the regional risks $R_k$. A regional bank $k$ defaults when $w_G(Y_k) < \varphi$, or

$$\begin{aligned} Y_k < w_G^{-1}(\varphi) &= \frac{\Phi^{-1}(\varepsilon)+\sqrt{1-\rho}\Phi^{-1}(\varphi)}{\sqrt{\rho}} \\ &= \Phi^{-1}(\alpha) \end{aligned} \tag{21}$$

Equivalently, regional bank $k$ defaults when $\xi_k < 0$, where $\xi_k$ is the random variable:

$$\begin{aligned} \xi_k &\equiv -\Phi^{-1}(\alpha) + Y_k \\ &= -\Phi^{-1}(\alpha) + \sqrt{\beta}G + \sqrt{1-\beta}R_k \end{aligned} \tag{22}$$

Note the formal symmetry between (22) and the expression for $Z_j$ for the regional bank in (7). The global bank faces borrowers who default with probability $\alpha$, whereas the regional bank faces borrowers who default with probability $\varepsilon$. The global bank faces uncertainty with both a diversifiable element $R_k$ and undiversifiable element $G$, whereas the regional bank faces diversifiable risk $X_j$ and undiversifiable risk $Y$. The parameter $\beta$ plays the analogous role for the global bank as parameter $\rho$ does for the regional bank.

### 2.2.6 Global bank leverage

The solution for global bank leverage is similar to that for regional banks. The global bank has a binary choice between a good portfolio and a bad portfolio. The good portfolio consists of loans with default probability $\alpha$ but where $\beta = 0$, so that correlation in defaults are eliminated. The bad portfolio consists of loans with a higher probability of default $\alpha + h$, for constant $h > 0$, and non-zero correlation of default $\beta' > 0$. The greater correlation in defaults generates dispersion in the asset realisation and hence higher option value of default. If the bank chooses the bad portfolio, the realised value of one dollar face value of loans is the random variable $w_B(G)$ where

$$\begin{aligned} w_B(G) &= \Pr\left(\sqrt{\beta'}G + \sqrt{1-\beta'}R_j \geq \Phi^{-1}(\alpha+h)\,|G\right) \\ &= \Phi\left(\frac{G\sqrt{\beta'}-\Phi^{-1}(\alpha+h)}{\sqrt{1-\beta'}}\right) \end{aligned} \tag{23}$$