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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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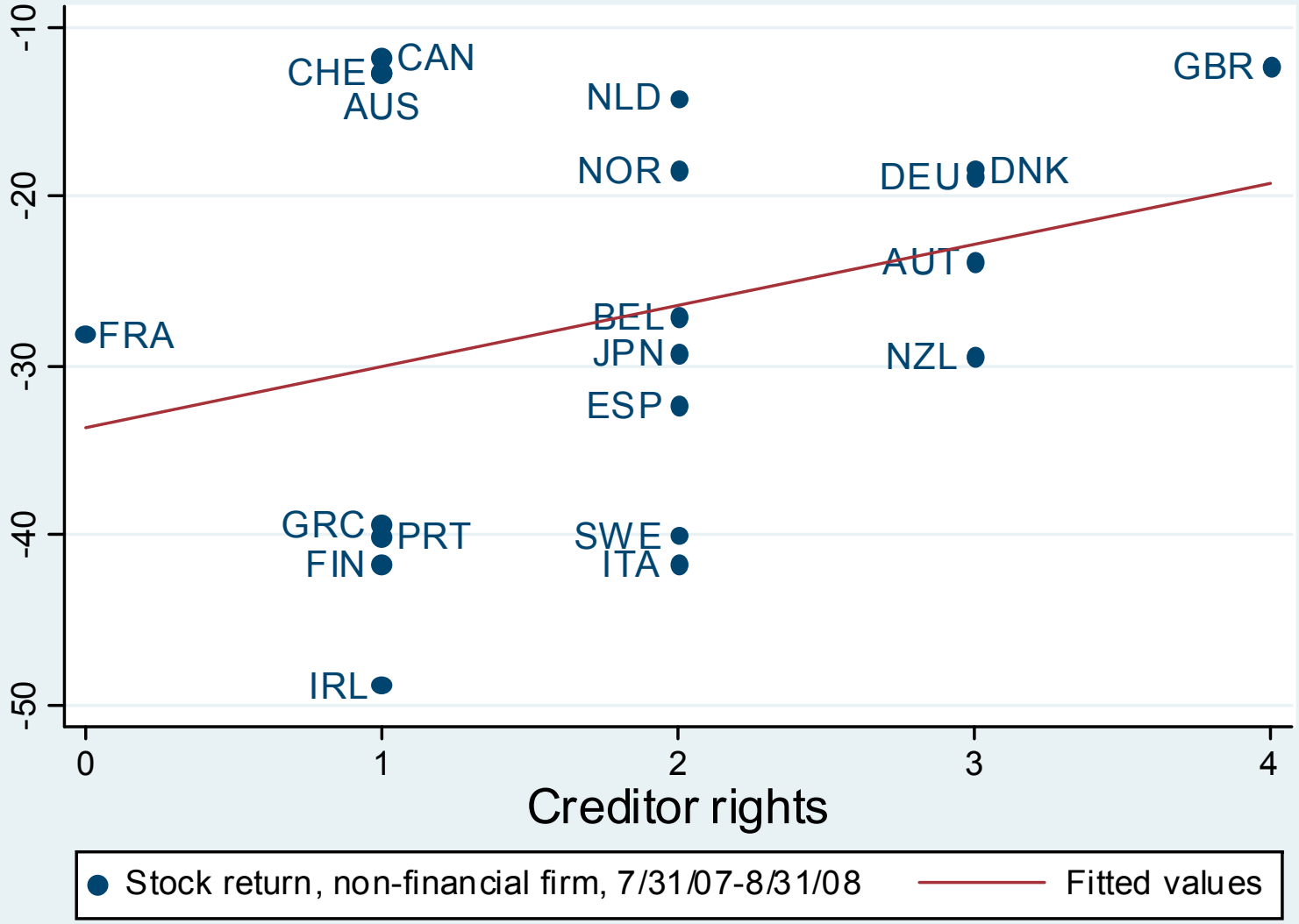
Main Question

- *How does creditor protection affect the level and the variance of stock prices?*

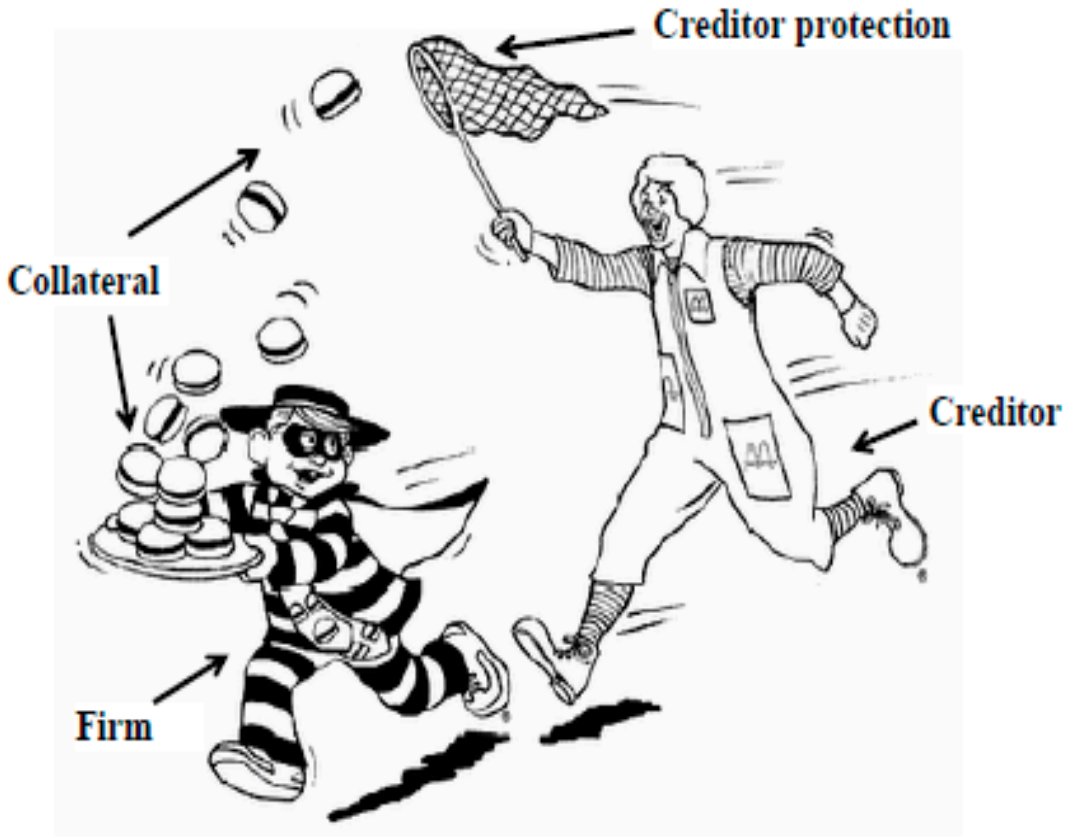
Stock Return of Non-financial Firms During the Subprime Crisis



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
  - Claessens, et al. (2001): operating income variability.
  - 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

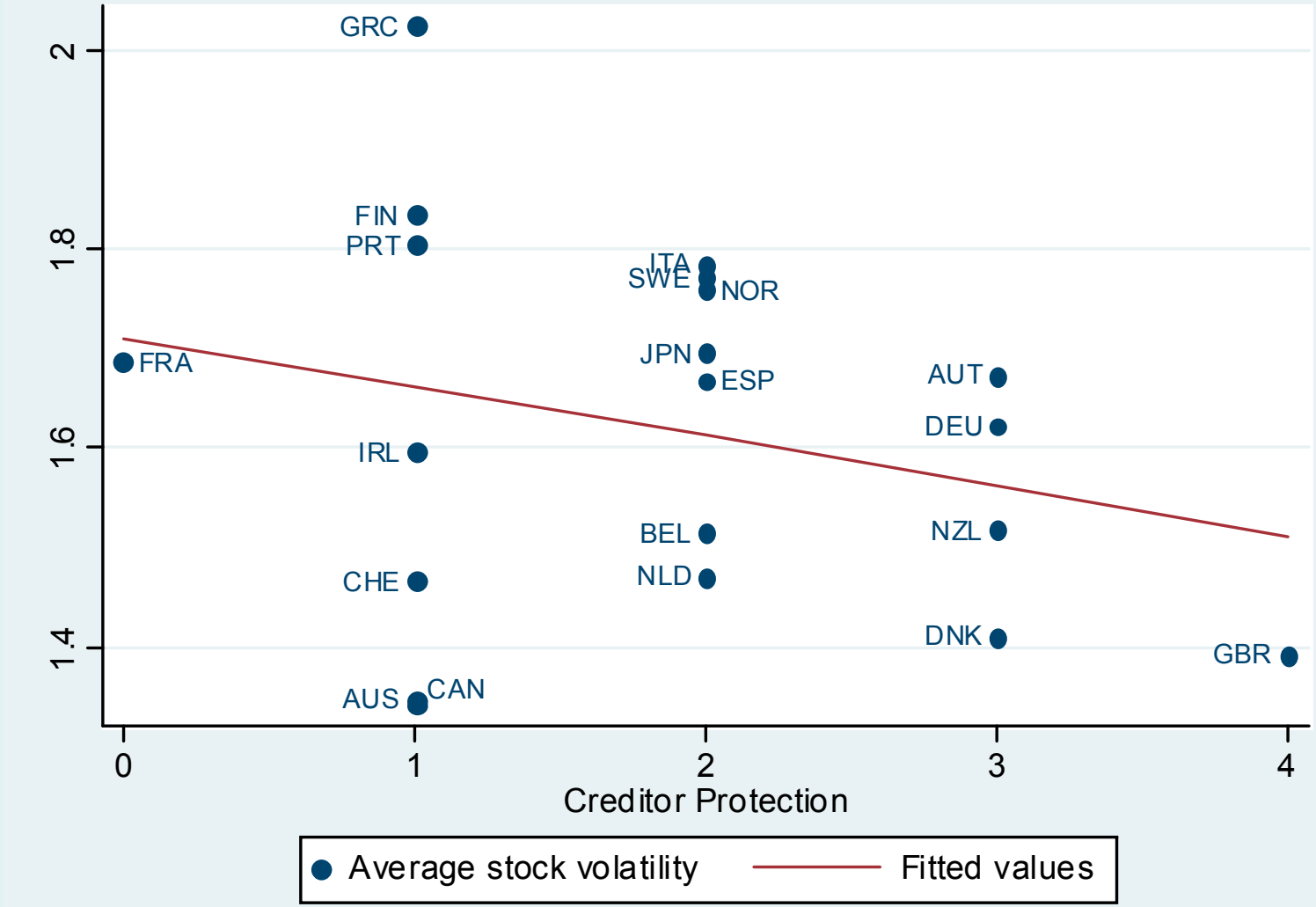


Methodology and Key Findings

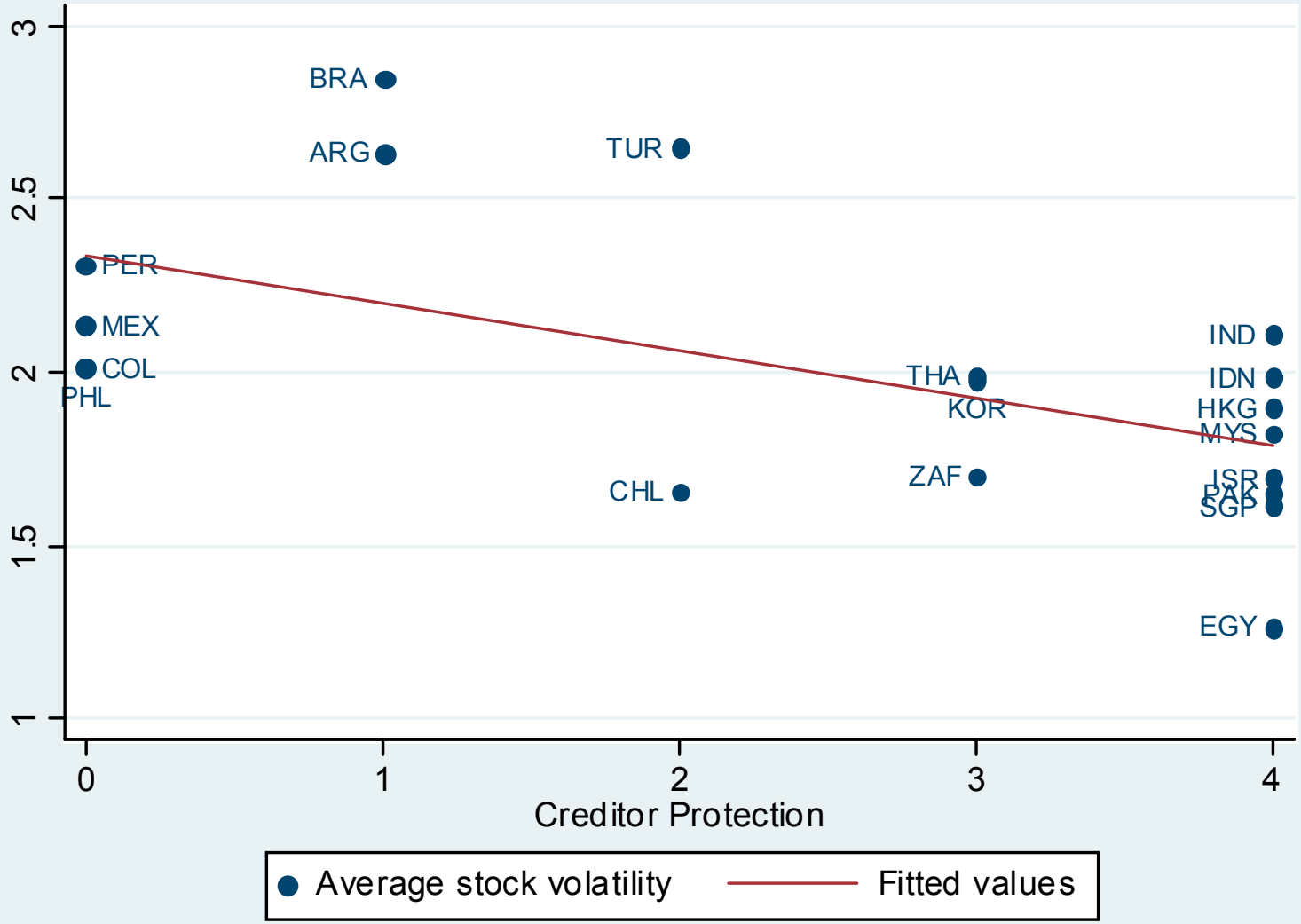
- We develop a Tobin Q model of stock price, and confront the model with a panel data of 40 countries from 1984 to 2004.

- We find that better creditor protection increases stock price and reduce volatility.

Average Stock Volatility (OECD, 84-04)



Average Stock Volatility (Non-OECD, 84-04)



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

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: $I_t \le \omega K_t - W_t$;

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

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

Comparative stat: $\frac{\partial \hat{P}_{t,constrained}}{\partial \omega} > 0$; $\hat{P}_{t,constrained} < \hat{P}_{t,unconstrained}$

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

$$\Pr\left(I_{t,\text{unconstrained}} > \omega K_t - W_t\right),$$

where $I_{t,unconstrained}$ is the investment under frictionless regime:

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

- Higher ω 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.

$$E\left[P_t\right] = \Pr\left(Constrained\right) P_{t,constrained} + \Pr\left(Unconstrained\right) P_{t,unconstrained}$$

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.

$$Var\left[P_t\right] = \Pr\left(Constrained\right) * \Pr\left(Unconstrained\right) * \left(P_{unconstrained,t} - P_{constrained,t}\right)^2$$

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

- Analyze aggregate stock prices in 40 countries from 1984-2004.
- 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

	Quantity definition	**Price definition**
Dummy (Creditor rights = 3 or 4)	-0.055***	-0.078***
Crisis (t-1)	0.119**	0.047
ICRG political stability	-0.002***	-0.003***
Growth rate of GDP per capita	-0.337***	
Lagged contagion indicator		0.005*
Capital openness (de jure)		-0.002***
McFadden's R^2	0.18	0.21

Second Stage

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

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

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 4: Second-Stage Regressions of Stock Market Level						
	Quantity	Quantity-developing	Quantity-developed	Price	Price-developing	Price-developed
Prob(crisis)–quantity	-0.675***	-0.625***	-0.896***			
Prob(crisis)–price				-0.835***	-0.749***	-0.279
Lagged dependent variable	0.745***	0.730***	0.785***	0.710***	0.687***	0.781***
Growth rate of GDP per capita	0.076	0.729***	-0.236***	0.082	0.613***	-0.124***

Table 6: Second Stage Regressions of Stock Market Volatility						
	Quantity	Quantity-developing	Quantity-developed	Price	Price-developing	Price-developed
Prob(crisis)–quantity	0.318**	0.334**	0.512			
Prob(crisis)–price				0.759***	0.509**	3.014***
Lagged dependent variable	0.266***	0.345***	0.116**	0.263***	0.345***	0.104*
Growth rate of GDP per capita	-0.271**	0.334***	0.245	-0.211*	-0.499***	0.207

Robustness Checks

- In the 2nd 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 1st 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.*