. I did find some weak evidence that there may be a large impact of being a member of the double cohort on women. Then, I found only weak evidence suggesting that earnings are reduced, and unemployment is increased with every additional percentage point of unemployment upon graduation. Finally, I found strong evidence for a persistent decrease in wages and earnings for women who were members of the double cohort compared to all men, and women who were not members of the double cohort.

The largest contribution of this essay is to identify that the removal of grade 13 had some effect on labour market outcomes, and indicates a need for further research, if a better dataset can be found. It also shows a clearly gendered difference, with women being affected more than men by the double cohort, and clear evidence of persistence in these effects. It is well known that women provide labour more elastically than men, but further research would be useful in determining what the exact mechanism of this gendered effect is. This difference in impact is very important to analyze further, as female high school graduates have even lower wages than males, before any additional effects of labour. Additionally, it was not only female members of the double cohort who were affected by the policy reform, but other female labourers outside of this group also saw lower wages and increased unemployment in the double cohort year. Thus, a large influx in low skilled workers may be hurting the labour market outcomes of some of the most vulnerable members of society, low-educated women. If this is the case, some policy to mitigate these negative effects should be considered.

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VIII. Appendix

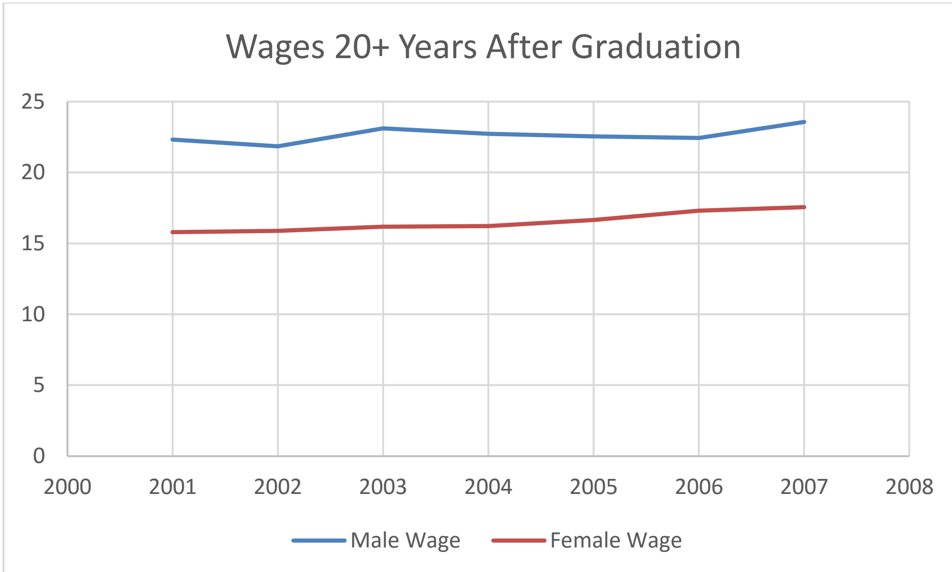

Figure 25- Wage 20+ years after graduation

Figure 26 - Unemployment 20+ years after graduation

Table 1 - Double Cohort Regression: Wages and Earnings

	Wage							
Years After Graduation	1	2	3	4	5	6	7	8
Double Cohort	-0.551	-0.736	1.74	0.939	-0.079	-2.898	1.018	0.499
	-(0.68)	-(0.81)	-(0.96)	-(0.99)	-(1.52)	-(1.66)	-(1.42)	-(2.2)
Sex	-0.833	-0.87	-1.441	-2.102**	0.172	-2.592	-1.169	-3.416
	-(0.57)	-(0.64)	-(0.76)	-(0.72)	-(1.26)	-(1.42)	-(1.32)	-(2.24)
Constant	9.780***	10.497***	10.757***	11.462***	12.600***	17.282***	15.234***	18.975***
	-(0.48)	-(0.51)	-(0.51)	-(0.62)	-(0.79)	-(1.19)	-(1)	-(2.11)
R-sqr	0.027	0.03	0.097	0.081	0.001	0.109	0.023	0.063
dfres	113	114	101	111	97	97	92	67
	Earnings							
Years After Graduation	1	2	3	4	5	6	7	8
Double Cohort	-5467.460**	-343.361	5543.08	-981.278	6973.475	-9379.69	-9274.468	-18970.020*
	-(1975.19)	-(2922.23)	-(3415.2)	-(3399.46)	-(6177.15)	-(4747.64)	-(5902.91)	-(7554.48)
Sex	-5476.194**	3383.208	-9825.659***	-5956.726*	-5099.098	-10810.806*	-12638.484*	-14540.793*
	-(1675.75)	-(3529.18)	-(2233.35)	-(2483.76)	-(4868.74)	-(4597.32)	-(5220.82)	-(6378.73)
Constant	14561.581***	11930.406***	17113.239***	19992.135***	24078.277***	33631.157***	27885.732***	35256.946***
	-(1298.75)	-(1610.28)	-(1869.08)	-(2009.56)	-(3241.8)	-(3566.11)	-(4504.15)	-(5072.88)
R-sqr	0.182	0.021	0.153	0.047	0.058	0.127	0.09	0.142
dfres	123	137	113	123	106	103	109	88

* p<0.05, ** p<0.01, *** p<0.001

Table 2 - Double Cohort Regression: Unemployment and Weeks Unemployed

	Unemployed							
Years After Graduation	1	2	3	4	5	6	7	8
Double Cohort	-0.206*	0.013	-0.119	0.103	-0.03	0.2	0.221	0.232
	-(0.09)	-(0.13)	-(0.16)	-(0.11)	-(0.09)	-(0.12)	-(0.15)	-(0.18)
Sex	0.059	0.112	0.131	0.109	-0.1	-0.098	-0.055	-0.109
	-(0.1)	-(0.12)	-(0.15)	-(0.09)	-(0.09)	-(0.08)	-(0.12)	-(0.12)
Constant	0.365***	0.303***	0.386***	0.138**	0.231**	0.134**	0.256**	0.263*
	-(0.08)	-(0.08)	-(0.1)	-(0.05)	-(0.08)	-(0.05)	-(0.09)	-(0.11)
R-sqr	0.047	0.013	0.025	0.029	0.018	0.088	0.047	0.081
dfres	123	137	113	123	106	103	109	88
	Weeks of Unemployment							
Years After Graduation	1	2	3	4	5	6	7	8
Double Cohort	-3.242	3.864	-1.158	3.884	1.579	6.385	7.363	19.329*
	-(1.98)	-(4.08)	-(1.88)	-(3.44)	-(3.56)	-(3.24)	-(6.55)	-(7.47)
Sex	0.152	4.891	3.087	1.864	-4.276	-4.190*	-4.811	1.425
	-(2.4)	-(3.43)	-(3.14)	-(2.21)	-(2.66)	-(1.81)	-(2.7)	-(3.31)
Constant	5.947**	4.864*	4.297***	2.084	5.330*	3.087*	5.398*	2.84
	-(1.82)	-(1.94)	-(0.96)	-(1.47)	-(2.46)	-(1.19)	-(2.66)	-(1.43)
R-sqr	0.018	0.043	0.026	0.029	0.044	0.175	0.099	0.223

Table 3 - Entry Unemployment: Wages and Earnings

Unemployed								
Years After Graduation	1	2	3	4	5	6	7	8
Initial Unemployment	-0.043	-0.007	-0.023	0.054	0.019	0.159***	0.081	0.119
	-(0.05)	-(0.05)	-(0.06)	-(0.05)	-(0.05)	-(0.04)	-(0.06)	-(0.08)
Sex	0.007	0.012	0.111	-0.109	-0.180*	-0.099	-0.039	-0.089
	-(0.08)	-(0.08)	-(0.11)	-(0.09)	-(0.07)	-(0.09)	-(0.11)	-(0.12)
Constant	0.92	0.438	0.675	-0.289	0.062	-1.614***	-0.64	-1.052
	-(0.62)	-(0.63)	-(0.77)	-(0.62)	-(0.55)	-(0.47)	-(0.73)	-(0.93)
R-sqr	0.004	0	0.011	0.019	0.05	0.101	0.023	0.07
dfres	303	288	221	222	193	177	147	106
Weeks of Unemployment								
Years After Graduation	1	2	3	4	5	6	7	8
Initial Unemployment	0.84	-1.249	1.62	-0.503	0.732	4.569**	3.437	7.997**
	-(1.08)	-(1.48)	-(1.38)	-(1.6)	-(1.31)	-(1.43)	-(2.43)	-(2.96)
Experience	-0.005	-0.127	-0.068	-4.554	-5.308**	-5.333*	-3.73	2.511
	-(1.9)	-(2.21)	-(2.42)	-(2.95)	-(1.71)	-(2.07)	-(3.22)	-(3.66)
Sex	-3.029	21.476	-12.097	15.342	-2.151	-47.090**	-32.308	-84.916*
	-(12.77)	-(17.97)	-(15.51)	-(20.41)	-(15.31)	-(15.32)	-(27.83)	-(32.44)
R-sqr	0.002	0.006	0.01	0.019	0.065	0.114	0.054	0.134
dfres	303	288	221	222	193	177	147	106

* p<0.05, ** p<0.01, *** p<0.001

Table 4 - Entry Unemployment: Unemployment and Weeks Unemployed

Unemployed								
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	-(0.05)	-(0.05)	-(0.06)	-(0.05)	-(0.05)	-(0.04)	-(0.06)	-(0.08)
Sex	0.007	0.012	0.111	-0.109	-0.180*	-0.099	-0.039	-0.089
	-(0.08)	-(0.08)	-(0.11)	-(0.09)	-(0.07)	-(0.09)	-(0.11)	-(0.12)
Constant	0.92	0.438	0.675	-0.289	0.062	-1.614***	-0.64	-1.052
	-(0.62)	-(0.63)	-(0.77)	-(0.62)	-(0.55)	-(0.47)	-(0.73)	-(0.93)
R-sqr	0.004	0	0.011	0.019	0.05	0.101	0.023	0.07
dfres	303	288	221	222	193	177	147	106
Weeks of Unemployment								
Years After Graduation	1	2	3	4	5	6	7	8
Initial Unemployment	0.84	-1.249	1.62	-0.503	0.732	4.569**	3.437	7.997**
	-(1.08)	-(1.48)	-(1.38)	-(1.6)	-(1.31)	-(1.43)	-(2.43)	-(2.96)
Experience	-0.005	-0.127	-0.068	-4.554	-5.308**	-5.333*	-3.73	2.511
	-(1.9)	-(2.21)	-(2.42)	-(2.95)	-(1.71)	-(2.07)	-(3.22)	-(3.66)
Sex	-3.029	21.476	-12.097	15.342	-2.151	-47.090**	-32.308	-84.916*
	-(12.77)	-(17.97)	-(15.51)	-(20.41)	-(15.31)	-(15.32)	-(27.83)	-(32.44)
R-sqr	0.002	0.006	0.01	0.019	0.065	0.114	0.054	0.134
dfres	303	288	221	222	193	177	147	106

* p<0.05, ** p<0.01, *** p<0.001

Table 5 - Gender Interaction: Wages and Earnings

	Wage							
Years After Graduation	1	2	3	4	5	6	7	8
Female Double Cohort	-0.379	-1.668***	-1.434**	-0.269	-1.938**	-3.152***	-3.519***	-1.536
	-1.2	-0.29	-0.54	-0.84	-0.68	-0.84	-0.96	-1.33
Male Double Cohort	0.105	-0.628	-0.364	-0.088	0.259	-1.462	2.1	-0.014
	-0.37	-0.55	-0.48	-0.69	-0.92	-1.18	-1.75	-1.34
Other Female	-0.813***	-0.986***	-1.420***	-1.421***	-1.218***	-1.699***	-2.011***	-2.039***
	-0.22	-0.19	-0.32	-0.29	-0.36	-0.45	-0.51	-0.59
Other Male (Const)	10.027***	10.915***	12.108***	12.977***	14.557***	18.127***	19.633***	21.754***
	-0.14	-0.13	-0.25	-0.19	-0.24	-0.33	-0.4	-0.46
R-sqr	0.008	0.018	0.014	0.018	0.01	0.014	0.022	0.01
dfres	2716	3292	3261	3229	2919	2717	2608	2377
	Earnings							
Years After Graduation	1	2	3	4	5	6	7	8
Female Double Cohort	-5125.667***	-3326.281***	-5505.015***	-7402.225***	-8632.786***	-13582.400***	-15772.590***	-8264.319*
	-726.69	-936.76	-1151.99	-1271.02	-2278.09	-2133.13	-2241.76	-3458.41
Male Double Cohort	2147.315	-1291.625	507.49	-3077.097	1962.213	-6014.184	-881.334	-137.525
	-2276.68	-1132	-1511.7	-1848.2	-2567.54	-3515.74	-3716.52	-4223.79
Other Female	-2990.218***	-1973.488***	-4164.143***	-5012.790***	-5879.647***	-7515.314***	-9775.667***	-8535.697***
	-421.66	-505.4	-563.5	-635.77	-892.73	-1136.52	-1220.84	-1551.24
Other Male (Const)	10334.225***	12068.951***	15747.086***	18437.459***	22940.590***	30363.440***	32692.153***	35074.996***
	-347.48	-388.12	-452	-514.95	-740.06	-889.44	-972.98	-1201.27
R-sqr	0.036	0.01	0.03	0.036	0.034	0.037	0.05	0.025
dfres	3190	3859	3613	3572	3212	3024	3011	2778

* p<0.05, ** p<0.01, *** p<0.001

Table 6 - Gender Interaction: Unemployment and Weeks Unemployed

	Unemployment							
Years After Graduation	1	2	3	4	5	6	7	8
Female Double Cohort	0.034	-0.029	0.018	0.063	-0.049	0.086	0.147*	-0.024
	-0.06	-0.06	-0.06	-0.06	-0.06	-0.07	-0.07	-0.06
Male Double Cohort	0.022	0.008	-0.019	0.121	-0.01	0.085	0.011	0.106
	-0.06	-0.06	-0.06	-0.07	-0.06	-0.08	-0.06	-0.07
Other Female	-0.036	-0.065**	-0.044	-0.02	-0.074***	-0.021	-0.006	-0.045*
	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
Other Male (Const)	0.318***	0.321***	0.298***	0.254***	0.265***	0.213***	0.206***	0.195***
	-0.02	-0.02	-0.02	-0.01	-0.02	-0.02	-0.02	-0.02
R-sqr	0.002	0.005	0.002	0.005	0.007	0.005	0.006	0.009
dfres	3190	3859	3613	3572	3212	3024	3011	2778
	Weeks Unemployed							
Years After Graduation	1	2	3	4	5	6	7	8
Female Double Cohort	2.087	0.021	0.558	0.223	-0.744	0.923	2.899	0.179
	-1.79	-1.67	-1.05	-0.88	-0.83	-1.26	-1.72	-2.2
Male Double Cohort	0.091	-1.046	-0.975	0.825	1.828	4.009*	0.705	6.103
	-1.15	-1.15	-0.72	-1.73	-1.59	-2	-1.59	-3.26
Other Female	-1.174*	-1.550**	-0.561	-0.132	-1.011*	-0.518	-0.255	-1.769*
	-0.53	-0.54	-0.41	-0.48	-0.39	-0.4	-0.53	-0.72
Other Male (Const)	4.967***	5.410***	3.849***	3.619***	3.266***	2.830***	3.312***	4.261***
	-0.42	-0.42	-0.29	-0.32	-0.31	-0.28	-0.4	-0.63
R-sqr	0.006	0.005	0.002	0	0.008	0.015	0.005	0.025
dfres	3190	3859	3613	3572	3212	3024	3011	2778

* p<0.05, ** p<0.01, *** p<0.001