THE IMPACT OF HIGH SCHOOL FINANCIAL EDUCATION ON KNOWLEDGE, ATTITUDES AND PREFERENCES: Evidence from a Randomized Trial

Olympia Bover (BdE), Laura Hospido (BdE, IZA), Ernesto Villanueva (BdE)

CHERRY BLOSSOM FINANCIAL EDUCATION WORKSHOP

April 15th 2016 **(PRELIMINARY)**

1. Financial literacy in school

- **Observational studies**
  - Cole and Shashtry (US) Brown et al (US): conflicting evidence
  - Walstad and Roeback (US) Luhrmann et al (DE)
    - *Increased knowledge (US), not so clear in DE*.

- **Randomized trials**
  - **Knowledge/attitudes**: Positive impact: 0.20 standard deviations.
    - *Bechetti et al (IT 2010), Bruhn et al (BR 2013), Berry et al* (GHA 2015)*
  - **Choices in incentivized tasks**: change in preferences for time, not for risk
    - *Luhrman et al (DE), Alan and Ertac* (TURK)*

- **THIS PAPER**
  - A high school program delivered in 77 schools all over Spain
    - *In 12 out of 17 regions (SP: lowest share of FL courses in PISA)*
  - 10 lessons on how to meet future needs and simple vehicles to do so.
  - Wide array of outcomes over a 3-6 months horizon
    1. Objective knowledge: *Key mediating factor*
    2. Attitudes / hypothetical choices
       Isolate problems with budget constraints.
    3. Controlled choices (convex time budget)

1. Contents of the course

Sponsored by various institutions: Ministry of Education

Web-based material (10 lessons plus additional exercises or activities).
Schools applied for the material, to be taught by their own teachers.

1. **Money and future**
   - Financial targets
2. **Saving towards a mean**
   - How to achieve something tomorrow
   - Interest rates and time
3. **Budgeting**
   - Allocation of expenses
4. **Credit**
   - Consequences of indebtedness
5. **Sustainable consumption**
   - Conspicuous expenses, environmentally friendly expenses
6. **Banking relationships**
   - Bank accounts, security
7. **Payment methods: cash**
8. **Payment methods: credit and debt cards**
   - (Dis)advantages of different payment methods
9. **Saving vehicles**
   - Return, liquidity and (elements of) risk
10. **Insurance vehicles**

2. Evaluation design

- **Contacted all schools that requested the materials for the first time**
  - As applications arrived, assigned schools to teach the course in January-March 2015 or April-June 2015
  - Randomization within 13 strata defined by **type of school** (public, private or concerted), **region** (Madrid vs rest) and **date of arrival** of the application
    - *For a small additional sample, only 3 strata defined by grade in which school intended to teach the course*

- **Participation conditional on acceptance of the following conditions**
  - **Course delivered to 9th graders in the assigned quarter**, students with 15-16 years.
  - A group in **10th grade** tested and surveyed, but **not taught the material**
  - **Excluded** some schools willing to accept conditions
    - *Schools that intended to teach small or non-representative groups*
  - 40% (=78/200) fully accepted the conditions, one dropped out later.

Table 1: Evaluation

	December 2014		March 2015		June 2015
9th graders (15 years of age)					
1. Treated schools	Baseline survey and pre-test	FL course	Post-test, survey to students	No course	3rd-test and incentivized saving task*
2. Control schools		No course		FL course	
10th graders (16 years of age)					
1. Treated schools	Baseline survey and pre-test	No course	Post-test, survey to students	No course	3rd-test and incentivized saving task*
2. Control schools		No course		No course	

* Incentivized saving task only in Madrid schools

November 2014: All teachers invited to Bank of Spain. Purpose, timetable of the course and going over one of the lessons.

2. Evaluation 2014-2015 (continued)

- **Built on pre-existing material**
  - **Set of items developed** by education experts for a previous evaluation (30 questions).
  - **Surveys to families, principals and teachers** .
    - *Adapted to PISA*

- **Geographical distribution of 78 schools (1 dropped out)**
  - 12 regions
    - *Andalusia, Aragon, Cantabria, Castile-La Mancha, Comunitat Valenciana, Extremadura, Balearic islands, Canary islands, Galicia, Madrid, Murcia, Rioja.*
  - Rural and urban schools

- **Characteristics reported by students and centers similar among treated and controls**
  - Slight higher share of students older than implied by normal progression
  - Similar share of public schools, females and labor market status.

2. Evaluation 2014-2015 (continued)

- **Method:**
  - **•OLS regression of outcome of interest on TREATED and stratification dummies.**
    - *•Intent-to-treat models*
    - *•Compliance according to surveys almost 100%*

  - •16 dummies with randomization units
    - *•Interactions of region, type of school and date of application*

- **•Control for baseline outcomes** in all models whenever available.
  - •Grade in the pre-test, attitudes toward saving or baseline choices.

- **•Standard errors** clustered at the school level.

- •Pre- and post-test: make no adjustment for difficulty of questions, simply compute the fraction of correct answers
  - •In each wave, implemented two different tests to minimize communication among students.
    - *• type of test dummies not included in this version –did not matter*

Table 2: Student characteristics

	Treated (N=**35** high schools)	Control (N=**43** high schools)	P-value of difference
Variables used in stratification			
Madrid	.304	.324	
Public school	.601	.663	
Privately run school	.297	.308	
Private school	.099	.029	
Demographic characteristics			
Female	.474	.492	.14
Foreign born	.137	.113	.44
Older than normal progression	.326	.242	.153
Labor status of father			
Employee	.536	.548	.55
Self-employed	.253	.262	.52
Unemployed	.088	.092	.53
Does not work/other	.090	.070	
Labor status of mother			
Employee	.471	.510	.56
Self-employed	.151	.149	.63
Unemployed	.084	.087	.85
Does not work/other	.286	.240	

Sample of 3.117 students in 78 schools.

Table 2: Student characteristics (continued)

	Treated (N=**35** high schools)	Control (N=**43** high schools)	P-value of difference
Variables used in stratification			
Madrid	.304	.324	
Public school	.601	.663	
Concerted school	.297	.308	
Private school	.099	.029	
Pre-test			
Fraction questions correct in pre-test	**.598**	**.598**	**.80**
Financial characteristics			
Talks to parents about economics			
Never	.247	.241	.44
Once a week	.287	.304	.89
More than once a week	.412	.428	.63
Sources of income			
Family business/allowance home duties	.352	.334	.60
Inconditional allowances	.79	.77	.21
Occasional jobs	.224	.206	.07*
Hypothetical preferences			
Prefers 100 euro today to 120 in two weeks	.253	.262	.677
Prefers 100 euro today to 150 in two weeks	.139	.122	.252
Prefers 100 euro today to 180 in two weeks	.070	.072	.731

Sample of 3.117 students in 78 schools.

3. Program Implementation

- **55 teachers in 35 treated schools answered the teachers' survey (3 did not)**
  - High level of commitment
    - *Less than 25% of schools gave less than 10 hours*
    - *At least 25% of schools gave more than 17 hours*
    - *The recommended number was 10*

- **Problems**
  1. One school dropped out in March prior to the pre-test
  2. One school postponed treatment without telling us
  3. One school delivered some material prior to the pre-test
     - *Include the latter two cases in the analysis, not the first.*

- **The average teacher delivered 7 out of the 10 lessons**
  - 30% economists.
  - Modules about saving and insurance vehicles not taught in many cases
  - General comment: "Too much material"
  - Overall degree of satisfaction is 7/10

Table 3: Program Implementation

	Total	Public	Concerted	Private
	N=55	N=33	N=20	N=2
Number of hours				
Minimum	4	4	9	--
25th centile	10	8	10	--
Median	10	10	10	15
75th centile	17	13	18	17
90th centile	20	20	22	--
Number of lessons taught	6.98	6.8	7.9	6
Fraction that made independent evaluation	.39	.36	.40	.50
Fraction that assigned homework	.28	.27	.40	0
Most important course in which taught				
Math	.127	.061	.15	1
Social Sciences	.164	.122	.15	0
Weekly hour with tutor	.291	.307	.30	0
Citizenship	.109	.152	.05	0
Alternative to religion	.091	.091	.05	0
Other	.228	.267	.30	0
Teacher's specialization				
Social Sciences	.345	.42	.30	0
Economics	.36	.36	.30	.5
Math	.127	.091	.15	.5
Computing science	.072	.0	.20	0
Other	.096	.12	.05	0
Taught material prior to the pre-test	.036	.03	0	.5

4. The impact on financial knowledge

Table 4: The effect of the financial literacy program on the normalized March tests scores.

	No strata	Strata dummies	Strata dummies, balanced panel	
	(1)	(2)	(3)	(4)
Panel A: Treated students vs controls (9th graders)				
1. Treated	.138	.160	.157	.163
(S.E.)	(.070)	(.075)	(.068)	(.065)
[p-value]	**[.053]**	**[.036]**	**[.023]**	**[.014]**
R squared	.158	.129	.33	.332
Students (schools)	3043 (77)		2734 (77)	
Panel B: Non-treated students in treated schools vs control schools (10th graders)				
1. "Treated"	-.0874	-.045	-.094	-.104
(S.E.)	(.0922)	(.048)	(.088)	(.084)
[p-value]	[.346]	[.345]	[.29]	[.22]
R squared	.24	.267	.33	.34
Sample size	1569 (77)		1366 (77)	

The dependent variable is the score in the March test, all models include as covariate performance in pre-test
Estimation method: OLS. Models 2 and 3 include stratum dummies. Model 4 merges two strata without treated
The standard errors are corrected for heteroscedasticity and arbitrary correlation at the school level

4. The impact on financial knowledge: summary

- **The course improved performance in the financial literacy test by 16% of one standard deviation**
  - Rule out mean effects above 30% of one standard deviation
  - Magnitude consistent with previous studies (that found a positive impact)
- **Test gains mostly on banking relationships**
  - Less precise impacts on saving vehicles or “intelligent consumption”
- **Some indications that impacts differ by type of school**

5. The impact on attitudes

1. **Talk to parents about economics**
   - Measures home's saving support (Berry et al, 2015)
   - Evidence of parents benefitting from children's financial literacy training (Bruhn et al, 2013)
   - At baseline, youths in families that never talk about finance more likely to expect an early drop-out from school

2. **A set of hypothetical saving choices "What do you prefer, 100 euro today or 120 in 3 weeks"?**
   - Time preferences, but also household's perceived rate
     - *Krupka and Stephens, 2013*
   - The answers at baseline correlate with measures of patience:
     1. *Students having **repeated a grade** are 4pp more likely to choose 100 euro today*
     2. *Those expecting to **drop out at minimum school leaving** age are 10pp more likely to choose 100 euro today*
     3. *Whose parents have high school or less are 5pp more likely to choose 100 euro today*

5. Attitudes: Talk to parents about economics

Table 5.A: The effect of the financial literacy program on attitudes - talk to parents about economics

	Treated students vs control students (9th graders)				
	Overall	> once a week	Once a wee	< once a week	Never
		(1)	(2)	(3)	(4)
Treated	*.122*	.018	.0238	-.002	-.040
(S.E.)	*(.053)*	(.018)	(.019)	(.015)	(.017)
[p-value]	***[.029]***	[.336]	[.203]	[.89]	**[.026]**
Mean dep. var	--	.25	.244	.292	.209
Sample size			2714		

Overall is the latent index coefficient of an ordered Probit, with outcomes (1)-(4) as different levels of the dependent variable.
All models control for strata fixed-effects and the lagged values of the dependent variable
Standard errors allow for arbitrary correlation at the school level (77 schools)

5. Attitudes: time preferences and hypothetical choices

Table 5.B: The effect of the financial literacy program on attitudes - hypothetical saving choices

	Treated students vs control students (9th graders)				
Prefers:	Earlier choice (pooled)	100 euro now to 120 in 3 weeks	100 euro now to 120 in 6 weeks	100 euro now to 150 in 3 weeks	100 euro now to 180 in 3 weeks
Treated	-.0263	-.045	-.051	-.010	-.007
(S.E.)	(.012)	(.018)	(.019)	(.014)	(.008)
[p-value]	**[.029]**	**[.015]**	**[.012]**	[.477]	[.415]
Mean dep. var	--	.293	.66	.125	.061
Sample size	10.760		2714 (77)		

Earlier choice pools the four choices and controls for three dummies that indicate the particular choice. The variable treated measures if present always chosen regardless of the future reward.
All models control for strata fixed-effects and for the lagged values of a similar hypothetical choice in December 2014.
Standard errors allow for arbitrary correlation at the school level (77 schools)

5. The impact on attitudes: summary

1. **Talk to parents about economics**
   - Fraction who never talk about economics falls by 4% (baseline of 20.6%)

2. **Increase in patience in hypothetical choices**
   - Fraction who select earlier choice (100 euro today vs 120 in 3 weeks) fall by 4.5% (baseline: 29.3%)

- **Both groups (those who never talk to parents about economics or select earlier choice) look particularly impatient**
  1. More likely to have repeated a grade
  2. Expect to drop out at minimum school leaving age
  3. Disadvantaged background

6. The impact on monetary choices

- **In December 2014 (baseline) and March 2015 we ran small surveys after the exam**
  - Based on financial PISA

- **Income, saving and assets**
  1. Whether or not have a bank account or a money card
     - *Measures of financial inclusion*
  2. How much do you save?
     - *Standard measure in financial literacy studies, although unclear that saving is optimal for those youths*
       - Lührmann et al (2013), Bruhn et al (2013), Berry et al (2015)
  3. Sources of income of youths
     - *We focus on those that involve exchange of services*

6. Monetary choices: bank account and savings

Table 6.A: The effect of the financial literacy program on financial inclusion and savings

Treated students vs control students (9th graders)					
	Holds bank account or money card	Holds a bank account	Holds a money card		
Treated	.010	.0155	-.014		
(S.E.)	(.020)	(.020)	(.022)		
[p-value]	[.588]	[.442]	[.21]		
Mean	.575	.514	.102		
	Saves				Not enough
	Same amount	Varies	Occasionally	Not	money to save
Treated	-.004	.0047	.005	-.0127	.0064
(S.E.)	(.014)	(.020)	(.017)	(.008)	(.008)
[p-value]	[.744]	[.81]	[.76]	[.11]	[.425]
Mean	0,163	0,48	0,23	0,061	0,058
Sample size (schools)	2734 (77)				

All models estimated by OLS, including stratification dummies and lagged values of the dependent variable as of December 2014. Standard errors are clustered at the school level.

6. Monetary choices: sources of income

Table 6.B: The effect of the financial literacy program on sources of income

	Sources of income				
	Any source of income for labor	Occasional jobs	Sells things (Internet, markets)	Money for tasks at home	Work in family business
	Treated students vs controls (9th graders)				
Treated	.036	.0013	-.0097	.0386	.0252
(S.E.)	(.020)	(.0128)	(.0009)	(.019)	(.011)
[p-value]	**[.076]**	[.98]	[.304]	**[.046]**	**[.019]**
Mean dep.var	.41	.148	.121	.27	.06
Sample size (schools): 2714 (77)					

OLS regressions that control for stratification dummies and lagged values of the dependent variable (corresponding to baseline interview in December 2014)
Standard errors clustered at the school level.

6. The impact on monetary choices: summary

1. **Do not detect effects on the decision of holding a bank account or a money card (measures of financial inclusion)**

2. **Small impact on saving behavior**
   - There is a small drop in the probability of reporting not saving at all
   - However, the group was small to start with (6% at baseline)

3. **Students going through financial literacy course increased labor supply**
   - Effect driven by a higher likelihood to work at home (least costly adjustment)
     - *Family business (6% at baseline, increase of 2.5%)*
     - *Doing household tasks (27% at baseline, increase of 3%)*
     - *Consistent with increase in involvement in household financial matters*

   - Berry et al. (2015) also document an increase in labor supply among Ghanan children following a financial literacy course

7. Actual choices in a controlled setting

1. **Implemented in June an incentivized saving task (Convex Time Budget), originally aimed at recovering preferences.**

   Andreoni and Sprenger (2012)

   By June, all 9th graders had been treated, 10th graders acted as controls.

2. **Nine sequential choices asking youths to allocate 6 euros between consumption today and consumption in one or two weeks**

   Three different interest rates (0, 100% and 150%)

   Change the time horizon (today vs 1 week, today vs 2 weeks, one week from now vs 2 weeks from now).

3. **Payoffs: USBs with different capacities –students knew this.**
   - 6 euros would be 8GB, 12 euros to 32GB (*similar* to market prices)

4. **In each class, a randomly selected student obtained one randomly chosen option**
   - Picked from one bag by one of the students
   - Future payoffs (USBs) given to the principal, with instruction about the date to be given to students.

SHEET 1		Get … euros **today**	And get … euros **in one week**	Pick one option
Block 1	Option a	6	0	
	Option b	4	2	
	Option c	2	4	
	Option d	0	6	
Block 2	Option a	6	0	
	Option b	4	4	
	Option c	2	8	
	Option d	0	12	
Block 3	Option a	6	0	
	Option b	4	6	
	Option c	2	12	
	Option d	0	18	

Translation to English from Spanish original. Given in a sheet of paper, to be filled in with pencil, and handed out to interviewer

7. Actual choices in a controlled setting

Table 7.A: The effect of the financial literacy program on units allocated to the earlier date

	Treated students (9th graders) vs control students (10th graders)					
	Today vs 1 week		Today vs 2 weeks		1 week vs 2 weeks	
	R=1.0	R=1.5	R=1.0	R=1.5	R=1.0	R=1.5
Treated	-.182	-.067	-.224	-.165	-.248	-.183
(S.E.)	(.135)	(.122)	(.139)	(.120)	(.127)	(.147)
[p-value]	[.185]	[.585]	[.115]	[.177]	**[.059]**	[.219]
Sample size	1,006					

All models control for strata fixed-effects and for lagged values of hypothetical choice in December 2014. Standard errors allow for arbitrary correlation at the school-class level (20 schools in Madrid).

7. Actual choices in a controlled setting

Table 7.B: The effect of the financial literacy program on units allocated to the earlier date (pooled)

		Short-term effect	Long-term effect
	Treated (9th graders) vs control (10th graders)	Treated (9th graders in April-June 2015) vs control (10th graders)	Treated (9th graders in January-March 2015) vs control (10th graders)
Treated	-.178	-.123	-.269
(S.E.)	(.115)	(.112)	(.150)
[p-value]	[.130]	[0.280]	**[.085]**
Sample size	6036	4290	3534

The sample used pools all choices in Table 9. All models control for indicators of interest rate (R=1.0 or R=1.5), time horizons (today vs 1 week; today vs 2 weeks; or 1 week vs 2 weeks), strata fixed-effects and lagged values of hypothetical choices in December 2014.
Standard errors allow for arbitrary correlation at the school-class level (20 schools in Madrid).

7. The impact on actual choices: summary

1. **Treated students more likely to allocate resources to future dates across choices, holding the time period and the interest rate constant**
   - However, the results are imprecise

2. **If anything, the tendency in June to allocate resources to future dates is strongest for those who received the course between January and March**
   - Suggesting some persistence of the attitudes measured in the course 3 months after the sessions ended

8. Summary

1. **Increase financial knowledge by a sixth of one standard deviation**
   - Driven by knowledge on banking relationships

2. **Evidence of changes in attitudes due to program**
   - Fraction who never talk about economics falls
   - Increase in patience in hypothetical choices

3. **Some evidence pointing at some changes in monetary outcomes**
   - No changes in holding bank accounts or saving behavior
   - Increase in labor supply –like working for money in family business or getting money of household tasks
     - *No changes in the take-up of occasional jobs or other market activities*

- **Attitudes relevant, as may affect long-run decisions**
  - Also some suggestive evidence from an incentivized choice
  - Relevance of following up those students

THANKS FOR YOUR ATTENTION!

4. The impact on financial knowledge, by topic

Table 4.A: The effect of the financial literacy program on the March tests scores -by topic

	Saving	Means of payment	Banking relationships	Sustainable consumption
	(1)	(2)	(3)	(4)
1. Treated	.0014	.025	.029	.037
(S.E.)	(.016)	(.015)	(.010)	(.023)
[p-value]	[.927]	[.110]	**[.005]**	[.114]
2. Score in the pre-test	.64	.466	.371	.460
	(.033)	(.029)	(.018)	(.021)
3. Pre-test missing	-.173	.004	-.007	-.073
	(.120)	(.020)	(.015)	(.099)
4. Constant	.54	.63	.32	1.05
	(.021)	(.020)	(.014)	(.031)
Fraction correct in pre-test	.55	.60	.47	.28
R squared	.158	.129	.224	.202
Students (schools)			3043 (77)	

The dependent variable is the fraction of correct answers in the March test.
the estimation method is OLS, and all models control for stratification dummies
The standard errors are corrected for heteroscedasticity and arbitrary correlation at the school level

4. The impact on financial knowledge: public vs rest

Table 4B: The effect of financial literacy program on the March tests scores -by type of school

	Public school	Non-public school
	(1)	(2)
1. Treated	.0258	.010
(S.E.)	(.0147)	(.011)
[p-value]	**[.086]**	[.96]
2. Score in the pre-test	.411	.442
	(.020)	(.029)
3. Pre-test missing	-.011	-.028
	(.020)	(.020)
4. Constant	.453	.544
	(.011)	(.025)
R squared	.237	.287
Number of students (schools)	1859 (42)	1149 (33)

The dependent variable is the fraction of correct answers in the March test.
The estimation method is OLS. All specifications control for stratification dummies.
The standard errors are corrected for heteroscedasticity and arbitrary correlation at the school level