deposit funding L, raised from workers. The cost of debt financing is f so that the bank owes $(1 + f) L$ at date $t + 1$ (its notional liabilities). We will show shortly that f is the risk-free rate.

Recall that production chains are subject to a hazard rate $\varepsilon > 0$ of failure by of production chain. Entrepreneurs have limited liability, and so the failure of the chain results in credit losses for the bank. The correlation in defaults across loans follows the Vasicek (2002) model. Production chain j survives into the next period (so that the loan is repaid) when $Z_j > 0$, where Z_j is the random variable

$$Z_j = -\Phi^{-1}\left(\varepsilon\right) + \sqrt{\rho}S + \sqrt{1 - \rho}X_j \tag{36}$$

where $\Phi\left(.\right)$ is the c.d.f. of the standard normal, S and $\{X_j\}$ are independent standard normals, and ρ is a constant between zero and one. S has the interpretation of the economy-wide fundamental factor that affects all chains, while X_j is the idiosyncratic factor for chain j. The parameter ρ is the weight on the common factor, which limits the extent of diversification that investors can achieve. Note that the probability of default is given by $\Pr\left(Z_j < 0\right)$ $= \Pr\left(\sqrt{\rho}S + \sqrt{1 - \rho}X_j < \Phi^{-1}\left(\varepsilon\right)\right) = \Phi\left(\Phi^{-1}\left(\varepsilon\right)\right) = \varepsilon$, consistent with our assumption that each chain has a constant hazard rate of failure of ε.

With bank equity fixed, total lending is determined by the leverage of the bank. Leverage is determined through the following contracting problem, which follows Bruno and Shin (2012). The bank chooses between two alterantive portfolios. The good portfolio consists of loans which have a probability of default ε, and $\rho = 0$. The bad portfolio consists of loans with a higher probability of default $\varepsilon + k$, for $k > 0$ and non-zero ρ. The bad portfolio generates greater dispersion in the outcome density for the loan portfolio, and is associated with a higher option value of limited liability.

Credit extended by the bank is C at interest rate r so that the notional value of assets is $(1 + r) C$. Conditional on Y, defaults are independent. Taking the limit where the number of borrowers becomes large while keeping the notional assets fixed, the realized value of the bank's assets can be written