Econ70 Section 3

2023 Fall

The Age of Reason

Do People Make Good Financial Decisions?

- In the class, we mentioned good financial decisions.
  - Budgeting
  - Paying credit card debts
  - Emergency savings
- In reality, people make poor financial decisions.
  - Saving too little for retirement.
  - Choose credit cards with higher fees.
  - Invest in funds with lower return and higher fees.
- Why?

The Age of Reason

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So... people make best financial decisions at middle age?

- (Agarwal, Driscoll, Gabaix and Laibson, 2009)
- Let's see some supporting evidence.

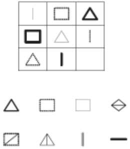
Testing Cognitive Impairment

Figure 1. Examples of Memory and Analytical Tests

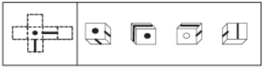
Memory
Study the following words and then write as many as you can remember

Goat
Door
Fish
Desk
Rope
Lake
Boot
Frog
Soup
Mule

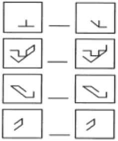
Reasoning
Select the best completion of the missing cell in the matrix



Spatial Visualization
Select the object on the right that corresponds to the pattern on the left

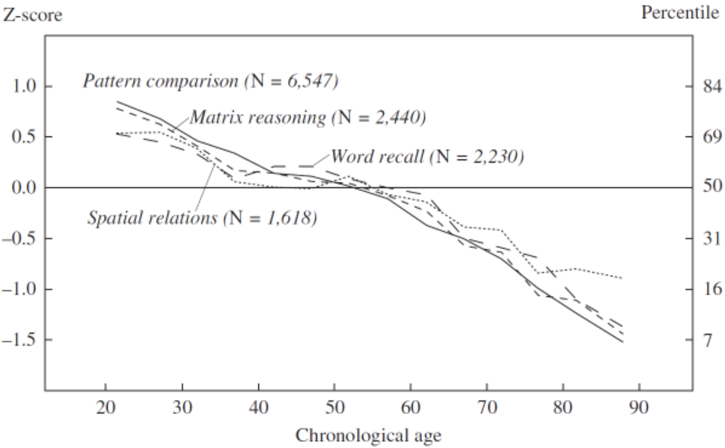


Perceptual Speed
Classify the pairs as same (S) or different (D) as quickly as possible



Testing Cognitive Impairment

Figure 2. Performance on Memory and Analytical Tasks by Age



Testing Cognitive Impairment

Table 1. Prevalence of Cognitive Impairment by Age in North America

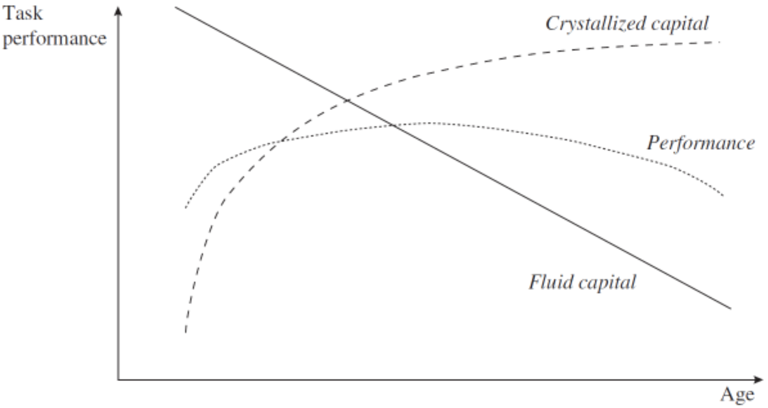
Percent

Age	*Prevalence*	*95 percent confidence interval*
Dementia		
60–64	0.8	0.6–1.0
65–69	1.7	1.5–1.9
70–74	3.3	2.7–3.9
75–79	6.5	5.5–7.5
80–84	12.8	11.8–13.8
85 and over	30.1	27.9–32.3
Cognitive impairment without dementia		
71–79	16.0	11.5–20.5
80–89	29.2	24.3–34.1
90 and over	38.8	25.6–52.0
All ages	22.0	18.5–22.5

Sources: Ferri and others (2005); erratum to Plassman and others (2008).

Cognitive Impairment vs Knowledge

Figure 3. Relationship of Net Cognitive Performance to Crystallized and Fluid Capital



Testing Financial Decisions

- The Eureka Moments problem.
- Credit card holders often receive offers to transfer debts to a new account with lower APR (lower interest rate).
- But new purchases on the new card has high APR (as in the old card).
- When you make payments on the new card, your payment goes to the transferred debt first (low APR) and then the new purchases (high APR).
    - New purchases accrue high interests but are not allowed to be paid!

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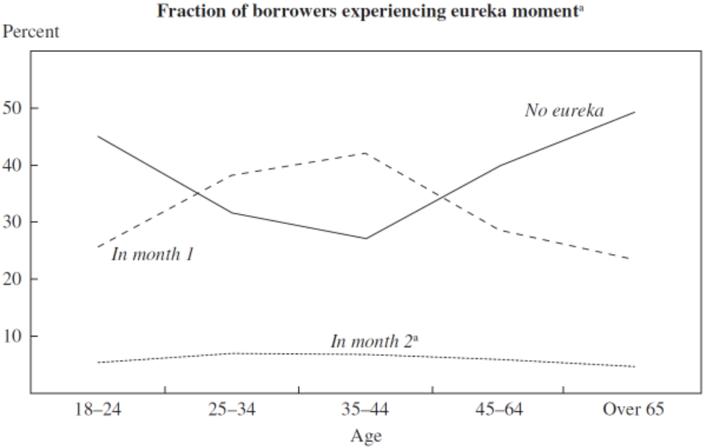
- When you make payments on the new card, your payment goes to the transferred debt first (low APR) and then the new purchases (high APR).
  - New purchases accrue high interests but are not allowed to be paid!
- Optimal solution: transfer the debt and leave the new card alone; purchase with old card and pay the old card first.
  - But often people just stick to the new card.

Testing Financial Decisions

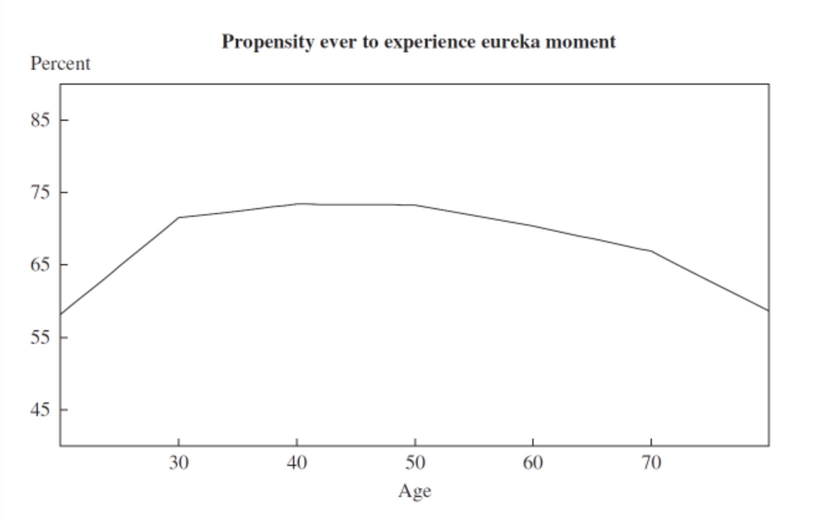
- How long does it take to realize the optimal decision?
  - i.e. arrive at the eureka moment?
- Is it faster for middle-age people?

Testing Financial Decisions

Figure 6. "Eureka" Moments in Credit Card Balance Transfers by Age of Borrower



Testing Financial Decisions



Testing Financial Decisions

Table 2. Age of Peak Performance for 10 Financial Tasks

	Age	
Task	*Mean*	*Standard deviation*
Minimizing APR on:		
Home equity loans	55.9	4.2
Home equity lines	53.3	5.2
Credit cards	50.3	6.0
Automobile loans	49.6	5.0
Mortgages	56.0	8.0
Small business credit cards	61.8	7.9
Experiencing eureka moment	45.8	7.9
Avoiding credit card late fees	51.9	4.9
Avoiding credit card overlimit fees	54.0	5.0
Avoiding credit card cash advance fees	54.8	4.9
Average	53.3	4.3

Source: Authors' calculations.

Practice Questions

Q2: The FIRE movement

The FIRE (Financial Independence Retire Early) movement argues that by saving aggressively early in life, one can retire at age 40 and finance 50 years of retirement spending. A common rule of thumb is that spending 4% of one's savings at age 40, and then maintaining this constant level of spending in real terms thereafter, is consistent with constant spending until age 90.

- Suppose i $=3.5\%$. Use the formula to figure out what fraction of savings you can spend at age 40 while meeting the goals of the FIRE movement. Is the FIRE rule of thumb financially sustainable?

Q2: The FIRE movement

If an annuity pays X per year for n years given return rate i, its present value is:

$$PV = X\left(\frac{1 - (\frac{1}{1+i})^n}{i}\right).$$

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- Suppose your current savings is W.
- Suppose you spend X every year, for $n = 90 - 40 = 50$ years
- Want to find X, i.e. how much you can spend

$$W = X\left(\frac{1-(\frac{1}{1+i})^n}{i}\right)$$

- Available spending as a fraction of the savings:

$$\frac{X}{W} = \frac{i}{1-(\frac{1}{1+i})^n}$$

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- $i = 0.035$: $\frac{X}{W} \approx 4.26\%$
- $i = 0.03$: $\frac{X}{W} \approx 3.89\%$
- Does spending 4% of your savings work?
- The rule of thumb works assuming that the real return on your retirement savings is somewhere between 3% and 3.5%!

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In 2030, scientists discover a way to abolish death and allow people to live forever. If retirement goes on forever, what rate of return is needed to justify the FIRE rule of thumb?

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What if $n \to \infty$?

- $\frac{1}{1+i} < 1$
- $(\frac{1}{1+i})^n \to 0$
- $\frac{X}{W} \to i$
- Need a real return of 4%

Q6: Paying off a credit card debt

The number of months needed to pay off a credit card debt is

$$n = -\frac{log\left(1 - \frac{R \times PV}{X}\right)}{R},$$

where R is the interest rate per month, PV is the value of the debt, and X is the monthly payment

You have credit card debt of $3,000 on a card with an APR of 24%. Your minimum monthly payment is $70. If you make the minimum monthly payment, how many months does it take you to pay off the debt?

Q6: Paying off a credit card debt

$$n = -\frac{log\left(1 - \frac{R \times PV}{X}\right)}{R},$$

R is **monthly** interest rate

$R \approx APR/12 = 0.02, X = \$70, PV = \$3000$

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For your payment each month, most of the \$70 goes to monthly interest and only a little bit goes to the principal. If you pay \$140, the other \$70 goes to the principal entirely.