The High Cost of Other People’s Money

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Appalachian State University
NCCTM October 2005
A helpful progression for students:

- Larger loans
- Credit cards (and debit cards)
- Various financial sources
Compound Interest:

Suppose we deposit $1000 in an investment that promises 6% interest compounded annually. How much will be in the account after five years?

After 1 year: $1000 + 0.06\times 1000 = \$1060$

1000 (1+0.06)

After 2: $1060 + 0.06\times 1060 = \$1123.60$

1000(1+0.06)(1+0.06)

1000(1+0.06)^2

After 5: $1000(1+0.06)^5 = \$1338.23$
Compound Interest:

Suppose we deposit $1000 in an investment that promises 6% interest compounded quarterly. How much will be in the account after five years?

After 1 quarter: $1000 + \frac{0.06}{4} \times 1000 = $1015$

After 1 year: $1000 \times (1 + \frac{0.06}{4})^4 = $1061.36$

After 5 years: $1000 \times (1 + \frac{0.06}{4})^{4 \times 5} = $1346.86$

$8.63$ increase by quarterly compounding
compound interest:

\[ FV = P(1+\frac{r}{n})^{nt} \]

FV: future value
P: principal
r: annual rate (decimal)
n: # compoundings/yr
n: # years
Periodic end of period payment/deposit:

\[
FV = R \left[ \frac{1 + \frac{r}{n}}{\frac{n}{r}} \right]^{nt} - 1
\]

\[R = \text{pmt/dep}\]
Example:

Joe deposits $250 at the end of each month into a retirement account which promises 7.2% interest compounded monthly. If he does this for 20 years, how much will he have in his account?

\[
FV = 250 \left[ \left(1 + \frac{.072}{12} \right)^{12 \times 20} - 1 \right] = \frac{.072}{12} \approx \$133,440.58
\]
Loan Formula (derivation):

\[
R \left[ \left(1 + \frac{r}{n} \right)^{nt} - 1 \right] = P \left(1 + \frac{r}{n} \right)
\]

\[R = \frac{P \left( \frac{r}{n} \right)}{\left[ 1 - \left(1 + \frac{r}{n} \right)^{-nt} \right]}\]

\[R = \text{loan payment}\]
Loan Example:

John buys a car for $25,000 and must pay a 10% down payment and borrow the rest at 6%, making monthly payments for four years.

Down payment: \( .10 \times 25000 = 2500 \)

Loan amount: \( 25000 - 2500 = 22,500 \)

\[
R = \frac{22500 \left( \frac{.06}{12} \right)}{1 - \left(1 + \frac{.06}{12}\right)^{-12 \times 4}} = 528.41
\]

If John works 40 hours a week, 4 weeks a month, each hour of take-home pay must provide:

\[
\frac{528.41}{40 \times 4} = 3.30
\]
John’s car costs $25,000. How much will he pay for it?

\[528.41 \times 12 \times 4 + 2250 = 27,613.68\]

How much interest did he pay?

\[27,613.68 - 25,000 = 2,613.68\]

This is the cost of other people’s money! In this case, it’s an additional

\[
\frac{2,613.68}{25,000} = 10.5\%
\]
John decides to buy a house. Suppose he chooses a modest $150,000 home and manages 8% down payment, paying the rest over then next 25 years at 6% in monthly payments.

Down payment: \(0.08 \times 150000 = \$12,000\)

\[
R = \frac{138000 \left( \frac{0.06}{12} \right)}{1 - \left( 1 + \frac{0.06}{12} \right)^{-12 \times 25}} = \$889.14
\]
note: per hour out of take home pay, so far $3.30 + $5.56 = $8.86 out of every hour of pay…after taxes….
John’s house costs $150,000. How much will he pay for it?

$889.14 \times 12 \times 25 + $12000 = $278,742.00

How much interest did he pay?

$278,742 - $138,000 = $140,742.00

This is the cost of other people’s money! In this case, it’s an additional

\[
\frac{$140,742}{$138,000} = 102\%
\]

note: ...and where did the $2500 + $12000 = $14,500 come from anyway?
• John is now thinking seriously about the high cost of money in loans.
• Notice the APR used in the examples is 6%.
• Currently 90% finance of new vehicles through SECU is 5.75% up to 60 months.
• Currently ARM for new first mortgage homes is around 6%.
• SECU “Share” accounts pay 1.5%
• SECU “Money Market Share” is 3%
Note: compound interest and loan formulas easily accessible on TI83+

- TI83+ use TVM solver (2nd/ Finance /Enter):
  - N= (our nt value)
  - I%= (our r value)
  - PV=
  - PMT=
  - FV=
  - P/Y=
  - C/Y=
  - PMT: END BEGIN
Note: compound interest and loan formulas easily accessible in Excel

- **FV and PV functions**

- **PMT function:**
  - Rate: (our r/n)
  - Nper: (our nt)
  - Pv: (loan amount)
  - Fv
  - Type
College Students and Credit Cards
(Nellie Mae, start of 2004 school year)

• The average credit card debt owed by undergraduate college students is about $2,169.
• Almost half carryover balances of $1000 or more.
• Close to a quarter of students owe more than $3,000.
• About 10 percent owed more than $7,000.
• (note: all these have declined since 2001)
College Students and Credit Cards
(Nellie Mae, start of 2004 school year)

• 21% with cards say they pay off all cards each month
• 44% say they make more than the minimum payment but generally carry a balance
• 11% say they make less than the minimum required payment each month
College Students and Credit Cards
(Nellie Mae, start of 2004 school year)

- Students held an average of three cards
- 76% had at least one credit card (u-grad)
- 32% had four or more
- 95% of graduate students carry cards
### Terms and Conditions

<table>
<thead>
<tr>
<th>Annual Percentage Rate (APR) for Purchases, Balance Transfers and Convenience Checks</th>
<th>0% fixed* APR is effective for the first twelve billing cycles after you open your account. After that, <strong>12.49% variable,</strong> 16.49% variable,** or 20.49% variable,** depending on our review of your application and credit history.†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other APRs</td>
<td>Cash Advance APR: 24.49% variable,† Default APR: Up to 28.99% variable,†</td>
</tr>
<tr>
<td>Variable Rate Information</td>
<td>Your APR may vary. The rate is determined monthly by adding the Prime Rate and:</td>
</tr>
<tr>
<td></td>
<td>• 5.74%, 9.74%, or 13.74% for Purchases, Balance Transfers and Convenience Checks after the introductory period and this rate will not be lower than 11.99%, 15.99%, and 19.99% respectively.</td>
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<td>• 17.74% for Cash Advances, and this rate will not be lower than 23.99%.</td>
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<td>Grace Period</td>
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<tr>
<td>Annual Fee</td>
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</tr>
<tr>
<td>Minimum Finance Charge</td>
<td>$1.00</td>
</tr>
<tr>
<td>Method of Computing the Balance for Purchases</td>
<td>Average Daily Balance (including new purchases)</td>
</tr>
<tr>
<td>Transaction Charges</td>
<td>• Balance Transfer and Convenience Check Charge: During the first twelve billing cycles: 3% of the amount of each transfer or check, $5 minimum, $50 maximum. After the first twelve billing cycles: 3% of the amount of each transfer or check with a minimum fee of $5.</td>
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A FIXED APR means that the APR will not vary in concert with changes to an index, such as the U.S. Prime Rate. Juniper reserves the right to change the APR as described in these terms and conditions and in accordance with the Cardmember Agreement, Delaware law and the Federal Truth in Lending Act.

*Introductory Rate Notice: If you do not timely pay at least the minimum due, your payment is not honored by your bank, or you exceed your credit line, the 0% Introductory APR will change to the rate for Defaults.

† Default Rate: If your payment is received late, you fail to pay at least the minimum due, your payment is not honored by your bank, or your balance exceeds your credit line, the APR on all balances may be increased to the then applicable Default Rate. The Default Rate will be determined at the time of the action based on your Juniper account history as well as your performance on non-Juniper accounts. The maximum Default Rate will increase or decrease with changes in the Prime Rate.

Credit Performance: Juniper Bank has established the APRs in this offer based on criteria which reflect your credit performance history. After your account is opened, Juniper will periodically review your credit performance including, but not limited to, your usage of the Juniper card and your payment history on the Juniper card and on other creditors accounts including timeliness of payment, if you exceed your credit line, or if you make a payment that is not honored by your bank. If you do not maintain your past level of credit performance, Juniper may increase each of your APRs.

**The Prime Rate used in determining the APRs used on your Account each billing cycle is the highest rate published in the Money Rates column of The Wall Street Journal on either the first or last day of each billing cycle. APRs are current as of 09/21/2005 using a Prime Rate of 6.75%.
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- Foreign Country Transactions: 2% of the U.S. Dollar amount.                                                                                                                                 |

Average Daily Balance
excluding new purchases

• No interest if paid in full each month.

• Interest is paid only on any balance left over from the previous month.

• 20 days grace period before interest on new new purchases, regardless of your balance.
Average Daily Balance

including new purchases

• No interest if paid in full each month.

• In any balance carried over from previous month, no grace period for additional purchases.

• Some cards operate without grace periods, interest always from day of purchase.
Two-cycle Average Daily Balance including new purchases

- No interest if paid in full each month.

- In any balance carried over from previous month, no grace period for additional purchases.

- Original grace period retroactively eliminated any time you begin carrying an unpaid balance.

- Some cards operate without grace periods, interest always from day of purchase, meaning balances carried forward result in double interest.
Example

- Make two purchases, $100 purchase on April 1 and $200 purchase on May 1.
- Receive a bill in May for the April purchase, but don’t pay it.
- Pay your bill in full in June.
- If billing period ends at end of each month and APR is 18% (assuming grace period):
Average Daily Balance excluding new purchase

- Charges from April (May bill):
  - $100 is charged; grace period, no interest

- Charges from Apr and May (June bill):
  - $100 carried over- grace period expired-interest charged
  - $200 charged; grace period, no interest

- June bill: $100 + $200 + $1.50 = $301.50
Average Daily Balance including new purchase

- Charges from April (May bill):
  - $100 is charged; grace period, no interest

- Charges from Apr and May (June bill):
  - $100 carried over- grace period expired-interest charged: $0.015 \times 100 = $1.50
  - $200 charged; no grace period, interest charged: $0.015 \times 200 = $3.00

- June bill: $100 + $200 + $4.50 = $304.50
Two-Cycle Average Daily Balance including new purchase

• Charges from April (May bill):
  – $100 is charged; grace period, no interest

• Charges from Apr and May (June bill):
  – $100 carried over- grace period retroactively eliminated; interest charged on previous month: $0.015\times100 = $1.50
  – For second month, interest will be charged on the first month’s balance, which now includes principal and interest: $0.015\times101.50 = $1.52
  – $200 charged; no grace period, interest charged: $0.015\times200 = $3.00

• June bill: $100 + $200 + $4.50 + $1.52 = $306.02
One scenario with a “minimum finance charge”

- $50 purchase
- minimum monthly payment of $25
- 19.5% APR
- Second table with a minimum monthly finance charge of $1.50
With/Without minimum finance charge of $1.50

<table>
<thead>
<tr>
<th>Bill #</th>
<th>Payment Amt</th>
<th>Interest</th>
<th>Principal</th>
<th>Balance Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$ 50.00</td>
</tr>
<tr>
<td>2</td>
<td>$25</td>
<td>$ 0.81</td>
<td>$ 24.19</td>
<td>$ 25.81</td>
</tr>
<tr>
<td>3</td>
<td>$25</td>
<td>$ 0.42</td>
<td>$ 24.19</td>
<td>$ 1.23</td>
</tr>
</tbody>
</table>

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<td>$-</td>
<td>$-</td>
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</tr>
<tr>
<td>2</td>
<td>$25</td>
<td>$ 1.50</td>
<td>$ 23.50</td>
<td>$ 26.50</td>
</tr>
<tr>
<td>3</td>
<td>$25</td>
<td>$ 1.50</td>
<td>$ 23.50</td>
<td>$ 3.00</td>
</tr>
</tbody>
</table>
Debit Cards
security/liability issues

- Use of PIN diminishing (more $ to banks)
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- Greater liability than credit cards:
  - Credit cards: $50
  - Debit cards: $50 if notify in 2 days, $500 or more if over 2 days. (banks changing “voluntarily”)

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- Use of PIN diminishing (more $ to banks)
- Greater liability than credit cards:
  - Credit cards: $50
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- Checking acct empty! Bank slow, checks bouncing, fees piling up....
Debit Cards
fee-based overdraft loans

Students are often unaware of what they have agreed to in fee charges and automatic overdraft loans. They did sign the agreement, and they can avoid overdraft charges if they don’t overdraw.
At noon, John doesn’t have the $10 he needs for going out to lunch. He has $5 in his checking account, but he figures he can use his debit card and deposit the check his mom sent later in the afternoon and have it all covered.
At noon, John doesn’t have the $10 he needs for going out to lunch. He has $5 in his checking account, but he figures he can use his debit card and deposit the check his mom sent later in the afternoon and have it all covered.

John doesn’t realize it, but when he uses his card the extra $5 cost him $39, ($5 loan and $34 overdraft fee). In addition, there may be an extra $1.50 in financing, and suppose checks bounce….?
Sue has $150 in her checking account. She buys $100 at a local store on Monday. Her balance is now $50.
Sue has $150 in her checking account. She buys $100 at a local store on Monday. Her balance is now $50.

Thursday Sue wants to buy something and checks her balance (at teller or ATM) and sees she has $150 available, so she spends $75 at a store.
Sue has $150 in her checking account. She buys $100 at a local store on Monday. Her balance is now $50.

Thursday Sue wants to buy something and checks her balance (at teller or ATM) and sees she has $150 available, so she spends $75 at a store.

Sue doesn’t realize that the $150 “available” is listed because the bank held the anticipated transaction for 3 days, then added it back because the store hadn’t made the deposit.
Friday Sue checks online and sees that she has overdrawn, owes $25 +$1.50 for the amount, $34 for the overdraft, and the checks she wrote for small amounts are bouncing at $55 each.
Friday Sue checks online and sees that she has overdrawn, owes $25 +$1.50 for the amount, $34 for the overdraft, and the checks she wrote for small amounts are bouncing at $55 each.

Sue racks up huge fees and never knew that she had agreed to overdraft fees. She assumed that when her account was empty, she would not be allowed any more debit transactions.
Predatory lending strips billions in wealth from low-income consumers and communities in the U.S. each year. Borrowers lose more than $25 billion annually due to predatory mortgages, payday loans, and other lending abuses like overdraft loans, excessive credit card debt, and tax refund loans.
“…borrowers are paying more than $10 billion per year for fee-based overdraft loans.”
Other options for resources

- Loans
- Store credit
- Rent-to-own
- Pawn shops
- Payday loans
Loans

- Bank loans: personal unsecured loans start at 11% APR and go up
Loans

• Bank loans: personal unsecured loans start at 11% APR and go up

• Other loan companies run from 20-40% (keeping APR as the measure)
Store Credit

“0% financing for 90 days! Buy now, pay nothing until 2006”
Store Credit

“0% financing for 90 days! Buy now, pay nothing until 2006”

translation: you don’t pay interest during the time period, but you still pay interest for the time period.
Store Credit

- October 1 you buy furniture for $2300.
- January 1 you owe three months interest.
Store Credit

With an 18% APR:

\[2300(1+.18/12)^3 = \$2405.06\]

so three “free” months cost $105, or $35 a month just to “wait”
Rent-to-Own options

MegaCool 27” Digital TV
Retail price: $591.63

- Weekly: $15.99 for 80 weeks
- Monthly: $$63.96 for 19 months
- Anytime the first 90 days fill in the “extra” to the retail price and it’s yours!
Rent-to-Own options

Rent for 19 months and your tv costs:

19 * $63.96 = $1215.24

(could have purchased outright for $450 in discount store originally)

APR?

$1215.24 = 450 (1+ r/12)^{19}

r = 65% APR
Pawn Shop

- Provide secured loans: they give you cash based in the goods you bring to them
- The shop holds your goods (the “pledge”) as surety for the loan
- You can “redeem” the pledge, with interest, within a time frame or they can sell it
- You can continue the arrangement by paying interest only
Pawn Shop

- Ed is $100 short on buying the tv he wants, but he does have the stereo system he bought for $300 last year
- $100 offer from pawn shop for the stereo
- Take $100 cash, get receipt, return within 30 days and pay them $100 plus $20 interest, get your stereo back (they can’t sell it in the mean time)
Pawn Shop

- 30 days go by and no $120 appears for Ed

- Ed can pay the $20 and do it all again another month OR let it slide….then he will see his stereo on the sales floor for $200 if he wants it back
Pawn Shop

• APR?

\[ 120 = 100 \left(1 + \frac{r}{12}\right)^1 \]

\[ r = 240\% \]

(watch out for “Pawn Your Title”…….)
Payday Loan

• Provide proof of income and address
• Write a check to the company now and get some cash
• When you get paid, come give cash for your check or just let them deposit it.
Payday Loan

• Ed wants the $100 extra to buy the tv, so he goes with pay proof to a payday lender
• He writes a check for $117.50 and they give him $100 cash
• At payday in two weeks, Ed can return and give the $117.50 for the check or let them deposit it.
• (I was actually told, “That’s only 17.5%, which is better than most credit cards!”)
Payday Loan

What’s the comparable APR?

$117.50 = 100 ( 1+ r/26)^1$

$r = 455\%$

…and if you don’t bring the check or have the money in your account…..
# Fee Schedule

<table>
<thead>
<tr>
<th>Term in Days</th>
<th>Annual Percentage Rate</th>
<th>Loan Amounts available depending on your earnings &amp; approval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$100</td>
</tr>
<tr>
<td>4</td>
<td>1825.00%</td>
<td>$20</td>
</tr>
<tr>
<td>5</td>
<td>1460.00%</td>
<td>$20</td>
</tr>
<tr>
<td>6</td>
<td>1216.67%</td>
<td>$20</td>
</tr>
<tr>
<td>7</td>
<td>1042.86%</td>
<td>$20</td>
</tr>
<tr>
<td>8</td>
<td>912.50%</td>
<td>$20</td>
</tr>
<tr>
<td>9</td>
<td>811.11%</td>
<td>$20</td>
</tr>
<tr>
<td>10</td>
<td>730.00%</td>
<td>$20</td>
</tr>
<tr>
<td>11</td>
<td>663.64%</td>
<td>$20</td>
</tr>
<tr>
<td>12</td>
<td>608.33%</td>
<td>$20</td>
</tr>
<tr>
<td>13</td>
<td>561.54%</td>
<td>$20</td>
</tr>
<tr>
<td>14</td>
<td>521.43%</td>
<td>$20</td>
</tr>
<tr>
<td>15</td>
<td>486.67%</td>
<td>$20</td>
</tr>
<tr>
<td>16</td>
<td>456.25%</td>
<td>$20</td>
</tr>
<tr>
<td>17</td>
<td>429.41%</td>
<td>$20</td>
</tr>
<tr>
<td>18</td>
<td>405.56%</td>
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**Finance Charge**
Getting money by saving it!
(a fresh new idea?)

• A the rent-to-own Ed pays $63.96 a month to have that tv. He will buy it for $1215.24, but he gets to take it home today!
• If he put $63.96 in a 3% money market, how long would it take to have the $450 to buy the tv outright?
Saving up for the tv:

\[ A = \frac{R \left(1 + \frac{r}{n}\right) \left[ \left(1 + \frac{r}{n}\right)^{nt} - 1 \right]}{\frac{r}{n}} \]
Saving up for the tv:

\[
$450 = \frac{63.96 \left( 1 + \frac{.03}{12} \right) \left[ \left( 1 + \frac{.03}{12} \right)^{12} - 1 \right]}{\frac{.03}{12}}
\]

\[ t \approx \text{months} \]

SO: if you wait 7 months you can own a brand new tv and save \$1215.24 - \$450 = \$765.24, over \$100 a month!

Get paid \$100 a month to live without the new one for 7 months!
Post-graduation Blues

- Student loans must be repaid
- Unexpectedly low income (after taxes)
- Need deposits and down payments
- Credit scores may be low or general credit weak from college experience
Money is a most expensive purchase.

Live right, do the math.