State Mandated Financial Education and the Credit Behavior of Young Adults

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Financial Literacy in the U.S.

Financial Literacy in the U.S. is generally low, but financial knowledge amongst young adults is particularly weak:

- Less than $\frac{1}{3}$ of Americans ages 23 to 28 possess basic knowledge of interest rates, inflation and risk diversification. (Lusardi and Mitchell (2010)).

  ▸ Big Three Questions

Low Levels of Financial Literacy have been associated with:

- Lower rates of planning for retirement, asset accumulation, stock market participation (Lusardi and Mitchell (2007, 2014); Lusardi et al. (2010); van Rooij et al. (2012)).

- Greater use of high cost financial services and higher levels of debt (Lusardi and Tufano (2009); Meier and Springer (2010)).

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Policy Response: Financial Education in the U.S.

- After the 2008 financial crisis, policymakers intensified efforts to increase financial literacy in the U.S.
  - One response: Expand K-12 personal finance and economic education requirements.

- Existing body of research on the effectiveness of personal finance education yields conflicting findings at best (Fernandes et al. (2013); Willis (2011)).

- This paper uses a novel approach to independently examine the effect of specific, well-defined personal finance mandates in three states.

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Previous Literature

Paper	Financial Education	Other Education	Sample Age
Brown et al. FRBNY WP (2013)	↑ credit score ↓ CC, auto delinquency	Econ ↑ debt Math ↑ bankruptcy	22-28
Cole et al. HBS WP (2012)	No effect	Math ↓ debt	24-54
Tennyson & Nguyen JCA (2001)	↑ literacy only when tested		HS Students
Bernheim et al. JPubE (2001)	↑ stock participation ↑ asset accumulation	Merges Econ & Personal Finance	30-49

Limitations of Previous Literature

Previous literature often assumes all personal finance education mandates are equal. However...

- Often a lag between mandate passage and implementation in schools (varies by state).
- After passage, some states do not require school districts to actually implement the new curriculum.
- Few states require teacher training on new curriculum.
- Hard to identify financial education effects if other education mandates (e.g. math, economics) change at the same time.

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Limitations of Previous Literature

Studies looking at effects later down the road

- Rely on retrospective survey data (Bernheim et al. (2001)).
- Make long-term assumptions regarding the probability of moving (Cole et al. (2013)).
- Could add noise to the estimates.

Studies that do look at heterogeneity in mandates (Tennyson and Nguyen (2001))

- Use survey data to look at immediate changes in knowledge–not observational differences in outcomes.
- May miss any changes in "attention" or behavior that affect longer-term outcomes.

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Our Contribution

Estimate Local Average Treatment Effect (LATE) of personal finance education in specific states

- Choose three states with relatively rigorous mandates passed post-2000: GA, ID, TX
- Determine exactly what each mandate entailed: standardized curricula, graduation requirements, teacher training, etc.
- Begin treatment with first class affected by mandate, not following passage of mandate.
- Use synthetic control methods to build proper comparison groups for each treated state.

Question: What are the effects of these specific personal finance education mandates in high school on credit behavior in early adulthood?

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Data Sources

Collect Data on Financial Education Mandates from 2000 to present from:

- Jump$tart Coalition for Personal Financial Literacy
- Council for Economic Education (CEE) Survey of the States
- Champlain College Center for Financial Literacy
    - In many cases, Jump$tart and CEE conflict.
    - Heterogeneity and actual implementation (vs. mandate) matter.
- Direct contact with states, graduation requirement documents, standardized curriculum.

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Treatment States: GA, ID, TX

- Each state's education program was implemented for graduating class of 2007.
- Each taught Personal Finance in a required HS Economics course.
- Each offered teacher training and a standardized curriculum.
- No other mandated economics, personal finance, or math course requirement changes in the sample period (2000-2013)

State	Length	Testing
Georgia	1yr	Yes
Idaho	0.5 yr	No
Texas	1yr	Yes

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Control States

Need adequate control states without mandates that did not change their math and economics curriculum in the sample period (2000-2013).

- Solution: Use Synthetic Control Methods for Comparative Case Studies (Abadie et al. (2010); Abadie and Gardeazabal (2003)).
- Collect state-level data in 2000: GDP, Median HH Inc, Poverty Rate, HPI, Unemployment, Education levels, Region, Division, % Private Schools, $ per Pupil, Race, Ethnicity, Total Education Expenditures.
- Find weights such that treatment states are comprised of one weighted average of potential control states based on pre-period observable characteristics.
- Assume: no contamination (spillovers) in Treatment effects.

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Synthetic Controls

1. Use when only a few, aggregated entities exist.

2. Combination of aggregated units best mimics the treatment.

3. Control is selected as weighted average of all potential comparison units.

4. Absence of randomization still exists.

5. Small sample bias still exists.

6. More important to do Placebo tests.

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Synthetic Control State Selection

- Specification (1) GDP, Median Inc, Poverty Rate, HPI, Unemployment, Education, Region, % Private Schools, $\frac{\$}{Pupil}$, Race, Ethnicity, Education \$s
- Specification (2): Specification 1, less GDP (excludes DC)
- Specification (3): Poverty Rate, Unemployment, Education, Region, Division, Percent of Private Schools, % Private Schools, $\frac{\$}{Pupil}$, Race, Ethnicity, Education \$s
- Specification (4): Specification 3 with math scores at grades 4 and 8 (which is a subsample of states)

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Treatment and 24 Potential Control States (+ AK & HI)

Legend

Potential Control States

Treatment States

States Not in Study

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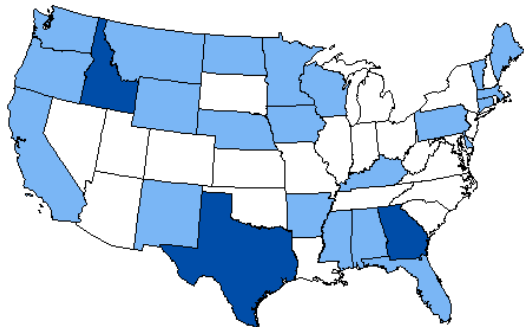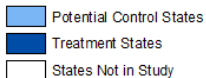
Synthetic Controls Selection: GA

Specification Georgia				
State	(1)	(2)	(3)	(4)
AK	0.03			
AL	0.084	0.056	0.071	0.262
CA	0.021			0.042
CT		0.059	0.013	0.026
DC			0.037	0.027
DE	0.111	0.014		
FL		0.154	0.151	
HI	0.021	0.027		
IN				0.103
KY	0.696	0.681	0.657	0.541
MD	0.037			
MI			0.071	
MN		0.008		

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Synthetic Controls Selection: ID, TX

Specification Idaho				
State	(1)	(2)	(3)	(4)
ND	0.441	0.436	0.31	0.64
NE	0.247	0.246	0.12	
OR			0.57	
WA	0.312	0.317		
WY				0.36

Specification Texas				
State	(1)	(2)	(3)	(4)
AL			0.083	
CA	0.318	0.274	0.02	0.32
KY	0.382	0.34	0.15	0.387
MS	0.3	0.326	0.259	0.294
NM		0.06	0.487	

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Treatment and Synthetic Control States

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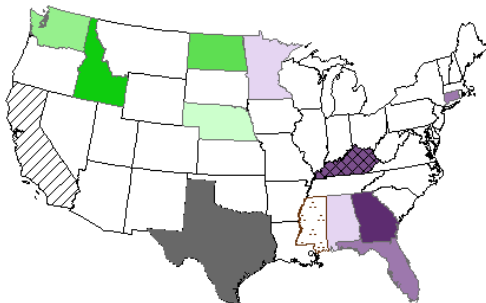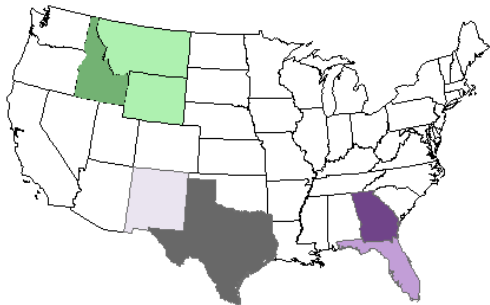
Treatment and Border Control States

Legend

- Border State-FL
- Treatment-GA
- Border State-MT, WY
- Border State-NM
- Treatment-TX

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Consumer Credit Panel Data

Use administrative credit bureau data from the FRBNY/Equifax
Consumer Credit Panel (CCP)

- 5% sample of U.S. credit files from Equifax, plus all
  household members with credit files.
- Panel data collected quarterly.
- Know birth-date, so we assume age 18 = graduation year.
- Not all individuals in sample have credit files at 18, assume
  HS state = current state.
- Restrict the sample to those 18-22 years of age.

Dependent variables:

- Credit Score
- Delinquency: Any account 30, or 90+ days delinquent;
  Auto loan 30, or 90+ days delinquent

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Synthetic Control, Treatment, and Border Sample: GA

	Control	GA	Border (FL)
Credit Score	618.1239	606.5294	611.1519
	(85.6048)	(89.4437)	(88.1336)
Number of Accounts	2.3075	2.0766	2.4485
	(2.3996)	(2.2480)	(2.5576)
Account 30 Days Delinquent	0.1535	0.1576	0.1581
	(0.3604)	(0.3644)	(0.3648)
Account 90 + Days Delinquent	0.1751	0.1818	0.1809
	(0.3801)	(0.3857)	(0.3849)
Auto 30 Days Delinquent	0.0320	0.0362	0.0310
	(0.1759)	(0.1867)	(0.1732)
Auto 90 + Days Delinquent	0.0115	0.0127	0.0103
	(0.1066)	(0.1120)	(0.1008)
Number of Individuals	329160	55081	112735

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Synthetic Control, Treatment, and Border Sample: ID

	Control	ID	Border (WY, MT)
Credit Score	638.1212	632.3341	637.6713
	(80.2629)	(85.5644)	(78.4124)
Number of Accounts	2.4552	2.2857	2.4190
	(2.3890)	(2.1718)	(2.3192)
Account 30 Days Delinquent	0.1115	0.1079	0.1148
	(0.3147)	(0.3102)	(0.3188)
Account 90 + Days Delinquent	0.1205	0.1217	0.1237
	(0.3256)	(0.3269)	(0.3292)
Auto 30 Days Delinquent	0.0207	0.0229	0.0220
	(0.1425)	(0.1495)	(0.1467)
Auto 90 + Days Delinquent	0.0066	0.0087	0.0098
	(0.0810)	(0.0927)	(0.0983)
Number of Individuals	62678	11310	10999

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Synthetic Control, Treatment, and Border Sample: TX

	Control	TX	Border (NM)
Credit Score	630.2958	609.3161	614.2561
	(85.4562)	(88.5174)	(87.2455)
Number of Accounts	2.3680	2.3674	2.2232
	(2.3532)	(2.4861)	(2.1841)
Account 30 Days Delinquent	0.1076	0.1488	0.1375
	(0.3099)	(0.3559)	(0.3444)
Account 90 + Days Delinquent	0.1260	0.1781	0.1585
	(0.3318)	(0.3826)	(0.3652)
Auto 30 Days Delinquent	0.0311	0.0323	0.0297
	(0.1735)	(0.1768)	(0.1698)
Auto 90 + Days Delinquent	0.0078	0.0084	0.0110
	(0.0879)	(0.0911)	(0.1043)
Number of Individuals	270322	153807	12625

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Trends in Dependent Variables: Credit Score

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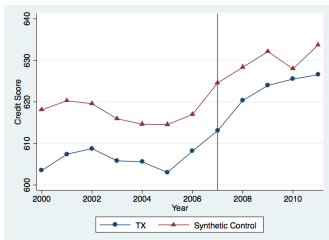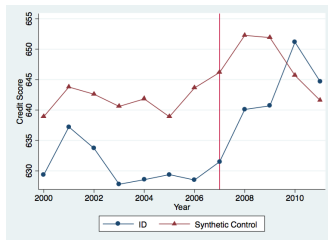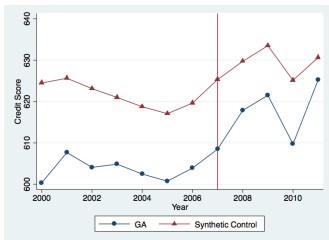
Trends in Dependent Variables: 30 Day Delinquency

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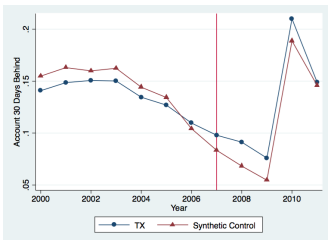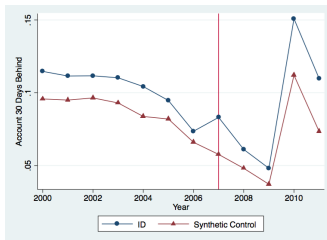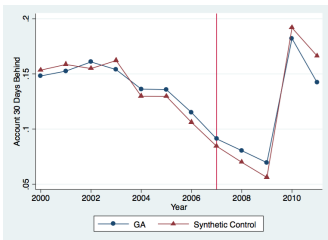
Trends in Dependent Variables: 90 Day Delinquency

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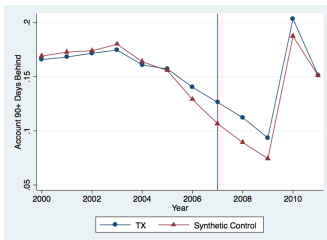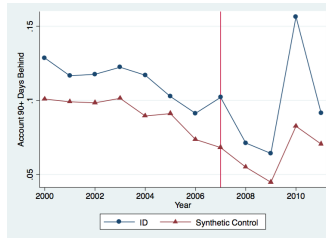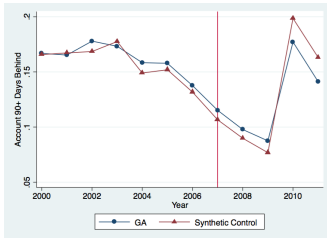
Empirical Strategy: Difference-in-Differences

$$
\begin{aligned}
Y_{ist} &= \alpha_0 + \beta_1(T_s \times P1_{it}) + \beta_2(T_s \times P2_{it}) + \beta_3(T_s \times P3_{it}) \\
&+ \gamma_1 u_{it} + \delta_s + \kappa X_{it} + \eta_t + \epsilon_{ist}
\end{aligned}
$$

Y_{ist}	$=$	credit score, any trade delinquency, and auto trade delinquency
T_s	$=$	1 if state was treated
$T_s \times$ P1, 2, 3$_{it}$	$=$	1 if received education 1, 2, or 3 years following implementation
u_{it}	$=$	unemployment rate in the county
n_i	$=$	number of quarters of individual's credit file
δ_s	$=$	state fixed effects
X_{it}	$=$	number of credit accounts for individual i
η_t	$=$	quarter by year fixed effects

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Synthetic Control Sample Results: GA

	(1) Credit Score	(2) Account 30 Days Delinquent	(3) Account 90 + Days Delinquent	(4) Auto 30 Days Delinquent	(5) Auto 90 + Days Delinquent
P1	0.666	-0.00232**	-0.00550***	-0.00229	0.000768
	(0.414)	(0.00103)	(0.00135)	(0.00235)	(0.00149)
P2	13.40***	-0.00509***	-0.0205***	-0.00515**	-0.00249*
	(0.419)	(0.00108)	(0.00140)	(0.00237)	(0.00145)
P3	28.71***	-0.0149***	-0.0364***	-0.0174***	-0.00257
	(0.508)	(0.00127)	(0.00169)	(0.00264)	(0.00184)
N	3894181	3412901	3412901	687659	687659
Means	611.7	0.156	0.179	0.034	0.012

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Synthetic Control Sample Results: ID

	(1) Credit Score	(2) Account 30 Days Delinquent	(3) Account 90 + Days Delinquent	(4) Auto 30 Days Delinquent	(5) Auto 90 + Days Delinquent
P1	-7.332***	0.00388*	0.00846***	0.00257	-0.000784
	(0.917)	(0.00204)	(0.00262)	(0.00350)	(0.00192)
P2	2.183**	-0.00206	-0.0114***	-0.00670**	0.00297
	(0.861)	(0.00191)	(0.00232)	(0.00309)	(0.00240)
P3	6.509***	-0.00180	-0.00686**	-0.0115***	-0.00929***
	(0.977)	(0.00224)	(0.00288)	(0.00355)	(0.00178)
N	703386	620045	620045	138733	138733
Means	635.9	0.110	0.121	0.022	0.007

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Synthetic Control Sample Results: TX

	(1) Credit Score	(2) Account 30 Days Delinquent	(3) Account 90 + Days Delinquent	(4) Auto 30 Days Delinquent	(5) Auto 90 + Days Delinquent
P1	-0.938***	0.00137**	-0.00810***	-0.00608***	0.000483
	(0.261)	(0.000601)	(0.000825)	(0.00117)	(0.000654)
P2	4.943***	0.000253	-0.0218***	-0.00621***	-0.00124*
	(0.262)	(0.000599)	(0.000811)	(0.00123)	(0.000637)
P3	13.01***	-0.000685	-0.0327***	-0.00568***	-0.00198***
	(0.284)	(0.000666)	(0.000887)	(0.00142)	(0.000712)
N	4174049	3683648	3683648	752678	752678
Means	617.1	0.134	0.159	0.032	0.008

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Border Sample Results: GA

	(1) Credit Score	(2) Account 30 Days Delinquent	(3) Account 90 + Days Delinquent	(4) Auto 30 Days Delinquent	(5) Auto 90 + Days Delinquent
P1	-0.529	-0.00197*	-0.00501***	-0.00284	0.00229
	(0.407)	(0.00100)	(0.00133)	(0.00228)	(0.00147)
P2	6.293***	-0.00152	-0.0136***	-0.00451**	-0.00112
	(0.410)	(0.00105)	(0.00137)	(0.00229)	(0.00138)
P3	10.89***	-0.00653***	-0.0181***	-0.0128***	-0.000574
	(0.486)	(0.00118)	(0.00160)	(0.00243)	(0.00171)
N	1632241	1407663	1407663	329800	329800
Means	609.5	0.158	0.181	0.032	0.011

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Border Sample Results: ID

	(1) Credit Score	(2) Account 30 Days Delinquent	(3) Account 90 + Days Delinquent	(4) Auto 30 Days Delinquent	(5) Auto 90 + Days Delinquent
P1	-4.276***	0.00156	0.00524*	0.00176	0.000989
	(0.969)	(0.00216)	(0.00277)	(0.00363)	(0.00205)
P2	8.143***	-0.00651***	-0.0187***	-0.00805**	0.00288
	(0.938)	(0.00213)	(0.00255)	(0.00336)	(0.00253)
P3	16.19***	-0.00897***	-0.0199***	-0.0145***	-0.0125***
	(1.131)	(0.00265)	(0.00332)	(0.00412)	(0.00245)
N	210165	185194	185194	49477	49477
Means	634.9	0.111	0.123	0.022	0.009

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Border Sample Results: TX

	(1) Credit Score	(2) Account 30 Days Delinquent	(3) Account 90 + Days Delinquent	(4) Auto 30 Days Delinquent	(5) Auto 90 + Days Delinquent
P1	5.182***	0.000860	-0.0150***	-0.00763***	-0.00129*
	(0.299)	(0.000693)	(0.000945)	(0.00135)	(0.000752)
P2	16.30***	-0.00178**	-0.0353***	-0.0105***	-0.00408***
	(0.324)	(0.000745)	(0.00102)	(0.00153)	(0.000822)
P3	31.71***	-0.00566***	-0.0576***	-0.0130***	-0.00628***
	(0.388)	(0.000924)	(0.00124)	(0.00193)	(0.000979)
N	1585593	1669260	1669260	1669260	1669260
Means	609.6	0.148	0.177	0.032	0.009

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Synthetic Control Mandate Year Results: GA

	(1) Credit Score	(2) Account 30 Days Delinquent	(3) Account 90 + Days Delinquent	(4) Auto 30 Days Delinquent	(5) Auto 90 + Days Delinquent
M1	6.743***	-0.00331***	-0.0106***	-0.00702***	-0.00137
	(0.437)	(0.00115)	(0.00140)	(0.00210)	(0.00135)
M2	10.23***	-0.00345***	-0.0186***	-0.00685***	-0.00705***
	(0.460)	(0.00120)	(0.00147)	(0.00235)	(0.00140)
M3	9.251***	-0.00149	-0.0222***	-0.00966***	-0.00770***
	(0.476)	(0.00123)	(0.00153)	(0.00243)	(0.00142)
N	2869079	2547209	2547209	552460	552460

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Synthetic Control Mandate Year Results: ID

	(1) Credit Score	(2) Account 30 Days Delinquent	(3) Account 90 + Days Delinquent	(4) Auto 30 Days Delinquent	(5) Auto 90 + Days Delinquent
M1	-3.290***	-0.000663	-0.00203	-0.00501	0.00175
	(0.920)	(0.00223)	(0.00255)	(0.00323)	(0.00228)
M2	-4.411***	-0.00123	-0.00320	-0.00545	0.000956
	(0.994)	(0.00231)	(0.00266)	(0.00340)	(0.00220)
M3	-6.742***	0.00743***	-0.00530**	0.000782	-0.00170
	(0.976)	(0.00238)	(0.00259)	(0.00364)	(0.00194)
N	448347	401074	401074	93344	93344

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Synthetic Control Mandate Year Results: TX

	(1) Credit Score	(2) Account 30 Days Delinquent	(3) Account 90 + Days Delinquent	(4) Auto 30 Days Delinquent	(5) Auto 90 + Days Delinquent
M1	5.179***	-0.00369***	-0.0118***	-0.00997***	-0.000571
	(0.272)	(0.000670)	(0.000856)	(0.00120)	(0.000662)
M2	1.074***	0.000611	-0.0101***	-0.00732***	-0.00278***
	(0.283)	(0.000694)	(0.000896)	(0.00128)	(0.000662)
M3	3.733***	0.000818	-0.0182***	-0.0117***	-0.00367***
	(0.294)	(0.000709)	(0.000914)	(0.00136)	(0.000696)
N	3074161	3205133	3205133	3205133	3205133

Discussion

- Find evidence that rigorous personal finance education mandates do in fact have an effect on early-life delinquency and credit scores.
- Emphasize that not all state education mandates or personal finance education programs are created equal
- If well done, personal finance education appears to yield significant improvements in financial behavior
- However, estimating the long-run effects of financial education will require further research

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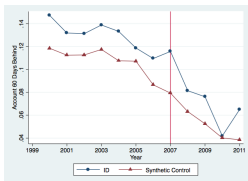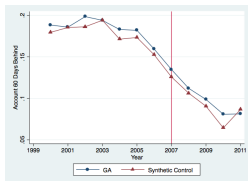
Big 3 Questions (*Lusardi and Mitchell (2008, 2011)*)

1. Suppose you had $100 in a savings account and the interest rate was 2 percent per year. After 5 years, how much do you think you would have in the account if you left the money to grow: more than $102, exactly $102; less than $102; do not know; refuse to answer.

2. Imagine that the interest rate on your savings account was 1 percent per year and inflation was 2 percent per year. After 1 year, would you be able to buy: more than, exactly the same as, or less than today with the money in this account; do not know; refuse to answer.

3. Do you think that the following statement is true or false? "Buying a single company stock usually provides a safer return than a stock mutual fund." [true; false; do not know; refuse to answer]

Trends in Other Dependent Variables

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