Methodological Challenges and Advances in Evaluating Financial Literacy Interventions

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May 10, 2018
Financial Literacy Seminar Series
Global Financial Literacy Excellence Center

Rationale for improving financial decision-making

- **Financial decisions have gotten more complicated**
  - Switch from defined benefit to defined contribution
  - Increasingly complex financial products

- **Ample evidence that poor financial decisions are common and can be costly for households ...**
  - Low savings: only 25% could come up with $2000 in 30 days
    - Lusardi, Schneider, and Tufano 2011
  - High-cost debt: Hold credit card debt even while they have savings
    - Gross and Souleles 2002
  - 27% of students who did not fill out the FAFSA would have been eligible for a PELL grant
    - Kantrowitz 2009

- **... and costly for the economy**
  - Limited understanding of finances may have played a role in the recent financial crisis
    - Gerardi, Goette and Meier 2010

Is financial literacy training the answer?

- **Individuals who are less financially literate have worse financial outcomes**
  - Lusardi and Mitchell (2007), Lusardi and Tufano (2009), Hilgert and Hogarth (2003), Alessie, Lusardi and van Rooij (2007), Hogarth and O'Donnell (1999), Mandell (2007), Gross and Souleles (2002), ...
  - Less likely to plan or save for retirement or emergencies
  - More likely to borrow at high interest rates and default
  - **Correlation is well-documented**

- **Broad policy interest in financial literacy training**
  - Dodd-Frank Act established "Office of Financial Education" within Consumer Financial Protection Bureau
  - At least 44 states include "personal finance" in high school curriculum

- **Does financial literacy training improve financial outcomes?**
  - Literature is very much mixed

Why is this a difficult question to answer?

- **Correlation is well-documented but causality is unclear**
- **Comparing people who have taken a financial literacy course to those who have not is problematic**
  - People who seek out financial training are likely to be different than those who do not
    - Perhaps more able or more patient
  - Difficult to identify whether an effect is due to the financial literacy course or these other factors (ability, patience)
- **Possible strategies**
  - Use variation induced by changes in policy
  - Conduct an experiment where individuals are randomly assigned to "treatment" and "comparison" groups

Overview

- **High school financial literacy courses**
  - Will reach largest fraction of US population
  - But impact is unclear
  - **Bernheim, Garrett, and Maki (2001)** documents positive effect
  - **Cole, Paulson, and Shastry (2016)** finds no effect on outcomes
  - **Brown et al. (2016)** finds a positive effect on outcomes
  - **Bruhn et al. (2016)** in Brazil find a positive effect on knowledge but mixed impacts on behavior

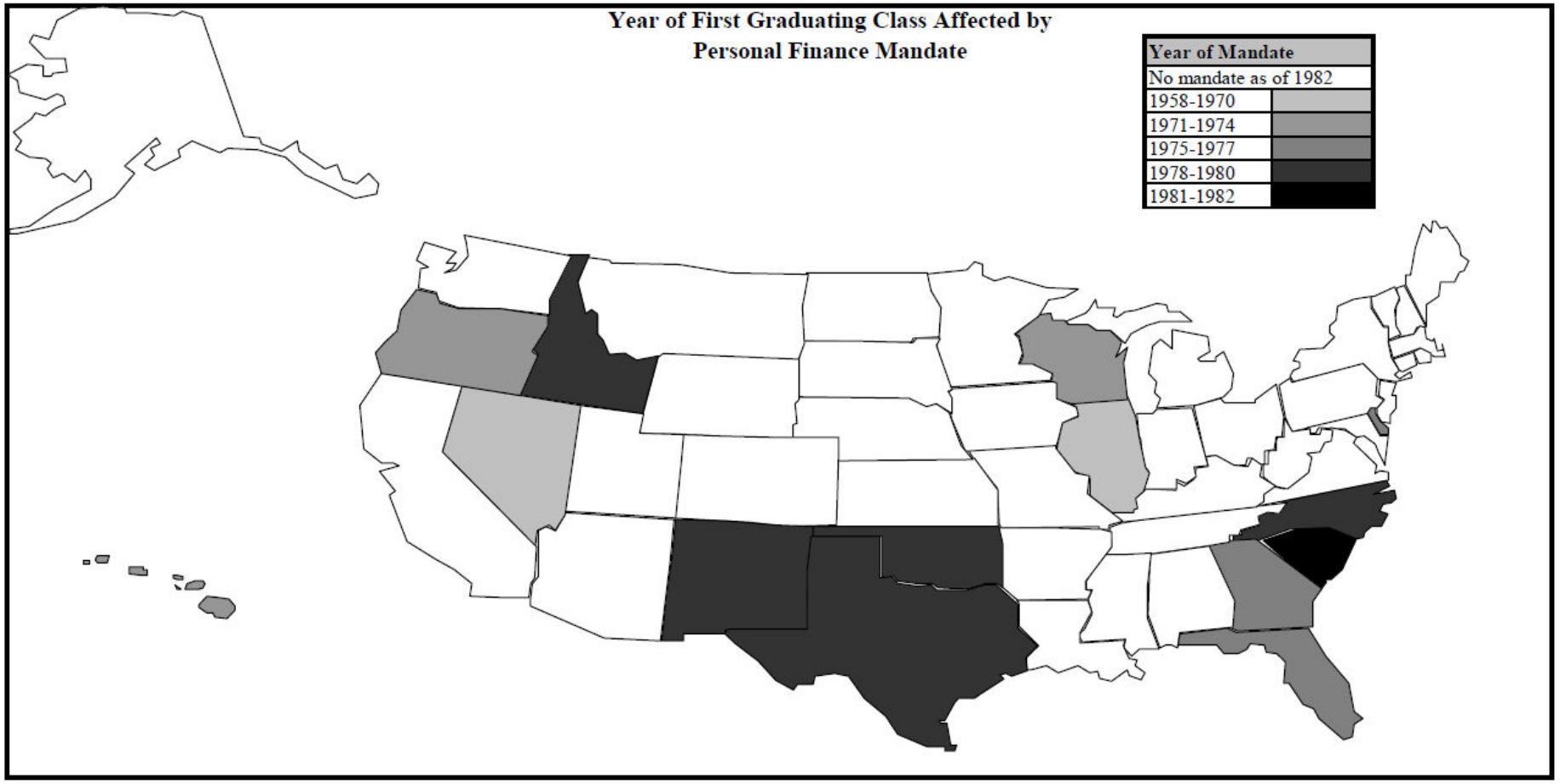
- **Outside of high school**
  - College courses, online courses, employer-provided education
  - Evidence is mixed, both in the U.S. and in other countries
    - Review of the literature: Hastings, Madrian, and Skimmyhorn (2013)
    - **Cole, Shapiro and Shastry (2018)** on gold-mine workers in South Africa
    - **Barua, Shastry and Yang (2018)** on foreign domestic workers in Singapore

Effects of Personal Finance Mandates

“Education and saving: The long-term effects of high school financial curriculum mandates” (Bernheim, Garrett and Maki 2001)

Financial literacy mandates in high school

- **Personal finance mandates (1957 – 1982)**
  - 14 states imposed a high school graduation requirement in consumer education with personal finance topics



Source: financial education mandates listed in Bernheim, Garrett, and Maki (2001)

Identification strategy

- **Difference-in-difference**
  - Compare differences in outcomes between states with mandates and states without mandates, taking into account *average* differences across these states before the mandates
  - Does not rely on students choosing to enroll in a course

- **Data**
  - Survey of 2000 households conducted in 1995
  - Sample population between 30 and 49 years old in 1995
  - Includes data on state of high school attendance, and self-reported rates of savings, assets and liabilities

- **Results**
  - Individuals graduating from high school after the mandates have higher savings rates and net worth

Re-examination of these Personal Finance Mandates

“High School Curriculum and Financial Outcomes: The Impact of Mandated Personal Finance and Mathematics Courses” (Cole, Paulson, and Shastry 2016)

More flexible empirical strategy

Differences-in-differences with fixed effects

$$y_{isb} = \alpha_s + \gamma_b + \beta E_{isb} + \beta X_i + \varepsilon_{isb}$$

- y_{isb}= financial outcome, E_{isb} = dummy for whether i graduated from HS after the reform was implemented in his/her state, X_i includes race and gender, α_s state of birth fixed effects, γ_b year of birth fixed effects

- **Strengths**
  - Accounts for unobserved, time-invariant state-specific differences and unobserved cohort differences at the national level

- **Disadvantages**
  - Impacts may not be immediate and constant (or linear, etc.). School districts may take time to implement mandates.
  - Pre-existing differential trends would bias estimates.

➢ **Conduct an 'event-study' using event-year indicators**

Empirical specification: event-study

$$y_{isb} = \alpha_s + \gamma_b + \gamma_{-(T+1)} D_{isb}^{-(T+1)plus} + \sum_{k=-T}^{-1} \gamma_k D_{isb}^{k} + \sum_{k=1}^{T-1} \gamma_k D_{isb}^{k}$$

$$+ \gamma_T D_{isb}^{Tplus} + \beta X_i + \varepsilon_{isb}$$

- D_{isb}^{k}: **event-year indicators = dummies denoting individual i graduated k years after (or before) a mandate was passed in his/her state of birth**
  - 15 pre and post event-year indicators
  - Post-event indicators: impact of curriculum change
  - Pre-event indicators: expose trends prior to curriculum change
  - Omitted category: individuals in state with no mandate or who graduated the same year mandate was implemented (conditional on state fixed effect).

- **Hypothetical evidence of a beneficial effect: coefficients on D_{isb}^{k}, for *k*<0 should be indistinguishable from zero, with no obvious trend and D_{isb}^{k}, for *k*>0 should be positive and significant**

- **Standard errors clustered by state of birth**

Using an event study specification

- **Benefits**
  - Allows data to determine how mandate affects the outcome (constant, increasing, decreasing, non-monotonic)
  - Allows us to examine pre-existing trends

- **Identifying assumption**
  - Conditional on state and year of birth fixed effects, cohorts that graduated before the reforms were no different from cohorts that graduated after.
    - Focus on cohorts graduating close to the reform year

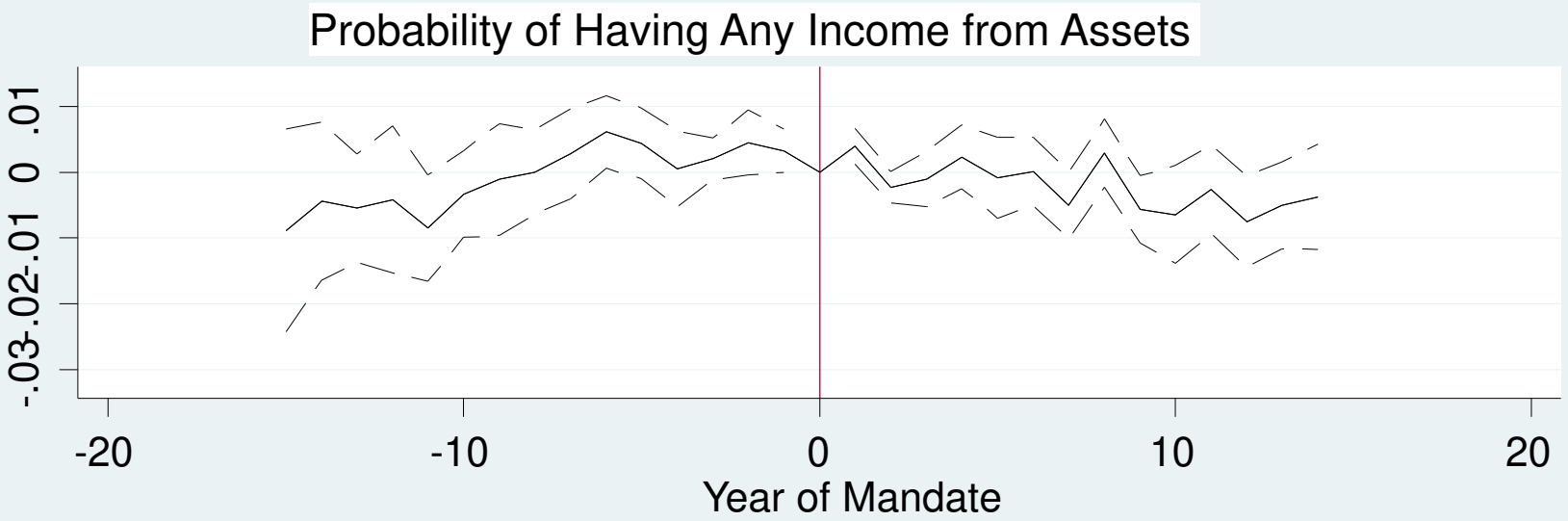
Three data sources

- **Require large data sets with appropriate financial outcome variables as well as key demographic variables (state and year of birth).**
- **U.S. Census, 2000 Census, 5% sample, 2.7 million observations.**
- **Survey of Income and Program Participation (1996, 2001, 2004 and 2008 panels), 38,000 – 53,000 observations.**
- **Federal Reserve Bank of NY Consumer Credit Panel (FRBNY-CCP). Nationally representative sample of 5% of individuals with a credit report, 3.7 million observations, quarterly panel from 1999 to 2011.**
- **Sample population between 35 and 54 years old in 2000**

Outcome variables

	Mean
Asset Accumulation	
– Indicator for any investment income (Census)	23%
– Amount of investment income (Census)	$728
– Investment income percentile (Census)	28%
– Value of financial assets (SIPP)	$23,519
– Value of equity in real estate (SIPP)	$39,207
Credit Management (FRBNY-CCP)	
– Credit score	692
– % Balance current	95%
– % Quarters delinquent	10%
– Bankruptcy b/w 1992 – 2011	18%
– Foreclosure b/w 1992 – 2011	8%

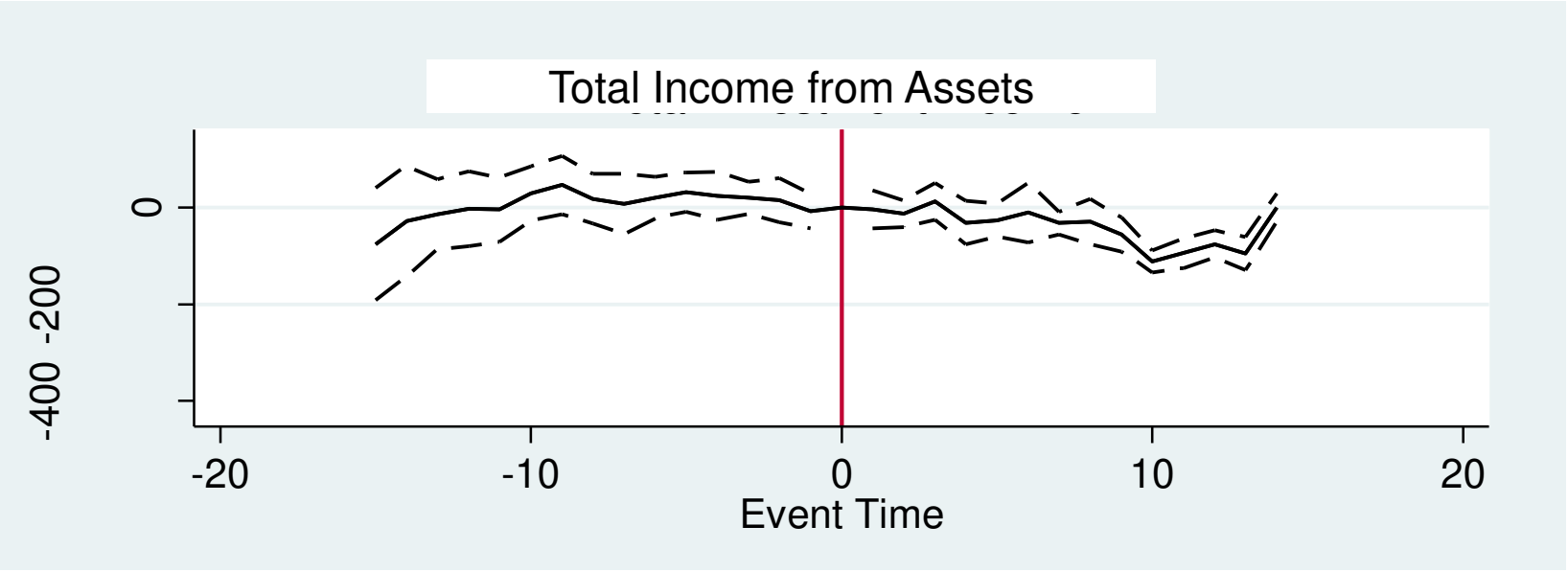
Personal finance mandates and any asset income



- **Evolution of propensity to accumulate assets over time in states with a mandate, controlling for factors such as state, year of birth**

- **No discernable effect of the mandate**
  - Difference between 5 cohorts before and after: -0.25 percentage points
    - Can rule out a positive effect as small as 0.1 percentage points with 95% confidence

Personal finance mandates and asset income



- **No discernable effect on the amount of asset income**
  - Difference between 5 cohorts before and after: -$29
    - Can rule out a positive effect as small as $7 with 95% confidence

- **Similar conclusions for total financial assets, equity in real estate, credit card delinquency, bankruptcy and foreclosure**

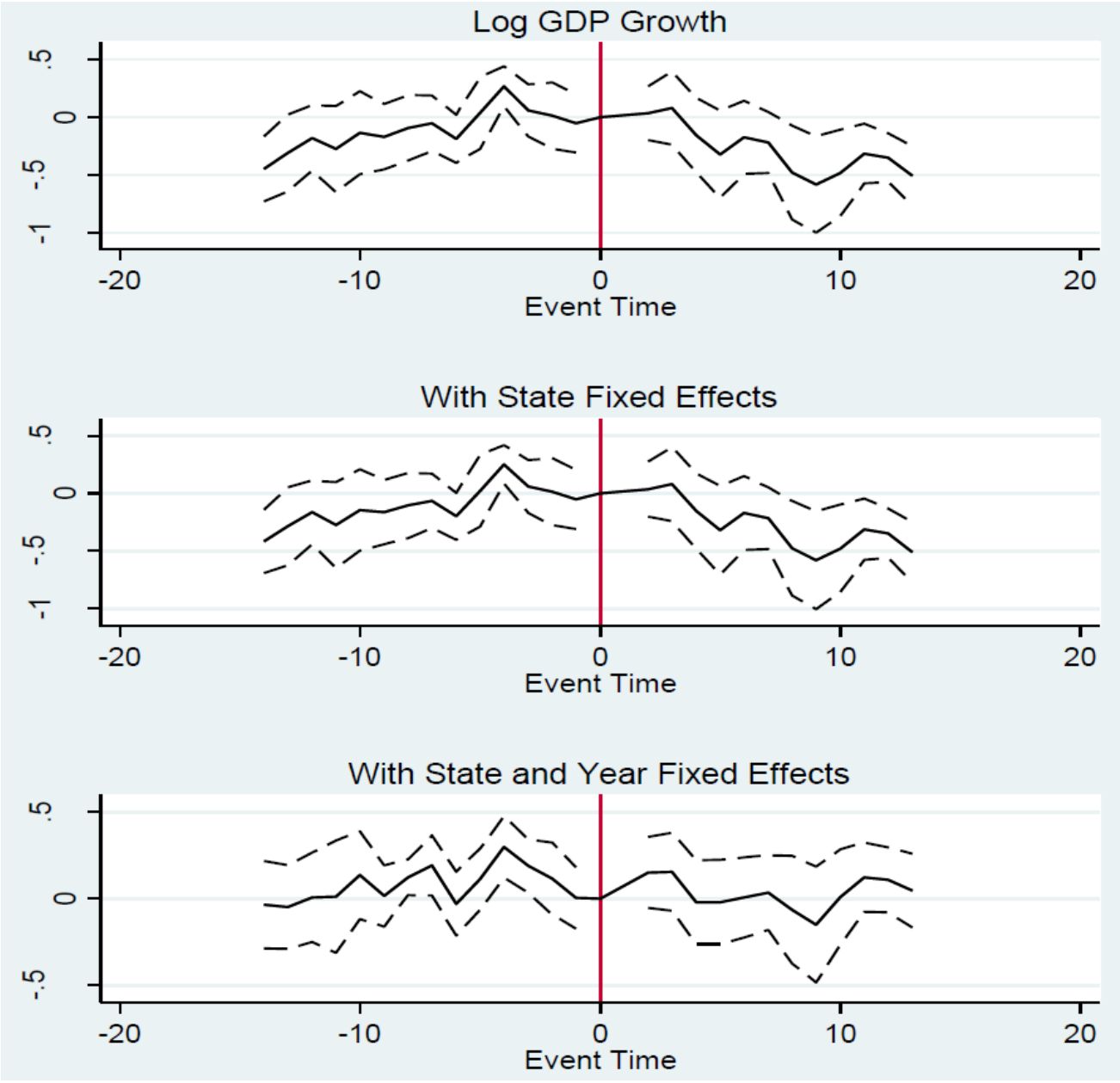
Why different results from Bernheim et al?

- **They use different data?**
  - Telephone survey of 2000 people
  - Outcome variables differ: savings rate, net worth
  - *But: we are able to replicate their results with their specification*

- **Their strategy did not account for all differences across states**
  - Simple differences-in-differences but without state fixed effects
  - We compare people *within* a state who were or were not impacted by the requirements (based on graduation year)

- **States that passed mandates differed from those that did not**
  - Incomes were growing more quickly – so savings likely to be higher anyway.

Personal Finance Mandates and GDP Growth



Effects of High School, in general

“Smart Money? The Effect of Education on Financial Outcomes” (Cole, Paulson, and Shastry 2014)

The effect of general education

- **Does education affect financial outcomes?**
  - Changes in compulsory schooling laws across U.S. states
    - Revised frequently in each state
  - U. S. Census 1980-2000
  - Survey of Income and Program Participation
  - FRBNY Consumer Credit Panel/Equifax dataset 1999-2011

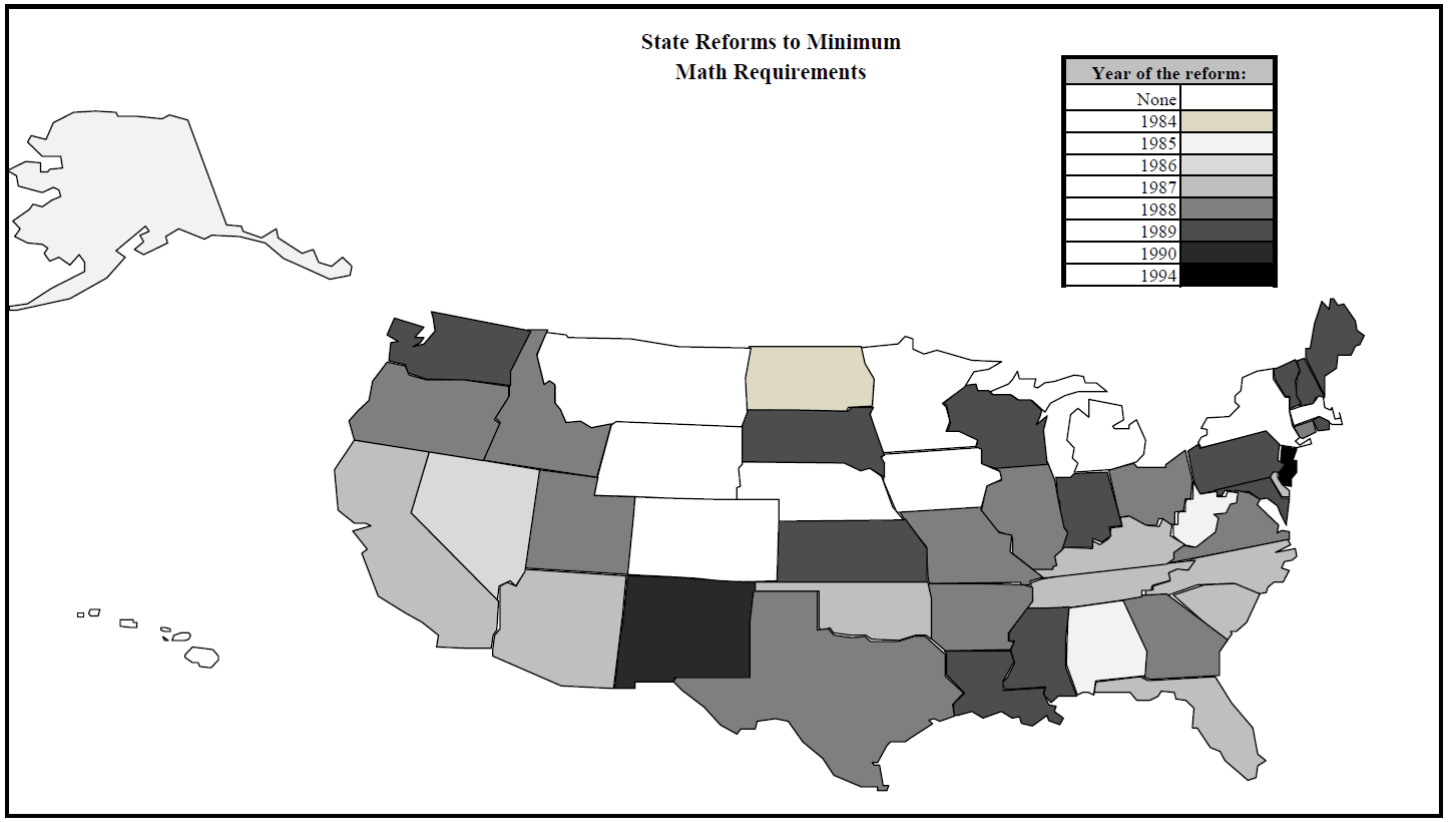
- **Education improves financial outcomes**
  - Increases income from assets and equity ownership
  - Reduces probability of bankruptcy, foreclosure, delinquency
  - Effects are large in magnitude, too large to be driven entirely by labor market return to education

Effects of Math Reforms

"High School Curriculum and Financial Outcomes: The Impact of Mandated Personal Finance and Mathematics Courses" (Cole, Paulson, and Shastry 2016)

Increased high school math requirements

- **Increased math requirements (1984 – 1994)**
  - 1983 National Commission on Excellence in Education report recommended 3 years of math ⇨ 38 states responded
  - Goodman (2012) finds an impact on completed math courses and wage income for some demographic groups

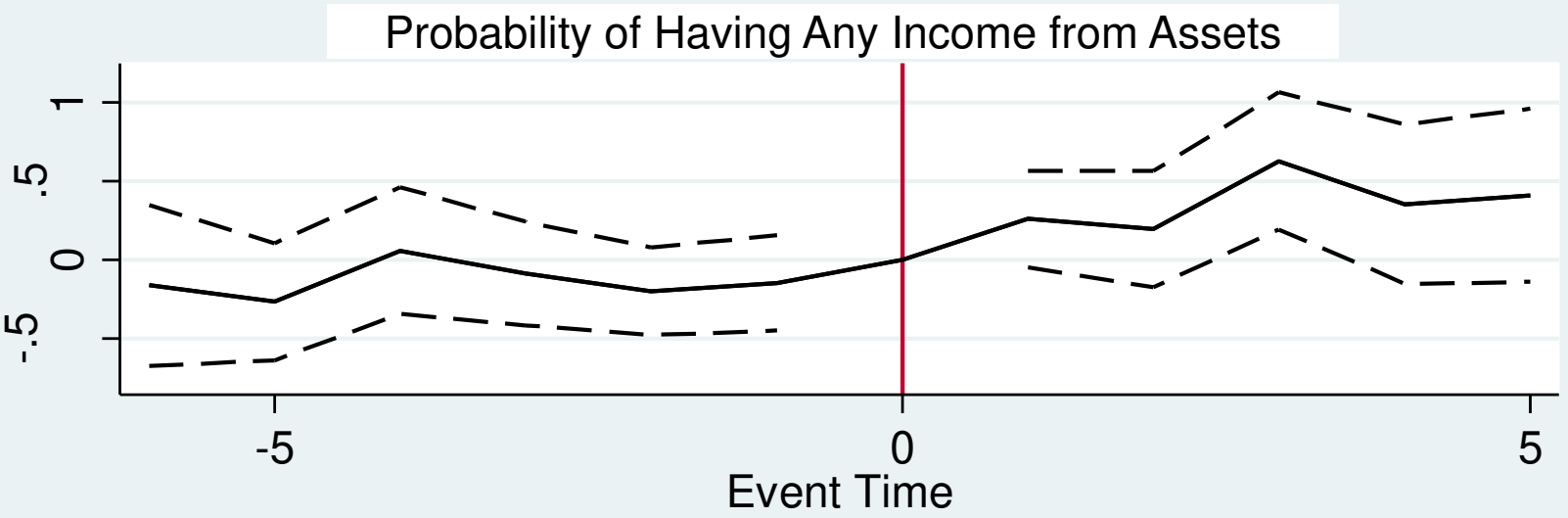


Source: State mathematics requirements identified in Goodman (2012)

Differences in data specification

- **Specification**
  - Only use 6 pre and post event-year indicators in event study
  - Additional math controls (following Goodman 2012): total # of non-math courses required for each graduating cohort, indicators for exit exam requirement, state per-student expenditures on education, student teacher ratio, state poverty and unemployment rate as of the year the individual turned 1

Math requirements and any asset income



- **This pattern suggests a causal effect of math reforms**
- **Comparing 5 graduating classes post reform to 5 classes pre reform (aged 24-36 in 2000)**
  - 0.5 percentage point increase in any asset income (basis of 15%)
  - $3300 increase in real estate equity (basis of $15,500)
  - 0.3 percentage point reduction in probability of foreclosure (basis of 9%)

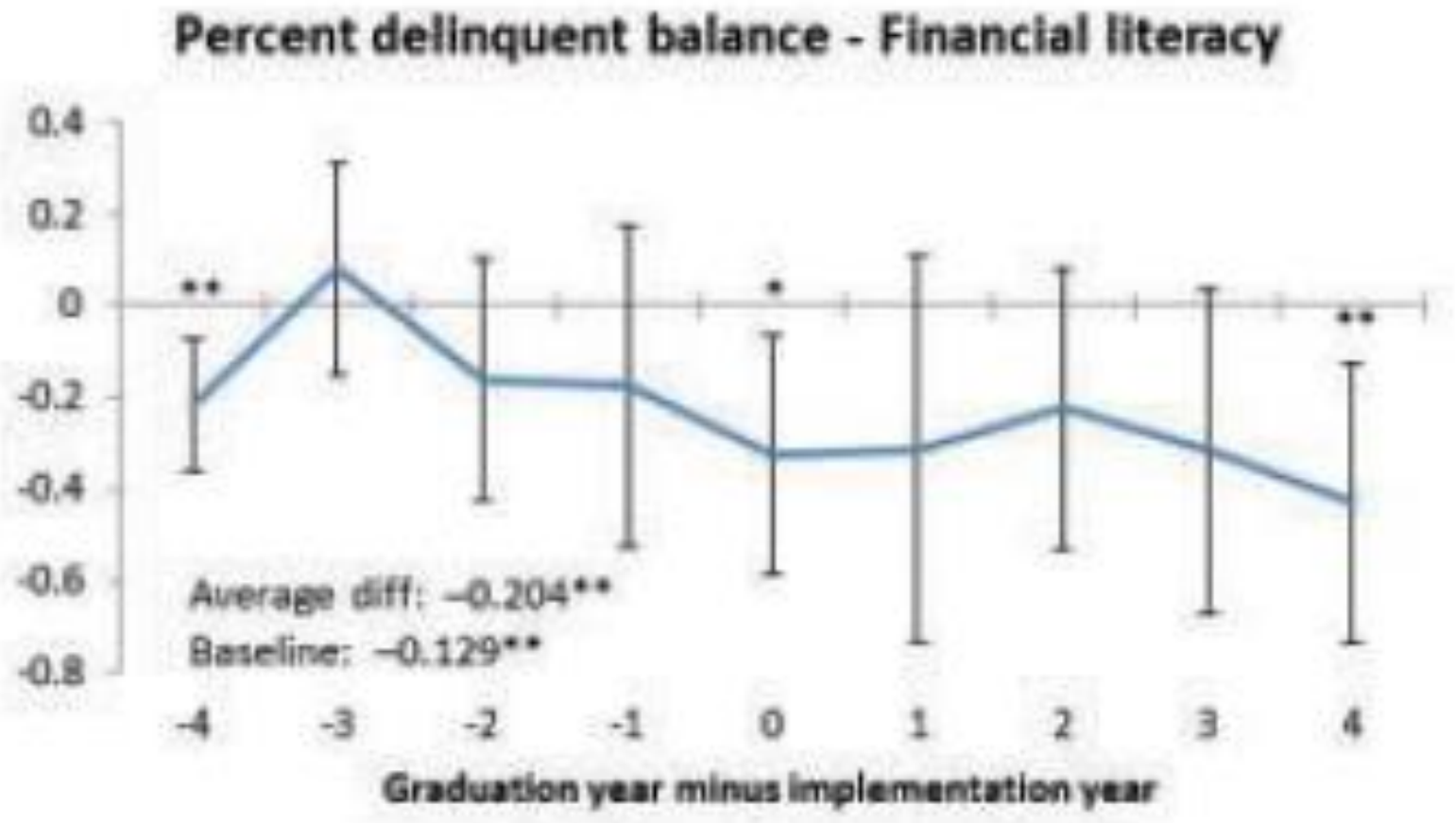
Recent Changes in Graduation Requirements

"Financial Education and the Debt Behavior of the Young" (Brown, van der Klaauw, Wen and Zafar 2016)

More recent personal finance mandates

- **Study impact of recent changes in high school personal finance, math and economics requirements (1998-2011)**
  - Similar strategy and specification as our paper
- **Same data source: FRBNY Consumer Credit Panel**
  - Focus on 22-28 year olds
  - Debt outcomes during early adulthood
- **"Significant, if moderate, impacts"**
  - Math and personal finance courses improve credit outcomes
    - Likelihood of holding debt falls by 0.6 pp (base 76.4%)
  - Economics courses increase probability of holding debt and repayment difficulties

Effect of financial literacy on consumer debt



Source: Brown, van der Klaauw, Wen and Zafar 2016

Effect of financial literacy on consumer debt

Source: Brown, van der Klaauw, Wen and Zafar 2016

Our findings vs. Brown et al.

- **Consistent impacts of math courses**
- **Results differ for personal finance mandates**
- **Possible explanations**
  1. Courses taught in 1957-1982 or 1998-2011
     - Has financial literacy training improved?
     - Differences in enforcement?

Our findings vs. Brown et al., continued

2. Age difference in the sample
   - Their sample is 22-28, ours is 35-54
   - Do effects decay over time/with age? (Fernandes et al 2014)
     - Brown et al. find that the effects do fade with age even in this limited age range, by age 27
3. Differences in economic and financial conditions
   - Financial crisis vs. era of credit expansion
   - Topics discussed may become obsolete quickly when financial products are changing rapidly

- **Perhaps financial literacy material has an effect when immediately applicable and/or when it covers more general material, that can be applied more broadly**

Evidence from a Randomized Controlled Trial

Randomized controlled trial in Brazil

- **"The Impact of High School Financial Education: Evidence from a Large-Scale Evaluation in Brazil" (Bruhn, Leao, Legovini, Marchetti and Zia 2016)**

- **High schools received teaching materials and teacher training to implement new financial literacy curriculum**
  - Half the interested schools were *randomly* chosen to participate
  - *Very large* study: 892 schools, 25,000 students

- **Curriculum was very carefully developed**
  - 72 case studies integrated into regular school subjects (math, Portuguese, science, geography, and history)
    - Case studies related to *real world decisions*, applicable to youth
  - Detailed teaching notes provided, in addition to teacher training
  - *72-144 hours of material over 1.5 years*

Impacts on financial knowledge and behavior

- **Increased financial knowledge substantially**
- **Improved some financial behaviors**
  - More likely to save for purchases, make financial plan, negotiate prices
  - "Trickle-up" impacts on parents' financial behaviors
- **But also worsened other financial behaviors**
  - More likely to use expensive credit to purchase consumer items
  - More likely to be behind on repayments
- **Other caveats**
  - Financial behaviors are self-reported
  - Teacher training, curricular development may have other effects
    - Grade-level passing rates increased

Reconciling these findings

- **Financial education focused on savings, less clear guidance on credit usage**
  - "Willpower depletion"?
- **Students more aware of money?**
  - More likely to work
  - Recall that Brown et. al's finding economics courses worsened credit outcomes as well

→ Effects of financial literacy training are likely to be very content- and context- specific

Where do we go from here?

- **Is high school the right time to teach financial education?**
  - Has the largest (captive) audience
    - Demand for financial literacy training is low (Bruhn, Ibarra & McKenzie 2014)
  - But most important financial decisions are far in the future
    - Impact is likely to decay, due to time, age, and changes in financial products available
  - Literature suggests focusing on general skills (e.g. math), general material that can be applied broadly (e.g. budgeting)

- **More customized financial education**
  - "Just-in-time" financial education (Fernandes et al 2014)
    - Tied to specific decisions, such as getting a mortgage, signing up for 401K, etc.
  - Financial coaching
  - Tailored courses for target populations

Barua, Shastry & Yang (2018)

- **Financial education for foreign domestic workers**
  - Migrant workers face additional financial challenges
  - More complex intra-household decision-making over how money is spent or saved
  - Gender differences in impact of financial education

- **Financial literacy intervention**
  - Tailored to female Filipino foreign domestic workers in Singapore
    - Material focused on importance of savings and learning to say no to unnecessary expenses (by individual and family)
  - Savings clubs of 10-12 women with a mentor met once a month for 9 months, 3 hours per meeting

- **RCT: Randomly chosen individuals invited to join a club for free**

Results

- **Take-up: 16% of those invited enrolled in the course**
  - Participants generally get only 2 days off/month, meeting was during this time

- **Preliminary intent-to-treat effects**
  - Comparing those *invited* to a class to those not invited
  - No impact on financial knowledge or planning
  - Self-reported savings fell

	Any Savings	Any Savings in Singapore	Savings Amount in Singapore	Any Savings in Philippines	Savings Amount in Philippines
Treated	-0.106**	-0.0992	-44.35	-0.0765	-11663.9*
	(0.0456)	(0.0744)	(158.3)	(0.0753)	(6457.8)
N	233	211	211	211	211
R-squared	0.16	0.17	0.07	0.12	0.24
Mean Dep. Var.	0.85	0.48	412.18	0.54	23664.52

Possible explanations (future work)

- **Effect of the invitation and then choosing not to enroll?**
  - Can't separate from effect of course, take-up is endogenous
- **Real change in savings**
  - "Good mom hypothesis" (Phipps and Woolley 2008)
    - Women prefer to invest in their children
  - Discouragement effect? But no change in stated savings goals
- **Reporting real savings or aspirational savings?**
  - Intra-household bargaining

	Has full control over how remittances are spent/saved	Had disagreements about how remittances are spent/saved
Treated	-0.0686	0.0450*
	(0.0730)	(0.0246)
N	228	233
R-squared	0.15	0.09

Conclusion

- **Math (and other general skills) is a higher priority than financial literacy education in high school**
  - Both Brown et al. (2016) and Cole, Paulson & Shastry (2016) find that math improves financial outcomes
  - Cole, Paulson & Shastry (2016) find precise estimates of no impact of personal finance courses from 1957-1982
  - Brown et al. (2016) find impacts of more recent personal finance courses but the effects fade with age, even by age 27
  - Bruhn et al. (2016) find that a well-designed curricula can impact behaviors, but there is concern about financial behaviors not addressed directly
  - Limited potential for finance-specific education in high school

- **Customized financial education may have potential**
  - Think carefully about self-reported outcomes and aspirations
  - Cole, Shapiro and Shastry (2018) on gold-mine workers in South Africa uses administrative data from bank transactions