What is worth more for the merit of credit?
Evidence from the credit system in the North Eastern Italian District.

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A pre-view

1. Recent crisis proof Basel 1 and 2 regulation bias in risk estimation

2. There is no main single stream on Basel 3 perspectives (especially on implications for SMEs)

3. Innovative foundations to a new rating system must be searched

4. We present evidences that such innovation is needed

5. and propose a Lintner’s (1965) certainty equivalent approach for credit scoring
Research Questions

Banks and firms ability to consider corporate risks in their strategy:

1. Is there a relationship between the risk/return profile of northern Italian SMEs and banks’ financing decisions?

2. Is there a relationship between the profitability of northern Italian SMEs and balance sheet indicators capturing various risk measures (operational, financial and asset side risks)?

3. Is there a relationship between the profitability of northern Italian SMEs and balance sheet indicators capturing various risk measures (operational, financial and asset side risks), when these firms are classified as leading (LF), stand alone (SA) and suppliers (SF)?
Literature review

1. Basel regulation

2. Credit ratings

3. Lintner’s Confident Equivalent Methodology and evolutions
   Lintner (1965), Gardenal (2011)

4. SME’s networks

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The Lintner-based Approach

We consider confident equivalent (CE): the return on investments (ROI) rate that a firm will surely produce with the 90% of confidence.

Starting from the CE estimation for groups of similar firms through $E(ROI)$ and $\sigma_{ROI}$:

$$CE_s = E(ROI_s) - z^*\sigma_{ROI_s}$$

$$E(ROI_s) = CE_s + z^*\sigma_{ROI_s} = \beta_0 + \beta_j * X_j + \varepsilon$$

Moving to single firm’s $E(ROI)$ and average ROI comparison, we can produce a ranking of firms, measured as over performance capacity.

If $ROI_i > E(ROI_i)$ then $CE_i > CE_s$
Bank system allocation efficiency

Comparing average relation of $E(ROI)$ and ROI to the amount of financial resources raised by firms (DEB/OPRE), we are able to determine the efficiency of bank system in resources allocation.

**Table 1:** Cross section match between ROI-$E(ROI)$ and DEB/OPRE classification.

<table>
<thead>
<tr>
<th>DEB/OPRE</th>
<th>ROI-$E(ROI)$</th>
<th>POSITIVE</th>
<th>NEGATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGHER</td>
<td></td>
<td>1. Super performers that raise more financial resources than sample average</td>
<td>2. Low performers that raise more financial resources than sample average</td>
</tr>
<tr>
<td>LOWER</td>
<td></td>
<td>3. Super performers that raise less financial resources than sample average</td>
<td>4. Low performers that raise less financial resources than sample average</td>
</tr>
</tbody>
</table>
Bank system price efficiency

Comparing average relation of E(ROI) and ROI to the interest rate (INTE/DEB), we are able to determine the efficiency of bank system in credit pricing.

Table 2: Cross section match between ROI-E(ROI) and DEB/OPRE classification.

<table>
<thead>
<tr>
<th>INTE/DEB</th>
<th>ROI-E(ROI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGHER</td>
<td>POSITIVE 1. Super performers that pay less for their raised financial resources 2. Low performers that pay less for their raised financial resources</td>
</tr>
<tr>
<td>LOWER</td>
<td>NEGATIVE 3. Super performers that pay more for their raised financial resources 4. Low performers that pay more for their raised financial resources</td>
</tr>
</tbody>
</table>

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Sample

4,066 manufacturing firms located in the North East of Italy (Trentino Alto Adige, Veneto, Friuli Venezia Giulia), a region with a high presence of SMEs.

Firms are selected considering continuity in balance sheet data from 2006 to 2012, and for each year:

- Total assets ≥ 1,000 €;
- Operating Revenue ≥ 1,000 €;
- Fixed Assets ≥ 1,000 €;
- Shareholders’ Funds ≥ 1,000 €;
- Cost of Employees ≥ 1,000 €;
- Firm with an unconsolidated account.

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Indexes

4 typologies of risk for a total of 23 indexes:

- **Technology features**
  - CA/FIAS (%) Currency rate of assets
  - CA/CL (%) Current equilibrium
  - WKCA/FIAS (%) Relative intensity of working capital
  - FIAS/OPRE (%) Absolute intensity of fixed assets
  - RLFA (-) Residual Life of Fixed Assets

- **Financial strategy**
  - DEB/EBITDA (-) Years for debt re-financing
  - DEBLT (%) Long term debt rate
  - DEB/EQUITY (-) Relative rate of debtness
  - DEB/ORPE (-) Absolute rate of debtness
  - LEV (-) Financial leverage
  - INTE/DEB (%) Financial interest rate

- **Operative risks**
  - WKCA/OPRE (%) Absolute intensity of working capital
  - DOL-volume (-) Degree of operative leverage on volume changes
  - DOL-price (-) Degree of op. lev. on price changes of x (x=1%)
  - DEB-CRED (dd) Difference between delays on payments to creditors and payments from debtors

- **Rate of return**
  - ROI (%) Return on Investment
  - ROE (%) Return on Equity
  - ROS (%) Return on Sales
  - AV/STAF (%) Work productivity
  - EBIT/INT (-) Interest Coverage
  - FCFC/OPRE (%) Margin of Free Cash Flow Characteristic
  - FCFO/OPRE (%) Margin of Free Cash Flow Operative
  - TAX (%) Tax rate

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New Firm Classification Method

Firm’s specific operational risk exposition:

**Table 3:** Sub-samples based on operating leverage levels – definitions

<table>
<thead>
<tr>
<th>DOL-price</th>
<th>DOL-volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>High</td>
<td>High-Risks</td>
</tr>
<tr>
<td>Low</td>
<td>Volume-Risk</td>
</tr>
</tbody>
</table>

Firm’s specific role in or out a productive network:
- Stand Alone firm (SA);
- Leader Firm (LF) that support its suppliers (productive network);
- Supplier Firm (SF) financed by the leaders.

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Results - Debt and Investment Decisions

Debt availability is strong depending on the past debt level (Regression B) of a firm, and no important correlation is registered with today (Regression A) and past (Regression C) levels of risk variables.

Table 4: Panel Regression Adjusted R-squared for Absolute Indebtedness and Relative Indebtedness

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>DEB/OPRE</th>
<th>DEB/EQUITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression A - years 2007-2012</td>
<td>0.221203</td>
<td>0.050612</td>
</tr>
<tr>
<td>Regression B - years 2008-2012</td>
<td>0.831424</td>
<td>0.57834</td>
</tr>
<tr>
<td>Regression C - years 2008-2012</td>
<td>0.290982</td>
<td>0.079881</td>
</tr>
</tbody>
</table>

Also investment choices present a higher relation to past than to risk:

Table 5: Panel Regression Adjusted R-squared for Returns On Investments (ROI)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>ROI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression A - years 2007-2012</td>
<td>0.10412</td>
</tr>
<tr>
<td>Regression B - years 2008-2012</td>
<td>0.154344</td>
</tr>
<tr>
<td>Regression C - years 2008-2012</td>
<td>0.138537</td>
</tr>
</tbody>
</table>

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Results – Regressions’ Precision

The sub samples produces an increasing in R-squared values for Regressions considered:

D) Analyze the relation between the level of ROI and the contemporary level of risks;

F) Analyze the relation between the variation on ROI level and the level of risks.

<table>
<thead>
<tr>
<th></th>
<th>Low-Risks</th>
<th>Volume-Risk</th>
<th>Price-Risk</th>
<th>High-Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regression D</strong></td>
<td>0.155899</td>
<td>0.144582</td>
<td>0.098044</td>
<td>0.178782</td>
</tr>
<tr>
<td><strong>Regression F</strong></td>
<td>0.584104</td>
<td>0.546872</td>
<td>0.452113</td>
<td>0.53213</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Total Manufacturing Sample</th>
<th>Stand Alone (SA)</th>
<th>Supplier Firms (SF)</th>
<th>Leader Firms (LF)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regression D</strong></td>
<td>0.156253</td>
<td>0.693441</td>
<td>0.148303</td>
<td>0.605364</td>
</tr>
<tr>
<td><strong>Regression F</strong></td>
<td>0.511537</td>
<td>0.268789</td>
<td>0.51904</td>
<td>0.252065</td>
</tr>
</tbody>
</table>

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Results – Analyzing Confident Equivalent

Confident equivalent estimation gives the measure of the value of the investment in a specific set of firms, giving also the measure of which type of firm produces the investment’s highest values.

Table 8: Certainty equivalent estimated using the highest R-squared regression for every sample and sub sample and considering a 10% confidence interval of a normal distributed variable (z=-1,282)

<table>
<thead>
<tr>
<th></th>
<th>Total Manufacturing Sample</th>
<th>Sub Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Low-Risk</td>
</tr>
<tr>
<td><strong>E(ROI)</strong></td>
<td>12.4%</td>
<td>16.6%</td>
</tr>
<tr>
<td><strong>σ_&lt;sub&gt;ROI&lt;/sub&gt;</strong></td>
<td>41.2%</td>
<td>27.4%</td>
</tr>
<tr>
<td><strong>CE</strong></td>
<td>-40.4%</td>
<td>-18.6%</td>
</tr>
</tbody>
</table>

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Results – Bank System Efficiency

Confident equivalent estimation gives the measure of the value of the investment in a specific set of firms, giving also the measure of which type of firm produces the investment’s highest values.

**Table 9:** Cross section match between average ROI-E(ROI) ranking and DEB/OPRE levels.

<table>
<thead>
<tr>
<th>ROI-E(ROI)</th>
<th>DEB/OPRE</th>
<th>POSITIVE</th>
<th>NEGATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGHER</td>
<td></td>
<td>25.8%</td>
<td>20.7%</td>
</tr>
<tr>
<td>LOWER</td>
<td></td>
<td>26.2%</td>
<td>27.4%</td>
</tr>
</tbody>
</table>

**Table 10:** Cross section match between ROI-E(ROI) ranking and INTE/DEB levels.

<table>
<thead>
<tr>
<th>ROI-E(ROI)</th>
<th>INTE/DEB</th>
<th>POSITIVE</th>
<th>NEGATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOWER</td>
<td></td>
<td>32.3%</td>
<td>31.6%</td>
</tr>
<tr>
<td>HIGHER</td>
<td></td>
<td>19.6%</td>
<td>16.5%</td>
</tr>
</tbody>
</table>