The Return to Capital for Small Retailers in Kenya

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Outline

- Estimate rates of return for small retailers in Kenya
  1) Bulk discounts from distributors
  2) Stockouts of phone cards
- Examine heterogeneity across firms, within firms
  - Credit constraints?
  - Optimization failure
Context

- Retail shops in western Kenya
  - In small towns and rural market centers
  - Carry a small set of household goods
- Retailers purchase from:
  - Distributor who delivers on regular schedule
  - Wholesalers
  - Other suppliers (coke, phone cards, etc)
- Fixed wholesale, retail prices for all goods in our data
I) Bulk discounts

- Retailers received discounts based on total purchase amount:
  - 0.5% discount on purchases > 5,000 Ksh (~ $67)
  - 1% discount on purchases > 7,000 Ksh (~ $93)
  - 1.5% discount on purchases > 10,000 Ksh (~ $133)
- Substantial relative to typical retail markup of 10%
- Data on purchases 2005-2009 from a major distributor of over 100 household goods - cooking fat, soap, detergent, soup mix, etc.
- Low depreciation
I) Bulk Discounts: Data

- **Rough bound on interest rates**: If a shop does not buy enough to obtain a discount, this implies that the cost of financing the incremental purchase is greater than the benefit from the discount.
1) Bulk Discounts: Data

- **Rough bound on interest rates**: If a shop does not buy enough to obtain a discount, this implies that the cost of financing the incremental purchase is greater than the benefit from the discount.
I) Bulk discounts

- Any firm that does not buy enough to qualify for bulk discount reveals itself to prefer paying a higher price in order to tie up less working capital
- Restrict analysis to shops that buy at least 5000Ksh in first month and use data of subsequent purchases
  - Likely bigger shops: shops at about the 80th percentile of total purchases
- Calculate bounds on return to capital using data on subsequent purchases
I) Bulk Discounts: Results

• Under baseline perfect information assumption, median shop has rate of return of 162% annually

• If roughly adjusted to unforeseen demand shocks median shop would have an annual rate of return of 56% to 87% annually
1) Bulk Discounts: Results

- Rough adjustments to perfect foresight assumption:

![Estimated Returns from Bulk Discount Analysis, < 2,000% per year](chart)

- Perfect Foresight
- Assuming shop expected it to take 50% longer to sell items
- Assuming shop expected it to take 100% longer to sell items
II) Stockouts of Phone Cards

- A second approach looks at stockouts of scratch-off phone cards
- An additional unit of inventory would tie up working capital but generates additional sales
- We measure lost sales due to “stockouts” (instance in which a customer asks for a product which is out of stock)
- Likely lower bound because phone card sales
  - May generate other sales
  - Have low storage and depreciation costs
  - Have no substitutes
II) Stockouts: Results (below 80th percentile)
II) Stockouts: Results (above 80\textsuperscript{th} percentile)

Annualized Rates of Return Above 80th percentile, all cards

95% CI shown in red
## Interbrand correlations of returns

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annualized Return on Safaricom</td>
<td>0.297 (0.022)***</td>
<td>0.021 (0.027)</td>
<td>0.297 (0.083)***</td>
</tr>
<tr>
<td>Annualized Return on Celtel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dummy for Return on Celtel &gt; 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controls for Card Denomination/Brand</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Observations</td>
<td>89</td>
<td>78</td>
<td>89</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.68</td>
<td>0.01</td>
<td>0.13</td>
</tr>
<tr>
<td>Spearman Correlation</td>
<td>0.55</td>
<td>0.46</td>
<td>0.00</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.82</td>
<td>0.09</td>
<td>0.00</td>
</tr>
<tr>
<td>Mean of Independent Variable</td>
<td>415.803</td>
<td>4.988</td>
<td>0.171</td>
</tr>
<tr>
<td>Mean of Dependent Variable</td>
<td>68.35</td>
<td>21.68</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Sample

- All
- Only those with returns < 75% per year

Notes: Column 1 excludes 1 individual with rate of return > 50,000 per year.
II) Stockouts of Phone Cards

- Average marginal rate of return/shop: 39% per year
- 18% have return > 50%
- Evidence of heterogeneity across shops in rates of return, even within towns
- Reject equality of the estimated $r$ across shops (at 1 percent)
What explains heterogeneity in returns?

1) Credit constraints
2) Optimization failures
Analysis of correlates

• How do returns correlate across different cell phone brands?
  – Firms with extremely high returns on one brand are more likely to have extremely high returns on the other.
  – Less correlation for lower returns
  – Suggest high return “types”

• How do returns and shop owner demographics and shop characteristics correlate?
  – Preliminary analysis: no significant correlation
## Correlations with Shop, Owner Characteristics

Notes: report (annualized) regression coefficients from regression of interest rate on these independent variables.

<table>
<thead>
<tr>
<th></th>
<th>Independent Variable Characteristics</th>
<th>Regression on annualized returns</th>
<th>Regression on dummy for whether return &gt; 50</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SE</td>
<td>Coeff</td>
</tr>
<tr>
<td>Years Education</td>
<td>10.9204</td>
<td>(3.22)</td>
<td>-3.2430</td>
</tr>
<tr>
<td>Years Shop Open</td>
<td>6.4596</td>
<td>(6.48)</td>
<td>1.0955</td>
</tr>
<tr>
<td>Other income last week</td>
<td>21.7439</td>
<td>(83.99)</td>
<td>0.0654</td>
</tr>
<tr>
<td>Value of durable goods owned</td>
<td>2627.1500</td>
<td>(5974.91)</td>
<td>0.0006</td>
</tr>
<tr>
<td>Value of animals owned</td>
<td>814.0836</td>
<td>(1063.89)</td>
<td>-0.0049</td>
</tr>
<tr>
<td>Got bank loan in past year</td>
<td>0.0973</td>
<td>(0.30)</td>
<td>-11.4157</td>
</tr>
<tr>
<td>Got MF loan in past year</td>
<td>0.1947</td>
<td>(0.40)</td>
<td>-4.4198</td>
</tr>
<tr>
<td>has bank account</td>
<td>0.6637</td>
<td>(0.47)</td>
<td>-5.9728</td>
</tr>
<tr>
<td>ROSCA contributions in past year</td>
<td>95.0140</td>
<td>(164.35)</td>
<td>-0.0248</td>
</tr>
<tr>
<td>If needed 1,000Ksh, take out of inventory</td>
<td>0.2743</td>
<td>(0.45)</td>
<td>56.5309</td>
</tr>
<tr>
<td>If needed 10,000Ksh, take out of inventory</td>
<td>0.2124</td>
<td>(0.41)</td>
<td>50.6596</td>
</tr>
<tr>
<td>Total startup costs</td>
<td>897.6158</td>
<td>(1470.03)</td>
<td>0.0003</td>
</tr>
<tr>
<td>Building startup costs</td>
<td>81.1548</td>
<td>(261.36)</td>
<td>0.0401</td>
</tr>
<tr>
<td>Inventory startup costs</td>
<td>724.7650</td>
<td>(1432.81)</td>
<td>-0.0011</td>
</tr>
<tr>
<td>Other startup costs</td>
<td>55.4684</td>
<td>(95.44)</td>
<td>0.0052</td>
</tr>
</tbody>
</table>
# Time trend: Learning (I)

Table: Regression of daily interest rate on these independent variables

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days Since first Visit at Shop</td>
<td>-0.050</td>
<td>-0.052</td>
<td>-0.040</td>
<td>-0.075</td>
<td>-0.075</td>
</tr>
<tr>
<td></td>
<td>(0.006)**</td>
<td>(0.006)**</td>
<td>(0.004)**</td>
<td>(0.022)**</td>
<td>(0.022)**</td>
</tr>
<tr>
<td>Days since Project Start (July 2005)</td>
<td>-0.055</td>
<td>-0.06</td>
<td>-0.051</td>
<td>-0.187</td>
<td>-0.187</td>
</tr>
<tr>
<td></td>
<td>(0.006)**</td>
<td>(0.007)**</td>
<td>(0.013)**</td>
<td>(0.027)**</td>
<td>(0.027)**</td>
</tr>
<tr>
<td>Days Since first Visit at Shop * New Sample</td>
<td>0.035</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days since Project Start (July 2005) * New Sample</td>
<td>0.136</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.03)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dummy for New Sample</td>
<td>-34.844</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(11.012)**</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Controls for Card Denomination/Brand
- N
- Y
- N
- N
- N

<table>
<thead>
<tr>
<th>Observations</th>
<th>10283</th>
<th>10283</th>
<th>8451</th>
<th>1832</th>
<th>10283</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean of Dependent Variable</td>
<td>14.63</td>
<td>14.63</td>
<td>10.75</td>
<td>34.22</td>
<td>14.63</td>
</tr>
</tbody>
</table>

Sample
- Both
- Both
- New
- Old
- Both

Notes: report (annualized) regression coefficients from regression of daily interest rate on these independent variables. Std. errors calculated by delta method. 

p-value for test that Days Since first Visit at Shop + Days Since First Visit at Shop * New Sample <0.001
Future work: non-experimental

• Look for monthly cycles in stockouts of shop owners with monthly wage income in family
• Test behavior across markets with more or less competitors?
Future work: experimental

- Potential randomized evaluations of:
  1) $100 Grant
  2) Information
     • Provide marginal returns for own shop, as measured by our study
  3) Credit intervention
     - directly provide short term trade credit through distributor
     - Vouchers for loans of 1000 Ksh, 20% APR, term=2 weeks
     - After 2 weeks, penalties begin to accrue
  4) Variation in bulk discount cutoffs
- Outcome: administrative data on bulk discounts
Summary

• Marginal rates of return to inventories are:
  – Very high for some retailers
  – Heterogeneous, even locally

• Biggest question: Are shop owners limited by credit constraints or are they failing to optimize?

• Evidence suggests not just credit constraints
  • Low correlation of returns w/ background characteristics
  • Learning