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On the cyclicality of schooling decisions: Evidence from Canadian data*

Diana Alessandrini **

Abstract

This paper studies the cyclicality of schooling decisions. Its novelty is threefold. This is the first study that focuses on Canada. Second, the analysis is based on longitudinal data, while previous papers in the literature mainly focused on pooled cross-sectional data. Third, the analysis distinguishes among individuals of different ability levels, which is new to the literature. Main results show that macroeconomic conditions affect schooling decisions of recent high-school graduates only. University enrollment is counter-cyclical: more students enroll in university during economic contractions. Ability, proxied by parental education, negatively affects the counter-cyclicality of university enrollment. Finally, economic downturns stimulate the acquisition of theoretical rather than practical education. Contrary to university enrollment, college enrollment is pro-cyclical and enrollment in other (non-university) PSE institutions is acyclical.

1 Introduction

This paper investigates how business cycles impact post-secondary education (PSE) decisions. The literature has already analyzed the response of college enrollment to economic cycles, providing

*While the research and analysis are based on data from Statistics Canada, the opinions expressed do not represent the views of Statistics Canada.

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inconsistent empirical results. On one hand, economic downturns stimulate PSE enrollment by reducing the opportunity cost of education (i.e. the forgone labor income). On the other hand, recessions negatively affect family income and reduce the ability to afford education. The cyclicality of PSE enrollment depends on which effect dominates.

Economic downturns have negative consequences on the economy in the short run. However, if enrollment rates are counter-cyclical, crises may also have a positive impact on the economy. Several studies have shown the importance of human capital for growth starting from the seminal paper by Mankiw et al. (1992). Education also generates other types of positive externalities (e.g. lower crime rates and increased civic participation. For an overview, see Hanushek and Woessmann 2008). If individuals acquire more skills and knowledge during recessions, the economy may benefit both in the short and long run.

The long-run economic impact of recession is perhaps the most interesting and least explored aspect. If downturns increase the total stock of human capital and human capital fosters technological progress, economic crises may have a positive long-run impact on the economy. The literature has shown that recessions lead to the re-organization and destruction of the least productive firms and, therefore, may affect productivity (Caballero and Hammour, 1994, 1996; Hall, 2000). However, the impact of economic crises on productivity may also depend on the counter-cyclicality of education and human capital accumulation. This does not imply that recessions are beneficial for the economy. The costs of recessions most likely offset the benefits. However, it is still important to have a comprehensive picture of the dynamics associated with economic downturns.

Several papers have analyzed the cyclicality of college enrollment using US data. Edwards (1976), Mattila (1982), Kane (1994) and Christian (2007) found no impact of business cycles on enrollment decisions. Betts and McFarland (1995), Dellas and Sakellaris (2003), Dellas and Koubi (2003), and Méndez and Sepúlveda (2012) found evidence in favor of counter-cyclicality. Sakellaris and Spilimbergo (2000) focused on US enrollment rates of foreign students. They found a negative relationship between US enrollment rates of foreign students coming from OECD countries and GDP growth in the country of origin. However, the relationship is positive for students

coming from non-OECD countries. This result suggests that enrollment is pro-cyclical in countries where the financial support to PSE is low and access to credit is restricted, such as non-OCED countries. In this case, it is difficult for students to afford education during economic contractions.

Brunello and Winter-Ebmer (2003) focused on the time to degree using European data. By looking at 26 economics and business faculties in 10 European countries, they show that the average excess time to graduation is positively correlated with unemployment. The literature has also studied the cyclicality of other types of human capital accumulation, such as job training. In the US, for example, training financed by employees is counter-cyclical, while training sponsored by firms is pro-cyclical (Méndez and Sepúlveda, 2012).

However, with the exception of Emery et al. (2012), little work has been done regarding PSE decisions in Canada. In their paper, Emery and co-authors study the impact that the natural resource boom in Alberta in the 80s had on human capital accumulation. They show that individuals postponed post-secondary education to take advantage of favorable labor market conditions.

The current paper, instead, is the first study that uses Canadian data from all provinces (Survey of Labor and Income Dynamics, SLID) and provides a complete analysis of PSE decisions. The importance of using Canadian data is twofold. First, the education systems in Canada and US present some differences. Also the government intervention in the education sector varies between the countries. Therefore, there is no reason to assume that the results found in the US apply to Canada as well. Second, the majority of previous studies in the literature focused on college enrollment by using cross-sectional data[1]. By using panel data from SLID, instead, this paper provides a complete analysis of PSE decisions, including the decision to pursue graduate studies, the decision to drop out of university, and the decision to leave the labor market and return to school. Finally, the analysis distinguishes among individuals of different ability levels, which is new to the literature.

Main results show that university enrollment is counter-cyclical: more students enroll in university during economic contractions. Business cycles mainly affect decisions of recent high-school graduates. Recessions do not seem to have a significant impact on the decision to pursue graduate

[1]The only exceptions are Méndez and Sepúlveda (2012), who used panel data from NLSW and focused mainly on training activities, and Brunello and Winter-Ebmer (2003) who analyzed time to degree using European data.

studies or the decision to leave the labor market to return to university. Ability, proxied by parental education, negatively affects the counter-cyclicality of university enrollment. This result is very interesting because it may have important implications on income inequality. Since recessions mainly stimulate university enrollment of low-ability individuals, economic contractions may have a positive impact on the earnings differential of low-ability versus high-ability individuals. This aspect is unexplored in the current literature.

Finally, economic downturns stimulate the acquisition of theoretical rather than practical and job-oriented education. In fact, contrary to university enrollment, college enrollment is pro-cyclical and enrollment in other (non-university) PSE institutions is acyclical.

The paper is organized as follows. An overview of the dataset used for the analysis is reported in Section 2. Section 3 discusses the methodology and the results. Finally, Section 4 concludes by summarizing the main findings and directions for future research.

2 Data

This paper uses confidential data from SLID (1993-2010). This is a longitudinal survey started in 1993. Individuals are followed for six consecutive years. A new panel is introduced every three years. Each panel includes approximately 17,000 individuals. The survey targets all individuals living in Canada, excluding residents of the Territories and Indian reserves. Starting from 2011, the survey is no longer longitudinal.

From SLID, I construct a pooled panel sample (1993-2010) by pooling together panels 1 through 6[2]. Since the focus is on post-secondary education decisions, I exclude from the sample individuals who never graduated from high school. I collect information about school attendance, employment status, as well as age, ethnicity, sex, parental education, family resources (e.g. house ownership, family income and family size) and residence. After dropping observations where the respondent has missing information on educational activity, the sample contains 609,744 observa-

[2]Panel 1 reference years: 1993-1998), panel 2 reference years: 1996-2001, panel 3 reference years: 1999-2004, panel 4 reference years: 2003-2007, panel 5 reference years: 2005-2010 and panel 6 reference years: 2007-2010.

tions. Summary statistics are reported in Table 1. On average, individuals in the sample are 39 years old, married and live in urban areas. 13% of the individuals are enrolled in post-secondary education. Specifically, 6% are in university, 4% are in college, 1% are in CEGEP[3] and 2% are enrolled in other programs (i.e. trade and business schools).

Following the classification in SLID, I distinguish among the following post-secondary education institutions: university (ISCED[4] 5A and 6); college (ISCED 5B); trade, business and commercial schools (ISCED 4). For each category, I create a dummy variable that indicates whether the respondent was enrolled in any of these institutions during the reference year. From SLID, I also construct a series of variables that have an important impact on schooling decisions: the number of high school graduates in a given year and the PSE premium computed as log-difference between earnings of post-secondary graduates and high-school graduates.

To the dataset, I add the following aggregate variables obtained from Statistics Canada and the World Bank: annual provincial unemployment rate, annual provincial GDP, annual provincial employment rate, real interest rate, average weekly earnings, and the weighted national tuition level at public universities for domestic students enrolled in undergraduate programs. The first three variables are used as alternative indicators of business cycle fluctuations and are detrended using an HP filter[5].

Cyclicality of enrollment rates

The cyclical behavior of enrollment rates in post-secondary education is reported in Figure 1. Enrollment rates are obtained from the Labour Force Survey (October, 1976-2012), while the annual GDP series (1976-2012) is obtained from the World Bank. Both series are detrended using an HP filter with a smoothing parameter equal to 6.25. Enrollment rates display a counter-cyclical pattern. The correlation coefficient between GDP and enrollment is -0.35. That is, more students are enrolled when the GDP level of the economy is below trend. The next section investigates the

[3]Collège d'enseignement général et professionnel in Quebec.
[4]ISCED is the International Standard Classification of Education developed by UNESCO.
[5]The smoothing parameter is set to 6.25, following Ravn and Uhlig (2002)

cyclicality of schooling decisions at the micro level.

3 Methodology and Results

The probability of being enrolled in post-secondary education can be estimated by:

$$Pr(enrolled_{it} = 1/X_{i,t}) = F(\alpha + \beta X_{i,t}) \tag{1}$$

where $enrolled_{it}$ is a dummy variable equal one if individual i is enrolled in a PSE institution at time t and zero otherwise, F is a logistic transformation of the linear index function $(\alpha + \beta X_{i,t})$, $X_{i,t}$ is a vector including individual characteristics (i.e. demographic variables, geographic variables, family resources, parental education) and aggregate variables that affect schooling decisions (i.e. real interest rate, university tuition[6], average weekly earnings, PSE premium, high-school graduates and the cyclical indicator).

I assume the following structure for the error term:

$$u_{i,t} = \alpha_i + \varepsilon_{i,t} \tag{2}$$

where $\varepsilon_{i,t}$ is i.i.d.. In order to take into account unobserved individual characteristics (α_i), equation 1 is estimated using a conditional logistic regression[7]:

$$Pr(enrolled_{it} = 1/\alpha_i, X_{i,t}) = F(\alpha_i + \beta X_{i,t}). \tag{3}$$

By performing a Hausman test, I reject the null that the coefficients in the fixed-effects and random-

[6] Given the unavailability of data on tuition for college and trade schools, university tuition is used as proxy for tuition in any PSE institution.

[7] This type of regression is different from an ordinary logistic regression because the data are divided into groups (in this case, individuals) and within each group the probability of a positive outcome (e.g. enrollment) is partly determined by unobserved individual characteristics. Further, terms that are constant within groups cannot be estimated by this regression. This implies that it is not possible to estimate the intercepts (i.e. fixed effects), the effect of other constant observed factors (e.g. gender, ethnic background) and average marginal effects.

effects models are the same[8].

Table 2 reports the logit coefficients from the estimation in equation 3[9]. Robust standard errors are in parenthesis. *Ceteris paribus*, family resources have a significant impact on the log odds of enrollment. Both family income and the number of earners in the household increase the log odds of being enrolled. Living at home with parents and working[10] also positively affect the decision to enroll in PSE. Tuition has a positive but non always significant impact. This result is consistent with previous studies on university enrollment in Canada. The literature has not consistently found a negative relationship between university tuition and university enrollment. See Neill (2009) for an overview of Canadian studies. This result is also consistent with US studies by Dellas and Sakellaris (2003) and Betts and McFarland (1995).

The effect of the number of high-school graduates depends on the PSE institution. This variable is included in the regression to partially account for the probability of being admitted into a PSE program. The likelihood of enrollment decreases as the number of applications increases (competition effect). The number of applications, in turn, depends on the number of high-school graduates. Therefore, the coefficient should be negative. However, the number of high-school graduates can also account for signaling effects. The higher the number of graduates, the stronger the incentive for students to enroll in PSE rather than entering the labor market in order to signal their ability. In this case, the coefficient should be positive. Since the logit coefficient is insignificant for university enrollment, the two effects offset each other in this case. This is in accordance with the results in Dellas and Sakellaris (2003) and Mattila (1982). However, the competition effect dominates the signaling effect for enrollment in trade schools. The opposite is true for college enrollment.

Also the cyclicality of PSE enrollment depends on the type of institution. University enrollment is counter-cyclical, while college enrollment is pro-cyclical. Enrollment in other institutions (e.g. trade, commercial and business schools) is acyclical. Overall, PSE enrollment is acyclical as well. Table 4 shows the robustness of these results to different cyclical indicators. Marginal effects (at

[8] χ^2=249.82, Prob $> \chi^2$= 0.000.

[9] Note that some observations are dropped because there is no within-group variation in terms of the dependent variable.

[10] Working refers to any type of work (full-time or part-time).

the means) are reported in squared brackets[11]. As shown in the table, GDP and employment rate have a negative impact on the probability of being enrolled in university, while unemployment has a positive impact on university enrollment. For example, the marginal effect of GDP indicates that a one-percent increase of GDP above trend decreases the probability of being enrolled in university by seven percentage points. This implies that enrollment in Canadian universities is counter-cyclical. On the contrary, college enrollment is pro-cyclical. A one-percent increase of GDP above trend increases the probability of being enrolled in college by six percentage points.

This result has important implications on the type of human capital that individuals accumulate during business cycles. Recessions stimulate the acquisition of general education rather than practical and job-oriented education. During expansionary periods, instead, the opposite is true. A possible explanation is related to the fact that university graduates earn higher salaries and face lower unemployment rates on average. During difficult times, students may be more sensitive to differences among PSE institutions in terms of returns to schooling. Therefore, they may be more oriented towards university rather than college education because the former offers better prospects and a better insurance against future recessions.

During expansionary periods, instead, students are more oriented towards college education. This is consistent with the findings in King and Sweetman (2002), who showed that skill retooling is pro-cyclical for Canadian workers over 25 years old. Skill retooling refers to the decision to return to school in order to acquire new skills and switch occupation. Based on the results in this paper, skill retooling mainly happens through college education.

Differences by ability type

Tables 6 through 9 present the results for different ability types. Parental education is used as a proxy for ability. This is common in the economics of education literature and reflects the fact

[11] In an ordinary logit model, the marginal effect of variable x is given by: $\widehat{F(\cdot)}\left(1-\widehat{F(\cdot)}\right)\beta_x$, where $\widehat{F}$ is the sample counterpart of F. However, in a conditional logit model, $\widehat{F}$ cannot be estimated unless one assumes that the intercept is zero (i.e. fixed effect is zero). This assumption would contradict the reason why a conditional logit model is needed in the first place. As a result, I replace $\widehat{F}$ with the sample mean of the dependent variable. This implies that $\widehat{F}$ is the same for all individuals.

that ability is both inherited and created. Besides genetics, ability greatly depends on early human capital investments made by parents on behalf of their children, family income and the parental environment[12]. For these reasons, parental education is a strong predictor of an individual's educational achievement and it is often used as proxy for ability. Specifically, the sample has been divided into two groups: high and low ability individuals. Then, equation 3 has been estimated for the two groups separately. Two classifications are used to distinguish between the groups. First, high-ability individuals are defined as those respondents whose father/mother received at least a bachelor's degree. Then, high-ability individuals are defined as those respondents whose father/mother received at least a non-university certificate or diploma. Tables 6 and 7 show the results using father's education, Tables 8 and 9 show the results using mother's education.

Given the ability measure used in this paper, the cyclicality of university enrollment is mainly driven by low-ability individuals. Enrollment is acyclical for high-ability individuals in all cases. The difference in behavior between ability types can be explained by differences in the opportunity cost and the benefit of education. When a downturn hits the economy, the opportunity cost of education (i.e. forgone labor income) decreases. This is especially true for low-ability individuals who earn lower salaries, face fewer opportunities for promotion and career development, and face higher unemployment rates. Therefore, they have a stronger incentive to enroll in university. Instead, high-ability individuals enroll in university independently of macroeconomics conditions. On one hand, the cost of leaving the labor market to accumulate extra skills and knowledge is high. On the other hand, they are less likely to become unemployed. Therefore, business cycles do not significantly affect their enrollment decisions. Regarding enrollment in other institutions, instead, the results do not display a consistent difference between ability types. Individuals are equally likely to attend college or trade schools during business cycles.

[12]For a review of the empirical and theoretical studies on this topic, see Cunha et al. (2006) and Carneiro and Heckman (2003).

Employment-to-school transition

The panel structure of SLID allows me to further investigate people's decisions regarding post-secondary education. This section focuses on the transition from work to school. Do people leave the labor market to enroll in PSE during recessions? Or do recessions affect only students who are graduating from high school and are about to decide on post-secondary education?

Table 10 shows the logit coefficients obtained from a conditional logistic regression that estimates the odds of leaving the labor market to return to school. The analysis studies the decision to return to university, college and trade school separately. Each column refers to a different dependent variable. Each dependent variable is equal one if the respondent worked for at least 20 weeks during the previous year and is enrolled (in university or college or trade school) during the reference year. The variable is equal zero if the respondent worked for at least 20 weeks in the previous year and is not enrolled in the reference year.

There is no evidence to support the claim that individuals are likely to return to school during bad times. Recessions mainly impact recent high-school graduates or who is already enrolled in a post-secondary program. However, there is evidence suggesting that workers go back to school to pursue a college degree during economic expansions. This result is consistent with the findings in King and Sweetman (2002).

University enrollment: differences by major and degree

This section focuses on university enrollment and distinguishes among university majors and degrees. For the purpose of this analysis, university major has been grouped into six categories: humanities, arts, social sciences; business; physical and life sciences, mathematics, computer and information sciences, and engineering; agriculture and natural resources; health and fitness; personal, protective and transportation services, and others[13]. Equation 3 is estimated separately for

[13]This classification is based on the Classification of Instructional Programs (CIP) - primary grouping developed by Statistics Canada and the National Centre for Education Statistics. The six categories have been defined as follows: group 1 (CIP-primary grouping 1-4), group 2 (CIP-primary grouping 5), group 3 (CIP-primary grouping 6-8), group 4 (CIP-primary grouping 9), group 5 (CIP-primary grouping 10), group 6 (CIP-primary grouping 11-12)

each major.

As shown by Table 11, enrollment in humanities, social sciences and agricultural studies is counter-cyclical, while enrollment in other programs is acyclical. A possible explanation is related to the fact that top students in Canada tend to enroll in lucrative fields and elite majors (Davies and Hammack, 2005). If, as argued by (Stark, 2007), non-science degrees are less lucrative than science degrees, low-ability individuals should be more likely to enroll in non-science degrees compared to others. Therefore, given that the cyclicality of university enrollment is driven by low-ability individuals, it should not be surprising that enrollment in humanities and social sciences is counter-cyclical, while enrollment in other programs is acyclical.

Table 13, instead, compares respondents with and without a bachelor's degree. Enrollment is counter-cyclical only for respondents without a bachelor's degree. Therefore, business cycles affect the decision to pursue a first degree rather than the decision to pursue graduate studies or a second degree. This is consistent with the fact that macroeconomic conditions affect university enrollment decisions of recent high-school graduates only.

Does counter-cyclical enrollment lead to a higher number of university graduates?

Do students, who initially enrolled due to the recession, complete their studies? This question is important because, if students graduate at the end of their studies, economic downturns also affect the total number of students with a university degree and, therefore, significantly impact the aggregate human capital stock in the economy. To answer this question, I construct a new binary variable equal one if the respondent was enrolled in the previous year and dropped from university in the reference year, and zero if she is still enrolled in university. Then, I estimate the odds of dropping out of university using a conditional logistic regression. Together with the previous control variables, I include lags of GDP or lags of the difference between GDP in one year and the previous year.

Based on the results presented in Table 14, the decision to drop out of university is not significantly affected by current economic conditions or economic conditions in previous years. Also

changes in economic conditions from one year to another do not affect the odds to drop out. If the logit coefficients for GDP differences between consecutive years were positive and significant, students would be more likely to drop when economic conditions improve over time and less likely to drop when economic conditions worsen over time. Instead, insignificant coefficients suggest that students are likely to remain enrolled in university even if macroeconomic conditions improve while they are attending school.

4 Conclusions

This paper has shown that PSE decisions respond to business cycles fluctuations. University enrollment is counter-cyclical, while college enrollment is pro-cyclical. This result suggests that economic contractions stimulate the acquisition of general education, while economic expansions stimulate the acquisition of practical and job-oriented education.

Low-ability individuals are driving the cyclicality of university enrollment. High-ability individuals are not responsive to macroeconomic conditions. They tend to enroll in university during normal times. Once they enter the labor market, they earn higher wages and face lower unemployment rates on average. As a result, they do not benefit by leaving the labor market to accumulate extra skills and knowledge.

Macroeconomic conditions mainly affect the decision of recent high-school graduates to pursue a bachelor's degree, while they do not significantly affect the decision to pursue advanced studies or return to university. There is no evidence suggesting that workers leave the labor market in order to return to school during recessions. However, the decision to return to college is pro-cyclical, which is consistent with previous studies on the cyclicality of skill retooling. Finally, students are likely to remain enrolled even if macroeconomic conditions improve, implying that recessions lead to a higher number of university graduates.

These results have important implications at the aggregate and individual level. Since, during economic downturns, individuals accumulate skills and knowledge that they would not acquire oth-

erwise, recessions increase the aggregate human capital stock in the economy. This may positively impact the economy in the long run. Further, downturns may give the opportunity to low-ability individuals to reduce the earnings gap with high-ability individuals, suggesting that recessions may have a positive impact on income inequality. Both aspects have not been explored by the current literature, suggesting directions for future research.

Tables and Figures

Table 1: Summary statistics

Variable	Mean	Standard Deviation
Age	39.03	13.59
Female	0.51	0.50
Married	0.58	0.49
Single	0.27	0.45
PSE enrollment	0.13	0.33
University enrollment	0.06	0.24
College enrollment	0.04	0.19
CEGEP enrollment	0.01	0.12
Enrollment in other PSE institutions	0.02	0.13
Paid worker	0.76	0.43
Family size	3.12	1.39
House ownership	0.80	0.40
Resident in metropolitan area	0.75	0.43
Live with parents	0.68	0.47
N = 609,744		

Table 2: Logit coefficients: PSE enrollment

Dependent variable: PSE/university/college/other enrollment (=1 if enrolled, =0 otherwise)

	PSE enrollment		University enrollment		College enrollment		Enrollment in other institutions	
ln(GDP)	-0.06	(0.39)	-1.30**	(0.60)	1.48***	(0.55)	-1.07	(0.82)
Age	0.41***	(0.03)	0.50***	(0.05)	0.41***	(0.04)	0.31***	(0.06)
Age^2	-0.01***	(0.00)	-0.01***	(0.00)	-0.01***	(0.00)	-0.01***	(0.00)
Married	-0.81***	(0.07)	-0.90***	(0.11)	-0.71***	(0.10)	-0.09	(0.13)
DSW	-0.79***	(0.10)	-0.90***	(0.19)	-0.70***	(0.13)	-0.08	(0.19)
Live in rural area	-0.20***	(0.105)	-0.24***	(0.09)	-0.10	(0.07)	-0.12	(0.09)
ln(family income)	0.63***	(0.03)	0.63**	(0.05)	0.41***	(0.05)	0.31***	(0.05)
Negative family income	-11.4***	(0.78)	-11.8***	(1.10)	-7.43***	(1.05)	-6.47***	(1.06)
Number of earners in hh	0.05***	(0.02)	0.12***	(0.03)	-0.01	(0.03)	-0.05	(0.03)
Live at home	1.18***	(0.06)	1.20***	(0.10)	0.81***	(0.08)	0.71***	(0.11)
Worked in ref. year	1.02***	(0.03)	1.21***	(0.05)	0.76***	(0.04)	0.44***	(0.06)
Real interest rate	-0.02**	(0.01)	-0.01	(0.16)	1.0e-3	(0.01)	-0.06***	(0.02)
University Tuition*1,000	0.06**	(0.02)	0.03	(0.04)	0.05	(0.04)	0.06	(0.06)
ln(high-school graduates)	0.09	(0.07)	0.04	(0.11)	0.24**	(0.11)	-0.29*	(0.15)
Average weekly earnings * 100	-0.03	(0.06)	0.25***	(0.09)	-0.16**	(0.08)	-0.20*	(0.12)
PSE premium	0.47	(0.42)	0.47	(0.67)	-0.37	(0.61)	2.12**	(0.83)
N	149,093		65,407		68,889		36,543	

Robust standard errors are reported in brackets. The weight variable used is *ilgwt26*. For each individual, I only use the weight corresponding to the first year in which the respondent joined the panel. DSW stands for divorced/separated/widowed. GDP has been transformed into natural logarithm and detrended with an HP filter. Family income, tuition, GDP and average weekly earning are in 1993 constant dollars.
* 10-percent significance level , ** 5-percent significance level, *** 1-percent significance level.

Table 4: Logit coefficients and marginal effects: PSE enrollment

Dependent variable: PSE/university/college/other enrollment (=1 if enrolled, =0 otherwise)	PSE enrollment	University enrollment	College enrollment	Enrollment in other institutions
ln(GDP)	-0.06	-1.30**	1.48***	-1.07
(standard error)	(0.39)	(0.60)	(0.55)	(0.82)
[marginal effect]	[0.01]	[-0.07]	[0.06]	[0.02]
Controls	✓	✓	✓	✓
N	149,093	65,407	68,889	35,543
Unemployment rate	0.05*	0.16***	-0.03	0.04
(standard error)	(0.03)	(0.04)	(0.41)	(0.05)
[marginal effect]	[0.01]	[0.01]	[1e-3]	[3e-3]
Controls	✓	✓	✓	✓
N	149,093	65,407	68,889	36,543
Employment rate	0.01	-0.01	0.04*	-0.04
(standard error)	(0.02)	(0.02)	(0.02)	(0.03)
[marginal effect]	[0.01]	[-0.01]	[0.01]	[-4e-3]
Controls	✓	✓	✓	✓
N	149,093	65,407	68,889	36,543

Robust standard errors are reported in round brackets. The weight variable used is *ilgwt26*. For each individual, I only use the weight corresponding to the first year in which the respondent joined the panel. GDP, unemployment rate and employment rate are detrended using an HP filter.
* 10-percent significance level , ** 5-percent significance level, *** 1-percent significance level.

Table 6: Logit coefficients: PSE enrollment by ability type (father's education)

Dependent variable:	PSE enrollment		University enrollment		College enrollment	
	HIGH father's education ≥bachelor's degree	LOW father's education < bachelor's degree	HIGH father's education ≥ bachelor's degree	LOW father's education < bachelor's degree	HIGH father's education ≥ bachelor's degree	LOW father's education < bachelor's degree
ln(GDP)	2.25**	-0.66	-0.01	-1.91***	3.26	1.09
	(1.00)	(0.42)	(1.21)	(0.69)	(1.66)	(0.58)
Controls	✓	✓	✓	✓	✓	✓
N	21,202	127,891	14,506	50,901	7,124	61,765
	HIGH father's education > high school	LOW father's education ≤ high school	HIGH father's education > high school	LOW father's education ≤ high school	HIGH father's education > high school	LOW father's education ≤ high school
ln(GDP)	1.47**	-1.11	-0.16	-2.69***	2.84***	0.65
	(0.66)	(0.48)	(0.86)	(0.84)	(0.99)	(0.65)
Controls	✓	✓	✓	✓	✓	✓
N	51,706	97,387	30,233	35,174	20,970	47,919

Each estimation includes the same variables as in Table 2. The stars indicate the significance level: * indicates 10-percent significance level , ** indicates 5-percent significance level, *** indicates 1-percent significance level.

Table 7: Logit coefficients for unemployment: PSE enrollment by ability type (father's education)

Dependent variable:	PSE enrollment		University enrollment		College enrollment	
	HIGH father's education ≥bachelor's degree	LOW father's education < bachelor's degree	HIGH father's education ≥ bachelor's degree	LOW father's education < bachelor's degree	HIGH father's education ≥ bachelor's degree	LOW father's education < bachelor's degree
Unemployment rate	-0.15*	0.07**	-0.03	0.21***	-0.17	-0.03
	(0.08)	(0.03)	(0.09)	(0.05)	(0.13)	(0.04)
Controls	✓	✓	✓	✓	✓	✓
N	21,202	127,891	14,506	50,901	7,124	61,765
	HIGH father's education > high school	LOW father's education ≤ high school	HIGH father's education > high school	LOW father's education ≤ high school	HIGH father's education > high school	LOW father's education ≤ high school
Unemployment rate	-0.03	0.09**	0.10	0.22***	-0.14**	0.01
	(0.05)	(0.03)	(0.06)	(0.06)	(0.07)	(0.05)
Controls	✓	✓	✓	✓	✓	✓
N	51,706	97,387	30,233	35,174	20,970	47,919

Each estimation includes the same variables as in Table 2. The stars indicate the significance level: * indicates 10-percent significance level , ** indicates 5-percent significance level, *** indicates 1-percent significance level.

Table 8: Logit coefficients: PSE enrollment by ability type (mother's education)

Dependent variable:	PSE enrollment		University enrollment		College enrollment	
	HIGH mother's education ≥bachelor's degree	LOW mother's education < bachelor's degree	HIGH mother's education ≥ bachelor's degree	LOW mother's education < bachelor's degree	HIGH mother's education ≥ bachelor's degree	LOW mother's education < bachelor's degree
ln(GDP)	1.06	-0.30	-0.72	-1.51**	3.44**	1.17**
	(1.11)	(0.42)	(1.35)	(0.67)	(1.74)	(0.58)
Controls	✓	✓	✓	✓	✓	✓
N	16,698	132,395	11,590	53,817	5,902	62,987
	HIGH mother's education > high school	LOW mother's education ≤ high school	HIGH mother's education > high school	LOW mother's education ≤ high school	HIGH mother's education > high school	LOW mother's education ≤ high school
ln(GDP)	0.89	-0.80*	3e-3	-2.93***	2.68***	0.78
	(0.67)	(0.48)	(0.88)	(0.83)	(0.99)	(0.66)
Controls	✓	✓	✓	✓	✓	✓
N	52,231	96,862	30,631	34,776	21,305	47,584

Each estimation includes the same variables as in Table 2. The stars indicate the significance level: * indicates 10-percent significance level , ** indicates 5-percent significance level, *** indicates 1-percent significance level.

Table 9: Logit coefficients for unemployment: PSE enrollment by ability type (mother's education)

Dependent variable:	PSE enrollment		University enrollment		College enrollment	
	HIGH mother's education ≥bachelor's degree	LOW mother's education < bachelor's degree	HIGH mother's education ≥ bachelor's degree	LOW mother's education < bachelor's degree	HIGH mother's education ≥ bachelor's degree	LOW mother's education < bachelor's degree
Unemployment rate	-0.13	0.06**	-0.02	0.19***	-0.06	-0.03
	(0.09)	(0.03)	(0.11)	(0.05)	(0.14)	(0.04)
Controls	✓	✓	✓	✓	✓	✓
N	16,698	132,395	11,590	53,817	5,902	62,987
	HIGH mother's education > high school	LOW mother's education ≤ high school	HIGH mother's education > high school	LOW mother's education ≤ high school	HIGH mother's education > high school	LOW mother's education ≤ high school
Unemployment rate	0.01	0.06*	0.10	0.19***	-0.10	0.09
	(0.05)	(0.03)	(0.07)	(0.06)	(0.07)	(0.11)
Controls	✓	✓	✓	✓	✓	✓
N	52,231	96,862	30,631	34,776	21,305	47,584

Each estimation includes the same variables as in Table 2. The stars indicate the significance level: * indicates 10-percent significance level , ** indicates 5-percent significance level, *** indicates 1-percent significance level.

Table 10: Logit coefficients: Employment-to-PSE transition

Dependent variable:	Return to university	Return to college	Return to trade school
ln(GDP)	3.65*	-0.53	-0.06
	(2.17)	(1.71)	(2.04)
Controls	✓	✓	✓
Unemployment rate	-0.14	-0.21**	0.01
	(0.14)	(0.10)	(0.12)
Controls	✓	✓	✓
Employment rate	0.13	0.18***	0.01
	(0.08)	(0.06)	(0.07)
Controls	✓	✓	✓
N	4,937	7,788	6,421

Each estimation includes the same variables as in Table 2. * 10-percent significance level , ** 5-percent significance level, *** 1-percent significance level.

Table 11: University enrollment by major

Dependent variable:	University enrollment in GROUP 1 (humanities/social sciences)	University enrollment in GROUP 2 (business)	University enrollment in GROUP 3 (science/math)
ln(GDP)	-2.69**	-0.37	-3.12
	(1.25)	(1.69)	(1.94)
Controls	✓	✓	✓
N	16,874	8,009	7,008

	University enrollment in GROUP 4 (agriculture)	University enrollment in GROUP 5 (health/fitness)	University enrollment in GROUP 6 (other)
ln(GDP)	-11.36**	-0.61	-5.53
	(5.24)	(1.92)	(4.95)
Controls	✓	✓	✓
N	972	5,351	1,081

Each estimation includes the same variables as in Table 2. Each dependent variable is equal one if the respondent is enrolled in university in a specif major (group 1 - group 6) and zero if she is not enrolled in university. * 10-percent significance level , ** 5-percent significance level, *** 1-percent significance level.

Table 12: University enrollment by major: logit coefficients for unemployment

Dependent variable:	University enrollment in GROUP 1 (humanities/social sciences)	University enrollment in GROUP 2 (business)	University enrollment in GROUP 3 (science/math)
Unemployment rate	0.16*	0.06	0.23
	(0.90)	(0.13)	(0.14)
Controls	✓	✓	✓
N	16,874	8,009	7,008

	University enrollment in GROUP 4 (agriculture)	University enrollment in GROUP 5 (health/fitness)	University enrollment in GROUP 6 (other)
Unemployment rate	0.08	0.02	0.06
	(0.34)	(0.16)	(0.36)
Controls	✓	✓	✓
N	972	5,351	1,081

Each estimation includes the same variables as in Table 2. Each dependent variable is equal one if the respondent is enrolled in university in a specif major (group 1 - group 6) and zero if she is not enrolled in university. * 10-percent significance level , ** 5-percent significance level, *** 1-percent significance level.

Table 13: Logit coefficients: University enrollment by degree

Dependent variable:	First-degree enrollment	Advanced-degree enrollment
ln(GDP)	-1.33*	-1.24
	(0.69)	(1.15)
Controls	✓	✓
Unemployment rate	0.20***	0.04
	(0.05)	(0.08)
Controls	✓	✓
Employment rate	-0.02	0.05
	(0.03)	(0.05)
Controls	✓	✓
N	42,287	39,136

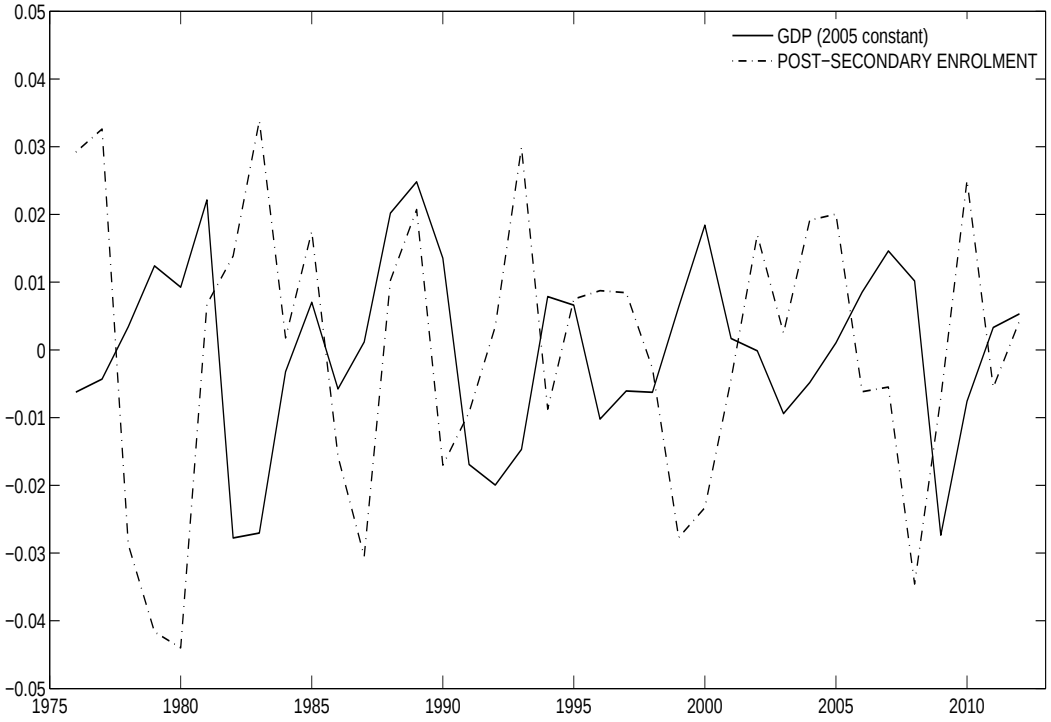
Each estimation includes the same variables as in Table 2. First-degree enrollment is equal one if the respondent is enrolled in university and does not have a bachelor's degree yet. It is equal zero if the respondent is not enrolled in university. Advanced-degree enrollment is equal one if the respondent is enrolled in university and has already a bachelor's degree. It is equal zero if the respondent is not enrolled in university. * 10-percent significance level , ** 5-percent significance level, *** 1-percent significance level.

Table 14: Decision to drop out of university

Dependent variable:	Drop =1 if dropped from university in ref. year =0 if did not drop					
$ln(GDP_T)$	3.15	3.14	4.71*	3.38	3.71	3.79
	(2.31)	(2.36)	(2.74)	(2.32)	(2.44)	(2.52)
$ln(GDP_{T-1})$	-	-0.11	1.08	-	-	-
		(2.03)	(2.36)			
$ln(GDP_{T-2})$	-	-	5.17*	-	-	-
			(2.97)			
$ln(GDP_T) - ln(GDP_{T-1})$	-	-	-	-1.34	-0.88	-0.25
				(1.31)	(1.47)	(1.74)
$ln(GDP_{T-1}) - ln(GDP_{T-2})$	-	-	-	-	1.93	2.85
					(2.07)	(2.52)
$ln(GDP_{T-2}) - ln(GDP_{T-3})$	-	-	-	-	-	3.47
						(2.37)
Observations	6,913	6,913	6,913	6,913	6,913	6,913

The estimation includes the same variables as in Table 2. * 10-percent significance level , ** 5-percent significance level, *** 1-percent significance level.

Figure 1: Deviation from HP trend of GDP and PSE enrollment



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