Reps and Warrants and Risk Retention

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Reps and Warrants

- R&W as a put can be expressed via

$$P(L, X, T, \sigma),$$

an American Put Option with loan value L, exercise price $X = 100$, time to maturity of T and volatility σ of market price of the loan.

Uncertain Costly Exercise

- Exercise is uncertain since the investor is uncertain as to whether or not there is a violation of the R&W, the determination of the violation is costly

$$R = \pi_v P(L, X, T, \sigma) - \gamma$$

π_v is the probability of a violation of the R&W,

γ is the cost of determining if there is a violation and enforcing the violation.

Note that, cost γ is incurred for every loan, but the put is only exercised for the proportion π_v with R&W violations.

When to exercise

$$R = \pi_v(X - L) > \gamma$$

As it is costly to perform the analysis to determine if there is a violation, the value of the put may be less than the cost of analysis if

- The value of L is close to X, that is, there is not much pay-off, even with the known violation and the exercise price,
- The percentage of loans analyzed with violations is low.
- The cost of analysis is high.

Investors generally wait until there is a default before determining if there is a violation of the rep and warrant.

For defaulted loans vs. performing loans

- $D \equiv \mathrm{Max}(0,\ X - L)$ is larger
- π_v, the percentage of loans with violations is larger

R&W payoff is equity constrained

- Since exercise of the R&W option is often delayed until default, the equity of the seller/warranty provider becomes important. Proceeds from exercise of the put will be limited by the equity of the counterparty. We can write this as:

$$R = Min\,(E, \pi_v D) - \gamma$$

- Where E is the equity of the provider of the rep and warrant, for an individual loan. Suppose the firm originated N loans with total equity E_0. The amount of equity available for each loan would be:

$$E = E_0/N$$

- Thus, the greater the number of loans the less available to satisfy each repurchase requirement.

$$R = Min\,(E_0/N, \pi_v D) - \gamma$$

R&W is a complex compound option

The investor retains the right as to whether to perform the analysis of violations and enforce the reps and warrants through repurchase, the intrinsic value of the Rep and Warrant can be written as:

$$R = Max[\,0, Min\,(E_0/N, \pi_v D) - \gamma]$$

R&W alternative: penalties

Alternative: provide a penalty, Δ, for a violation regardless of the value of the loan.

- Replace the put option in formula with the penalty.

$$R = Min\,(E_0/N, \pi_v \Delta) - \gamma$$

If Δ is large enough, the firm will have the incentive to investigate violations.

- The equation is positive only if

$$\pi_v \Delta > \gamma$$

- Capital will not limit the payoff only if

$$E_0/N > \pi_v \Delta$$

Setting the penalty and capital

$\bar{\pi}_v$ is the maximum acceptable violation rate

$\hat{\pi}_v$ is the capital requirement violation rate, $\hat{\pi}_v > \bar{\pi}_v$.

Required penalty is $\bar{\Delta} \equiv \gamma/\bar{\pi}_v$

- Penalty covers the cost of re-underwriting.
- A lower acceptable violation rate translates into a larger penalty.

The capital requirement set to cover the expected penalty

$$\overline{E_0} \equiv N\hat{\pi}_v\bar{\Delta} = \gamma N \frac{\hat{\pi}_v}{\bar{\pi}_v}$$

- As, $\frac{\hat{\pi}_v}{\bar{\pi}_v}$ is greater than 1,

$$\overline{E_0} > \gamma N$$

Example

- Cost of an evaluation is 0.2% (20 basis points)of the loan amount
- Allowed violation rate is 1%
- Penalty should be at least 20% of the loan amount.
- Violation rate for capital purposes is 5%, or five times the allowed violation rate,
- Total capital required would only be 1% of the originated loan balance.
- Investor can determine $\bar{\pi}_v$ on a sample of 5% of N, but if there are violations, it will claim the penalty on all $N\pi_v$ loans.
- 5% sample of the loans and would then incur a 0.01% (one basis point) cost on all loans