The Liquidity Sensitivity of Healthcare Consumption: Evidence from Social Security Payments

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BU & NBER     Harvard & NBER   Harvard
The timing of consumption depends on the timing of income.

Olafsson and Pagel (2018): low-income households spend 70 percent more on days when they get their paycheck than on the average day.

Parker (1999); Souleles (1999); Agarwal et al. (2007); Agarwal and Qian (2014); Stephens (2003); Johnson et al. (2006); Baugh and Wang (2018); Parker et al. (2013); Gross and Tobacman (2014); Gross et al. (2019).
The timing of consumption depends on the timing of income.

Patients Exposed
The share of Americans under 65 enrolled in high deductible plans is rising

- High deductible without health savings account
- High deductible with health savings account

Source: National Health Interview Survey
The timing of consumption depends on the timing of income.

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In the past 12 months have you not taken a medication as prescribed to reduce costs?

8.4 percent of insured 18–64-year-olds (2016 NHIS)
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Research Questions

1. Is the healthcare consumption of low-income consumers "liquidity sensitive?"

2. How does "liquidity sensitivity" relate to price sensitivity?

Bottom line, should health insurance be structured differently for low-income consumers?
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Social Security Checks \[\rightarrow\] Medicare-Covered Drug Consumption
Preview of Results:

- Prescription fills increase by 6–14 percent when Social Security checks are distributed.
- When copayments are reduced to zero, recipients stop delaying fills until their paydays.
- Those who tend to fill scripts on Social Security paydays exhibit a price elasticity of demand that is twice as large as other recipients' price elasticity of demand.

Possible Mechanisms:

1. Straightforward liquidity constraints
2. Mental accounting or some other "behavioral friction"

We propose a simple framework to quantify the share of moral-hazard-driven deadweight loss that can be accounted for by liquidity sensitivity.
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Background

The Effect of Social Security Checks

The Effect of Changes in Generosity

Implications
Background

The Effect of Social Security Checks

The Effect of Changes in Generosity

Implications
Benefits paid on | Birth date on
--- | ---
Second Wednesday | 1st – 10th
Third Wednesday | 11th – 20th
Fourth Wednesday | 21st – 31st

- **Supplemental Security Income (SSI)**: Social Security benefits prior to May 1997; or if receiving both Social Security and SSI, Social Security is paid on the third.
Social Security Payment Schedule

Two-thirds of checks arrive after a 28-day wait

<table>
<thead>
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<th>APRIL 2019</th>
<th>MAY 2019</th>
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<tbody>
<tr>
<td>S</td>
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</tr>
<tr>
<td>1</td>
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| 5  | 6  | 7  | 8  | 9  | 10 | 11 |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 | 31 |    |
One-third of checks arrive after a 35-day wait
We have three “copay groups”

1. No-copay group: Low-income recipients who pay neither premiums nor copayments (Medicare-Medicaid duals)

2. Subsidized-copay group: Low-income recipients who pay subsidized copayments (Medicare-only but incomes < $550/month, $825/month for couples)

3. Full-copay group: Typical Part D population with full premiums and copays
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### Summary Statistics

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<tr>
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<th>No-Copay Group</th>
<th>Subsidized-Copay Group</th>
<th>Full-Copay Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of beneficiaries in 20% sample in 2015</td>
<td>678,447</td>
<td>143,779</td>
<td>3,788,347</td>
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<tr>
<td>Mean total scripts per year</td>
<td>52.48</td>
<td>44.08</td>
<td>29.11</td>
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<tr>
<td>Mean out-of-pocket spending per year</td>
<td>$0</td>
<td>$183.38</td>
<td>$550.67</td>
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<tr>
<td>Mean share filling a script each day</td>
<td>.064</td>
<td>.058</td>
<td>.0475</td>
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<tr>
<td>Share male</td>
<td>.367</td>
<td>.392</td>
<td>.447</td>
</tr>
<tr>
<td>Average age</td>
<td>70.35</td>
<td>70.31</td>
<td>70.71</td>
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<tr>
<td>Average number of chronic conditions</td>
<td>4.40</td>
<td>3.99</td>
<td>3.64</td>
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<tr>
<td>Share white</td>
<td>.578</td>
<td>.693</td>
<td>.883</td>
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Full-Copay Group Out-of-Pocket Payments
We Have Several Points of Comparison

• Different check dates
• Different copay groups
• 28- versus 35-day waiting periods
• Different beneficiaries, different drugs, etc.
We Have Several Points of Comparison

Different check dates
We Have Several Points of Comparison

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- Different copay groups
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Background

The Effect of Social Security Checks

The Effect of Changes in Generosity

Implications
First Empirical Approach: A Re-Centered Time Series

For each event day, we calculate the difference in scripts filled between beneficiaries about to receive their check and beneficiaries who are two weeks away. We perform that calculation both for those who face copayments and those who do not.
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We perform that calculation both for those who face copayments and those who do not.
Log total scripts in relevant payday group relative to other payday groups
Log total scripts in relevant payday group relative to other payday groups

Days since check-distribution

No-copay group
Log total scripts in relevant payday group relative to other payday groups

Days since check-distribution

No-copay group
Subsidized-copay group

-0.15
-0.1
-0.05
0
0.05
0.1
0.15

-10 -8 -6 -4 -2 0 2 4 6 8 10
Regression Framework

\[ Y_{bt} = \alpha_b + \alpha_t + \sum_{\tau=-10}^{10} \beta_t \times I_{bt}^\tau + \varepsilon_{bt} \]

where

- \( Y_{bt} \) scripts filled for each birthday group (1 through 31) and date (January 1, 2006 through December 31, 2015)
- \( \alpha_b \) birthday-specific fixed effects
- \( \alpha_t \) calendar-date-specific fixed effects
- \( I_{bt}^\tau \) event-time indicator functions
28-Day Wait
35-Day Wait
No-Copay Group
Subsidized-Copay Group
Full-Copay Group
0
0.05
0.1
0.15
Increase in scripts on check-distribution day
Increase in scripts on check-distribution day

- Generic
- Brand
- Low Cost
- High Cost
- Refill
- First Script
- Chronic
- Acute
- Plavix
- Warfarin
- HIV
- Anti-psychotics
- Anti-seizure
- Anti-biotics
- Insulin
- Statins
- Anti-depressants
- Inhalers
- Opioids
Increase in scripts on check-distribution day

- White
- Non-White
- COPD
- Heart Disease
- Diabetes
- Depression
- Alzheimer's
- Cancer
Increase in scripts on check-distribution day

Median income ventile

Increase in scripts on check-distribution day
Summary of Overall Effect

On Social Security paydays, we observe a 6–14-percent increase in total scripts being filled.

Prescription filling of some Medicare beneficiaries is highly sensitive to liquidity, even with very generous insurance.
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   Can rule out “bus fare effect.”
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- But could be either real liquidity constraints (no cash) or mental accounting (feel better about spending when I have more)
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Mechanism is less clear
Can rule out “bus fare effect.”
But could be either real liquidity constraints (no cash) or mental accounting (feel better about spending when I have more)
But either way, consumers face a “liquidity-related friction.”
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The Effect of Changes in Generosity

Implications
We analyze changes in insurance generosity in three steps:

1. **Price Sensitivity:**
   - Insurance generosity \(\rightarrow\) Drug purchases

2. **Liquidity Sensitivity:**
   - Insurance generosity \(\rightarrow\) Payday filling

3. **Interaction:**
   - Liquidity sensitivity \(\leftrightarrow\) Price sensitivity
We analyze changes in insurance generosity in three steps

1. **Price Sensitivity:** Insurance generosity $\rightarrow$ Drug purchases
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① **Price Sensitivity**: Insurance generosity $\rightarrow$ Drug purchases

② **Liquidity Sensitivity**: Insurance generosity $\rightarrow$ Payday filling

③ **Interaction**: Liquidity sensitivity $\leftrightarrow$ Price sensitivity
Step 1. Price Sensitivity
Price and Quantity Changes for Copay to No-Copay

Average out-of-pocket payment per script

Average monthly scripts

Months since switch from copay to no-copay
Price and Quantity Changes for Copay to No-Copay

Average out-of-pocket payment per script

- Average monthly scripts

[Graphs showing changes in out-of-pocket payments and average monthly scripts over time.]
Price and Quantity Changes for No-Copay to Full-Copay

Average out-of-pocket payment per script

Months since switch from no-copay to copay

Average monthly scripts
Price and Quantity Changes for No-Copay to Full-Copay

Average out-of-pocket payment per script

Average monthly scripts

Months since switch from no-copay to copay
Regression Framework for Studying Copay-Group Transitions

\[ \log(Y_{ict}) = \alpha_i + \gamma_t + \beta \times 1\{t - s_c \geq 0\} + \varepsilon_{ict} \]

where:
- \( Y_{ict} \) scripts filled in calendar-month \( t \) by each person \( i \) in switching cohort \( c \)
- \( \alpha_i \) individual-specific fixed effects
- \( \alpha_t \) calendar-date-specific fixed effects
- \( 1\{t - s_c \geq 0\} \) an indicator function equal to one for months after the transition to a new copayment group
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<th>(2) Log Out-of-Pocket</th>
<th>(3) Elasticity</th>
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<tr>
<td>Post</td>
<td>0.0808***</td>
<td>-1.2690***</td>
<td>-0.0636***</td>
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<tr>
<td>Transition</td>
<td>(0.0028)</td>
<td>(0.0087)</td>
<td>(0.0022)</td>
</tr>
<tr>
<td>Mean</td>
<td>2.97</td>
<td>6.76</td>
<td></td>
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<td>N</td>
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<td>Post</td>
<td>-0.0640***</td>
<td>1.3096***</td>
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<td>Transition</td>
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<td>(0.0156)</td>
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<td>Mean</td>
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<td>0.00</td>
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<tr>
<td>N</td>
<td>579,264</td>
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Step 2. Liquidity Sensitivity
How to measure “payday filling?”

In order to assess the effects of more-generous insurance on liquidity sensitivity, we want a measure of liquidity sensitivity that we can calculate for every quarter pre- and post-transition to the no copay group.
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1. Divide beneficiaries into cohorts based on month of transition onto the no-copay group.
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In order to assess the effects of more-generous insurance on liquidity sensitivity, we want a measure of liquidity sensitivity that we can calculate for every quarter pre- and post-transition to the no-copay group.

1. Divide beneficiaries into cohorts based on month of transition onto the no-copay group.
2. For each quarter relative to the transition, calculate share of Wednesday drug fills that occurred on payday.
Share of Wednesday fills on payday

Quarters since switch from copay to no-copay
Step 3. Interaction
How does price sensitivity vary with liquidity sensitivity?

• We assess how the demand-response to more-generous coverage differs for liquidity-sensitive versus other beneficiaries.

• For each beneficiary, we compute the portion of Wednesday scripts filled on payday when they are in the full-copay group.

• We then divide beneficiaries into deciles of that measure.

• We estimate a separate price elasticity of demand for each decile.
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Estimated price elasticity of demand

Decile of payday filling

Estimated price elasticity of demand for all deciles.
Estimated price elasticity of demand

Decile of payday filling

[Diagram showing estimated price elasticity of demand across different deciles of payday filling]
Summary: What Happens when Copayments Disappear?

1. People consume more drugs.
2. People stop waiting for their Social Security paydays to fill prescriptions.
3. Those who were previously most liquidity sensitive, increase their consumption the most.
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Implications
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• Typical discussion about cost sharing: risk protection versus moral hazard

• Our results suggest an additional benefit of generous insurance: Insurance allows liquidity-sensitive consumers to purchase healthcare when they need it rather than when they have cash (Ericson and Sydnor, 2018).

• Further, if CMS could “tag” the liquidity sensitive and give them Medicaid, then the overall elasticity of demand would be 13 percent lower

• We next construct a simple framework based on Baicker et al. (2015) to explore other implications
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Conventional View

[Graph showing the relationship between Price and Quantity, with Demand decreasing as Quantity increases.]
Conventional View

![Graph showing the intersection of demand and marginal cost curves at quantity Q*.](image-url)
Conventional View

![Graph showing demand and marginal cost]
Incorporating Liquidity

Realized Demand

Price

Quantity
Incorporating Liquidity

- Frictionless Demand
- Realized Demand
Incorporating Liquidity

Frictionless Demand

Realized Demand

Marginal Cost

\[ Q^* \]
Incorporating Liquidity

- Frictionless Demand
- Realized Demand
- Marginal Cost

Price

Quantity

\( Q^* \)  \( Q_H \)

\( p_H \)

\( A \)  \( B \)  \( H \)  \( I \)  \( E \)  \( F \)
Incorporating Liquidity

Frictionless Demand
Realized Demand

Price

Marginal Cost

Quantity

Q*
Q_H
Q_L

p_H
p_L

p_H

Q*
Q_H
Q_L

p_H

Q_H

Q_L

p_L

Q*
Q_H
Q_L
Incorporating Liquidity

Realized Demand

Frictionless Demand

Marginal Cost

Price

Quantity

\( Q^* \)

\( Q_H \)

\( Q_L \)

\( P_H \)

\( P_L \)

\( p \)

\( p_H \)

\( p_L \)

\( Q \)
Numerical Estimates

1. We can empirically estimate linear demand curves: copay group $\rightarrow$ no-copay group $\Rightarrow$ two price-quantity pairs.

2. One heroic assumption: if liquidity-sensitive consumers were to no longer face a liquidity-related friction, then they would exhibit the same demand curve as other recipients.

3. With that assumption, we can construct both the "realized" and "frictionless" demand curves and calculate deadweight loss based on each.
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<th>Deadweight loss accounting for liquidity</th>
<th>Share of deadweight loss explained by liquidity</th>
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<tbody>
<tr>
<td>Entire Market</td>
<td></td>
<td></td>
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<td></td>
<td>$46.67</td>
<td>$9.99</td>
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<td>78%</td>
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<td>$16.88</td>
<td>9.1%</td>
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<td>78%</td>
</tr>
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Conclusions

1. Prescription fills increase by 6–14 percent when Social Security benefits are distributed.
2. When copayments are reduced to zero, recipients stop filling scripts on Social Security paydays.
3. Those who tend to fill scripts on Social Security paydays exhibit a price elasticity of demand that is twice as large as other recipients' price elasticity of demand.
4. “Liquidity sensitivity” suggests that optimal copayments would be lower than the optimal copayments implied by the conventional model.
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