

Borrowing High and Lending Low Under No-Arbitrage*

Jonathan Zinman
Dartmouth College
July 25, 2006

* I will post a new draft of the paper soon at:
<http://www.dartmouth.edu/~jzinman/>

Motivation

- Average U.S. credit card holder spends about \$100 per year by:
 - Borrowing high on credit cards
 - Lending low in demand deposit accounts
- *Why are households borrowing high and lending low (BHLL)?*

Motivation

- Several recent papers* have argued that:
 - BHLL is a puzzle for neoclassical models of consumer choice**
 - BHLL requires psychological explanations (mental accounting)
- Crux of these arguments is that BHLL represents *foregone arbitrage*
 - Consumer leaves money on table, ergo he is not *homo economicus*

* Gross and Souleles (2002); Bertaut and Haliassos (2002); Bogan and Hamammi (2004); Haliassos and Reiter (2005)

** Laibson et al (2005) study time-inconsistent preferences as a explanation for BHLL w/r/t *illiquid* assets– different issue since illiquidity actually provides commitment

My Argument

- Foregone arbitrage view of BHLL is fundamentally flawed
- Arbitrage as commonly defined and applied refers to *riskless* profit opportunities from the (near-) simultaneous purchase and selling of an *identical* asset
- But credit cards and demand deposits are *not* identical assets (quite the contrary), consequently using liquid assets to pay down credit card debt *does* entail risk

My Argument: BHLL Involves Different Assets

- Cash is still king as medium of exchange
- Credit cards still can not be used to directly settle most household expenditures
- Demand deposits readily convertible to cash; readily used for payment
- Lines of credit can be converted to cash even when cards not accepted (“cash advances”), but:
 - Costly for routine transactions
 - Risky (rationed) for contingencies

My Argument in a Nutshell

- Credit card is (very) imperfect substitute for cash/debitable account as a payment device
- Therefore BHLL is not *foregone* arbitrage
- And we're done.
 - If you have neoclassical priors, there is no “puzzle”.... there must be some rational reason(s) why consumers BHLL
 - Even if consumers start off on wrong foot, BHLL is high-frequency decision: opportunities for learning (Lucas 1986)

Elaboration

- But.... my priors are more agnostic
- Not very satisfying to cast doubt on an explanation without offering a plausible alternative

BHLL Explanation

Don't have to look far for alternative:

- *Liquidity motives*
- Given the friction that credit cards are less widely accepted as a payment device
- Given some demand for credit (consumption smoothing)
- Need to hold liquid assets for transaction purposes

BHLL Explanation

- Crux of liquidity motives perspective: neoclassical consumer optimizes portfolio w/r/t liquidity needs arising from payments and credit frictions
- Follows intuitively (though not totally formally) from 5 decades of research in finance and money demand
- Finance: agent facing a liquidity problem and uncertain access to credit in bad state may rely on asset management rather than liability management
- Money demand: frictions give liquid assets implicit value
» hold them even though they are “rate-of-return-dominated”
 - Theory and empirics have long focused on high-yielding assets as the opportunity cost margin, but this is changing thanks to Telyukova and Wright (2006); Telyukova (2006)

So Why Do Consumers BHLL?

- If not psychology, then what?
- Very generally, *transaction demand*
 - Routine
 - Precautionary
- Payment frictions create implicit value for liquid assets: nominal yield understates true yield
- Also, (and more specifically)– several *features of common contracts*:
 - Minimum balance checking accounts (Stavins)
 - Downpayment requirements (Faig and Shum)
 - Overdraft penalties (Bar-Ilan; Fusaro)
 - Imperfect enforcement » strategic default (Lehnert and Maki)

Is BHLL Optimal?

- So BHLL is not a puzzle per se
- Appears to be ample motives and incentives for BHLL
- But... does this mean that consumers are getting it right? Perhaps not:
 - Overvaluing liquidity (Campbell 2006)?
 - Underestimating borrowing costs (Ausubel 1991; Agarwal et al 2005)?*

* In interest of full disclosure, see also the less directly related Bertrand-Karlan-Mullainathan-Shafir-Zinman 2005; Stango-Zinman 2006

How Test Whether BHLL is Optimal?

- Difficult to test BHLL optimality directly or precisely
- Easy to get a rough sense of the size of any mistakes and show that they are small for almost everyone
- I do this in 3 steps.....

Roughly Estimating the Size of any BHLL Mistakes

1. Calculate upper bound on true BHLL costs (assume demand deposits have no implicit value)
 - 23-30% of households with credit cards lose $> \$10$ per month
2. Show that cost savings from “pay down and charge up strategy” are small
 - Commensurate with time/bandwidth costs
3. Rough accounting for routine & precautionary demands; contract incentives
 - Perhaps 7-10% of hh's make nontrivial mistakes

Distributional Consequences?

Remaining concern:

- What if those making substantial BHLL mistakes can ill afford it?
- Does not seem to be the case; conditional on other demographics:
 - Lower income hh's less likely to incur big BHLL costs
 - Lower education hh's less likely to incur big BHLL costs

Related Work in the Liquidity Motives Tradition

- Telyukova (2006): calibrates stochastic partial equilibrium model with neoclassical agents and a precautionary motive for BHLL.... BHLL consistent with the model
- I reach similar conclusion with less formal approach:
 - broader set of motives/incentives
 - rationality of BHLL is *easy* to see
 - like Tobin (1957) on BHLL w/r/t to installment debt

Plan for Paper and Talk

1. BHLL measurement details
Elaboration on main argument and findings:
2. The absence of arbitrage
 - Limited credit card acceptance
 - Costly cash advances
3. Upper bound on BHLL mistakes
4. Adjusting for liquidity motives & incentives
5. *Who* is BHLL?
6. Next steps

Measuring BHLL

- Recall basic notion behind BHLL as a “puzzle”:
households should use low-yielding assets to pay down relatively expensive debt. This implies:
(1) *Unadjusted Wedge_i* = min[*Credit Card Debt_i*, *Demand Deposits_i*]
- Where “i” indexes households

Then what we really care about is:

- **(2) *Unadjusted Cost_i* = max[0, *Unadjusted Wedge**($r_i^c - r_t^a$)]**
- Where r_i^c is the household-specific (marginal) credit card rate
- r_t^a is the aggregate average return on demand deposits
 - Lack microdata on this or other asset yields

Measuring BHLL

Besides convention...

- Why define BHLL w/r/t credit card debt?
 - Most expensive among prevalent sources of consumer credit (median rates of 14.4% in 2001; 11.5% in 2004)
 - Arguably most important source of marginal credit for U.S. households
- Why define BHLL w/r/t to demand deposits?
 - Other financial assets less liquid » estimating (2) w/r/t financial assets requires (more) ad-hoc adjustments for transaction costs, timing considerations
 - Explicit returns on demand deposits relatively homogeneous » need to rely on aggregate avg yields less problematic
 - Facilitates links to money demand literature (e.g., Mulligan and Sala-i-Martin 2000)

Measuring BHLL

- Data source: primarily 2004 Survey of Consumer Finances (SCF)
 - Most comprehensive source of microdata on household balance sheets
 - Single snapshot
- Analysis sample: credit card holders
 - More on this in concluding remarks
- I focus on BHLL *costs* (equation 2), not the \$ amount of the *wedge* that could be used to pay down debt (equation 1)

BHLL is not Foregone Arbitrage

Credit card is imperfect substitute for demand deposits as payment device:

- Only 24% of consumer expenditure paid for by credit card in early 2000s
 - Most major, recurring expenditures (loan, rent, utility payments) require cash or debitable accounts (ABA/Dove)
- *So households need liquid assets for routine transactions*
- Households can get cash advances, but:
 - Expensive: fees, high rates
 - May be rationed: limited to fixed amount (per advance or per week), or to proportion of available credit
- *So households need liquid assets for contingencies*

But is BHLL Optimal?

The Upper Bound on Mistakes

- Again, plausible concern is that consumers make systematic mistakes, due, e.g., to over-valuing liquid assets, or under-estimating cost of borrowing
- One way to approach this question is to look at the upper bound on mistakes
- Do this by calculating (2) without adjusting for any implicit value of liquid assets
- Distribution of these costs suggests that there is a substantial right tail worth worrying about (Table 1):

Table 1. Upper Bound (Unadjusted) Monthly Costs of Borrowing High and Lending Low

<i>Unadjusted Wedge:</i>	min[money, credit card debt]	min[money, credit card debt*3]
	(1)	(2)
Mean	9.46	15.38
Median	0	0
75 th percentile	8.61	13.97
90 th percentile	26.92	40.50
Proportion with cost > \$0	0.49	0.49
Proportion with cost > \$10	0.23	0.30
Proportion with cost/inc > .01	0.06	0.10
Median <i>Wedge / Wedge</i> >0	1,100	1,800
<i>Wedge</i> = assets	0.52	0.64
<i>Wedge</i> = card debt(*3)	0.49	0.37

Is BHLL Optimal? Limited Benefits to More Aggressive Liquidity Management

- 2nd approach to question of whether BHLL is a mistake: what's benefit from reducing BHLL costs by closely managing the *Unadjusted Wedge*? E.g.,:
- “Pay Down and Charge up” strategy
 - “pay down”: make more the required 1 credit card payment per month
 - then “charge up” by using card for payments
- Additional payment incurs a transaction cost: time and attention if nothing else (Baumol-Tobin)

Limited Benefits to More Aggressive Liquidity Management

- What's the benefit (= BHLL cost savings) to Pay Down and Charge Up?
- Table 2 shows that it is limited to a small fraction of the cost due to:
 - Small fraction of chargeable expenditure
 - Cost of “borrowing-to-charge”
- 75th percentile of savings only \$5 per month
 - Again, \$5 is upper bound

Table 2. Estimated Cost Savings From An Extra Credit Card Payment Per Month

	BHLL <i>Unadjusted Wedge</i> =	
	min[money, credit card debt] (1)	min[money, credit card debt*3] (2)
Mean	3.28	3.52
Median	2.34	2.56
75 th percentile	4.68	4.97
90 th percentile	7.39	7.82

Is BHLL Optimal?

Adjustments for Liquidity Motives

- 3rd approach: adjust *Wedge* for routine and precautionary transaction demands
- Accounting approach: simply subtract a proxy for the demanded amount(s) from the *Wedge*, then recalculate *Cost*
- But how measure household-specific transaction demands?
- Routine: subtract one month's income, or recurring expenses (SCF has loans, rent)
- Precautionary: use Kennickell-Lusardi (2004) question—
“About how much do you think you (and your family) need to have in savings for emergencies and other unexpected things that may come up?”

Table 3. Adjusted BHLL Costs

Unadjusted Wedge: Adjustment(s):	min[money, credit card debt]				min[money, credit card debt*3]			
	Income	Recurring Expenses	Precautionary	Cumulative	Income	Recurring Expenses	Precautionary	Cumulative
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean	3.75	8.21	3.37	2.96	6.70	13.62	6.19	5.59
Median	0	0	0	0	0	0	0	0
75 th	0	6.25	0	0	0	10.20	0	0
90 th	7.29	23.13	7.91	6.04	28.83	36.13	13.90	10.25
Cost > \$0	0.18	0.41	0.19	0.17	0.18	0.41	0.19	0.17
Cost > \$10	0.08	0.19	0.09	0.07	0.11	0.25	0.12	0.10
Cost/income > .01	0.02	0.05	0.02	0.02	0.04	0.09	0.03	0.03

Other Incentives for BHLL: Financial Contracts

- Table 3 suggests that general transaction demand eliminates nontrivial BHLL for all but perhaps 7%-10% of card holders (or 25% max)
- But even this may overestimate prevalence & size of mistakes.....
- Specific types of contracts offer incentives for BHLL:
 - Minimum balance checking (Stavins 1999)
 - Checking overdraft penalties (Fusaro 2005; Tufano et al 2005)
 - Introductory pricing on balance transfers
 - Downpayment constraints (Faig and Shum 2002)
 - Strategic default under limited enforcement (Lehnert and Maki 2005; Dawsey and Ausubel 2004)

Who is BHLL?

- Are those paying substantial BHLL costs “vulnerable” (=== poor, uneducated)?
- No...

Table 4. Who Borrows High and Lends Low?

Dependent variable:	Unadjusted > \$10	Cumulative > \$10
	(1)	(2)
high school	0.101 (0.069)	0.056 (0.054)
some college	0.122* (0.073)	0.090 (0.063)
college+	0.100* (0.061)	0.035 (0.042)
owns home	-0.033 (0.026)	-0.031* (0.019)
net worth quintile 2	0.009 (0.031)	0.049* (0.026)
net worth quintile 3	-0.015 (0.035)	0.079*** (0.030)
net worth quintile 4	-0.124*** (0.033)	0.026 (0.030)
net worth quintile 5	-0.177*** (0.024)	-0.055*** (0.019)
income quintile 2	0.104*** (0.037)	0.012 (0.024)
income quintile 3	0.180*** (0.040)	0.103*** (0.030)
income quintile 4	0.199*** (0.047)	0.140*** (0.038)
income quintile 5	0.184** (0.087)	0.070 (0.059)
mean LHS	.2304155	.1022069
pseudo R-squared	.0623644	.0736111
N	3476	3476

Findings in Brief

- BHLL is not a puzzle *per se* for neoclassical models of consumer choice
 - BHLL is not foregone arbitrage because credit cards and demand deposit different assets
- In fact viewing BHLL through lenses of rich literatures in money demand and finance suggest several rational motives/incentives
- Descriptive evidence is *consistent* with BHLL being a rational response to frictions in payments and credit markets
 - Also little reason for concern that those who do pay substantial BHLL costs are vulnerable

Concluding Remarks: Next Steps

- Two key directions to push study of BHLL:
 - Expand study to those without credit cards:
 - Relatively poor... relatively incomplete balance sheets in SCF (cash, payday borrowing)?
 - Test whether a neoclassical model or behavioral alternative(s) does a *better* job of explaining behavior
- Both require new data– of the type we'll be discussing tomorrow!