Research Plan: Essays in Human Capital Investment; Essays in Economics of Education; Economics of Education throughout Lifecycle;...

[Notes]

- put in support from the literature

1. Introduction

在这篇博士论文中，我计划对于教育进行的研究贯穿了人的一生。对于不同的人生阶段，我会选取不同的切入点与侧重点，使用经济学的方法与工具，试图深入地理解人力资本投资的相关问题。在终身学习的概念框架之下，人的教育大致可以分为早期的学校教育以及离开学校之后的教育与培训。这篇博士论文中的后面三章是三篇独立的学术论文，它们主要采用实证、因果的工具，将经济学的视角应用于教育及相关问题的分析，评估相关的公共政策，回答生命周期中不同阶段的教育经济问题。从主题上说，这三篇文章以教育为最中心的关注点，往外联系劳动、人口等与之密切相关的话题，将教育作为个人与社会发展过程中的一个根本性因素进行分析，在深入探讨具体问题时，也将它们放在系统的视域之下进行理解。

第一篇论文关注大学教育，将目标落在大学学费与学生学业表现的关系之上。更宏观地说，我期待这篇文章为教育财政投入与教育资源使用效率等问题提供一个微观行为层面的实证支持。This chapter is going to be co-authored with both my supervisors, Andreu Arenas and Jenifer Ruiz-Valenzuela.

第二篇论文在学校教育与劳动力市场表现搭建桥梁，研究教育如何影响劳动力市场表现的不确定性。教育如何影响一个人的经济表现，从上世纪教育经济学发端，就已经是最为重要的一个话题。经济学家基于人力资本理论而提出的“教育是最好的投资”等说法，如今已经是人人都知道的陈词滥调。然而，尽管教育是最重要的人力资本“投资”方式，相比于其他类型的投资，我们对它的理解却不够透彻——既有研究对于收益的调查已经细致入微，但对投资的另一个重要角度的考察，即风险或不确定性，却仍处在一个比较模糊的阶段。

第三篇论文关注人生较后阶段的人力资本投资问题，试图从实证上理解培训对于老年工作者的表现有什么样的影响。研究人在劳动最后一阶段的教育与培训问题，与关注正要踏入劳动力市场的大学学生的第一篇论文形成了一种很微妙的呼应。但更重要的是，如果说前两篇文章所关注的教育经济领域一般兴趣的问题，第三篇文章所试图回答的这个问题则是当前时代及以后相当长一段时间内具有十分重要的意义，因为我们的世界正处在并将长期处在所谓的老龄化社会。

2. Chapter 1 *Tuition Fees and Efficient Use of Higher Educational Resources*

2.1 Background and Motivation

Higher education plays a vital role within the education system. At the country level, each year significant resources are allocated to tertiary education institutions; at the individual level, students' performance during this period directly influences their transition from being students to becoming productive members of society in the next stage of their life. In OECD countries, for example, the amount of per-student spending surpasses that of other levels of education, and these public investments have continued to rise at a faster pace than the increase in enrolment rates. However, the utilization of these funds does not seem to be as efficient as expected. Low graduation rates and delayed graduation among university students have long been a serious concern across countries even in the world's most developed countries, as evidenced by recent data showing that only 39% of undergraduates in OECD countries graduate on time and that more than a fifth of enrolled students do not manage to graduate after all (OECD, 2022). It seems that resources have continuously been invested in higher education, but they fail to yield the desired outcomes.

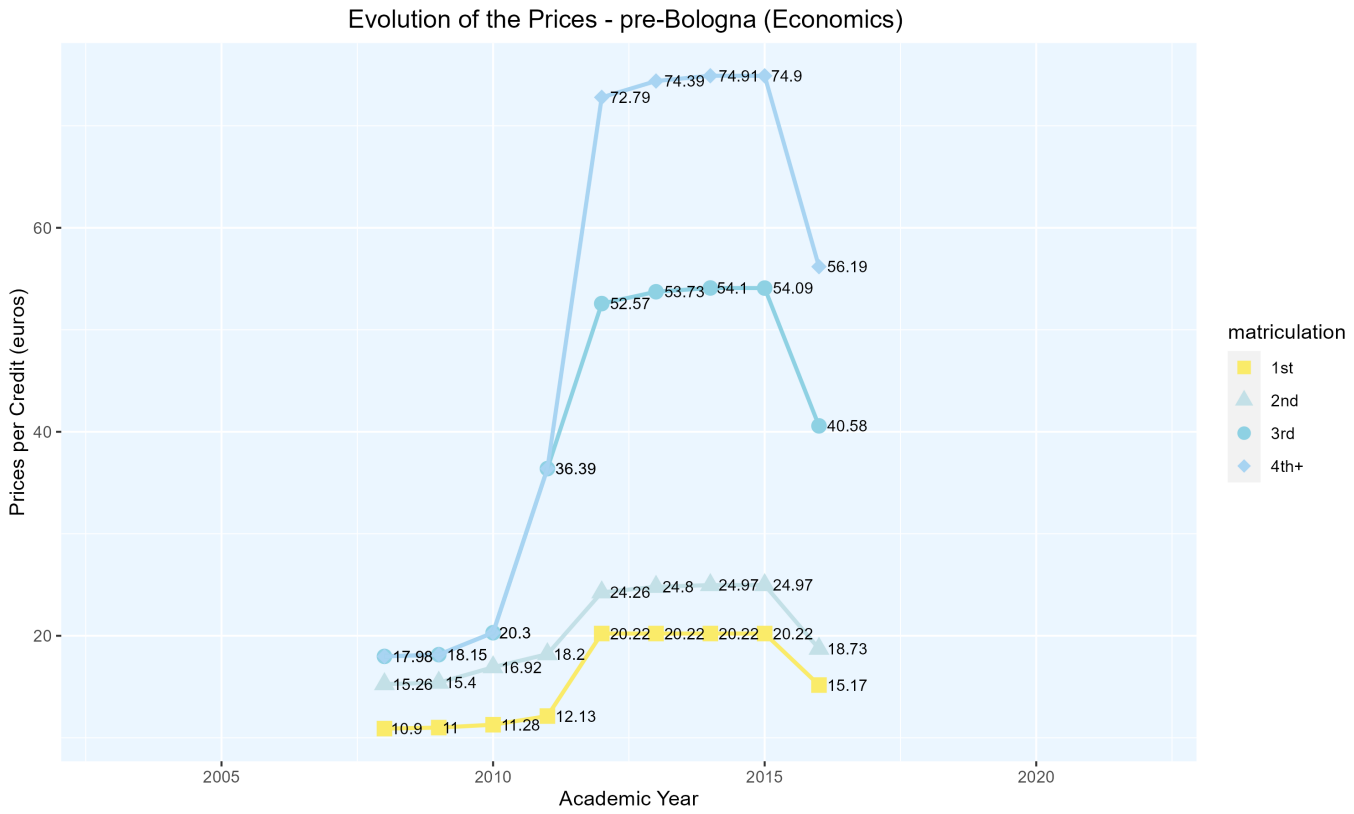
A critical aspect of higher education funding revolves around public subsidies on tuition fees. There has been an ongoing debate in policy practice or theoretical research on whether public universities should charge fees, to what extent the state should provide financial support for students, and what portion of the cost of higher education should be borne by individuals. To this day we are still far from reaching consensus. Over the past few decades, there have been numerous policy attempts addressing the issue of tuition fees in higher education. These policies have sparked considerable discussion and debate. For instance, England implemented tuition fees in 1998 (see Murphy et al 2019; Sa 2019; etc), while several German states introduced fees in the early 21st century only to abandon them approximately a decade later (see Bietenbeck et al 2023; Bruckmeier and Wigger 2014; etc).

These examples represent significant shifts in the systems, transitioning from free education to fee-based or vice versa. However, it is important to note that in practice, rather than experiencing radical changes such as complete introductions or cancellations of fees, many educational systems undergo modifications in the levels of tuition fees. How can tuition fees be adjusted to make the financial investment in higher education more efficient? Or, will higher or lower tuition fees motivate students to use higher educational resources more efficiently and produce better academic performance, and to what extent will so? These are not only academic questions to be answered, but also significant in the practice of fiscal and educational policy.

The 2008 financial crisis in the United States spread to the world, leading to the largest global economic crisis in decades. European countries were greatly affected, and many governments fell into difficulties, leading to the European debt crisis. The Spanish government, in order to reduce expenses in this context, increased university tuition fees in the following years. This change was nationwide. The price changes in Catalonia occurred between 2010 and 2012; before and after this period, the university tuition fees in the region remained relatively stable, providing us with an ideal policy change for our research.

2.2 Objectives and Expected Contribution

Taking advantage of the change in tuition fees as described above, we attempt to find out whether the increase in tuition fees has an impact on students' behaviors in the university, with a particular focus on the number of retakes for a student to pass a course. In order to answer such a question, some details about the price change. In most regions of Spain, and especially in Catalonia, the levels of tuition fees for enrolling in a course for the first time and for subsequent repetitions of the same course are different. As is shown in [Graph 1], before 2010, the raise in fees if one takes more times of a course--considered here as the extra costs--was not significant. For instance, students majoring in economics need to pay at most 5 euros more per credit if they fail a course and take it for the second or more times. However, after the policy change, the highest price per credit for retaking a course (for the fourth and subsequent times of repetition) has become almost four times the price for the first enrolment. Take economics as an example again. In 2011, the extra cost per credit is 18.19 euros, or 100%, if the student fails a course for the second time and needs to take it for the third. Here we are showing the price changes for the system before introducing the Bologna process; the trend behaves exactly the same for the later system.



With this variation, we are able to further explore how tuition fees affect students' behaviors including course retaking. Does reducing the subsidy level for course repetitions and increasing the cost of retraining for students motivate them to make greater efforts so that they retake fewer courses? Does it prompt students to complete their studies faster and reduce the proportion of delayed graduation?

This paper contributes to the strand of literature in the economics of education which looks at the relationship between financial situations and students' performance. Research on this topic in general started several decades ago (Kane 1994; Ehrenberg and Mavros 1995; Dynarski, 2003). However, a large portion of papers has studied the impact of various aids and scholarships (Murphy and Wyness 2023; Denning et al 2019; Castleman and Long 2016; Fryer 2011; Dynarski, 2003). A possible explanation of this is that, compared to the introduction of aids and scholarships, tuition fees are more difficult to change due to procedural complexity, especially for public universities whose fees are regulated by laws. Also, in countries like the United States, grants and financial aid are used often as a tool to target different groups of students, thus attracting more policy-related concerns and examinations.

Recent studies have tried to identify the causal relationship between tuition fees and student behaviors by evaluating relevant policy changes. As mentioned in the previous section, the shift away from England's free higher education system has been a possible policy change to explore. Yet, due to the complication and long progression of the change, past research either found it difficult to separate the pure effect of charging fees (Sa 2019) or provide descriptive evidence rather than causal inference (Murphy et al 2019). The introduction of fees for universities in Germany is another most often explored setting. Looking at this change, Hübner (2012) and Bruckmeier and Wigger (2014) obtain rather controversial results--the former study concludes with a decrease in enrolment in the face of a rise in fees while the latter finds no significant impact. Recently, Bietenbeck et al (2023) disentangle the effects in the extensive and intensive margins using this variation, reaching the conclusion that the introduction of fees increases students' effort and degree completion but decreases enrolment rates, thus leading to an insignificant overall effect. Such a lack of consensus exists in other parts of the literature. In Italy, Garibaldi et al (2012) exploit a special tuition fee discontinuity at Bocconi University, finding that higher tuition fees do reduce the probability of late graduation. In contrast, Hans Fricke (2018) uses an unexpected raise in fees at the University of St. Gallen in Switzerland and finds no significant effect at all on both graduation and grades. For the extensive margin, according to a meta-analysis by Havranek et al (2017), though most research reports that increasing tuition fees would lower enrolment rates, the mean effect has become close to zero after adjusting for publication bias. For the effects on the intensive margin, the debate is still going on; this is also what we mainly focus on in the paper.

Pertinent to the particular context we use, there is only one paper looking at a similar change in Spain, as far as our knowledge is concerned. Beneito et al. (2018) compare students who pay fees to those who are exempt before and after a rise in university prices in Valencia, Spain, using data from three majors in one cohort at the University of Valencia. However, they do not try to investigate different levels of extra costs students face when there are course repetitions, which is our focus in this paper to understand in detail the efficiency of. Besides, with more data available, we are also able to explore the heterogeneity of the effects on different groups of students from various backgrounds, disciplines, etc, when facing a change in prices. **[should I drop the last bit? It doesn't look good to me somehow... →]** For instance, disciplines with heavier reliance in experiments will probably suffer from a negative impact in student outcomes; disciplines with closer connections with the economic sector outside of universities might experience a negative effect in student performance as students may react to the increasing tuition fees by spending more time in doing part-time jobs (or maybe

students in such disciplines are less affected because they can compensate for this increase by working part-time more easily).

2.3 Identification Strategy and Data

1) Data

We use the administrative data from the University of Barcelona (UB), which provides a detailed record of the academic performance of undergraduate students before and after the change in tuition fees. The sample consists of all students who enrolled at UB from 2007 to 2017. Our data includes their course selection, grades, retakes, and graduation dates. It also incorporates the background information of students recorded during the pre-enrollment process, as well as their performance in the college entrance examination.

The main outcome variables we use to indicate academic behaviors include: 1) grades a student obtained, 2) the number of enrollments for a course before passing it, 3) the number of courses a student enroll in, and 4) a dummy indicating whether a student passes a course for each time of enrollment, among others. These outcomes help us to identify effects in the intensive margin, which is our main target in this research as described in previous sections. Besides, we also investigate the drop-out and completion rates, as well as pre-enrolment characteristics such as relative performance in the College Entrance Exam, which complements our main analysis by looking at the extensive margin.

At the moment we have obtained the slices covering three cohorts of students majoring in Economics, as the administrative side is still processing our request for the whole dataset. Descriptive statistics and preliminary results are generated for exploratory purposes and are presented below. We can see that the

2) Methodology

a. Diff-in-Diff

In order to identify how such a policy shock in tuition fees affects students' performance, we use a staggered Difference-in-Difference specification as our baseline model:

$$y_{ijk} = \alpha_k + \gamma_j + \beta D_{ijk} + \theta X_i + \varepsilon_{ijk},$$

where y_{ijk} denotes the outcomes as defined above for individual i in cohort j at the k-th year of study, D_{ijk} indicates whether this individual is exposed to the rise in fees, α_k captures the fixed effects for different years of study, γ_j captures the fixed effects for cohort j, and X_i is a vector of characteristics of individual i. We assume that, in the absence of the rise in tuition fees, the pattern of evolution of students' behaviors as they proceed to higher years of study does not change across cohorts, while the absolute levels of performance may change from cohort to cohort. This assumption lays the foundation for identifying the causal effects of the policy change in tuition fees using the above specification. To illustrate, an individual in the 2008 cohort ($j = 2008$), was affected by the sharp increase in tuition fees in the academic year 2010/11, which is the third year of her university study ($k = 3$). Therefore, our regression will capture any possible changes in her performance from the second to the third year, which, when compared to that of another individual in the 2007 cohort from his second to third year, will lead us to the effect caused by the rise in tuition fees.

(To disentangle the effect for extra punishment of failure: In academic year 2010/2011, there is a sharp increase in third-time enrollment for the same course, while the fees for the first and second registrations do not change significantly compared to previous years. Thus, by using a Diff-in-Diff or event study, we can separate the effect of the extra costs on failing for the third and subsequent times. That is, we compare academic performance of students in different cohorts exposed to the first rise in tuition fees in 2010/11 in their different years of study.)

b. RD in Time

2.4 Pilot Results

3. Chapter 2 *Education and Labor Market Risks in China*

3.1 Motivation and Background

"Good good study, safe safe job!" Seeking to lower risks in the labour market through education has been pursuit of many families over decades. In the first half of the 20th century, China experienced the trauma of the Japanese Invasion and the following civil war; turbulence and unrest was the theme of the time, and a sense of insecurity and anxiety about life and future was engraved into the collective memory. Generations afterwards - probably up until the Reform and Opening Up - thus bear the obssession for "stable" jobs and pass the preference onto following generations through the

mechanism of expectation. Today, "Study well, find a stable job, and get married." is still commonly heard in Chinese families. A joke usually seen online nowdays about Chinese parents' perception of a "good job" goes: "If you are not a civil servant, a teacher, a doctor, or an SOE employer, you are having an unworthy job." Although the joke is exagerating, it reflects the mindset of previous generations to explicitly pursue jobs that are secure (the "Iron Rice Bowls") to such an extreme point that other jobs, such as being employed in a private company, are sometimes considered not decent.

In the literature of financial investment, returns and risks are explored; in the past decades, research on risks has been attracting even more attention from academia. Yet, in the field of human captial investment, the estimation of returns to eduation, training and health has always been at the center of the stage, leaving risks relatively little explored.

3.2 Objectives and Expected Contribution

In this chapter,

Parallel to the ideas of return and risk in financial investment which take the forms of financial market performance, returns and risks to human capital, especially to education, can be defined as labor market outcomes and their uncertainty. Take salary as an example. The returns one receives from higher education compared to high school can be defined as the marginal increase of expected wages one earns if they go to college instead of leaving school after high school, holding other factors constant. One possible definition of the risk of this outcome would be the probability of this marginal increase to be negative, or, more broadly, the . (Risks of investing in a stock, for example, can be defined as the probability of receiving a negative return, compared to taking no action in the financial market, i.e., the risk-free rate.)

Such corresponding definitions can be used in various labor market outcomes, such as employment status - the marginal increase in job stability (measured for example as the average time staying in the same job) for receiving more education, and the probability of this increase to be negative. Considering the perpetuity of the returns to human capital investment, we can also define risks of such returns as the fluctuation of salary over the life cycle, as in Delaney and Devereux (2021).

3.3 Potential Identification Strategy and Data

4. Chapter 3 *Make Gray the New Green: Human Capital Re-Investment in Aging Workers*

4.1 Background and Motivation

Population aging has been becoming the new norm of the world, albeit at varying rates across different regions. Developed countries in Europe and North America find themselves in the middle of this demographic shift, while developing countries such as China are in the early stages. Regardless of their current positions, all countries face similar challenges arising from population aging, including a decline in the working-age population and an increase in the dependency ratio. These may lead to conflicts in the distribution of resources, economic recessions, and social instability. The aging society has emerged as a significant issue on the agenda demanding attention from all countries worldwide.

Current explorations from the practice side have been based on ideas of increasing the consumption of the elderly and reducing the burden of elderly care. These include, for example, developing a "silver market" to target the consumption needs of the elderly and providing more elderly care as public services to reduce the pressure on young people to support their elders. Such approaches are necessary but insufficient, as they are mainly derived *merely* from the point of view that treats the elderly as unproductive piggy banks or social burdens. However, to build a harmonious and sustainable aging society, a paradigm shift in this mindset is necessary.

It is crucial to recognize that elderly individuals can also contribute to socio-economic development, only with appropriate measures in place. This is mainly related to human capital, including enabling them to cope with the fast-changing environment, and activating and utilizing what older workers accumulate during years of work, which is too valuable to waste. One promising approach is by providing further education and training opportunities to older workers. Through such training, these aging individuals can formulate new human capital and reduce the depreciation rate of their existing skills and knowledge, enhancing their adaptability in today's labor market and improving their productivity. Another effective approach involves identifying and leveraging the existing strengths of elderly workers, so as to, for example, increase more opportunities for older workers (Acemoglu et al, 2022). By recognizing and harnessing their unique skills and

knowledge, we can enhance efficiency in utilizing their expertise and increase their labor market returns. From a macro perspective, empowering elderly workers allows them to continue making valuable contributions to the economy, fundamentally altering the notion that an "aging society" is synonymous with increasing social burdens and economic slowdown; from an individual perspective, it enables them to lead lives with greater dignity in society.

4.2 Objectives and Expected Contribution

In this chapter, I will evaluate the effects of a training program on labor market outcomes of older workers. Training programs targeting older workers is not a new concept, at least in the late 20th century, some researchers have pointed out possible advantages of offering such programs (Samorodov, 1999), although there was little evidence to support them.

One possible concern is that firms do not believe older workers will stay with them very long, making them reluctant to invest in their human capital.

4.3 Potential Identification Strategy and Data

Mid-Career Enhanced Subsidy - Singapore

the 2020 Work for Tomorrow Act - Germany (or WEGEBAU before) - but they use admin data mostly

5. Data Management Plan

For the first chapter, I am using the administrative data from the UB, which my supervisors have requested for this project. Access to the data is granted to us (Andreu Arenas, Jenifer Ruiz-Valenzuela, and Mengwei Lin) and us only. Therefore I am not going to publish the data or share it without further permission from the UB. Besides, we are authorized to use and reuse the data during the project. In terms of storage, the data will be stored online in a OneDrive folder under my UB account (mengwei.lin@ub.edu), and shared with both of my co-authors. We believe that it is safe to store the data in this way. The original datasets are in .csv format, and when processing the data with Stata, the main software package used in the project, they will be converted to .dta files before further operation. This also ensures that the original data will not be manipulated and can be reused whenever necessary. Last, with the provided codebook, the data is understandable. Relevant details of the data will be reported in the main part of the paper.

For the second and third chapters, although I have made a preliminary plan on data and methods, relevant details still need to be confirmed. With the research progressing, I will be able to provide further details about data management related to the last two papers.

6. Work Plan

[insert Table 6.1 Work Plan here]

As Table 6.1 shows, the research of my PhD thesis will involve conducting the three chapters with a simultaneous and slightly staggered approach. Due to some administrative reasons, I commenced my PhD studies in February 2023; the subsequent research progress will be planned out in light of this situation. Currently, my primary focus has been on the first chapter, which is co-authored with both of my supervisors. We have summarized and reviewed the relevant literature, and are processing the data and obtaining some preliminary empirical results. Additionally, I have formulated research questions to be explored and addressed in the next two chapters and reviewed the key literature, and presented possible strategies and datasets to be used, while this still requires detailed consideration and examination in the following years.

For the academic year 2023/24, my plan entails, first, completing the first chapter and presenting it at international conferences that cover the economics of education. Second, I plan to spend a relatively substantial amount of time on the empirical analysis of the second paper. The objective is to finalize the core content by the conclusion of the second year. In the meantime, pertinent to the third chapter, I will proceed to examine in a more careful manner possible datasets and empirical strategies. For the academic year 2024/25, the plan is to finish drafting my second chapter at the beginning of the year and attend relevant conferences for presentations. Concurrently, I will advance the progress of the third article, with a predominant focus on the empirical analysis component. The writing and presentation aspects of the third article will also primarily be completed by the end of the third year.