The Experimental Setup in this Study

Bicycle Messengers in Zurich, Switzerland

- Data: Delivery records of Veloblitz and Flash Delivery Services, 1999 - 2000.
  - Contains large number of details on every package delivered.

- Observe hours (shifts) and effort (revenues per shift).

- Work at the messenger service
  - Messengers are paid a commission rate $w$ of their revenues $r_{it}$ ($w = \text{wage}^\text{w}$). Earnings $wr_{it}$
  - Messengers can freely choose the number of shifts and whether they want to do a delivery, when offered by the dispatcher.

- Suitable setting to test for intertemporal substitution.

- Highly volatile earnings
  - Demand varies strongly between days

- Familiar with changes in intertemporal incentives.
Experiment 1

- **The Temporary Wage Increase**
  - Messengers were randomly assigned to one of two treatment groups, A or B.
    - $N=22$ messengers in each group
  - Commission rate $w$ was increased by 25 percent during four weeks
    - Group A: September 2000 (Control Group: B)
    - Group B: November 2000 (Control Group: A)

- **Intertemporal Substitution**
  - Wage increase has no (or tiny) income effect.
  - Prediction with time-separable preferences, $t= a$ day:
    - Work more shifts
    - Work harder to obtain higher revenues
  - Comparison between TG and CG during the experiment.
    - Comparison of TG over time confuses two effects.
Results for Hours

- Treatment group works 12 shifts, Control Group works 9 shifts during the four weeks.
- Treatment Group works significantly more shifts ($\chi^2(1) = 4.57$, $p<0.05$)
- Implied Elasticity: 0.8

Figure 6: The Working Hazard during the Experiment

- Wage = normal level
- Wage = 25 Percent higher
Results for Effort: Revenues per shift

- Treatment Group has lower revenues than Control Group: -6 percent. \((t = 2.338, p < 0.05)\)
- Implied *negative* Elasticity: -0.25

The Distribution of Revenues during the Field Experiment

- Distributions are significantly different (KS test; \(p < 0.05\));
Results for Effort, cont.

- **Important caveat**
  - Do lower revenues relative to control group reflect lower effort or something else?

- **Potential Problem: Selectivity**
  - Example: Experiment induces TG to work on bad days.
  - More generally: Experiment induces TG to work on days with unfavorable states
    - If unfavorable states raise marginal disutility of work, TG may have lower revenues during field experiment than CG.

- **Correction for Selectivity**
  - Observables that affect marginal disutility of work.
    - Conditioning on experience profile, messenger fixed effects, daily fixed effects, dummies for previous work leave result unchanged.
  - Unobservables that affect marginal disutility of work?
    - Implies that reduction in revenues only stems from sign-up shifts in addition to fixed shifts.
    - **Significantly lower revenues on fixed shifts, not even different from sign-up shifts.**
Corrections for Selectivity

- **Comparison TG vs. CG without controls**
  - Revenues 6 % lower (s.e.: 2.5%)

- **Controls for daily fixed effects, experience profile, workload during week, gender**
  - Revenues are 7.3 % lower (s.e.: 2 %)

- **+ messenger fixed effects**
  - Revenues are 5.8 % lower (s.e.: 2%)

- **Distinguishing between fixed and sign-up shifts**
  - Revenues are 6.8 percent lower on fixed shifts (s.e.: 2 %)
  - Revenues are 9.4 percent lower on sign-up shifts (s.e.: 5 %)

- **Conclusion: Messengers put in less effort**
  - Not due to selectivity.
Measuring Loss Aversion

- **A potential explanation for the results**
  - Messengers have a daily income target in mind
  - They are loss averse around it
  - Wage increase makes it easier to reach income target

  ➢ That’s why they put in less effort per shift

- **Experiment 2: Measuring Loss Aversion**
  - Lottery A: Win CHF 8, lose CHF 5 with probability 0.5.
    - 46 % accept the lottery
  - Lottery C: Win CHF 5, lose zero with probability 0.5; or take CHF 2 for sure
    - 72 % accept the lottery

  ➢ Large Literature: Rejection is related to loss aversion.

- **Exploit individual differences in Loss Aversion**

  - Behavior in lotteries used as proxy for loss aversion.
  ➢ Does the proxy predict reduction in effort during experimental wage increase?
Measuring Loss Aversion

- Does measure of Loss Aversion predict reduction in effort?
  - Strongly loss averse messengers reduce effort substantially: Revenues are 11 % lower (s.e.: 3 %)
  - Weakly loss averse messenger do not reduce effort noticeably: Revenues are 4 % lower (s.e. 8 %).
  - No difference in the number of shifts worked.

- Strongly loss averse messengers put in less effort while on higher commission rate
  - Supports model with daily income target

- Others kept working at normal pace, consistent with standard economic model
  - Shows that not everybody is prone to this judgment bias (but many are)
Concluding Remarks

- **Our evidence does not show that intertemporal substitution in unimportant.**
  - Messenger work more shifts during Experiment 1
  - But they also put in less effort during each shift.

- **Consistent with two competing explanations**
  - Preferences to spread out workload
    - But fails to explain results in Experiment 2
  - Daily income target and Loss Aversion
    - Consistent with Experiment 1 and Experiment 2
    - Measure of Loss Aversion from Experiment 2 predicts reduction in effort in Experiment 1
    - Weakly loss averse subjects behave consistently with simplest standard economic model.
    - Consistent with results from many other studies.