The Impact of Creditor Protection in the Presence of Credit Crunches

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The Impact of Creditor Protection on Stock Prices in the Presence of Credit Crunches

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Main Question

- How does creditor protection affect the level and the variance of stock prices?
Stock Return of Non-financial Firms During the Subprime Crisis

![Graph showing the stock return of non-financial firms during the Subprime Crisis. The x-axis represents creditor rights, and the y-axis shows the stock return. Countries are plotted on the graph, with a trend line indicating the fitted values.]
Why This Topic

- Literature so far focused on the impact of creditor rights on the credit market, and little on the stock market.
  - La Porta et al. (1997): depth of debt markets
  - Bae & Goyal (2003): borrowing costs
  - Galindo & Micco (2005): volatility of the credit market

- We address how creditor rights affect stock market, through the investment channel.
THE LOGIC OF THE STORY

Collateral

Creditor

Firm

Credit protection
Methodology and Key Findings

- We develop a Tobin Q model of stock price, and confront the model with a panel data of 40 countries from 1984 to 2004.

- We find that better creditor protection increases stock price and reduce volatility.
Average Stock Volatility (OECD, 84-04)

Creditor Protection

Average stock volatility
Fitted values
Average Stock Volatility (Non-OECD, 84-04)

The graph shows the relationship between Creditor Protection and Average Stock Volatility for various countries. Each country is represented by a dot, and the fitted values are indicated by a red line. The x-axis represents Creditor Protection, and the y-axis represents Average Stock Volatility.
Baseline Model

Production function: \( Y_t = A_t K_t^{1-\rho} \)

Gross investment: \( Z_t = I_t \left( 1 + \frac{1}{2\nu} \frac{I_t}{K_t} \right) \), where \( I_t = K_{t+1} - K_t \)

Firm Lagrangian (present value of future dividends):

\[
L_t = E_t \left[ \sum_{s=1}^{\infty} \frac{1}{(1+r)^s} \left( A_t K_{t+s}^{1-\rho} - Z_{t+s} + Q_{t+s} \left( K_{t+s} + I_{t+s} - K_{t+s+1} \right) \right) \right]
\]
Stock Price in Frictionless Regime

FOC for $I_t, K_t$: $Q_t = \frac{1}{(1 + r)} E_t \left( A_{t+1} K_{t+1}^{1-\rho} + \frac{1}{2\nu} \left( \frac{I_{t+1}}{K_{t+1}} \right)^2 + Q_{t+1} \right)$

Solve for Tobin's $Q_t = B_0 + B_1 a_t + B_2 k_t$

Stock price: $P_{t, unconstrained} \equiv \frac{\tilde{L}_{t,\max}}{K_{t+1}}$

In credit-constain-free regime, stock price equals Tobin's Q.
Stock Price in Constrained Regime

Credit constraint: \( I_t \leq \omega K_t - W_t \);

Stock Price: \( P_t \equiv \frac{\hat{L}_{t,\text{max}}}{K_{t+1}} = \frac{1}{1 + r} E_t \left( A_{t+1} K_{t+1}^{-\rho} - \omega \left( 1 + \frac{\omega}{2\nu} \right) + \frac{1 + \omega}{1 + r} P_{t+1} \right) \)

Solve for \( \hat{P}_{t,\text{constrained}} = C_0 + C_1 a_t + C_2 k_t \)

Comparative stat: \( \frac{\partial \hat{P}_{t,\text{constrained}}}{\partial \omega} > 0; \hat{P}_{t,\text{constrained}} < \hat{P}_{t,\text{unconstrained}} \)
Stock Price in Constrained Regime (2)

\[ C_1 \propto \frac{1}{1 - \gamma - \gamma \omega + 2r + 2r^2} \]

Hence \( \frac{\partial C_1}{\partial \omega} > 0 \)

\[ C_2 \propto \frac{-1}{r^2 + 2r - \omega} \]

Hence \( \frac{\partial C_2}{\partial \omega} < 0 \)
Probability of Constrained Regime

The probability of entering constrained regime is

\[ \Pr(I_{t,\text{unconstrained}} > \omega K_t - W_t), \]

where \( I_{t,\text{unconstrained}} \) is the investment under frictionless regime:

\[ I_{t0} = \nu K_t \left( P_{\text{unconstrained},t} - 1 \right) \]

- Higher \( \omega \) reduces the probability of entering constrained regime.
Creditor Right and Stock Price Level

**Proposition 1**: The expected stock price rises with stronger creditor protection, through two channels: (1) The probability of credit crunches declines; (2) firm’s market value rises in the credit-constrained regime.

\[
E[P_t] = \Pr(\text{Constrained}) P_{t,\text{constrained}} + \Pr(\text{Unconstrained}) P_{t,\text{unconstrained}}
\]
Creditor Right and Stock Volatility

**Proposition 2:** With stronger creditor protection, the variance of stock returns declines, because: (1) The difference between the stock prices, in the constrained regime and the unconstrained regime, decreases; and (2) The probability of credit crunches declines.

\[ \text{Var}[P_t] = \Pr(\text{Constrained}) \times \Pr(\text{Unconstrained}) \times \left( P_{\text{unconstrained},t} - P_{\text{constrained},t} \right)^2 \]
Theory to Empirics

- In the theoretical model, the credit constraint mechanism works through a random situation where the constraint moves between binding and nonbinding.

- In the empirical model, we use the probability of a liquidity crisis to proxy for the probability of a binding constraint.
Empirical Method

- Use a two stage analysis to examine the relationship between stock price and creditor protection.
- In the first stage, we look at how creditor protection affects the probability of a liquidity crisis. We then use the Probit regression results to construct predicted crisis probability.
- In the second stage, how the predicted probability of the liquidity crunch affects the price and volatility.
Liquidity Crisis

- Quantity approach: as a sharp decline in bank credit to the private sector;
- We define the top 5 or 10 percent tail as crises.
- Price approach: as a sharp increase in the real interest rate.
Creditor Rights

- As in La Porta et al. (1998), creditor rights index ranges from 0 to 4 (higher, better protection)
  - creditor consent or minimum dividends to file for reorganization
  - no automatic stay on assets
  - seniority of secured creditors
  - debtor does not retain the administration pending the resolution
Table 3. Marginal Effects of the First–stage Probit Regressions

<table>
<thead>
<tr>
<th></th>
<th>Quantity definition</th>
<th>Price definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dummy (Creditor rights = 3 or 4)</td>
<td>-0.055***</td>
<td>-0.078***</td>
</tr>
<tr>
<td>Crisis (t-1)</td>
<td>0.119**</td>
<td>0.047</td>
</tr>
<tr>
<td>ICRG political stability</td>
<td>-0.002***</td>
<td>-0.003***</td>
</tr>
<tr>
<td>Growth rate of GDP per capita</td>
<td>-0.337***</td>
<td></td>
</tr>
<tr>
<td>Lagged contagion indicator</td>
<td></td>
<td>0.005*</td>
</tr>
<tr>
<td>Capital openness (de jure)</td>
<td></td>
<td>-0.002***</td>
</tr>
<tr>
<td>McFadden's R²</td>
<td>0.18</td>
<td>0.21</td>
</tr>
</tbody>
</table>
Second Stage

Level: $\ln(P_{it}) = \alpha_i + \rho \ln(P_{i,t-1}) + \gamma \Pr(\text{Crisis})_{i,t+1} + Z'_{it} \delta + \eta_{it}$;

Volatility: $\ln(\sigma_{it}) = \alpha_i + \rho \ln(\sigma_{i,t-1}) + \gamma \Pr(\text{Crisis})_{i,t+1} + Z'_{it} \delta + \varepsilon_{it}$;
Exclusion Conditions

- The 2-stage system can be identified by functional form. But functional form identification tends to weak.

- Excluded from the second stage: lag of liquidity crisis indicator, lag of contagion indicator

- Lagged variables should not directly affect stock index, which is forward-looking according to the market efficiency theory.
<table>
<thead>
<tr>
<th></th>
<th>Quantity</th>
<th>Quantity-developing</th>
<th>Quantity-developed</th>
<th>Price</th>
<th>Price-developing</th>
<th>Price-developed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prob(crisis)–quantity</td>
<td>-0.675***</td>
<td>-0.625***</td>
<td>-0.896***</td>
<td></td>
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<tr>
<td>Prob(crisis)–price</td>
<td></td>
<td></td>
<td></td>
<td>-0.835***</td>
<td>-0.749***</td>
<td>-0.279</td>
</tr>
<tr>
<td>Lagged dependent variable</td>
<td>0.745***</td>
<td>0.730***</td>
<td>0.785***</td>
<td>0.710***</td>
<td>0.687***</td>
<td>0.781***</td>
</tr>
<tr>
<td>Growth rate of GDP per capita</td>
<td>0.076</td>
<td>0.729***</td>
<td>-0.236***</td>
<td>0.082</td>
<td>0.613***</td>
<td>-0.124***</td>
</tr>
<tr>
<td></td>
<td>Quantity</td>
<td>Quantity-developing</td>
<td>Quantity-developed</td>
<td>Price</td>
<td>Price-developing</td>
<td>Price-developed</td>
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</tr>
<tr>
<td>Prob(crisis)–quantity</td>
<td>0.318**</td>
<td>0.334**</td>
<td>0.512</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prob(crisis)–price</td>
<td></td>
<td></td>
<td></td>
<td>0.759***</td>
<td>0.509**</td>
<td>3.014***</td>
</tr>
<tr>
<td>Lagged dependent variable</td>
<td>0.266***</td>
<td>0.345***</td>
<td>0.116**</td>
<td>0.263***</td>
<td>0.345***</td>
<td>0.104*</td>
</tr>
<tr>
<td>Growth rate of GDP per capita</td>
<td>-0.271**</td>
<td>0.334***</td>
<td>0.245</td>
<td>-0.211*</td>
<td>-0.499***</td>
<td>0.207</td>
</tr>
</tbody>
</table>
Robustness Checks

- In the 2\textsuperscript{nd} stage, additional control variables, such as budget surplus, inflation level and volatility, current account, P/E ratio, exchange rate regime, do not change results.

- In the 1\textsuperscript{st} stage, we add more lags of liquidity crisis indicators. This increases the impact of the crisis probability in the 2nd stage.
Conclusion

- Creditor protection not only increases the level of the stock market in the environment of credit constraints, but also lowers its volatility.