

Internet Appendix for
"Dynamic Debt Runs and Financial Fragility:
Evidence from the 2007 ABCP Crisis"

This internet appendix contains supplemental material to the paper ‘Dynamic Debt Runs and Financial Fragility: Evidence from the 2007 ABCP Crisis.’

Internet Appendix A. The Model

As in He and Xiong (2012), we focus on symmetric monotone equilibria, where each creditor is best-responding to all others’ decision to run if and only if the fundamental asset value drops below a common threshold, y^* . To solve for our model’s threshold, we must show first that the creditor’s value function depends only on one state variable: the conduit’s (inverse) leverage, x_t , i.e., the ratio of asset value, y_t to total debt, D_t . We start by characterising the dynamics of the conduit’s debt, then of x_t and then solve for the threshold x^* .

Debt dynamics

Since all debt is equally likely to roll over in the next instant, regardless of when and at what yield it was originated, then the total face value of paper outstanding at t , D_t , equals the average face value of debt rolling over at time t . Moreover, the change in total face value at time t equals

$$dD_t = \delta D_t (R_t - 1) dt, \tag{1}$$

where a fraction δdt is rolled over at every period, and for every dollar of face value that is rollover over, the conduit issues new debt at face value R_t .

Value function

There are three possible payouts for a lender who holds debt with face value R_s at some date $\tau \leq s$:

1. The program matures at time $\tau = \tau_\phi$ so that the creditor is either paid in full or gets share of the assets proportional to his face value, i.e.,

$$\frac{R_s}{D_{\tau_\phi}} \times \min(D_{\tau_\phi}, y_{\tau_\phi}) = R_s \min\left(1, \frac{y_{\tau_\phi}}{D_{\tau_\phi}}\right). \quad (2)$$

2. The firm defaults at time $\tau = \tau_\theta$ after other creditors run and backup credit lines fail. The creditor recovers a share of the post-liquidation net present value of the asset, i.e.,

$$\frac{R_s}{D_{\tau_\theta}} \min(D_{\tau_\theta}, ly_{\tau_\theta}) = R_s \min\left(1, l \frac{y_{\tau_\theta}}{D_{\tau_\theta}}\right), \quad (3)$$

where

$$ly_{\tau_\theta} \equiv \alpha \frac{\phi}{\rho + \phi - \mu} y_{\tau_\theta}. \quad (4)$$

3. The debt contract matures at time $\tau = \tau_\delta$, allowing the lender to choose between rolling over or running. Because the amount of debt maturing at each instant is infinitesimally, a running lender can be paid off in full. If the lender rolls over, the old loan is retired and a new loan is issued with face value R_{τ_δ} . Let $V(y_\tau, D_\tau, R_s; y^*)$ be the value in time τ of one dollar loaned at time $s \leq \tau$. The lenders payoff in τ_δ is therefore

$$\max_{\text{roll over or run}} \{R_s V(y_{\tau_\delta}, D_{\tau_\delta}, R_{\tau_\delta}; y^*), R_s\} = R_s \max_{\text{roll over or run}} \{V(\cdot), 1\}$$

Combining these three possible payoffs, the time t value to a creditor who last loaned one dollar at time $s \leq t$ equals

$$\begin{aligned} V(y_t, D_t, R_s; y^*) = & E_t \left\{ e^{-\rho(\tau-t)} R_s \min\left(1, \frac{y_\tau}{D_\tau}\right) \mathbf{1}_{\{\tau=\tau_\phi\}} \right\} + \\ & E_t \left\{ e^{-\rho(\tau-t)} R_s \min\left(1, l \frac{y_\tau}{D_\tau}\right) \mathbf{1}_{\{\tau=\tau_\theta\}} \right\} + \\ & E_t \left\{ e^{-\rho(\tau-t)} R_s \max_{\text{rollover or run}} \{V(y_{\tau_\delta}, D_{\tau_\delta}, R_{\tau_\delta}; y^*), 1\} \mathbf{1}_{\{\tau=\tau_\delta\}} \right\}. \end{aligned} \quad (5)$$

For $x_t \equiv y_t/D_t$, equation (5) simplifies to

$$V(y_t, D_t, R_s; y^*) = R_s W(x_t; x^*) \quad (6)$$

$$\begin{aligned} W(x_t; x^*) = & E_t \left\{ e^{-\rho(\tau-t)} \min(1, x_\tau) \mathbf{1}_{\{\tau=\tau_\phi\}} \right\} + \\ & E_t \left\{ e^{-\rho(\tau-t)} \min(1, lx_\tau) \mathbf{1}_{\{\tau=\tau_\theta\}} \right\} + \\ & E_t \left\{ e^{-\rho(\tau-t)} \max_{\text{rollover or run}} \{R_\tau W(x_\tau; x^*), 1\} \mathbf{1}_{\{\tau=\tau_\delta\}} \right\}. \end{aligned} \quad (7)$$

The new function $W(x_t, x^*)$ is the value at time t to a creditor with one dollar of face value. This value does not depend on when the creditor last rolled over, due to the memoryless properties of the exponential distribution.

Applying Ito's Lemma and equation (1), it is straightforward to show that inverse leverage follows

$$\frac{dx_t}{x_t} = [\mu - \delta(R_t - 1)] dt + \sigma dZ_t. \quad (8)$$

Since the value function (7) and the dynamics of x_t are both functions of x_t only, then x_t is the only state variable of the problem.

Loosely speaking, x_t measures the inverse of firm leverage. This result implies that rollover yields depend on leverage but not on the asset value (y_t) or the debt level (D_t) individually, which is intuitive. Also, the model exhibits hysteresis: even if two firms started with the same initial asset value y_0 and share the same current asset value y_t , the firm that experienced lower intermediate realizations of y_s , for some $0 < s < t$, will have higher debt and hence higher yields and a higher probability of a run. Most importantly, investors choose whether to run by comparing the current inverse leverage x_t to a threshold x^* .

The numerical procedure below relies on the limit of debt prices W when inverse leverage x becomes large. In this limit, there is effectively no chance of default or runs, so W simplifies to

$$\begin{aligned} \lim_{x \rightarrow \infty} W(x; x^*) &= E_t \left\{ e^{-\rho(\tau-t)} \left[\mathbf{1}_{\{\tau=\tau_\phi\}} + \mathbf{1}_{\{\tau=\tau_\delta\}} \right] \right\} \\ &= \frac{\phi + \delta}{\rho + \phi + \delta}. \end{aligned}$$

Equilibrium debt prices and run threshold

Next we characterize the equilibrium properties of the face value, R_t . Investors break even if for every \$1 invested in the firm at time t , they receive a loan worth \$1. Formally, breaking even implies

$$1 = R_t W(x_t; x^*), \quad (9)$$

where W is the present value of \$1 of face value. Since face values cannot exceed the cap, \bar{R} , the rollover face value is

$$R_t = \min \left[\bar{R}, W(x_t; x^*)^{-1} \right].$$

Following He and Xiong (2012), we focus on symmetric monotone equilibria: if all other investors use run threshold x^* , then an investor's optimal response is to use that same threshold. The following Proposition describes how to find this threshold.

Proposition 1 *Let $R_t \equiv \min \left[\bar{R}, W(x_t; x^*)^{-1} \right]$. Then*

$$R_t = \begin{cases} W(x_t; x^*)^{-1} & \text{if } x_t > x^*, \\ \bar{R} = W(x_t; x^*)^{-1} & \text{if } x_t = x^* \\ \bar{R} & \text{if } x_t < x^*. \end{cases}$$

The proof is below. The Proposition states that runs will not occur at face values R_t below the cap \bar{R} . The reason is that face values can still increase if they are below their cap, potentially inducing creditors to roll over their debt. Proposition 1 characterizes the equilibrium threshold, x^* , as the point $x_t = x^*$ where investors break even at the capped face value, i.e., where

$$\bar{R} = W(x^*; x^*)^{-1}.$$

Proof of Proposition 1. Note first that any creditor's continuation payoff must be equal to 1. By definition, for any x_t , the payoffs are

$$\begin{aligned} \max_{\text{run or roll over}} \{1, R_t W(x_t, x^*)\} &= \max_{\text{run or roll over}} \left\{ 1, \min \left[\bar{R}, W(x_t, x^*)^{-1} \right] W(x_t, x^*) \right\} \\ &= \max_{\text{run or roll over}} \left\{ 1, \min \left[\bar{R} W(x_t, x^*), 1 \right] \right\} = 1. \end{aligned}$$

First we show $R_t = \bar{R}$ if $x_t < x^*$. If $x_t < x^*$, creditors will refuse to roll over their loan at maturity. Because running gives them a payoff of 1, rolling over must give them a strictly lower payoff, i.e., $R_t W(x_t, x^*) < 1$. By definition of R_t , this inequality becomes

$$\min \left[\bar{R}, W(x_t, x^*)^{-1} \right] \times W(x_t, x^*) < 1.$$

Since $W(x_t, x^*)^{-1} \times W(x_t, x^*) = 1$, it must be that $\min \left[\bar{R}, W(x_t, x^*)^{-1} \right] = \bar{R}$. Therefore, $R_t = \bar{R}$.

Suppose that $x_t \geq x^*$. In this case, creditors choose to roll over. If they do so, their payoff must be at least as high as running, which pays 1. Because their payoffs are bounded above by 1, then rolling over must always pay 1. Therefore, for $x_t \geq x^*$

$$\begin{aligned} \min \left[\bar{R}, W(x_t, x^*)^{-1} \right] \times W(x_t, x^*) &= 1 \\ \Rightarrow \min \left[\bar{R} W(x_t, x^*), 1 \right] &= 1. \end{aligned}$$

The previous equality holds if either $\bar{R} W(x_t, x^*) > 1$ for every $x \geq x^*$ or if there exist some $x' \in [x^*, \infty)$ where $\bar{R} W(x', x^*) = 1$ and $\bar{R} W(x_t, x^*) > 1$ for all other $x_t \neq x'$. Because $W(x, x^*)$ is strictly increasing in x , then x' is unique. Moreover, because $\bar{R} W(x', x^*) = 1$ is a minimum, then $x' = x^*$, i.e., the lowest point in the support. In summary, then either

$$R_t = \begin{cases} W(x_t, x^*)^{-1} > \bar{R} & \text{for all } x_t \geq x^*, \\ \bar{R} & \text{if } x_t < x^*. \end{cases} \quad [\text{case (i)}]$$

or

$$R_t = \begin{cases} W(x_t, x^*)^{-1} & \text{if } x_t > x^* \\ \bar{R} & \text{if } x_t = x^* \\ \bar{R} & \text{if } x_t < x^* \end{cases} \quad [\text{case (ii)}].$$

Next we show that case (i) cannot be true, arguing by contradiction. In case (i) we have

$$R^* \equiv W(x^*, x^*)^{-1} < \bar{R}$$

exactly at the run boundary. Hence we have

$$1 = R^*W(x^*, x^*) < \bar{R}W(x^*, x^*). \quad (10)$$

The equality above is from the definition of R^* , and the inequality is from $W > 0$ and $R^* < \bar{R}$. By the assumed continuity of $W(x, x^*)$ at $x = x^*$, there exists a $\xi > 0$ such that for all $x' \in (x^* - \xi, x^*)$, $\bar{R}W(x', x^*) > 1$. We therefore have a contradiction: At $x' < x^*$ the investor runs (since we assume runs happen below x^*), but at x' it is not optimal to run (since $\bar{R}W(x', x^*) > 1$, the payoff from rolling over at $R_t = \bar{R}$, is strictly greater than 1, the payoff from running). ■

Analytical solution to the ODE for $W(x, x^*)$ below the run threshold

Using equations (7) and (8), we can write the general Hamiltonian-Jacobi-Bellman (HJB) equation as

$$\begin{aligned} \rho W(x_t; x^*) &= [\mu - \delta(R_t - 1)]x_t W_x(\cdot) + \frac{\sigma^2}{2}x_t^2 W_{xx}(\cdot) \\ &+ \phi[\min(1, x_t) - W(\cdot)] \\ &+ \theta\delta\mathbf{1}_{\{x_t < x^*\}}[\min(1, lx_t) - W(\cdot)] \\ &+ \delta \left[\max_{\text{rollover or run}} \{R_t W(x_t; x^*), 1\} - W(\cdot) \right]. \end{aligned} \quad (11)$$

Since $R_t W(x_t; x^*) \leq 1$, the HJB equation simplifies to

$$\begin{aligned} \rho W(x_t; x^*) &= [\mu - \delta(R_t - 1)]x_t W_x(\cdot) + \frac{\sigma^2}{2}x_t^2 W_{xx}(\cdot) \\ &+ \phi \min(1, x_t) + \theta\delta\mathbf{1}_{\{x_t < x^*\}} \min(1, lx_t) \\ &- (\phi + \theta\delta\mathbf{1}_{\{x_t < x^*\}} + \delta) W(\cdot) + \delta. \end{aligned} \quad (12)$$

For a given threshold x^* , the HJB equation can be solved analytically for $x_t < x^* \iff R_t = \bar{R} < W(x_t, x^*)^{-1}$. We rely on this analytical solution in our numerical procedure for finding x^* .

When $x < x^*$, the HJB simplifies to

$$\begin{aligned}
0 &= [\mu - \delta (\bar{R} - 1)] x_t W_x + \frac{\sigma^2}{2} x_t^2 W_{xx} \\
&+ \phi \min(1, x_t) + \theta \delta \min(1, lx_t) \\
&- (\rho + \phi + \theta \delta + \delta) W(\cdot) + \delta,
\end{aligned} \tag{13}$$

The exact solution is

$$\begin{aligned}
W(x, x^*) &= d_2 x^\eta + d_3 x^{-\gamma} - \frac{a_5}{a_3} - \frac{a_4}{a_3 + a_1} x, \\
\eta &\equiv \frac{1}{2a_2} \left(a_2 - a_1 + \sqrt{(a_2 - a_1)^2 - 4a_3 a_2} \right) > 0 \\
-\gamma &\equiv \frac{1}{2a_2} \left(a_2 - a_1 - \sqrt{(a_2 - a_1)^2 - 4a_3 a_2} \right) < 0,
\end{aligned}$$

$$\begin{aligned}
a_1 &= (\mu + \delta - \delta \bar{R}) \\
a_2 &= \frac{\sigma^2}{2} > 0 \\
a_3 &= -(\phi + \rho + \theta \delta + \delta) < 0 \\
a_4 &= \theta \delta l \mathbf{1}_{\{x \leq 1/l\}} + \phi \mathbf{1}_{\{x \leq 1\}} \geq 0 \\
a_5 &= \delta + \theta \delta l \mathbf{1}_{\{x \geq 1/l\}} + \phi \mathbf{1}_{\{x \geq 1\}} > 0,
\end{aligned}$$

where coefficients d_2 and d_3 are determined by boundary conditions, value matching, and smooth pasting at $x = 1$ and $x = 1/l$. Next we examine the cases where $x \leq x^*$ and either $x^* \leq 1$, $1 \leq x^* \leq 1/l$, or $x^* \geq 1/l$.

Case 1: $x^* \leq 1$

The solution is

$$W(x, x^*) = Ax^\eta - \frac{a_5}{a_3} - \frac{a_4}{a_3 + a_1} x, \text{ for } x \leq x^*$$

where

$$\begin{aligned}
a_4 &= \theta \delta l + \phi \\
a_5 &= \delta.
\end{aligned}$$

Following He and Xiong (2012), we eliminate the term with $x^{-\gamma}$ so that the solution does not explode as x approaches zero.

If $x^* < 1$ then we can already solve for A as a function of x^* . Value matching and Proposition 1 imply that

$$W(x^*, x^*) = A(x^*)^\eta - \frac{a_5}{a_3} - \frac{a_4}{a_3 + a_1}(x^*) = \frac{1}{R},$$

$$A = \left[\frac{1}{R} + \frac{a_5}{a_3} \right] (x^*)^{-\eta} + \frac{a_4}{a_3 + a_1} (x^*)^{1-\eta}.$$

Case 2: $1 \leq x^* \leq 1/l$

The solution is

$$W(x, x^*) = \begin{cases} Ax^\eta - \frac{a_5}{a_3} - \frac{a_4}{a_3 + a_1}x & \text{for } x \leq 1 \\ B_1x^\eta + B_2x^{-\gamma} - \frac{b_5}{a_3} - \frac{b_4}{a_3 + a_1}x & \text{for } 1 < x \leq x^* \end{cases}$$

where

$$b_4 = \theta\delta l$$

$$b_5 = \delta + \phi$$

$$B_1 = A + \frac{\phi}{\gamma + \eta} \left[\frac{\gamma}{a_3} - \frac{\gamma + 1}{a_3 + a_1} \right]$$

$$B_2 = \frac{\phi}{\gamma + \eta} \left[\frac{(1 - \eta)}{a_3 + a_1} + \frac{\eta}{a_3} \right]$$

$$A = \left(\frac{1}{R} + \frac{b_5}{a_3} \right) (x^*)^{-\eta} + \frac{b_4}{a_3 + a_1} (x^*)^{1-\eta}$$

$$- B_2 (x^*)^{-\gamma-\eta} - \frac{\phi}{\gamma + \eta} \left[\frac{\gamma}{a_3} - \frac{\gamma + 1}{a_3 + a_1} \right].$$

Runs and solvency

Like He and Xiong (2012), we find that creditors may run on solvent firms, i.e., $x^* > 1$, but not on “super-solvent” firms. Solvent firms are those where the asset’s market value, $F(y_t)$, exceeds the amount owed to creditors, D_t . Super-solvent firms are those where the asset’s fire-sale value, $\alpha F(y_t)$, exceeds D_t , i.e., where $x > 1/l$. When the run threshold x^* exceeds $1/l$, then the analytical solution for W (the market value of \$1 of face value) decreases in x for some values $x < x^*$. Formally, the analytical solution for $W(x, x^*)$ for all $x \leq x^*$ and $x^* \geq 1/l$ is

$$W(x, x^*) = \begin{cases} Ax^\eta - \frac{a_5}{a_3} - \frac{a_4}{a_3+a_1}x & \text{for } x \leq 1, \\ B_1x^\eta + B_2x^{-\gamma} - \frac{b_5}{a_3} - \frac{b_4}{a_3+a_1}x & \text{for } 1 < x \leq 1/l, \\ C_1x^\eta + C_2x^{-\gamma} - \frac{c_5}{a_3} - \frac{c_4}{a_3+a_1}x & \text{for } 1/l < x \leq x^*. \end{cases}$$

where

$$c_5 = \delta + \theta\delta l + \phi$$

$$c_4 = 0$$

$$C_1 = B_1 + l^\eta\theta\delta \frac{\gamma}{\gamma + \eta} \left[\frac{l}{a_3} - \frac{1}{a_1 + a_3} \left(1 + \frac{1}{\gamma} \right) \right],$$

$$C_2 = B_2 + l^{-\gamma}\theta\delta \frac{\eta}{\gamma + \eta} \left[\frac{l}{a_3} - \frac{1}{a_1 + a_3} \left(1 - \frac{1}{\eta} \right) \right],$$

and the formulas for B_1 and B_2 are above. The expression for A is now

$$\begin{aligned} A = & \left(\frac{1}{R} + \frac{c_5}{a_3} \right) (x^*)^{-\eta} + \frac{c_4}{a_3 + a_1} (x^*)^{1-\eta} - C_2 (x^*)^{-\gamma-\eta} \\ & - l^\eta\theta\delta \frac{\gamma}{\gamma + \eta} \left[\frac{l}{a_3} - \frac{1}{a_1 + a_3} \left(1 + \frac{1}{\gamma} \right) \right] \\ & - \frac{\phi}{\gamma + \eta} \left[\frac{\gamma}{a_3} - \frac{\gamma + 1}{a_3 + a_1} \right]. \end{aligned}$$

Smooth-pasting at $W(1/l, x^*)$ implies that $W_x < 0$ for all $1/l < x < x^*$. That is, for frantic runs to occur, it must be that that bond values decrease in asset values.

Restrictions on parameter values

We impose the following necessary restrictions on the parameter values. To prevent the asset's present value, $F(y_t) = \phi / (\rho + \phi - \mu)$, from exploding or becoming negative, we require that

$$\mu < \rho + \phi.$$

Second, we limit α , the recovery rate in liquidation, to

$$\alpha < \frac{\rho + \phi - \mu}{\phi}$$

so that $l \equiv \alpha \frac{\phi}{\phi + \rho - \mu} < 1$, i.e., the asset liquidation value $\alpha F(y_t)$ is not enough to pay off all lenders when the firm's maturity value y_t drops below the total book value of outstanding debt, D_t .

Internet Appendix B. Partial Asset Sales

Suppose the conduit attempts to sell off portion a of its assets to pay out the running creditors, instead of borrowing from the sponsor's credit line. The partial asset sale will decrease the conduits leverage, and increase x_t if and only if

$$\begin{aligned} \frac{y_t}{D_t} &\leq \frac{y_t - a \times y_t}{D_t - \delta D_t dt} \\ &\Leftrightarrow \delta dt \geq a. \end{aligned} \tag{14}$$

Intuitively, leverage decreases if and only if the proportion of assets needed to be sold is lower than the proportion of debt needed to be paid out, which equals δdt .

To pay off creditors, the partial asset sale must generate enough cash net of liquidation costs, i.e.,

$$\begin{aligned} a \times ly_t &= \delta D_t dt \\ \Rightarrow a &= \frac{D_t \delta}{y_t l} dt. \end{aligned} \tag{15}$$

Replacing (15) into (14), we obtain that partial sales of assets will only decrease leverage, and increase x_t if and only if

$$ly_t \geq D_t,$$

which implies that the firm must be 'super' solvent, i.e., have enough assets to pay off all its debt even after full liquidation. As we show above, a run never occurs at such low levels of leverage. Therefore, partial liquidations of assets only worsen the leverage of a conduit during a run state.

Clearly, this analysis relies on the assumption that the unit fire-sale recovery rate, l , is independent of the size of the sale. In a more plausible scenario, the recovery rate on partial sales, \tilde{l} , would be higher than the recovery rate on full sales. In that case, the conduit could use partial sales at higher levels of leverage, possibly even during a run. However, for any given partial fire-sale recovery rate, $\tilde{l} > l$, there will be a leverage level $1/\tilde{x}$ such that leverage $1/x_t$ increases as a result of partial sales if and only if $1/x_t \geq 1/\tilde{x}$. That is, partial sales cannot be effective in deterring runs once the firm is sufficiently levered.

Internet Appendix C. Additional Tables

Table IA. Estimated Jacobian Matrix

This table presents the estimates of the Jacobian matrices for the 13 moment conditions in our SMM estimation procedure. The first Jacobian corresponds to the subsample of 90 ABCP conduits in 2007 with SIV or extendible credit guarantees. The second corresponds to the subsample of 191 conduits in 2007 with full credit or full liquidity guarantees. Moment 1 is the probability that a conduit experiences a recovery within 8 weeks of a run’s start. Moments 2 is the average number of days between the run’s start and recovery, conditional on a recovery occurring within 8 weeks of the run’s start. Moments 3 and 4 are the intercept and slope from a regression of absolute changes in yield spreads on the lagged yield spread. Moments 5–7 are the intercept and slopes from a regression of yield spreads on the number of weeks relative to a run and the exponent of that same number. Moments 8–13 come from 3 regressions, each of the indicator $\mathbf{1}_{\{\text{run within } \tau \text{ weeks}\}}$ on the current yield spread. The three regressions use $\tau=2, 4,$ and 8 weeks. Each row of each matrix contains the elasticities of the given moment with respect to the parameters across its columns. Estimation is done by SMM, which chooses parameter estimates that minimize the distance between actual and simulated moments.

		SIV/Extendible guarantee				Full credit/liquidity guarantee			
		Elasticity of moments with respect to				Elasticity of moments with respect to			
		θ	σ	\bar{r}	α	θ	σ	\bar{r}	α
Moments on time between run and recovery (τ):									
1	Pr[$\tau < 8$ weeks]	-0.209	-0.106	-0.036	0.075	-0.048	0.100	-0.004	0.270
2	$E[\tau \tau \leq 8 \text{ weeks}]$	-0.104	-0.295	-0.011	0.106	-0.009	-0.039	0.002	-0.107
Moments from regression of $ r_{it+1} - r_{it} $ on r_{it} :									
3	Intercept	0.112	0.106	0.724	-0.758	0.003	0.239	1.012	-1.159
4	Slope	0.002	-0.307	0.133	0.472	-0.045	-0.299	-0.070	0.921
Moments describing yield spreads leading up to runs:									
Regression of r_{it} on $\tau = 2$ weeks relative to run and $\exp(\tau)$									
5	Intercept	0.102	-0.186	0.990	-0.311	-0.059	0.159	1.012	-0.412
6	Slope on τ	0.133	-0.149	0.977	-0.870	0.006	0.365	1.012	0.100
7	Slope on $\exp(\tau)$	0.235	-0.548	1.093	-0.118	0.073	-0.250	1.002	0.667
Regressions of $\mathbf{1}_{\{\text{run within } \tau \text{ weeks}\}}$ on yield spread:									
8	Intercept ($\tau = 2$)	0.023	-0.424	0.243	-0.446	-0.137	-0.927	0.179	-1.952
9	Slope ($\tau = 2$)	-0.030	0.177	-0.055	-0.296	0.044	0.376	-0.036	0.958
10	Intercept ($\tau = 4$)	-0.414	0.694	-0.498	-2.562	-7.573	-4.870	-14.932	-22.509
11	Slope ($\tau = 4$)	0.028	-0.023	0.057	-0.444	0.105	0.138	0.227	0.687
12	Intercept ($\tau = 8$)	-0.158	0.283	-0.571	-0.344	-0.222	0.047	-0.764	-0.228
13	Slope ($\tau = 8$)	0.066	-0.067	0.180	-0.097	0.112	0.064	0.387	0.278

Table IIA. Robustness of parameter estimates with respect to μ

This table shows the robustness of parameter estimates with respect to the assumed value of μ , the asset's growth rate. Definitions are the same as in Table III in the main paper. Base-case results, which assume $\mu = \rho = 4.9\%$ = risk-free rate, are identical to the parameter estimates for the weak-guarantee subsample in Table III. The last rows show how parameter estimates change if we instead assume $\mu = \rho + 0.01$.

	Weakness of credit guarantee θ	Asset volatility (% per year) σ	Cap on yield spreads (b.p. per year) \bar{r}	Asset liquidity α
Base case ($\mu = \rho$)	0.449 (0.144)	4.30 (0.10)	59.8 (6.7)	0.920 (0.032)
Robustness ($\mu = \rho + 1\%$)	0.433 (0.118)	4.37 (0.06)	58.7 (7.9)	0.929 (0.013)

Table IIIA. Sensitivity of Run Probabilities to Model Parameters

This table shows the effect on run probabilities of changing model parameters by 1% from their estimated values. Panel A describes the four intervention points from which the sensitivity analysis starts. These points corresponds to yield spreads of 1%, 10%, 50%, and 90% of the capped value. Panel B (C) shows simulated 3-month (1-year) run probabilities. The baseline run probabilities are simulated when parameters are at their estimated value for the SIV/extendible subsample (Table III in the paper). Each following row shows run probabilities resulting from changing one parameter at a time in the direction shown. The last column of Panel B shows the predicted run threshold x^* predicted for the corresponding set of parameter values.

Panel A: Description of intervention points					
	Intervention point	(1)	(2)	(3)	(4)
	Initial yield spread (bp per year)	0.60	5.98	29.92	53.85
	Initial leverage ($1/x_0 = \text{debt to assets}$)	0.879	0.900	0.914	0.919

Panel B: Three-month run probabilities													
Perturbed parameter	Estimated value	Direction of change	Interpretation	Probability of a run within 3 months				Elasticity			Run threshold x^*		
				(1)	(2)	(3)	(4)	(1)	(2)	(3)		(4)	
None		None	Baseline case	0.025	0.255	0.699	0.907						1.0873
$1/x_0$		-	Lower initial leverage	0.006	0.104	0.383	0.550	74.29	59.24	45.31	39.39		1.0873
α	0.920	+	Higher asset liquidity	0.006	0.105	0.385	0.554	-73.89	-58.82	-44.95	-38.94		1.0765
μ	0.049	+	Higher excess growth rate	0.017	0.202	0.597	0.800	-31.63	-21.00	-14.66	-11.80		1.0841
ρ	0.049	-	Lower risk-free rate	0.017	0.203	0.599	0.803	31.09	20.70	14.43	11.55		1.0873
δ	9.872	-	Longer debt maturity	0.023	0.250	0.694	0.904	7.27	2.30	0.73	0.35		1.0873
σ	0.043	-	Lower asset volatility	0.025	0.255	0.698	0.906	0.40	0.18	0.20	0.17		1.0872
\bar{r}	0.0060	+	Higher yield cap	0.025	0.255	0.699	0.906	-0.27	-0.16	-0.12	-0.15		1.0842
θ	0.449	-	Stronger credit guarantee	0.025	0.255	0.699	0.907	0.13	0.08	0.06	0.06		1.0872
ϕ	0.171	+	Shorter asset maturity	0.025	0.255	0.699	0.907	0.00	-0.03	-0.01	-0.01		1.0873

Panel C: One-year run probabilities													
Perturbed parameter	Estimated value	Direction of change	Interpretation	Probability of a run within 1 year				Elasticity					
				(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)		
None		None	Baseline case	0.263	0.558	0.838	0.950						
$1/x_0$		-	Lower initial leverage	0.177	0.412	0.651	0.754	32.72	26.15	22.34	20.66		
α	0.920	+	Higher asset liquidity	0.178	0.414	0.653	0.756	-32.40	-25.88	-22.14	-20.44		
μ	0.049	+	Higher excess growth rate	0.234	0.512	0.779	0.892	-11.27	-8.27	-7.11	-6.13		
ρ	0.049	-	Lower risk-free rate	0.234	0.513	0.780	0.893	11.04	8.12	6.97	5.99		
δ	9.872	-	Longer debt maturity	0.257	0.553	0.835	0.948	2.27	0.87	0.34	0.17		
σ	0.043	-	Lower asset volatility	0.263	0.558	0.838	0.949	0.23	0.11	0.08	0.08		
\bar{r}	0.0060	+	Higher yield cap	0.263	0.558	0.838	0.949	-0.10	-0.07	-0.05	-0.07		
θ	0.449	-	Stronger credit guarantee	0.263	0.558	0.838	0.950	0.08	0.04	0.01	0.03		
ϕ	0.171	+	Shorter asset maturity	0.263	0.558	0.838	0.950	-0.18	-0.11	-0.03	-0.02		