

The Financial Precursors to Alzheimer's Disease and Related Dementias

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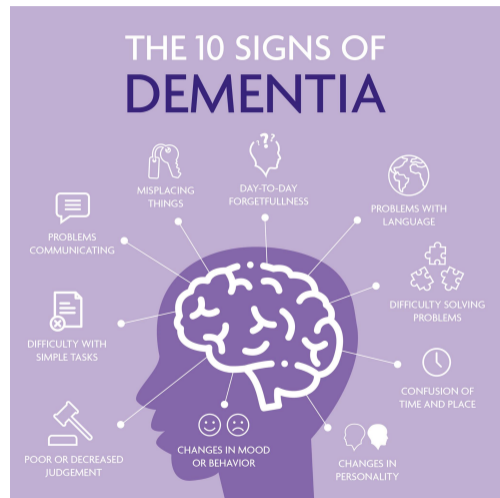
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The analysis and conclusions set forth are those of the author and do not indicate concurrence by other members of the research staff or the Board of Governors of the Federal Reserve System.

Alzheimer's Disease and Related Dementias (ADRD)

- Chronic, degenerative disease characterized by cognitive decline and loss of functional capacity:
 - deteriorating memory
 - changes in personality
 - changes in risk perception and impulsivity
- Currently, no known treatments to prevent or reverse
- 15% of 70+ (and 66+% of those in last years of life) have ADRD
- Care is costly
 - \$239 billion paid by Medicare/Medicaid +
 - \$76 billion out-of-pocket +
 - Unpaid care from 11 million caregivers



Source: Glasgow Memory Clinic

Cognitive impairment, financial capacity, and public policy

- Impaired financial capacity recognized as an early sign of cognitive impairment
 - difficulties managing money
 - erratic/risky financial decisions
 - greater fraud susceptibility
- Role of cognition in elder financial security receiving increased policy attention
 - FINRA Rule 4512 (Customer Account Information); Rule 2165 (Financial Exploitation of Specified Adults)
 - Social Security Representative Payee Program

Money Woes Can Be Early Clue to Alzheimer's



Gina Kolata

MIND OCT. 30, 2010



As Arthur Packer's dementia grew worse, he forgot how to handle money, and his wife, Renee, could not find where it all went. Ryan Collard for The New York Times

Anecdotal Evidence: Dementia and Financial Mistakes

- 84% of financial advisors report at least 1 cognitively impaired client (Fidelity survey)
- Media reports on families learning about cognitive impairment when loved one
 - loses home or business
 - falls prey to romance scam
 - suffers other significant financial losses
- Potential for many years of dementia-related financial mistakes to deplete retirement savings, mis-manage 401Ks, promote reliance on Medicaid and SSI

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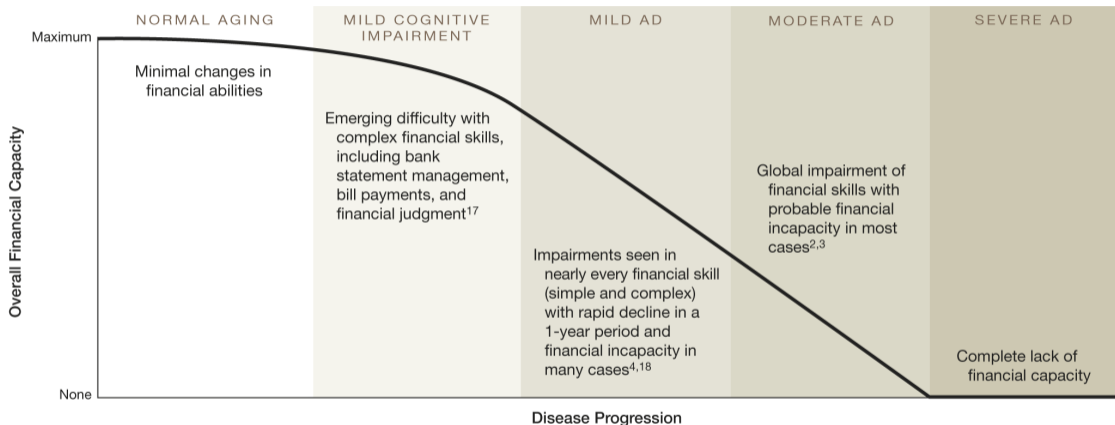


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Medical Evidence: ADRD and financial capacity, based on small samples



Source: Widera, Steenpass, and Marson (JAMA 2011) References: Griffith, Belue, Sicola, Krzywanski, Zamrini, Harrell, Marson (2003); Martin, Griffith, Belue, Harrell, Zamrini, Anderson, Bartolucci, Marson (2008); Okonkwo, Wadley, Griffith, Ball, Marson (2006); Marson, Sawrie, Snyder, McInturff, Stalvey, Boothe, Aldridge, Chatterjee, Harrell (2000); Marson, Martin, Wadley, Griffith, Snyder, Goode, Kinney, Nicholas, Steele, Anderson, Zamrini, Raman, Bartolucci, Harrell (2009)

Economic Evidence: Aging, Cognition, and Financial Decision-Making

- Higher IQ/cognitive functioning associated with better stock allocations/investing behavior (Browning and Finke, 2015)
- Older investors worse at stock selection, diversification (Korniotis and Kumar, 2011)
- Older adults pay higher interest rates and more fees than younger credit users (Agarwal, Driscoll, Gabaix, Laibson, 2007)
- Worse Medicare part D choices before and after dementia onset versus never-dementia (Bishop, Ketcham, Kuminoff, 2018)



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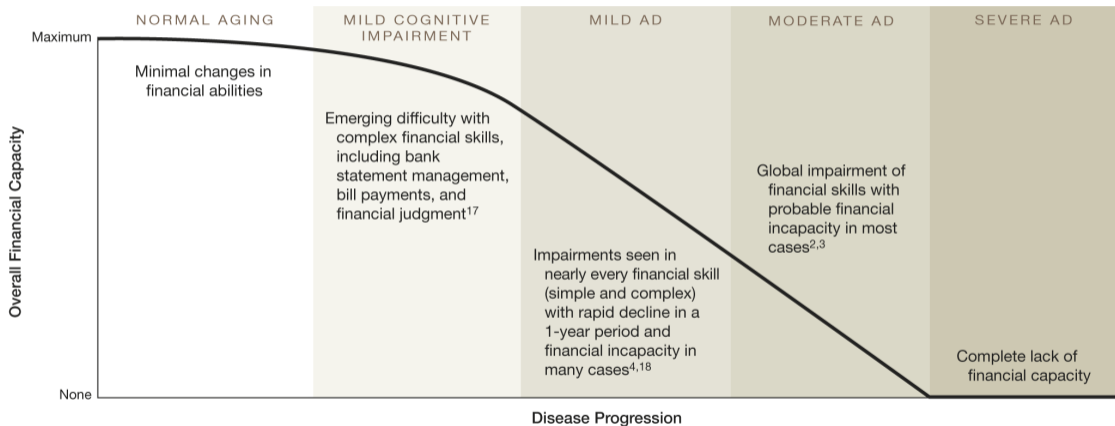
When and How Does Dementia Affect Financial Well-Being?

- Today's focus: financial precursors to Alzheimer's
- Need high-frequency data on financial outcomes and health data for the same people, some with ADRD and some without
- Existing data (like the Health and Retirement Study) are not well suited for these questions
- Idea: combine two large administrative datasets

Today's paper: are financial precursors to Alzheimer's detectable in large-scale data?

- Joint work with Lauren Nicholas (University of Colorado, Denver); Julie Bynum (University of Michigan); Ken Langa (University of Michigan)
- Match Federal Reserve Bank of New York Consumer Credit Panel/Equifax data to Medicare claims data
- Study timing of missed payments relative to Alzheimer's Disease and Related Dementia (ADRD) diagnosis
- Contrast ADRD results with other conditions as falsification tests
- Examine financial implications of cognitively impaired decision-making

Are financial precursors to Alzheimer's detectable in large-scale data?



Source: Widera, Steenpass, and Marson (2011)

Data: Federal Reserve Bank of New York Consumer Credit Panel/Equifax

- Quarterly credit bureau data for a 5% sample of US consumers (and others living at their address), 1999-2018
- Data reported by financial institutions and credit issuers
- Key Outcomes:
 - Any delinquency (30+ days past due)
 - Credit score (Equifax Risk Score)

Data: Medicare Claims

- Administrative billing data for all Medicare beneficiaries (nearly all Americans 65+, and some younger)
- Time of diagnosis for many health conditions (including Alzheimer's), 1999-2014
- Demographic information: age, sex, race/ethnicity

Linking the data

Match based on shared variables (exact match forthcoming):

- household size (restrict to single-person households headed by a primary sample member born in 1949 or earlier)
- birth year
- last known Census block of residence
- zip codes 2012-2015

Sample Characteristics

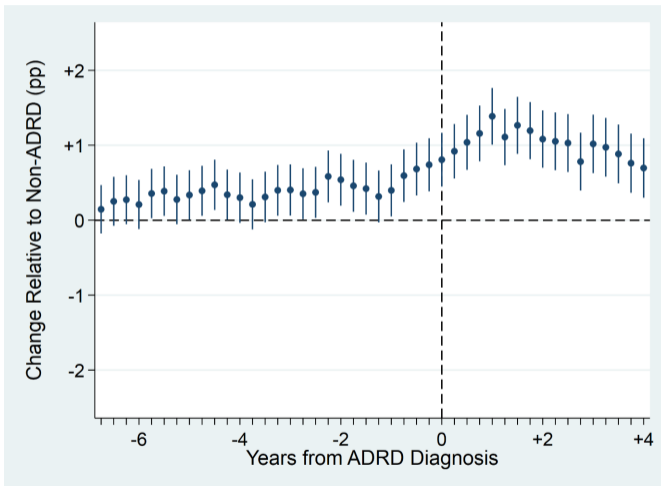
	Never-ADRD (N = 54,062)	Ever-ADRD (N = 27,302)
Any Delinquency -- % (\pm sd)	7.8 (15.9)	7.8 (17.8)
Subprime Credit Scores-- % (\pm sd)	9.3 (21.0)	8.5 (21.3)
Equifax Risk Score -- score (\pm sd)	747 (70.1)	754 (71.1)
Male -- no. (%)	18,196 (33.7)	8,586 (31.4)
Age -- yrs (\pm sd)	74.8 (7.3)	79.4 (7.52)
Black -- no. (%)	5,226 (9.7)	2,701 (9.9)
Hispanic -- no. (%)	606 (1.1)	648 (2.4)
Other Race -- no. (%)	1,344 (2.5)	1,069 (3.9)
Arthritis Ever -- no. (%)	29,973 (55.4)	21,130 (77.4)
Glaucoma Ever -- no. (%)	13,159 (24.3)	9,045 (33.2)
Heart Attack Ever -- no. (%)	2,871 (5.3)	2,607 (9.6)
Hip Fracture Ever -- no. (%)	2,159 (4.0)	3,957 (14.5)

Empirical Strategy

- Estimate how the credit outcomes of people x quarters before (or after) diagnosis differ from comparable people who were never diagnosed
 - “Comparable” = same age, demographics, other health conditions, and are observed in the same state, year, and quarter
- “Event study”-style regressions around an Alzheimer’s diagnosis (or other conditions for falsification tests)

$$CreditOutcome_{it} = \Sigma(Time - Diagnosis)_{it} + X_{it}\alpha + S + Y + Q + \epsilon_{it} \quad (1)$$

Payment Delinquency Before/After ADRD Diagnosis



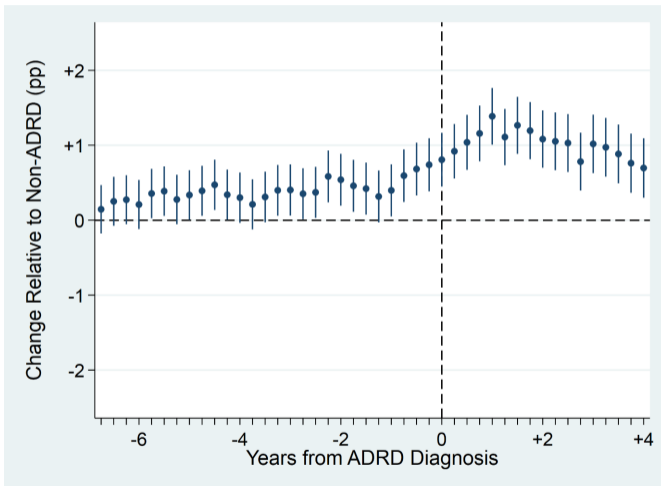
Data sources: FRBNY CCP/Equifax and Medicare Beneficiary Summary File.

- Difficulties paying bills emerge/increase well before diagnosis, relative to comparable never-diagnosed persons
- Comparison group: never-diagnosed persons of the same age, demographics, other health conditions, and observed in the same state, year, and quarter.

Falsification Tests: is ADRD unique?

- Main results are consistent with small-scale medical studies
- But are these patterns ADRD-specific, or common to health shocks more generally?
- Solution: use 4 common health events falsification tests to determine whether ADRD is different
 - Gradual Onset: Arthritis, Glaucoma
 - Acute: Heart Attack, Hip Fracture

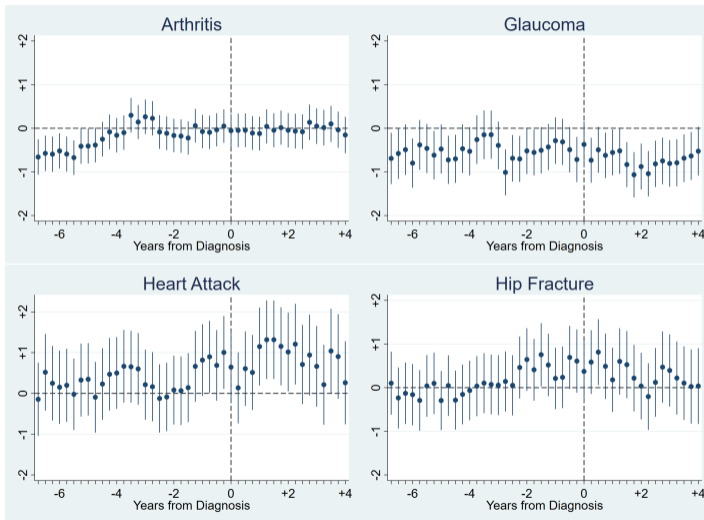
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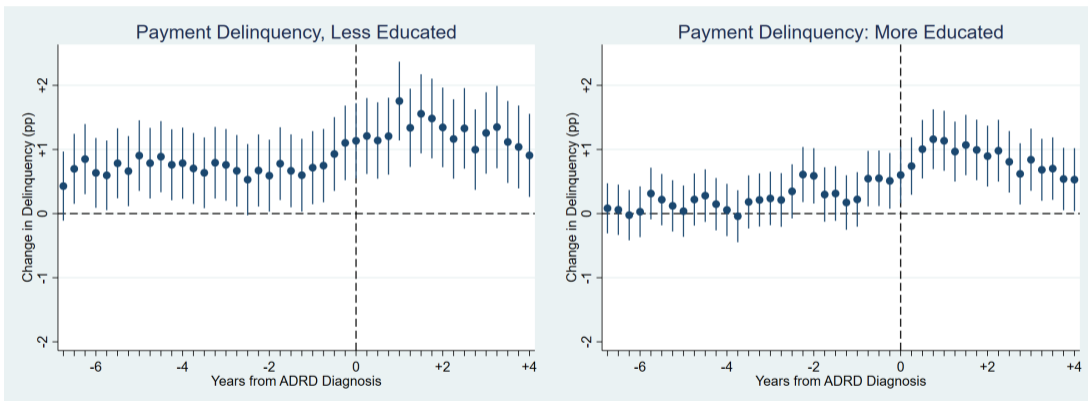
Data sources: FRBNY CCP/Equifax and Medicare Beneficiary Summary File.

- Difficulties paying bills emerge/increase well before diagnosis, relative to comparable never-diagnosed persons
- Comparison group: never-diagnosed persons of the same age, demographics, other health conditions, and observed in the same state, year, and quarter.

Unlike ADRD, no elevated delinquencies before/after other diagnoses

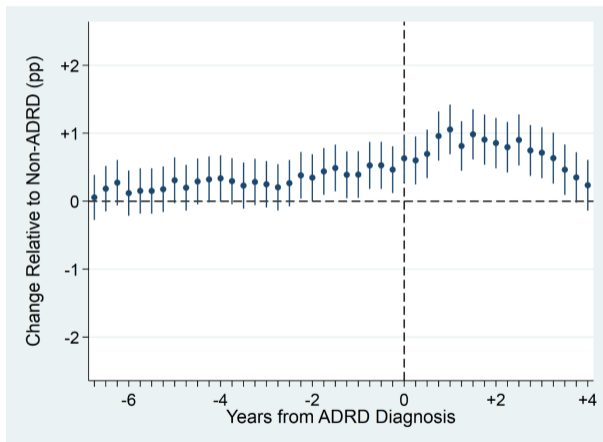


ADRD results are stronger among those in lower educated tracts



Data sources: FRBNY CCP/Equifax and Medicare Beneficiary Summary File.

Subprime Credit Scores Before/After ADRD Diagnosis



- Similar patterns as delinquency, but small magnitude
- Comparison group: never-diagnosed persons of the same age, demographics, other health conditions, and observed in the same state, year, and quarter.

Data sources: FRBNY CCP/Equifax and Medicare Beneficiary Summary File. Credit score is Equifax Risk Score

Other outcomes

- Some suggestive evidence for tax liens and foreclosures (low frequency events)
- Little evidence for unusual changes in credit spending, inquiries, new accounts

Back-of-the-Envelope Cost Estimates

- Missed payments are costly: trigger penalty fees and interest → service loss
- 80% of missed payments in sample are credit card bills
- Using late fees of \$35 and penalty interest increases of 15pp, cumulative costs to FFS beneficiaries in the 4 years before and after ADRD diagnosis, and median or mean characteristics:
 - 3-5 missed payments/year
 - \$686 - \$1,340 in fees and penalty interest charges
 - \$150M- \$293M cumulative costs

Caveats

- Limited to singles in Medicare Fee-for-Service
- Dementia algorithm requires healthcare utilization, likely excludes many true cases
- CCP/Equifax does not include bank accounts, utilities, and other accounts that may be impacted by dementia → we likely understate financial consequences

Moving forward

Next steps:

- Does having a partner protect against these financial outcomes?
- Can we detect similar evidence elsewhere on the household financial balance sheet? (Assets?)
- What about fraud/precursors to fraud?

Conclusions

- Financial behaviors associated with ADRD are distinct and generally more pronounced than with other health conditions
- Difficulties paying bills emerge several years prior to ADRD diagnosis and increase over time
- Some evidence with tax liens/foreclosure
- If there is fraud in new accounts, etc, we can't detect it
- Credit score (Equifax Risk Score) movement is small and unlikely to be sufficient for monitoring

Thank you!

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