



University of Cyprus
Economics Research Centre

Economic Policy Papers

Financial Education and Spillover Effects

Theodosis Kallenos

*Department of Accounting and Finance, University of Cyprus and Economic Analysis
and Research Department, Central Bank of Cyprus*

Andreas Milidonis

Department of Accounting and Finance, University of Cyprus

George Nishiotis[†]

Department of Accounting and Finance, University of Cyprus

Stavros Zenios

*Department of Accounting and Finance, University of Cyprus, Cyprus Academy of
Sciences, Letters and Arts, and Bruegel*

No. 01-23

March 2023

Publication Editor: Vasiliki Bozani

ERC Sponsors (in alphabetical order)

Central Bank of Cyprus

Directorate General for European Programmes, Coordination and Development

Economics Department, University of Cyprus

Ministry of Finance

University of Cyprus

Disclaimer: the views expressed in the Economic Policy Papers and Economic Analysis Papers are of the authors and do not necessarily represent the ERC.

Χρηματοοικονομική Παιδεία: Από τις Αίθουσες Διδασκαλίας στα Νοικοκυριά

Θεοδόσης Καλλένος, Ανδρέας Μιλιδώνης, Γιώργος Νησιώτης[‡] και
Σταύρος Ζένιος

ΠΕΡΙΛΗΨΗ

Μοιράζοντας αυτά που διδάχθηκαν στο Πανεπιστημίου Κύπρου, οι φοιτητές/τριες μπόρεσαν να βελτιώσουν τον χρηματοοικονομικό αλφαριθμητισμό για τις οικογένειές τους

Η εισαγωγή του μαθήματος Χρηματοοικονομικής Εκπαίδευσης στο Πανεπιστήμιο Κύπρου τον Σεπτέμβριο 2020, ήταν η πρώτη στο είδος της στα δημόσια Πανεπιστήμια της Κύπρου. Η επαφή που είχαν (μέχρι το 2020) οι μαθητές/τριες δευτεροβάθμιας εκπαίδευσης στην Κύπρο σε θέματα χρηματοοικονομικών γνώσεων αλλά ακόμα και πιο βασικών εννοιών όπως επιτόκια, αποταμίευση, επενδύσεις, στεγαστικό δάνειο, και διαφοροποίηση («διασπορά») ρίσκου, ήταν περιορισμένη. Η εισαγωγή του μαθήματος Χρηματοοικονομικής Εκπαίδευσης στο Πανεπιστήμιο Κύπρου, αποτέλεσε μια μοναδική ευκαιρία να μελετηθεί η αποτελεσματικότητα αυτής της πρωτοβουλίας πανεπιστημιακών για εκπαίδευση σε θέματα ενίσχυσης των χρηματοοικονομικών γνώσεων τόσο των φοιτητών/τριών, όσο, και ίσως πιο σημαντικό, των μελών των οικογενειών τους.

Ως αποτέλεσμα, μια ομάδα ακαδημαϊκών και ερευνητών από το Πανεπιστήμιο Κύπρου διεξήγαγε έρευνα για να καταγράψει την αποτελεσματικότητά του μαθήματος στο επίπεδο χρηματοοικονομικών γνώσεων. Συγκεκριμένα, η μελέτη, με τίτλο *“Financial Education and Spillover Effects”* (Στα ελληνικά: «Χρηματοοικονομική Εκπαίδευση και Διάχυση γνώσης») εξέτασε το ενδεχόμενο διάχυσης χρηματοοικονομικής γνώσης από την αίθουσα διδασκαλίας προς τους γονείς των φοιτητών και φοιτητριών.

Το μάθημα Χρηματοοικονομικής Παιδείας διήρκεσε 13 βδομάδες, με συναντήσεις των 75 λεπτών, 2 φορές τη βδομάδα. Το μάθημα προσφέρθηκε σε 4 ακροατήρια των 35 περίπου ατόμων, τόσο στην ελληνική όσο και στην αγγλική γλώσσα. Για την καταγραφή του επιπέδου χρηματοοικονομικών γνώσεων, χρησιμοποιήθηκε ερωτηματολόγιο το οποίο απαντήθηκε από τους φοιτητές και φοιτήτριες που παρακολούθησαν το μάθημα (δηλαδή την ομάδα παρέμβασης). Το ερωτηματολόγιο απαντήθηκε πριν και μετά την ολοκλήρωση του κύκλου του εν λόγω μαθήματος, για

να μετρηθεί η διαφορά στο επίπεδο χρηματοοικονομικών γνώσεων. Για να καταγραφεί πιθανή διάχυση γνώσης από την αίθουσα διδασκαλίας προς στο σπίτι, το ίδιο ερωτηματολόγιο απαντήθηκε επίσης από τους γονείς των φοιτητών/τριων, πριν και μετά την ολοκλήρωση του κύκλου του μαθήματος. Για να αντιμετωπιστούν οι περιορισμοί και οι προκλήσεις που αντιμετωπίζουν παρόμοιες μελέτες ακολουθήσαμε την βιβλιογραφία και το ερωτηματολόγιο απαντήθηκε επίσης από φοιτητές και φοιτήτριες που δεν παρακολούθησαν το μάθημα (δηλαδή την ομάδα ελέγχου).

Για την καταγραφή του επιπέδου χρηματοοικονομικών γνώσεων, χρησιμοποιήθηκαν 7 ερωτήσεις από τον Οργανισμό Οικονομικής Συνεργασίας και Ανάπτυξης (ΟΟΣΑ), με ελάχιστη βαθμολογία το 0 και μέγιστη το 7. Με βάση τις κατευθυντήριες γραμμές του ΟΟΣΑ, βαθμολογία πέραν του 5 σηματοδοτεί υψηλό επίπεδο χρηματοοικονομικών γνώσεων. Αντίστοιχα, βαθμολογία του 5 και κάτω θεωρείται χαμηλή και χρήζει βελτίωσης.

Το πιο κάτω γράφημα συνοψίζει τη απάντηση στο πρώτο ερώτημα: Έχει αιτιατή σχέση η εκπαιδευτική παρέμβαση στο επίπεδο χρηματοοικονομικών γνώσεων; Η απάντηση είναι καταφατική. Βλέπουμε το επίπεδο χρηματοοικονομικής γνώσης να αυξάνεται από 4.5 στο 5.9 από 7 στην ομάδα παρέμβασης. Να σημειωθεί ότι η αύξηση στο επίπεδο χρηματοοικονομικών γνώσεων έσπρωξε το επίπεδο χρηματοοικονομικών γνώσεων πέραν του ικανοποιητικού ορίου ο ΟΟΣΑ, δηλαδή βαθμολογία 5/7. Δηλαδή, όχι μόνο βελτιώθηκαν οι χρηματοοικονομικές γνώσεις των φοιτητών/τριων που παρακολούθησαν το μάθημα αλλά και το επίπεδο των γνώσεων ξεπέρασε τα διεθνώς καθορισμένα πρότυπα. Εστιάζοντας στην ομάδα ελέγχου, παρατηρούμε ότι δεν μεταβάλλεται το επίπεδο χρηματοοικονομικών γνώσεων, το οποίο είναι αναμενόμενο, αφού αυτή η ομάδα δεν ήρθε σε επαφή με το αντικείμενο κατά την ίδια περίοδο.

Ιδιαίτερα ενδιαφέρουσα, και καινούργια στην διεθνή βιβλιογραφία, είναι η απάντηση στο δεύτερο ερώτημα: Υπάρχει διάχυση γνώσης από την αίθουσα διδασκαλίας στο σπίτι; Η απάντηση είναι επίσης καταφατική, υπό την προϋπόθεση ότι υπάρχει συχνή επαφή των φοιτητών/τριων και των γονέων τους. Συγκεκριμένα, η μελέτη καταγράφει μέσω οικονομετρικών μοντέλων ότι το επίπεδο χρηματοοικονομικών γνώσεων των γονέων που έχουν παιδιά στην ομάδα παρέμβασης, τα οποία συναντούν τουλάχιστον 5 φορές τη βδομάδα, παρουσιάζουν μέση αύξηση τουλάχιστον 0.7 μονάδων στο επίπεδο χρηματοοικονομικών γνώσεων από την αρχή μέχρι την ολοκλήρωση του κύκλου του μαθήματος. Αυτό δεν συμβαίνει σε γονείς που δεν έχουν τόσο συχνή επαφή με τα παιδιά τους.

Τα αποτελέσματα της έρευνας μπορούν να έχουν σημαντικές προεκτάσεις σε θέματα εκπαιδευτικής πολιτικής. Συγκεκριμένα, το πρώτο συμπέρασμα αυτής της μελέτης αποδεικνύει ότι η εισαγωγή μαθήματος χρηματοοικονομικής εκπαίδευσης αυξάνει το επίπεδο χρηματοοικονομικών γνώσεων σημαντικά στους φοιτητές και φοιτήτριες που το παρακολουθούν. Το δεύτερο συμπέρασμα δείχνει ότι οι παρεμβάσεις χρηματοοικονομικής εκπαίδευσης στους νέους/ες, μπορούν να βελτιώσουν τις χρηματοοικονομικές γνώσεις του περίγυρού τους, όταν υπάρχει συχνή προσωπική επαφή μεταξύ των δύο ομάδων. Δεδομένης της σχετικά συχνής επαφής φοιτητών και φοιτητριών με τους γονείς τους στην Κύπρο, αυτό το αποτέλεσμα αναδεικνύει ένα σημαντικό μηχανισμό για μεταφορά χρηματοοικονομικών γνώσεων από τα πανεπιστήμια στα νοικοκυριά. Η παρέμβαση χρηματοοικονομικής εκπαίδευσης μπορεί να έχει ένα πολλαπλασιαστικό αποτέλεσμα. Η κύρια ομάδα πληθυσμού που πιθανόν να επωφεληθεί από τα πιθανά πολλαπλασιαστικά αποτελέσματα είναι η ηλικιακή ομάδα 45-55, δηλαδή οι γονείς των φοιτητών/τριών που παρακολουθούν το μάθημα. Η εισαγωγή του μαθήματος Χρηματοοικονομικής Παιδείας στο Πανεπιστήμιο Κύπρου είχε θετική επίδραση στους εγγεγραμμένους φοιτητές/τριες και λειτούργησε θετικά στη διάχυση της χρηματοοικονομικής γνώσης στον άμεσο περίγυρό τους και στους γονείς τους, σε μια χώρα με τεκμηριωμένα χαμηλά επίπεδα χρηματοοικονομικής παιδείας.

Εν κατακλείδι, τα αποτελέσματα της πιο πάνω μελέτης δείχνουν ότι η επιτυχής εισαγωγή παρόμοιου μαθήματος χρηματοοικονομικής εκπαίδευσης στη δημόσια δευτεροβάθμια εκπαίδευση θα μπορούσε να αποβεί καταλυτική για τη χρηματοοικονομική παιδεία των νέων μας, αλλά ακόμα και των γονέων τους. Η Εθνική Στρατηγική για την προώθηση του Χρηματοοικονομικού Αλφαριθμητισμού και της Χρηματοοικονομικής Παιδείας στην Κύπρο, η οποία εγκρίθηκε από το Υπουργικό Συμβούλιο τον Ιούνιο του 2022, περιλαμβάνει ακριβώς αυτή τη δράση. Ήδη 16 ιδιωτικά σχολεία δευτεροβάθμιας εκπαίδευσης, από πέντε επαρχίες της Κύπρου εκπροσωπώντας περίπου τα 2/3 των μαθητών και μαθητριών που φοιτούν στα ιδιωτικά σχολεία της Κύπρου έχουν ήδη δεσμευτεί και προχωρούν με την εισαγωγή χρηματοοικονομικής εκπαίδευσης στα στο πρόγραμμά τους, σε συνεργασία με την ομάδα μας.

Είμαστε αισιόδοξοι ότι τα δημόσια σχολεία Δευτεροβάθμιας Εκπαίδευσης στην Κύπρο θα στηρίξουν επίσης την υλοποίηση της Εθνικής Στρατηγικής, αγκαλιάζοντας τα μαθήματα χρηματοοικονομικής παιδείας από τους μαθητές/τριες μας, τους δασκάλους, και τους γονείς.

CONTENTS

Abstract.....	1
1. Introduction.....	2
2. Background, Literature Review and Objectives.....	5
2.1 Financial Literacy in Cyprus	5
2.2 Introduction of the New Financial Literacy Course.....	6
3. Survey Setup.....	8
4. Data	9
4.1 Data Construction.....	9
4.2 Sample Description	10
5. Empirical Analysis	12
5.1 Descriptive Analysis of Financial Knowledge Scores.....	12
5.2 Impact of the course on students' knowledge.....	15
5.3 Spillover effects.....	17
6. Conclusion	20
References.....	21
Appendix.....	25

Financial Education and Spillover Effects

Theodosios Kallenos, Andreas Milidonis*, George Nishiotis[‡] and Stavros Zenios

Abstract

Using a newly-introduced, semester-long, university course on financial education in a country of low financial literacy, we find evidence of financial knowledge spillovers from students to their parents. We measure the financial knowledge score of students and parents, before and after the introduction of the course, using both a treatment and a control sample. The spillover effect is economically significant and it is driven from the subsample of students who have frequent, face-to-face interaction with their parents.

Keywords: Financial Education, Financial Literacy, Spillover, University course.

* Corresponding author. Address: Department of Accounting and Finance, University of Cyprus, P.O. Box 20537, CY-1678, Nicosia, Cyprus. Email andreas.milidonis@ucy.ac.cy

1. Introduction

The effects of the 2008 global financial crisis led to a significant focus on financial literacy education in countries around the world as the means to improve financial resilience.¹ An important step towards increasing financial literacy in a society, is equipping the younger generations with the knowledge necessary for effective and responsible financial choice.² A large body of academic literature examines the level of financial literacy of young individuals (Lusardi, Mitchell, and Curto, 2010; Jorgensen and Savla, 2010; Mandell, 2008). Other studies focus on the evaluation of various intervention programs, typically of short duration, aiming to increase the level of financial literacy in colleges and high schools around the world (Brugiavini et al., 2018; Lührmann, Serra-Garcia, and Winter, 2015; Walstad, Rebeck, and MacDonald, 2010). The evaluation of these programs concentrates on their effects on outcomes such as financial knowledge, attitudes, and behaviours of the participating individuals.

Financial education programs could have important spillover effects. Spillovers from a financial education intervention, could occur from treated individuals actively passing new knowledge to their colleagues, friends or their family. Knowledge spillovers are beneficial since they help financial education programs reach a larger audience (Lusardi, 2013). Despite its critical importance, knowledge sharing through financial education interventions has received limited attention by the literature and to our knowledge no study has examined the spillover effects in the setting of financial education interventions for young individuals. Furthermore, studies evaluating financial education interventions face critical limitations and challenges. These include difficulty proving causality, potential biases and the lack of a control group (see Lusardi and Mitchell, 2014; Lusardi, 2013; Lyons and Neelakantan, 2008 and Fox, Bartholomae, and Lee, 2005 for discussions on the limitations of financial education program evaluation studies).³

In this paper we evaluate the impact of a semester-long, university course on financial education, in an environment of documented, low prior financial literacy (Andreou and Philip, 2018; Andreou and Anyfantaki, 2020; Central Bank of Cyprus,

¹ According to a joint study by OECD and the G-20 (OECD/G-20, 2013), since the financial crisis, a growing number of governments have engaged in the development of dedicated national strategies in order to enhance financial education efficiency. See also OECD/INFE (2009).

²The importance of financial education for the youth OECD (2014a) has been emphasized by the G-20 Leader's in the June 2012 summit (OECD/INFE, 2013).

³ Such limitations draw the attention of researchers, with some recent studies (e.g. Sayinzoga, Bulte, and Lensink, 2016) using designs that aim at bypassing the limitations.

2021), to assess its effect on financial knowledge.⁴ The natural experiment of introducing a new course along with our study design allows us to overcome some of the challenges faced by previous studies. We use a quasi- experimental design with treatment and control groups, thus addressing shortcomings in the literature that did not include control groups. We assess the impact of the course on the participants' financial knowledge score, by measuring it before and after the introduction of the course.

We assess the spillover effect by evaluating the impact of the new course on the treated students' parents. Specifically, we measure the difference in financial knowledge before and after the course. The recorded differences are compared to those of parents, whose children did not take the course. The financial education course is required for first-year undergraduate students in the Department of Accounting and Finance, and it is optional for students in other departments of the University of Cyprus. To minimize concerns related to self-selection bias into the elective course, we conduct a robustness test using the sample of students who are required to take it.

To test for a spillover effect on financial knowledge, we first need to establish that financial knowledge increases on the treatment student group relative to the control group. We document this (expected) increase in financial knowledge score of the students who registered for the course relative to the control group of students. Specifically, after controlling for the students' initial financial knowledge score, as well as demographic characteristics that may have an impact on the level of financial knowledge (e.g. age, gender, and income status), students in the treated group exhibit a statistically and economically significant increase in financial knowledge, relative to the students in the control group. It is important to note that interaction between control and treatment group was minimal during the Fall semester of 2020 due to Covid-19 restrictions.⁵

We then test whether the documented increase in financial knowledge score of the students who registered for the course spills over to their parents by measuring the change in the parents' financial knowledge before and after the course. We find that

⁴ Cyprus ranks between the lowest countries in the European Union in the latest Standard and Poor's Global Financial Literacy Survey with 35% of adults being considered as financially literate (for more information: <http://gflec.org/initiatives/sp-global-finlit-survey/>). Furthermore Andreou and Philip (2018) find low levels of financial literacy among university students in Cyprus.

⁵ The first vaccines were introduced in Cyprus in December of 2020; hence the level of face-to-face interaction was significantly reduced due to health protocols introduced by the government of Cyprus. Moreover, especially the first- year students who were required to take the course in their first semester of study, did not have opportunities to meet other students outside their cohort and thus potentially spillover any knowledge to the control group.

parents of students in the treated group experience a statistically significant increase in their financial knowledge. Moreover, we test and find that the increase in financial knowledge of treated parents arises in the subsample of parents who interact frequently with their child.

Our study contributes to the existing literature in several ways. Our main contribution is to document knowledge spillovers, which constitute an important aspect of the success of financial literacy interventions (Sayinzoga et al. 2016; Lusardi 2013), since spillovers can lead to an amplification of the effect of the treatment through knowledge propagation from treated individuals to their peers. Even though many studies focus on the effects of financial education programs on treated individuals, studies on the spillover effects of financial knowledge associated with these programs are scant. Duflo and Saez (2003) examine the effect of a retirement plan benefits information fair find positive spillover effects that result into increased enrolment in a Tax Deferred Account. In a different setting, Haliassos, Jansson, and Karabulut (2020) use a quasi- field experiment of exogenous allocation of refugees to estimate the effect of access to financially literate neighbors on saving for retirement and participation in stockholding. They find that the exposure to a higher share of neighbors with business or economics education and some college attendance has positive effects on the two aforementioned financial behaviors. On the contrary, no evidence of knowledge spillover is documented by Drexler, Fischer, and Schoar (2014) when examining the effects of accounting and rule-of-thumb financial training for entrepreneurs, and by Sayinzoga, Bulte, and Lensink (2016) when examining financial education intervention on smallholder farmers in Rwanda.

The second way our study differs from the literature is that it uses a longer intervention than previous studies to test the impact on financial literacy. According to Lusardi and Mitchell (2014), offering a few seminars can be ineffective since a large portion of the population is not financially literate about basic financial concepts. They also point out that it is unlikely that short exposure to financial literacy training would have a significant impact on the treated individual's decision-making process. Our study uses a semester-long university course, meeting twice a week (75 minutes each time) for 13 weeks. Moreover, students are assessed through a major project and two exams, thus giving them extensive exposure to the course material but also to information they research in order to deliver their project.

The third way our study differs from the literature is the inclusion of a treatment and control group. With the exception of very few studies (e.g. Brugiavini et al., 2018), previous studies on college interventions typically do not incorporate a control group.

The lack of a control group may lead to important biases in the measurement of program effectiveness. Collins and O'Rourke (2010) labels the use of a treatment groups and a comparison group as the "golden rule" of program evaluation (see also Lusardi and Mitchell, 2014 and Fox, Bartholomae, and Lee, 2005).

To the best of our knowledge, our study is the first to examine the spillover effects in the setting of financial education interventions for young individuals. Our findings have important policy implications. Treated individuals transfer knowledge through their face-to-face interactions, suggesting multiplier effects⁶ from the introduction of financial education programs in curriculums.

The remainder of the paper is organized as follows: In the next section, we discuss the level of financial literacy in the country setting (Cyprus), the introduction of the new course and provide a review of the related literature. Section 3 presents the survey setup while section 4 presents the data construction and the sample description. In section 5 we present a descriptive analysis of our experiment and the empirical testing for the spillover effect. Finally, section 6 concludes and discusses the public policy implications.

2. Background, Literature Review and Objectives

2.1 Financial Literacy in Cyprus

In 2013, Cyprus suffered one of its worst economic and financial crises as it was concurrently facing a twin crisis in its banking sector and government finances. This crisis led to an unprecedented bail-in of its banking sector, amounting to 5.8 billion euros or about 24% of its GDP, that affected the uninsured depositors of the two largest Cypriot banks, and resulted in a multi-year Memorandum of Understanding (MoU) with Troika extending up to 10 billion euro.⁷

The fallout from this crisis highlighted the lack of financial knowledge for a significant part of the Cypriot population, namely the lack of basic understanding on matters related to financial risk, borrowing, debt management and, crucially, depositor insurance. The lack of basic financial knowledge among the Cypriot population is documented in existing surveys and the scientific literature. According to the 2015 Standard and Poor's Global Financial Literacy Survey, Cyprus ranks among the

⁶ The results of Maturana and Nickerson (2018), in a study that examines the effect of teacher's mortgage refinancing activities on the refinancing activity of their peers, suggest that there are multiplier effects associated with increasing the availability of information and financial education of an individual.

⁷ Troika is a decision group formed by the European Commission, the European Central Bank, and the International Monetary Fund. The crisis led into strict austerity measures, the closure of the country's second-largest bank and prolonged capital controls (see Zenios, 2013 and Michaelides, 2014 for details on the 2013 Cypriot Crisis).

lowest from the European Union countries with only 35% of adults being considered as financially literate.⁸ Moreover, Andreou and Anyfantaki (2021), using a sample of adult individuals between 25 and 65 years old, find that only 37.33% of the survey's participants can be viewed as financially literate, with the problem being more pronounced among women and young individuals. Furthermore, the Central Bank of Cyprus (2021) survey finds that Cyprus ranks relatively low in terms of financial literacy compared to other European Union countries. Equivalently, Demertzis, Domínguez-Jiménez, and Lusardi (2020) find that Cyprus ranks very high in terms of financial fragility in the European Union.⁹ Cypriots rank among the lowest in terms of savings in bank accounts and among the highest in terms of household debt. Moreover, one out of two households in Cyprus are unable to meet an unexpected required expense while, according to a 2019 AON Hewitt Cyprus survey on retirement readiness, the average Cypriot employee will have to work until the age of 72 in order to meet retirement adequacy and maintain their standard of living.¹⁰ In terms of financial literacy of young individuals, Andreou and Philip (2018) find low levels of financial literacy among university students in Cyprus.

2.2 Introduction of the New Financial Literacy Course

The low levels of financial literacy in Cyprus have led various bodies in Cyprus to take initiatives to remedy the situation. Such initiatives were typically offered by professional associations related to the financial services industry who offered brief workshops (1-6 hours within a single day) primarily to high school students.

In September 2020 the Department of Accounting and Finance of the University of Cyprus became the first public university in Cyprus to introduce a Financial Education course to its students. The course is mandatory for all first-year students of the Department. It is offered as an elective for all University of Cyprus students and has been running with full enrolment since first offered from the majority of academic departments at the university, attracting students from engineering, mathematics & statistics, law, psychology, physics, history & archaeology, languages (e.g. french, english), computer science, sociology, education, together with business administration and economics. The second largest public university followed suit and offered a course in personal finance for their students.

⁸ <http://gflec.org/initiatives/sp-global-finlit-survey/>

⁹ Financial literacy has been shown to be an important determinant of financial fragility (Lusardi, Hasler, and Jakoboski, 2020).

¹⁰ <http://www.aonhewitt.com.cy/english/About/News?id=13>

This course offering was the reason that the University of Cyprus participated in the Ad-hoc Committee to draft the National Strategy of Financial Literacy and Education. The committee was formed in December 2020 under the auspices of the Central Bank. The University of Cyprus was also invited to draft a similar, financial education course by a private school in secondary education in Cyprus, for its students. This pilot course in Financial Education was offered from September 2021 until April 2022. The success of this newly introduced course prompted the majority of private, secondary education schools in Cyprus (15 schools, servicing about 2/3 of the student population) to commit in including financial education in their programs from September 2022. The latest development in Cyprus took place on June 28 2022, when the Council of Ministers of the Republic of Cyprus adopted the National Strategy on Financial Literacy and Education in Cyprus, proposed by the Ad-hoc Committee mentioned above.¹¹

Our study measures the impact of the introduction of this course on the financial knowledge of registered students, and, importantly, the spillover effects from these students to their parents. To address concerns about potential contamination of the treatment group from other initiative that might be taking place in the country, we use a control group of university students (and their parents) who are not registered for the course. Given that the course was offered in the Covid-19 pandemic period (September 2020-December 2020), over which strict health protocols were imposed since the first vaccines arrived in Cyprus after the end of the course, student interaction was also reduced. Moreover, first year students in accounting and finance were required to take the course in their first semester when all their program is predetermined and quite rigid, making it difficult to interact with students from other cohorts.

College students, in contrast to high school students, are typically adults that are likely to face soon, or are facing already, critical decisions that could affect their future financial wellbeing. Thus studies on college interventions, unlike studies examining high school interventions (see Walstad, Rebeck, and MacDonald, 2010; Lührmann, Serra-Garcia, and Winter, 2015; Mandell and Klein, 2009 among other), allow an examination of the treatment effects very close to important decisions and behaviour adjustments.¹²

Among the existing studies that focus on the effect of intervention programs aiming to

¹¹ <https://www.centralbank.cy/el/announcements/financial-literacy-28-06-2022>

¹² Fernandes, Lynch, and Netemeyer (2014) in a metaanalysis of the relationship between financial literacy and financial behaviors finds that intervention effects tend to decay over time and provides evidence in favour of scheduled interventions right before expected behaviors (just-in-time).

increase the level of financial literacy of college students, Brugiavini et al., (2018) use a 20-minute financial education intervention to examine its effect on financial knowledge in a test that took place at the completion of the intervention. They find an increase in both perceived and actual financial knowledge at the completion of the course. Similarly, Popovich et al. (2020) finds that a 38-minute-long series of short digital learning objects positively affects college student's financial knowledge following the course. Borden et al. (2008) find that a one-and-a-half-hour financial education seminar has a positive effect on the post-test financial knowledge and attitudes. Similar results are reported by Bowen, Faulcon, and Jones (2006) in a study that examines the effects of a 6-hour classroom seminar.

3. Survey Setup

We implement a quasi-experimental design with the use of both treatment and control groups and conduct pre-test and post-test evaluations. We use the 2018 OECD/INFE (International Network on Financial Education) Toolkit OECD (2018) for measuring financial literacy and financial inclusion along with the Toolkit's proposed questionnaire in order to assess the surveyed individuals' financial knowledge as well as the identification of their demographic characteristics.^{13,14} The questionnaire was translated in the Greek language following the instruction provided by OECD.

Our survey was conducted in two waves, one at the beginning of the course (September 2020) and one at the end of the course (December 2020). The participants include University of Cyprus students and their parents. Our student samples consist of those students that registered for the financial education course (treatment group) and other students from the university that did not register for the course (control group). Moreover, the parents of students in the treatment group are used as the treatment group in our knowledge spillovers analysis while the parents of the students serving as the control group are the control group for the spillover effect.

The parent and student questionnaires are almost identical. The only difference is the inclusion of two additional questions in the students' questionnaire on the frequency of student- parent interactions. The first question asks students whether they live with their parents. The second question is only presented to students who answer that they do not live with their parents and it asks about the weekly or monthly frequency

¹³ The toolkit offers methodological guidance for measuring financial literacy and financial inclusion. According to the authors, since 2010, the year that the questionnaire was first piloted, it has been successfully used to capture financial literacy of diverse populations. Moreover, the Toolkit was welcomed by G20 leaders in September 2013.

¹⁴The questionnaire can be found in Section 3 of the Toolkit (pages 11-33): <http://www.oecd.org/financial/education/2018-INFE-FinLit-Measurement-Toolkit.pdf>

face-to-face interaction with their parents.¹⁵

4. Data

4.1 Data Construction

In order to evaluate the effect of the financial education course on the students registered for the course, as well as their parents, we construct various variables from questionnaires answered by students and parents at the beginning and at the end of the course. We follow the OECD (2018) methodology and compute financial knowledge scores as the number of correct responses to seven financial knowledge questions that cover the following topics: time value of money, interest paid on a loan, simple interest calculation, interest compounding, risk and return, inflation and diversification. Scores range from 0 to 7. The initial (final) financial knowledge score is based on the answers to the questionnaires provided at the beginning (end) of the course.

We calculate the change in financial knowledge score between the final and initial score. To distinguish between the student control and treatment group, we construct the indicator variable S_Treat that takes the value of 1 if the student registered for the course and 0 otherwise. Similarly, to distinguish between the parent control and treatment group, we construct the indicator variable P_Treat .

Next, we quantify the frequency of interaction between student and parents, by constructing the indicator variable $Home$. This variable takes the value of 1 (otherwise 0) if the student lives at home with parent or if the parent meets face-to-face with the student (his/her child) at least five times per week. We conduct subsample analysis based on the $Home$ variable to test if the frequency of interaction between parents and students plays a role on a potential spillover effect.

We also construct various variables for demographic characteristics, to capture the main differences in financial knowledge recorded by the study of the Central Bank of Cyprus (2021). Specifically, the study finds lower financial knowledge scores in younger people, women, people with lower education, and people with lower income, results that are consistent with similar studies outside Cyprus (e.g. Bucher-Koenen and Lusardi, 2011; Cupák et al., 2018; Hasler and Lusardi, 2017; Klapper and Panos, 2012; Lusardi, Mitchell, and Curto, 2010; Lusardi, Michaud, and Mitchell, 2017; Mandell, 2008; OECD, 2020). Therefore, we use the following variables to capture these differences. $Female$ is an indicator variable that takes the value of 1 if the

¹⁵ The questions are presented in the appendix.

individual is female and 0 if male. We use four categories of monthly household net income: *900€ or lower* (used as the benchmark category), *between 900€ and 1600€*, *1600€ or higher*, and people who responded “*Don’t know*”. *30_or_greater* is an indicator value that takes the value of 1 if the student’s age is 30 or greater and 0 otherwise. Similarly, in the parents’ analysis, *50_or_greater* indicates if the parent’s age is 50 or greater and 0 otherwise. Also, we identify the parent’s education using the *University_or_higher* indicator with value 1 for those parents with a Bachelor’s degree or higher, and 0 otherwise.

4.2 Sample Description

Table 1 shows demographic characteristics for the student sample. The total number of students is 284, out of which 134 took the financial education course (treatment group) and 150 did not (control group). From the sample of 284 students, 71% of respondents are female, and 29% are male. Around 97% of students are in the 18-29 age group while less than 3% are above 30 years old. These numbers are consistent with the overall undergraduate population at the University of Cyprus (63% female, 3% are 30 years of older). Finally, around 11% of the students report that their net monthly household income is lower than € 960, 19.6% report net monthly household income between €960 and €1600 while around 40% report € 1,600 or higher. A significant number of students (29.2%) reported “don’t know” on the household income question.

TABLE 1
Students' sample distribution

		Treatment		Control		Total	
		#	%	#	%	#	%
Treatment		134	47.18%	150	52.82%	284	100.00%
Gender	Female	85	30.04%	116	40.99%	201	71.02%
	Male	48	16.96%	34	12.01%	82	28.98%
Age Group	Below 30	130	45.77%	146	51.41%	276	97.18%
	30 and above	4	1.41%	4	1.41%	8	2.82%
Net Household Income	Up to €960	9	3.20%	23	8.19%	32	11.39%
	Between €960 and €1,600	27	9.61%	28	9.96%	55	19.57%
	€1,600 or more	60	21.35%	52	18.51%	112	39.86%
	Don't Know	37	13.17%	45	16.01%	82	29.18%

The table presents the descriptive statistics of the students' sample, in total, and also separately for the control and treatment samples. The treatment group comprises the students who registered for the newly introduced Financial Education course at the University of Cyprus in September 2020. The control group comprises students who did not register for this Financial Education course over the same period. The demographic characteristics are: gender, age (below 30 years of age or 30 and above) and 4 net monthly household income categories: (a) up to €960; (b) between €960 and €1,600; (c) €1,600 or more; and (d) those that said "Don't Know".

Table 2 presents descriptive statistics of the parents' sample. The sample comprises 135 parents, 84 of which are in the treatment group and 51 are in the control group. 64% of the parents are female, and 36% are male. In terms of their age, around 58% of parents are below 50 years of age, while the remaining are above 50 years old. With respect to parents' education level, around 58% of them have university education or higher, while the rest have high school or lower education. Finally, we report the income distribution of the household using income thresholds used by the Cyprus National Statistics Office, following the OECD/INFE toolkit's suggestions. Around 7% of the parents report net monthly income lower than € 960, 23% between €960 to €1600 and around 66% over € 1,600. Around 4% of the parents did not indicate their household income.

TABLE 2
Parents' Sample Distribution

		Treatment		Control		Total	
		#	%	#	%	#	%
Treatment		84	62.22%	51	37.78%	135	100%
Gender	Female	54	40.91%	30	22.73%	84	63.64%
	Male	27	20.45%	21	15.91%	48	36.36%
Age Group	Below 50	47	36.15%	28	21.54%	75	57.69%
	50 and above	33	25.38%	22	16.92%	55	42.31%
Education Level	University or higher	44	33.85%	32	24.62%	76	58.46%
	Lower than University	36	27.69%	18	13.85%	54	41.54%
Net Household Income	Up to 960 €	6	4.62%	3	2.31%	9	6.92%
	Between €960 and €1,600	19	14.62%	11	8.46%	30	23.08%
	€1,600 or more	53	40.77%	33	25.38%	86	66.15%
	Don't Know	2	1.54%	3	2.31%	5	3.85%

The table presents the descriptive statistics of the parents' sample, in total, and also separately for the control and treatment samples. The treatment group comprises the parents of the students who registered for the newly introduced Financial Education course at the University of Cyprus in September 2020. The control group comprises parents of students who did not register for this Financial Education course over the same period. The demographic characteristics are: gender, age (below 50 years of age or 50 and above), education (those with no university education and those with university education or above) and 4 net monthly household income categories: (a) up to €960; (b) between €960 and €1,600; (c) €1,600 or more; and (d) those that said "Don't Know".

5. Empirical Analysis

5.1 Descriptive Analysis of Financial Knowledge Scores

Table 3 presents the average financial knowledge scores for students that took part in our survey before ("Initial Score") and after ("Final Score") the course began. Starting from the first row showing the entire sample ("All"), we observe an initial average knowledge score of 4.2 out of 7 and an average post-treatment score of 4.8 out of 7. The improvement in the initial knowledge score is 0.6 units (about 14%) and it is statistically significant (p -value < 0.01). This increase documented on the entire sample is driven by the respective increase in the knowledge score of the treatment group. Specifically, when we focus on the Treatment and Control group rows, we observe no statistically significant change in the knowledge score of the control

group.¹⁶ On the contrary we document a significant improvement in the knowledge score of the treatment group from an initial score of 4.5 out of 7 to a final score of 5.9 out of 7, thus generating an improvement of 1.4 units (31%).

TABLE 3
Students' Financial Knowledge scores in September 2020 and December 2020

Group	N	Final Score	Initial Score	Difference	Standard Error	p-value
All	284	4.774	4.190	0.585	0.112	0.000***
Treatment Group	134	5.910	4.515	1.396	0.144	0.000***
Control Group	150	3.760	3.900	-0.140	0.154	0.336
Treatment Group						
– Low Initial Score	67	5.448	3.239	2.209	0.223	0.000***
– High Initial Score	67	6.373	5.791	0.582	0.115	0.000***

This table presents the average financial knowledge score for students recorded at the beginning of the course in September 2020 (“Initial Score”) and at the end of course in December 2020 (“Final Score”). The table also shows the Difference between the Initial and Final scores, as well as the standard error and the p-value of this difference. The results are presented for all students in our sample (“All”) and separately also for the treatment group and the control group. The treatment group comprises the students who registered for the newly introduced Financial Education course at the University of Cyprus in September 2020. The control group comprises students who did not register for this Financial Education course over the same period. Finally, we split the treatment group into those students with “Low Initial Score”, i.e., those with initial financial knowledge score lower than 5 out of 7, and “High Initial Score”, i.e., those with initial financial knowledge score of at least 5 out of 7.

We take a deeper look into the treatment group by splitting this group into those with a high and a low initial knowledge score. According to OECD (2016) individuals with a score of at least 5 out of 7 are considered as financially knowledgeable. Hence, we categorize students within the treatment group into the low initial knowledge score group if they have scored less than 5 out of 7 and in the high initial score group if they scored at least 5 out of 7. The statistics of the two groups suggest a larger improvement in the financial knowledge score for those students with a low initial financial knowledge score. Specifically, students with low initial score experience an increase in financial knowledge of 2.2 units (improvement of 69%), that is, from an initial score of 3.2 to a final score of 5.4. On the other hand, students with a high initial score also experience a statistically significant increase in the financial knowledge score from 5.8 to 6.4 units, however this increase is only 0.6 units (10% improvement).

Table 4 presents the results of the average initial and final, financial knowledge scores for the parents' sample. The pre-treatment average score of all parents (n =

¹⁶ This result also suggests that being exposed to the questionnaire twice, did not produce a “learning” effect, either through familiarity with the questionnaire or through people educating themselves.

135) is around 4.7 out of 7, which is about half a unit than the financial knowledge score of students reported in Table 3. A similar difference is recorded in the most recent study with a representative sample of the Cypriot population on financial literacy conducted by the Central Bank of Cyprus (2021). Specifically, the Central Bank of Cyprus (2021) study reports that the age group 18-29 has an average score of 4.4 while age groups 40-49 and 50-59 have average scores of 5.3 and 4.6 respectively. Turning to the final score, we observe that it is almost identical to the initial score and the difference is not statistically significant. Similar results are shown in the second and third row where we report the scores for the treatment and control groups.

TABLE 4
Parents' Financial Knowledge scores in September 2020 and December 2020

Group	N	Final Score	Initial Score	Difference	Standard Error	p-value
<u>Panel A</u>						
All	135	4.660	4.674	-0.020	0.157	0.924
Treatment Group	84	4.869	4.715	0.155	0.205	0.453
Control Group	51	4.314	4.608	-0.290	0.237	0.220
Treatment group						
– Low Initial Score	33	3.364	2.606	0.758	0.426	0.085*
– High Initial Score	51	5.843	6.079	-0.24	0.178	0.194
– Home = 0	21	4.572	4.715	-0.140	0.38	0.711
– Home = 1	59	5.136	4.763	0.373	0.241	0.128
<u>Panel B</u>						
Treatment group & Home = 1						
– Low Initial Score	21	3.905	2.524	1.381	0.480	0.009***
– High Initial Score	38	5.816	6.000	-0.180	0.223	0.414

This table presents the average financial knowledge score for parents, recorded in September 2020 ("Initial Score") and in December 2020 ("Final Score"). The table also shows the Difference between the Initial and Final scores, as well as the standard error and the p-value of this difference. In Panel A, the results for all parents in our sample ("All") and separately also for the treatment group and the control group, are presented. The treatment group comprises the parents of the students who registered for the newly introduced Financial Education course at the University of Cyprus in September 2020. The control group comprises parents of students who did not register for this Financial Education course over the same period. Next, we split the treatment group into those parents with "Low Initial Score", i.e., those with initial financial knowledge score lower than 5 out of 7, and "High Initial Score", i.e., those with initial financial knowledge score of at least 5 out of 7. Finally, the treatment group is split into subgroups based on the "Home" indicator variable. "Home" takes the value of 1 if students either live at home with their parents or meet face-to-face with their parents at least five times a week. In panel B, we further split the Treatment group conditional on the "Home" indicator.

Following the rationale in Table 3, we split the parents' sample into subsamples of high and low initial financial scores (fourth and fifth rows respectively). A weakly significant (p -value < 0.10) difference obtains in the subsample of low initial financial score. On the other hand, the scores for the subsample of high initial score are not statistically different from each other.

We take the univariate analysis a step further in the subsample of low initial score to understand if the frequency of interaction between students and parents matters (sixth and seventh row). Even though results are based on simple t-tests, we find a statistically significant difference between the initial and final scores of the subsample of parents with low initial scores and high face-to-face interaction with their child. Specifically, the initial score is 2.5 and increases by 1.4 units (p -value < 0.01) to reach the final score of 3.9 (an improvement exceeding 50%).

In summary, the descriptive statistics on the student sample show an (expected) improvement in the financial knowledge score of those students who registered for the course. This evidence is consistent with the literature showing that financial education interventions improve financial knowledge. Our results reinforce previous results since our study is based on an intervention of a longer duration than the one used in the literature. Furthermore, we use both treatment and control groups, which is not typical of the literature. Moreover, we observe that the improvement in financial knowledge is larger for registered students with a low initial financial knowledge score, than registered students with a high initial score. More importantly though, we observe early evidence of a spillover effect of financial education from the classroom to home. Results show that parents with low initial knowledge score, whose children have attended the financial education course, have a positive and statistically significant improvement in their financial knowledge score, if they have high frequency of face-to-face interactions. We test the robustness of this early evidence of the spillover effect, using a multivariate analysis in the next section.

5.2 Impact of the course on students' knowledge

In order to evaluate the effect of the course on the registered students we use a multivariate analysis. The dependent variable is the difference between the initial and final financial knowledge score of all students (control and treatment group). The main explanatory variable is an indicator variable identifying the treatment group (S_Treat). The control variables we use are the initial knowledge score and demographic characteristics of the individuals such as indicator variables for the gender, age group, and net monthly household income.

We show the results in Table 5, in four different models by progressively adding control variables to the regression model. The simplest model (column 1) uses S_Treat and initial knowledge score as explanatory variables. We then add gender (column 2), age group (column 3) and finally the different income indicators (column 4). Results confirm the evidence in Table 3 and document an improvement of more

than 1.8 units out of 7 in the financial knowledge scores of the treatment group (p-value < 0.01) compared to the control group. This improvement is robust to all specifications. Turning on the control variables we note negative and statistically significant coefficient (p-value < 0.01) on the initial knowledge score, which suggests that students with a lower initial knowledge score experience a higher increase in financial knowledge score. Finally, the coefficients of the variables capturing the demographic characteristics of the students are not statistically significant.¹⁷

TABLE 5
Change in Students' Financial Knowledge Score

	(1)	(2)	(3)	(4)
S_Treat	1.847*** (0.000)	1.830*** (0.000)	1.832*** (0.000)	1.837*** (0.000)
Initial Financial Knowledge Score	-0.507*** (0.000)	- 0.531*** (0.000)	-0.536*** (0.000)	-0.547*** (0.000)
<u>Gender</u>				
Female		-0.215 (0.288)	-0.217 (0.284)	-0.146 (0.473)
<u>Age group</u>				
30 or greater			0.487 (0.233)	0.436 (0.281)
<u>Monthly Household Net Income:</u>				
Between 900€ and 1600€				-0.385 (0.264)
1600€ or higher				0.147 (0.626)
Don't know				-0.237 (0.455)
Intercept	1.836*** (0.000)	1.883*** (0.000)	1.890*** (0.000)	2.044*** (0.000)
N	284	283	283	280
Adjusted R ²	0.348	0.348	0.347	0.354

The table presents the results of multivariate regressions of the difference between the final and initial Students' Financial Knowledge Scores on various explanatory variables. *S_Treat* is an indicator variable that takes the value of 1 if the student was in the treatment group and 0 otherwise. Initial Financial Knowledge Score is the student's financial knowledge score in September 2020. *Female* takes the value of 1 if the student is female and 0 if the student is male. "*30 or greater*" takes the value of 1 if the student's age is 30 or greater and 0 otherwise. Four categories of monthly household net income are used, which are represented using indicator variables as follows: "900€ or lower" (used as the benchmark category), "*Between 900€ and 1600€*", "*1600€ or higher*" and people who responded "*Don't know*". We use robust standard errors. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

¹⁷ It is worth emphasizing that while several studies including the most comprehensive study by the Central Bank of Cyprus (2021) show that financial knowledge is lower among women in the entire population, we do not find evidence that female students in our student have different financial knowledge scores than male students.

5.3 Spillover effects

To test for spillover effects in financial knowledge, from the students to parents, we use a similar, multivariate setting. The dependent variable is now the difference of the parents' initial and final financial knowledge score. We use two main explanatory variables in our model. The first one (P_Treat) is an indicator variable to identify the parents of the students who registered for the course. The second variable indicates if parents have high or low frequency of interaction with their children ($Home$). The main control variables are the parents' initial knowledge score, and demographic characteristics such as indicators for gender, age group, education, and thresholds of the net monthly household income. Since the controls for age and income do not appear significant in our models, we do not report them.¹⁸

Table 6 presents the results testing for financial knowledge spillover effects. In column 1 we use the variables P_Treat , $Home$, and the initial financial knowledge score of parents, while we progressively add the indicator for gender (column 2), and education (column 3). We note however the decrease in the number of observations compared to the models shown in Table 5, due to the lower response rate of parents in our questionnaire.

The coefficient of P_Treat is positive and statistically significant in the first two models suggesting the presence of a spillover effect in financial knowledge from the student to the parents. This improvement in the financial knowledge score of parents is economically significant as it is about 0.6 units from an initial financial knowledge score of parents of 4.7 (an improvement of about 13%). The coefficient of P_Treat remains qualitatively the same in the third model when one more control variable is added (column 3), albeit with a lower statistical significance, as the degrees of freedom of the model decrease. With respect to the rest of the control variables, we note that the coefficient of the initial financial knowledge score of parents is negative and statistically significant, suggesting an overall increase in financial knowledge of parents at the end of the period, which is higher when their initial score is lower. This is consistent with the results in Table 5. We also observe weak statistical significance on the control variables for gender and education, which are consistent with the results of the Central Bank of Cyprus (2021). Finally turning to the $Home$ variable, we do not observe any statistical significance in this model specification.

¹⁸ Results are available from the authors.

TABLE 6
Change in Parents' Financial Knowledge Score

	(1)	(2)	(3)
P_Treat	0.618** (0.041)	0.654** (0.030)	0.533* (0.054)
Home	0.151 (0.659)	0.00107 (0.997)	-0.0383 (0.908)
Initial Financial Knowledge Score	-0.454*** (0.000)	-0.526*** (0.000)	-0.406*** (0.000)
Gender			
Female		-0.533* (0.093)	-0.282 (0.358)
Education			
University Education or Higher			0.532* (0.080)
Intercept	1.666*** (0.003)	1.906*** (0.001)	1.114* (0.054)
N	12 2	119	115
Adjusted R ²	0.261	0.292	0.170

The table presents the results of multivariate regressions of the difference between the final and initial parents' Financial Knowledge Scores on various explanatory variables. *P_Treat* is an indicator variable that takes the value of 1 for the parent of a registered student and 0 otherwise. *Initial Financial Knowledge Score* is the parent's financial knowledge score in September 2020. *Home* is an indicator variable taking the value of 1 if the student lives at home with parents or if he/she has very frequent, face to face interaction with parents (at least five times a week). *Female* takes the value of 1 if the parent is female and 0 if the parent is male. *University or Higher* is an indicator variable that takes the value of 1 for parents with university or higher education and 0 otherwise. We use robust standard errors. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

The coefficient of *P_Treat* is positive and statistically significant in the first two models suggesting the presence of a spillover effect in financial knowledge from the student to the parents. This improvement in the financial knowledge score of parents is economically significant as it is about 0.6 units from an initial financial knowledge score of parents of 4.7 (an improvement of about 13%). The coefficient of *P_Treat* remains qualitatively the same in the third model when one more control variable is added (column 3), albeit with a lower statistical significance, as the degrees of freedom of the model decrease. With respect to the rest of the control variables, we note that the coefficient of the initial financial knowledge score of parents is negative and statistically significant, suggesting an overall increase in financial knowledge of parents at the end of the period, which is higher when their initial score is lower. This is consistent with the results in Table 5. We also observe weak statistical significance on the control variables for gender and education, which are consistent with the results of the Central Bank of Cyprus (2021). Finally turning to the *Home* variable, we

do not observe any statistical significance in this model specification.

We take our analysis a step further to test if the level of interaction between parents and students plays a role in the increase of the parent's financial knowledge score from their children. Our motivation for this further analysis lies in the univariate results of Table 4. To test if the spillover effect is conditional on the level of interaction between parents and students, we conduct sub-sample analysis by splitting the original sample into those parents with high interaction (*Home* =1) and low interaction (*Home* =0) with their children (Table 7).

TABLE 7
Change in Parents' Financial Knowledge Score – Subsample analysis

	Home = 1			Home = 0		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>P_Treat</i>	0.898** (0.010)	0.891** (0.011)	0.702** (0.024)	-0.539 (0.146)	-0.406 (0.336)	-0.380 (0.436)
Initial Financial Knowledge Score	-0.535*** (0.000)	-0.567*** (0.000)	-0.422*** (0.000)	-0.292** (0.017)	-0.448*** (0.009)	-0.470** (0.031)
<u>Gender</u>						
Female		-0.412 (0.239)	-0.185 (0.602)		-0.786 (0.161)	-0.679 (0.260)
<u>Education</u>						
University Education or Higher			0.463 (0.182)			0.706 (0.311)
Intercept	2.022*** (0.000)	2.000*** (0.000)	1.127** (0.020)	1.771** (0.010)	2.238*** (0.007)	1.928 (0.116)
N	95	93	90	27	26	25
Adjusted R ²	0.327	0.335	0.184	0.122	0.151	0.092

The table presents the results of multivariate regressions of the difference between the final and initial parents' Financial Knowledge Scores on various explanatory variables. The results are presented separately for cases where a student lives at home with parents or if he/she has very frequent, face to face interaction with parents (*Home* = 1) and the rest of the sample (*Home* = 0). *P_Treat* is an indicator variable that takes the value of 1 for the parent of a registered student and 0 otherwise. *Initial Financial Knowledge Score* is the parent's financial knowledge score in September 2020. *Female* takes the value of 1 if the parent is female and 0 if the parent is male. *University or Higher* is an indicator variable that takes the value of 1 for parents with university or higher education and 0 otherwise. We use robust standard errors. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

Results in Table 7 document a spillover effect in the subsample of parents who have high interaction with their children (*Home* =1), as the coefficient of *P_Treat* is positive and statistically significant. The size of the coefficient is also sizable as it ranges from 0.65 to 0.90 units. Turning to the subsample of parents with low interaction with their children, we do not obtain any significant results on the *P_Treat* variable. While the

spillover effect on financial knowledge is clearly documented in the high interaction subsample, we note that the sample size in the low interaction subsample is small and could be influenced by the power of results in this group.

One potential concern relates to sample selection bias into the financial education course. For example, some students might choose to take the course because they have extra incentives to learn and spread the knowledge over their network. To alleviate this concern, we re-run our results on the sample of students who were required to take the course (i.e., the first year students in the Department of Accounting and Finance). Our results are robust to this specification.

6. Conclusion

In this paper we evaluate the impact of the introduction of a financial education university course in a country with documented low levels of financial literacy. To the best of our knowledge, no other study has used a financial education intervention of a full university course. Moreover, we use a quasi-experimental design with treatment and control groups, by measuring the financial knowledge score before and after the introduction of the course. We do this to test for potential spillover effects from students registered for the course and their parents.

After controlling for the initial knowledge score as well as demographic characteristics that may have an impact on the level of financial knowledge, we first document an increase in financial knowledge for the treated group relative to the control group. While this increase in financial knowledge is expected given the exposure of students to the financial education material, if the new course was effective, it is important to document it, before we test for spillover effects of this increase in knowledge to the treated group's parents.

We then provide our main evidence of a financial knowledge spillover effect onto the parents whose children are registered for this course. Moreover, when splitting the treated sample into parents who have high and low interaction with their children, we find that the result is driven by the subsample of high interaction between parents and children (students).

Our findings have important policy implications for the advancement of financial literacy. In the aftermath of the 2008 financial crisis, governments around the globe are working to develop national strategies in order to enhance financial education efficiency with a particular focus on young individuals. According to the 2017 OECD and G-20 report on financial literacy in G-20 countries, targeted financial education for young individuals is essential in order to develop the necessary knowledge and

skills that will lead to positive behaviors and attitudes (OECD/G-20, 2017).

We show that financial education intervention programs of significant duration, can have a multiplier effect through financial knowledge spillover effects from students to parents. Specifically, the positive effect a financial education course has on students' financial knowledge as well as the multiplier effects associated with the introduction of a financial education program in the university curriculum can motivate authorities around the globe to encourage academic institutions in engaging with such knowledge interventions.

Acknowledges

We thank Michael Haliassos and seminar participants at the University of Cyprus, for helpful comments and suggestions. Remaining errors are our own.

References

Andreou, Panayiotis C., and Sofia Anyfantaki, (2021), "Financial literacy and its influence on internet banking behavior", *European Management Journal*.

Andreou, Panayiotis C., and Dennis Philip, (2018), "Financial Knowledge Among University Students and Implications for Personal Debt and Fraudulent Investments", *Cyprus Economic Policy Review* 12: 3–18.

Borden, Lynne M., Sun A. Lee, Joyce Serido, and Dawn Collins, (2008), "Changing college students' financial knowledge, attitudes, and behavior through seminar participation", *Journal of Family and Economic Issues* 29: 23–40.

Bowen, Cathy, Faulcon, and Heather M Jones, (2006), "Empowering Young Adults to Control Their Financial Future", *Journal of Family and Consumer Sciences*.

Brugiavini, Agar, Danilo Cavapozzi, Mario Padula, and Yuri Pettinicchi, (2018), "On the effect of financial education on financial literacy: Evidence from a sample of college students", *Journal of Pension Economics and Finance*, 1–9.

Bucher-Koenen, T. and Lusardi, A., (2011), "Financial literacy and retirement planning in Germany", *Journal of Pension Economics & Finance*, 10(4): 565-584.

Central Bank of Cyprus, (2021), "Results from the Central Bank of Cyprus Survey for Financial Literacy in Cyprus", *Central Bank of Cyprus Working Paper*.

Collins, J. Michael, and Collin M. O'Rourke, (2010), "Financial education and counseling - still holding promise", *Journal of Consumer Affairs* 44: 483–498.

Cupák, Andrej, Pirmin Fessler, Alyssa Schneebaum, and Maria Silgoner, (2018),

“Decomposing Gender Gaps in Financial Literacy: New International Evidence”, *Economics Letters* 168: 102–6.

Demertzis, M., M. Domínguez-Jiménez, and A. Lusardi, (2020), “The financial fragility of European households in the time of COVID-19”, *Policy Contribution 2020/15*, *Bruegel*.

Drexler, Alejandro, Greg Fischer, and Antoinette Schoar, (2014), “Keeping it simple: Financial literacy and rules of thumb”, *American Economic Journal: Applied Economics* 6: 1–31.

Duflo, E., and E. Saez, (2003), “The Role of Information and Social Interactions in Retirement Plan Decisions: Evidence from a Randomized Experiment”, *The Quarterly Journal of Economics* 118: 815–842.

Fernandes, Daniel, John G Lynch, and Richard G Netemeyer, (2014), “Financial Literacy, Financial Education, and Downstream Financial Behaviors”, *Management Science* 60: 1861–1883.

Fox, Jonathan, Suzanne Bartholomae, and Jinkook Lee, (2005), “Building the case for financial education”, *Journal of Consumer Affairs* 39: 195–214.

Haliassos, Michael, Thomas Jansson, and Yigitcan Karabulut, (2020), “Financial Literacy Externalities”, *The Review of Financial Studies* 33: 950–989.

Hasler, Andrea and Annamaria Lusardi, (2017), “The Gender Gap in Financial Literacy: A Global Perspective | 1 The Gender Gap in Financial Literacy: A Global Perspective”.

Jorgensen, Bryce L., and Jyoti Savla, (2010), “Financial literacy of young adults: The importance of parental socialization”, *Family Relations* 59: 465–478.

Klapper, Leora F. and Georgios A. Panos, (2012), “Financial Literacy and Retirement Planning: The Russian Case”, *SSRN Electronic Journal*.

Lührmann, Melanie, Marta Serra-Garcia, and Joachim Winter, (2015), “Teaching teenagers in finance: Does it work?”, *Journal of Banking and Finance* 54: 160–174.

Lusardi, A., A. Hasler, and P. Yakoboski, (2020), “Building Up Financial Literacy and Financial Fragility”, *GFLEC Working Paper*.

Lusardi, Annamaria, (2013), “A framework for evaluating financial education programmes, *Evaluating financial education programmes: survey, evidence, policy instruments and guidance*”, OECD.

Lusardi, Annamaria, Pierre Carl Michaud, and Olivia S. Mitchell, (2017), “Optimal

Financial Knowledge and Wealth Inequality”, *Journal of Political Economy*, 125(2): 431–77.

Lusardi, Annamaria, and Olivia S. Mitchell, (2014), “The economic importance of financial literacy: Theory and evidence”, *Journal of Economic Literature* 52: 5–44.

Lusardi, Annamaria, Olivia S. Mitchell, and Vilsa Curto, (2010), “Financial literacy among the young”, *Journal of Consumer Affairs* 44: 358–380.

Lusardi, Annamaria, and Carlo de Bassa Scheresberg, (2013), “Financial Literacy and High-Cost Borrowing in the United States”.

Lusardi, Annamaria, and Peter Tufano, (2009), “Debt Literacy, Financial Experiences, and Overindebtedness”.

Lyons, Angela C., and Urvi Neelakantan, (2008), “Potential and Pitfalls of Applying Theory to the Practice of Financial Education”, *Journal of Consumer Affairs* 42: 106–112.

Mandell, Lewis, (2008), “The financial literacy of young american adults: Results of the 2008 National Jump\$tart Coalition Survey of High School Seniors and College Students”.

Mandell, Lewis, and Linda Schmid Klein, (2009), “The Impact of Financial Literacy Education on Subsequent Financial Behavior”, *Journal of Financial Counseling and Planning*, 20.

Maturana, Gonzalo, and Jordan Nickerson, (2018), “Teachers Teaching Teachers: The Role of Workplace Peer Effects in Financial Decisions”, *The Review of Financial Studies* 32: 3920–3957.

Michaelides, Alexander, (2014), “Cyprus: from boom to bail-in”, *Economic Policy*, 29: 639–689.

OECD/ G-20, (2017), “G20/OECD INFE report on adult financial literacy in G20 countries”.

OECD/G-20, (2013), “Advancing National Strategies for Financial Education”, Joint Publication by Russia’s G20 Presidency and the OECD.

OECD/INFE, (2013), “OECD/INFE set of criteria, principles, guidelines and policy guidance to improve financial education Part 2: addressing youths’ and women’s needs for financial education”.

OECD, (2009), “Financial Education and the Crisis: Policy Paper and Guidance”, OECD.

OECD, (2014), "*Financial Education for Youth: The Role of Schools Financial Education for Youth* (OECD)".

OECD, (2016), "*OECD/INFE International Survey of Adult Financial Literacy Competencies*".

OECD, (2018), "*OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion*".

OECD, (2020), "*OECD/INFE 2020 International Survey of Adult Financial Literacy*".

Popovich, Jacob J., Căzilia Loibl, Christopher Zirkle, and M. Susie Whittington, (2020), "Community college students' response to a financial literacy intervention: An exploratory study", *International Review of Economics Education*, 34: 100182.

Sayinzoga, Aussi, Erwin H. Bulte, and Robert Lensink, (2016), "Financial Literacy and Financial Behaviour: Experimental Evidence from Rural Rwanda", *The Economic Journal*, 126: 1571–1599.

Walstad, William B., Ken Rebeck, and Richard A. MacDonald, (2010), "The effects of financial education on the financial knowledge of high school students", *Journal of Consumer Affairs*, 44: 336–357.

Zenios, Stavros A., (2013), "The Cyprus Debt: Perfect Crisis and a Way Forward", *Cyprus Economic Policy Review*, 7(1): 3-45.

Appendix

Frequency of interaction questions – Student questionnaire

The following two questions were included in the Student

questionnaire F1. Do you live with your parents?

- Yes
- No
- Don't know / Refused to answer

F2. How many times per week do you personally interact (face-to-face) with your parents?

- Everyday
- 5-6 times per week
- 3-4 times per week
- 1-2 times per week
- Less than 4 times a month

Note that question F2 showed up in the questionnaire only in the case that the students replied "No" in question F1