Creditor Protection Law and Venture Capital Investment in Africa
Country-level Evidence

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Outline

1. Motivation
2. Conceptual Framework
3. Related Literature
4. Empirical Model
5. Data
6. Estimation Strategy
7. Results
8. Summary and Conclusion
Motivation

- **Advocacy**
- Change laws to increase venture capital and private equity investment (EMPEA, 2015)

**Country Level**

- Creditor protection law is a public good
- Changes occur through state actors, whose independent jurisdiction is limited to countries’ national boundaries

**Africa**

- Ranked by limited partners as one of their Top 3 most attractive markets (Haque, 2015)
Conceptual Framework

- Cleary et al. (2007)
  - Negative relationship between investment and internal funds for companies with negative or very low internal funds
  - Exogenous shock effects are magnified where information asymmetry is more severe

An increase in creditor protection law should have a larger effect on venture capital than on private equity investment

\[ H_0 : \beta_{\text{venture capital}} \leq \beta_{\text{private equity}} \]
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Related Literature

- **Developed Countries**
- **Developing Countries**
- Groh and Wallmeroth (2015)
Contribution

- Instrumental variable to account for simultaneity bias
- African venture capital and private equity data to test information asymmetry aspect of Cleary et al.’s (2007) theory
2SLS instrumental variable, random effects specification

**Structural form**

\[
(y_{it} - \hat{\theta} \bar{y}_i) = (1 - \hat{\theta}) \beta_0 + (X_{it1} - \hat{\theta} \bar{X}_{i1}) \beta'_1 + (\Gamma_{itk} - \hat{\theta} \bar{\Gamma}_{ik}) \beta'_k + (\nu_{it} - \hat{\theta} \bar{\nu}_i)
\]

\[v_{it} = \alpha_i + \omega_t + \epsilon_{it}\]

**Reduced form**

\[
(X_{it1} - \hat{\theta} \bar{X}_{i1}) = (1 - \hat{\theta}) \pi_0 + (\hat{\psi}_{it1} - \hat{\theta} \bar{\psi}_{i1}) \pi'_1 + (\Gamma_{itk} - \hat{\theta} \bar{\Gamma}_{ik}) \pi'_k + (\nu_{it} - \hat{\theta} \bar{\nu}_i)
\]
Empirical Model

- 2SLS instrumental variable, random effects specification

**Structural form**

\[
(y_{it} - \hat{\theta} \bar{y}_i) = (1 - \hat{\theta}) \beta_0 + (x_{it1} - \hat{\theta} \bar{x}_{i1}) \beta'_1 + (\Gamma_{itk} - \hat{\theta} \bar{\Gamma}_{ik}) \beta'_k + (\nu_{it} - \hat{\theta} \bar{\nu}_i)
\]

\[
\nu_{it} = \alpha_i + \omega_t + \varepsilon_{it}
\]

**Reduced form**

\[
(x_{it1} - \hat{\theta} \bar{x}_{i1}) = (1 - \hat{\theta}) \pi_0 + (\psi_{it1} - \hat{\theta} \bar{\psi}_{i1}) \pi'_1 + (\Gamma_{itk} - \hat{\theta} \bar{\Gamma}_{ik}) \pi'_k + (\nu_{it} - \hat{\theta} \bar{\nu}_i)
\]
Dependent Variable

- Seed, start-up, or early venture capital
- Expansion venture capital
- Private equity
- All
### Key Independent Variables

<table>
<thead>
<tr>
<th>$X_{it}$</th>
<th>$Ψ_{it}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength of legal rights index (World Bank)</td>
<td>Bank branch density (World Bank)</td>
</tr>
<tr>
<td>Sum of ten components creating a score ranging from 0 to 10</td>
<td>Number of retail locations of commercial banks in a country per 100,000 adults excluding the main office, which are not legally distinct subsidiaries</td>
</tr>
<tr>
<td>Higher values represent stronger collateral and bankruptcy law</td>
<td></td>
</tr>
</tbody>
</table>

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Control Variables

\[ \Gamma_{itk} \]
- Shareholder protection law
- Bankruptcy efficiency and costs
- Contract enforcement efficiency and costs
- Sentiment on legal process, criminal, and property law

\[ \Gamma_{itk} \]
- Start-up costs and procedures
- Number of GPs in country
- Real GDP growth rate
- Unemployment rate
- Real interest rate
- STEM journal publications per 1000 people
- 2006 to 2010 year dummies

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## Summary Statistics

**Table 1: Summary statistics for data excluding South Africa: 2006 to 2010**

<table>
<thead>
<tr>
<th>Variables</th>
<th>mean</th>
<th>standard deviation</th>
<th>minimum</th>
<th>maximum</th>
<th>observations</th>
<th>% missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed, start-up, or early</td>
<td>2.5366</td>
<td>1.9848</td>
<td>1</td>
<td>12</td>
<td>123</td>
<td>53.58</td>
</tr>
<tr>
<td>Expansion</td>
<td>2.3826</td>
<td>1.8381</td>
<td>1</td>
<td>9</td>
<td>115</td>
<td>56.6</td>
</tr>
<tr>
<td>Private equity</td>
<td>2.9917</td>
<td>2.5868</td>
<td>1</td>
<td>16</td>
<td>121</td>
<td>54.34</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td>8.8351</td>
<td>8.997</td>
<td>1</td>
<td>50</td>
<td>194</td>
<td>28.15</td>
</tr>
<tr>
<td>Collateral &amp; bankruptcy law</td>
<td>4.1566</td>
<td>2.0526</td>
<td>1</td>
<td>10</td>
<td>249</td>
<td>6.04</td>
</tr>
<tr>
<td>Bank branch density</td>
<td>5.4529</td>
<td>7.5773</td>
<td>0.2977</td>
<td>46.2092</td>
<td>247</td>
<td>6.79</td>
</tr>
<tr>
<td>Ease of shareholder suits</td>
<td>4.6908</td>
<td>2.0802</td>
<td>0</td>
<td>10</td>
<td>249</td>
<td>6.04</td>
</tr>
<tr>
<td>Director liability</td>
<td>3.0803</td>
<td>2.4498</td>
<td>0</td>
<td>9</td>
<td>249</td>
<td>6.04</td>
</tr>
<tr>
<td>Disclosure</td>
<td>4.5341</td>
<td>1.9155</td>
<td>0</td>
<td>8</td>
<td>249</td>
<td>6.04</td>
</tr>
<tr>
<td>Insolvency recovery rate</td>
<td>19.7052</td>
<td>16.0786</td>
<td>0</td>
<td>57.5</td>
<td>249</td>
<td>6.04</td>
</tr>
<tr>
<td>Closing cost</td>
<td>22.6053</td>
<td>13.8472</td>
<td>7</td>
<td>76</td>
<td>209</td>
<td>21.13</td>
</tr>
<tr>
<td>Days to enforce contract per procedure</td>
<td>17.6318</td>
<td>7.2727</td>
<td>5.6327</td>
<td>41.8293</td>
<td>249</td>
<td>6.04</td>
</tr>
<tr>
<td>Cost to enforce contract</td>
<td>48.6321</td>
<td>34.4337</td>
<td>14.3</td>
<td>151.8</td>
<td>249</td>
<td>6.04</td>
</tr>
<tr>
<td>Rule of law score</td>
<td>-0.7146</td>
<td>0.6419</td>
<td>-2.67</td>
<td>0.99</td>
<td>260</td>
<td>1.89</td>
</tr>
<tr>
<td>Start-up cost</td>
<td>155.6787</td>
<td>204.8292</td>
<td>1.4</td>
<td>1314.6</td>
<td>249</td>
<td>6.04</td>
</tr>
<tr>
<td>Start-up days per procedure</td>
<td>4.7215</td>
<td>3.376</td>
<td>1.1</td>
<td>15.2941</td>
<td>249</td>
<td>6.04</td>
</tr>
<tr>
<td>GP firms</td>
<td>5.4249</td>
<td>5.0792</td>
<td>1</td>
<td>31</td>
<td>193</td>
<td>27.17</td>
</tr>
<tr>
<td>GDP growth</td>
<td>0.0257</td>
<td>0.0406</td>
<td>-0.1795</td>
<td>0.1851</td>
<td>257</td>
<td>3.02</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>9.2025</td>
<td>6.9232</td>
<td>0.6</td>
<td>37.6</td>
<td>245</td>
<td>7.55</td>
</tr>
<tr>
<td>Real interest rate</td>
<td>14.57</td>
<td>60.383</td>
<td>-42.3102</td>
<td>572.9363</td>
<td>161</td>
<td>39.25</td>
</tr>
<tr>
<td>Journal articles</td>
<td>116.1088</td>
<td>319.1919</td>
<td>0</td>
<td>2431.2</td>
<td>260</td>
<td>1.89</td>
</tr>
<tr>
<td>Control of corruption score</td>
<td>-0.62</td>
<td>0.5808</td>
<td>-1.92</td>
<td>0.97</td>
<td>255</td>
<td>3.77</td>
</tr>
</tbody>
</table>
Estimation Strategy

- Estimate empirical model for each investment stage separately and compare coefficients
- Logarithmic dependent variable
- Standard errors clustered by country
- Predictive mean matching imputation of missing data
- Two-stage Heckman selection
  - Control of corruption score to satisfy exclusion restriction
Table 2: 2SLS instrumental variables, random effects estimation: Excluding South Africa

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1) Early Expansion Heckman</th>
<th>(2) Expansion Heckman</th>
<th>(3) Private equity Heckman</th>
<th>(4) All Heckman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collateral &amp; bankruptcy law</td>
<td>0.2398** (0.1019)</td>
<td>0.2088** (0.0992)</td>
<td>0.1468 (0.1094)</td>
<td>0.2422 (0.1993)</td>
</tr>
<tr>
<td>λ</td>
<td>-</td>
<td>-0.3859 (0.6242)</td>
<td>-0.1251* (0.628)</td>
<td>-0.0059 (0.6801)</td>
</tr>
</tbody>
</table>

Observations: 122 122 116 117 117 186 186
Countries: 40 40 40 38 38 46 46
No. of imputations: 20 20 20 20 20 20 20
Prob > F: 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000

Delta standard errors adjusted for clustering by country are in parentheses; ***p < 0.01; **p < 0.05; *p < 0.1
A unit increase in a country’s strength of collateral and bankruptcy law index score has a significantly positive effect on venture capital investment.

The magnitude of the effect is largest at the seed, start-up, or early venture capital stage.

The evidence supports Cleary et al.’s (2007) theory that effects of a shock to financially constrained companies in imperfect financial markets are magnified where information asymmetry is most severe.