Portfolio perspective and customer default risk

Model

Consider a supplier who needs to pay off a financial obligation by time T or go bankrupt. The supplier cannot raise external capital to pay the liability and relies on the payments from its customers.

The supplier has two projects: project *G* with the government and project *P* with a private-sector customer. Assume that the payment from either project is enough to pay off the obligation. However, the private-sector customer may default or pay later than agreed. The government's payment is reliable: it does not default and pays on time.

For simplicity, assume that the supplier can work on only one project a time. So it schedules the projects in the sequence of *PG* or *GP*.

Let t denote the time needed to finish project *G* and τ the payment delay of project *G*. If the supplier works on project *G* at time 0, it receives payment *V* at time $t + \tau \leq T$. So the supplier fulfills the financial obligation at T with probability one.

Let $\tilde{t}$ denote the time needed to finish project *P* and $\tilde{\tau}$ the payment delay. Normalize the payoff of project *P* to one. To reflect the possible payment delay or default, assume that $\tilde{\tau}$ is a random variable with $\tilde{\tau} \geq \tilde{\tau}_0$, where $\tilde{\tau}_0$ is the agreed-upone payment delay. As with Project *G*, assume that when the private-sector customer pays as promised, $\tilde{t} + \tilde{\tau}_0 \leq T$.

The supplier aims to maximize its expected present value of payoff ***subject to the constraint that it must pay off the obligation at*** T ***with probability*** α. (In the extreme case, $\alpha = 1$.)

Without QuickPay

Assume that, without QuickPay

$$Prob(t + \tau + \tilde{t} + \tilde{\tau} \leq T) < \alpha. \tag{1}$$

That is, the probability that the payments from both projects arrive before deadline T is less than α. Equ. (1) implies that only sequence *GP* is feasible. Thus, **the supplier works on project *G* first**.

With QuickPay

Let τ_Q denote the payment delay from project *G* after QuickPay implement, which reduces τ by 50% from 30 days to 15 days.

Assume that

$$Prob(t + \tau_Q + \tilde{t} + \tilde{\tau} \leq T) \geq \alpha \tag{2}$$

Equ. (2) implies that the constraint of paying off the obligation is satisfied under both sequences *GP* and *PG*. Thus, the supplier prioritize the project that has a higher payoff.

Roughly speaking, if project *G*'s payoff is lower than project *P*'s payoff, i.e., $V < 1$, then **the supplier works on project *P* first**.

Conclusion

Project *G* may be delayed under QuickPay because the payment acceleration alleviates the liquidity constraint that requires the supplier to work on safer projects with surer payment terms first.

Comments

The key assumption is that delay reduction of 15 days under QuickPay change equ. (1) to equ. (2). I think that this is plausible because even in the case of a multi-year project, the supplier is likely to bill its customers multiple times as it spends money on material and work force. So the customers make multiple payments over the course of the project. These payments may be made monthly or bi-monthly, in which case a reduction of 15 days is significant.

Indeed, as Barror (2016) reported, the bankruptcy rate in the trucking industry drops by 25% after the French government prevented trucking firms from extending to payment terms in excess of 30 days, which reduces the payment terms by 15%. In our case, QuickPay leads to a 50% cut in payment terms for government projects.