A Model

Proof of Proposition 1:

Proof. We start from the Euler equation in eqn. 1.

$$0 = h_t^d + \log E_t \left[\exp \left\{ \alpha \log \beta - \frac{\alpha}{\psi} \Delta c_{t+1}^{ND} + (\alpha - 1) r_{a,t+1}^{ND} + r_{d,t+1}^{ND} \right\} \right].$$

Using log-normality, this in turn implies that the expected return in a non-disaster sample is given by:

$$E_t[r_{t+1}^{i,ND}] + (1/2) var_t[r_{t+1}^{i,ND}] - r^f = + \frac{\alpha}{\psi} cov_t(\Delta c_{t+1}^{ND}, r_{d,t+1}^{i,ND}) - (\alpha - 1) cov(r_{a,t+1}^{ND}, r_{d,t+1}^{i,ND}) - h_t^{d,i}.$$

The result immediately follows. □

Proof of 2:

Proof. Solving the Euler equation for the dividend claim amounts to solving for the log price-dividend ratio in each state i, pd_i. We can solve the following system of N equations for pd_i:

$$\begin{aligned} pd_i &= h_i^d + \alpha \log \beta - \gamma \mu_c + (\alpha - 1)(\kappa_0^c - \kappa_1^c wc_i) + \kappa_0^d + \mu_d + \frac{1}{2}(\phi_d - \gamma)^2 \sigma_{ci}^2 + \frac{1}{2} \sigma_{di}^2 \\ &\quad + \log \left(\sum_{j=1}^{N} \pi_{ij} \exp \left\{ (\alpha - 1) wc_j + \kappa_1^d pd_j \right\} \right), \end{aligned}$$

together with the linearization constants in (6) and (7), and the mean pd ratio:

$$\overline{pd} = \sum_j \Pi_j pd_j. \tag{2}$$

Now take the limit $\pi_{ii} \to 1$. That delivers the result. □

A.1 Valuing the Consumption Claim

We start by valuing the consumption claim. Consider the investor's Euler equation for the consumption claim $E_t[M_{t+1} R_{t+1}^a] = 1$. This can be decomposed as:

$$1 = (1 - p_t) E_t[\exp(\alpha \log \beta - \frac{\alpha}{\psi} \Delta c_{t+1}^{ND} + \alpha r_{a,t+1}^{ND})] + p_t E_t[\exp(\alpha \log \beta - \frac{\alpha}{\psi} \Delta c_{t+1}^{D} + \alpha r_{a,t+1}^{D})],$$

where ND (D) denotes the Gaussian (disaster) component of consumption growth, dividend growth or returns. We define "resilience" for the consumption claim as:

$$H_t^c = 1 + p_t \left(E_t \left[\exp \left\{ (\gamma - 1) J_{t+1}^c \right\} \right] - 1 \right).$$

We log-linearize the total wealth return $R_{t+1}^a = \frac{W_{t+1}}{W_t - C_t}$ as follows: $r_{a,t+1} = \kappa_0^c + wc_{t+1} - \kappa_1^c wc_t + \Delta c_{t+1}$ with linearization constants:

$$\kappa_1^c = \frac{e^{\overline{wc}}}{e^{\overline{wc}} - 1} \tag{3}$$

$$\kappa_0^c = -\log \left(e^{\overline{wc}} - 1 \right) + \kappa_1^c \overline{wc}. \tag{4}$$

The wealth-consumption ratio differs across Markov states. Let wc_i be the log wealth-consumption ratio in Markov state i. The mean log wealth-consumption ratio can be computed using the stationary distribution:

$$\overline{wc} = \sum_{i=1}^{I} \Pi_i wc_i \tag{5}$$

where Π_i is the i^{th} element of vector Π. Note that the linearization constants κ_0^c and κ_1^c depend on $\overline{wc}$. Using the log linearization for the total wealth return, the Euler equation can be restated as follows:

$$1 = \exp(h_t^c) E_t \left[\exp\left\{ \alpha \log\beta - \frac{\alpha}{\psi}(\mu_c + \sigma_{ci}\eta_{t+1}) + \alpha(\kappa_0^c + wc_{t+1} - \kappa_1^c wc_t + \Delta c_{t+1}^{ND}) \right\} \right].$$

Resilience takes a simple form in our setting:

$$\begin{aligned} h_t^c &\equiv \log(H_t^c) = \log\left(1 + p_t \left[\exp\left\{\bar{h}^c\right\} - 1\right]\right), \\ \bar{h}^c &\equiv \log E_t \left[\exp\left\{(\gamma - 1) J_{t+1}^c\right\}\right] = \omega \left(\exp\left\{(\gamma-1)\theta_c + .5(\gamma-1)^2\delta_c^2\right\} - 1\right), \end{aligned}$$

where we used the cumulant-generating function to compute $\bar{h}^c$. It is now clear that resilience only varies with the probability of a disaster p_t. Therefore, it too is a Markov chain. Denote by h_i^c the log resilience in Markov state i. Solving the Euler equation for the consumption claim amounts to solving for the log wealth-consumption ratio in each state i. We obtain the following system of I equations, which can be solved for $wc_i,\ i = 1, \ldots I$:

$$1 \;=\; \exp(h_i^c) \exp\left\{ \alpha(\log\beta + \kappa_0^c) + (1-\gamma)\mu_c - \alpha\kappa_1^c wc_i + \frac{1}{2}(1-\gamma)^2\sigma_{ci}^2 \right\} \sum_{j=1}^{N} \pi_{ij} \exp\left\{\alpha wc_j\right\}$$

where π_{ij} is the transition probability between states i and j. Taking logs on both sides we get the following system of equations which can be solved in conjunction with (3), (4), and (5):

$$0 = h_i^c + \alpha(\log\beta + \kappa_0^c) + (1-\gamma)\mu_c - \alpha\kappa_1^c wc_i + \frac{1}{2}(1-\gamma)^2\sigma_{ci}^2 + \log \sum_{j=1}^{N} \pi_{ij} \exp\left\{\alpha wc_j\right\}.$$

A.2 Valuing the Dividend Claim

The investor's Euler equation for the stock is $E_t[M_{t+1} R_{t+1}^d] = 1$, which can be decomposed as:

$$\begin{aligned} 1 \;=\; & (1 - p_t) E_t \left[\exp(\alpha\log\beta - \frac{\alpha}{\psi}\Delta c_{t+1}^{ND} + (\alpha - 1) r_{a,t+1}^{ND} + r_{d,t+1}^{ND}) \right] \\ & + p_t E_t \left[\exp(\alpha\log\beta - \frac{\alpha}{\psi}\Delta c_{t+1}^{D} + (\alpha - 1) r_{a,t+1}^{D} + r_{d,t+1}^{D}) \right] \end{aligned}$$

If we define "resilience" for the dividend claim as:

$$H_t^d = 1 + p_t \left(E_t \left[\exp\left\{ \gamma J_{t+1}^c - J_{t+1}^d - \lambda_d J_{t+1}^a \right\} \right] - 1 \right),$$

then the Euler equation simplifies to:

$$1 = H_t^d E_t \left[\exp\left\{ \alpha\log\beta - \frac{\alpha}{\psi}\Delta c_{t+1}^{ND} + (\alpha-1) r_{a,t+1}^{ND} + r_{d,t+1}^{ND} \right\} \right].$$

We log-linearize the stock return on bank i, R^d_{t+1}, as $r_{d,t+1} = \kappa^d_0 + \kappa^d_1 pd_{t+1} - pd_t + \Delta d_{t+1}$, with the linearization constants:

$$\kappa^d_1 = \frac{e^{\overline{pd}}}{1+e^{\overline{pd}}}, \tag{6}$$

$$\kappa^d_0 = \log(1+e^{\overline{pd}}) - \kappa^d_1 \overline{pd}. \tag{7}$$

To compute the resilience term, we proceed as before:

$$\begin{aligned} h^d_t &\equiv \log\left(1 + p_t\left(\exp\left\{\bar{h}_d\right\} - 1\right)\right), \\ \bar{h}_d &\equiv \log E_t\left[\exp\left\{\gamma J^c_{t+1} - J^d_{t+1} - \lambda_d J^a_{t+1}\right\}\right]. \end{aligned}$$

By using the independence of the three jump processes conditional on a given number of jumps, we can simplify the last term to:

$$\begin{aligned} \bar{h}_d = \log\Bigg(&\sum_{n=0}^{\infty} \frac{e^{-\omega}\omega^n}{n!} e^{n(\gamma\theta_c + .5\gamma^2\delta_c^2)} e^{n(-\theta_d + .5\delta_d^2)} \\ &\times \left\{ e^{n(-\lambda_d\theta_r + .5\lambda_d^2\delta_r^2)} \Phi\left(\frac{\underline{J} - n\theta_r + n\lambda_d\delta_r^2}{\sqrt{n}\delta_r}\right) + e^{-\lambda_d \underline{J}} \Phi\left(\frac{n\theta_r - \underline{J}}{\sqrt{n}\delta_r}\right)\right\}\Bigg). \end{aligned}$$

The derivation uses Lemma 1 below. The last expression, while somewhat complicated, is straightforward to compute. In the no-bailout case ($\underline{J} \to +\infty$), the last exponential term reduces to $e^{n(-\lambda_d\theta_r + .5\lambda_d^2\delta_r^2)}$. The dynamics of h^d_t are fully determined by the dynamics of p_t, which follows a Markov chain. Denote by h^d_i the resilience in Markov state i.

Solving the Euler equation for the dividend claim amounts to solving for the log price-dividend ratio in each state i, pd_i. We can solve the following system of N equations for pd_i:

$$\begin{aligned} pd_i = \; & h^d_i + \alpha \log\beta - \gamma\mu_c + (\alpha - 1)\left(\kappa^c_0 - \kappa^c_1 wc_i\right) + \kappa^d_0 + \mu_d + \frac{1}{2}(\phi_d - \gamma)^2\sigma^2_{ci} + \frac{1}{2}\sigma^2_{di} \\ & + \log\left(\sum_{j=1}^{N} \pi_{ij} \exp\left\{(\alpha-1) wc_j + \kappa^d_1 pd_j\right\}\right), \end{aligned}$$

together with the linearization constants in (6) and (7), and the mean pd ratio:

$$\overline{pd} = \sum_j \Pi_j pd_j. \tag{8}$$

A.3 Dividend Growth and Return Variance, Return Covariance, and the Equity Risk Premium

Preliminaries Recall that dividend growth in state i today is

$$\begin{aligned} \Delta d_i &= (1-p_i)\Delta d^{ND}_i + p_i \Delta d^D_i, \\ \Delta d^{ND}_i &= \mu_d + \phi_d \sigma_{ci}\eta + \sigma_{di}\epsilon, \\ \Delta d^D_i &= \mu_d + \phi_d \sigma_{ci}\eta + \sigma_{di}\epsilon - J^d - \lambda_d J^a \end{aligned}$$

where the shock $\epsilon = \sqrt{\xi_d}\epsilon^a + \sqrt{1-\xi_d}\epsilon^i$ is the sum of a common shock and an idiosyncratic shock, both of which are standard normally distributed and i.i.d. over time. Stock returns in state i today and assuming a transition to state j next period are:

$$\begin{aligned}
r_i &= (1-p_i)r_i^{ND} + p_i r_i^{D}, \\
r_i^{ND} &= \mu_{rij} + \phi_d \sigma_{ci}\eta + \sigma_{di}\epsilon, \\
r_i^{D} &= \mu_{rij} + \phi_d \sigma_{ci}\eta + \sigma_{di}\epsilon - J^d - \lambda_d J^a, \\
\mu_{rij} &= \mu_d + \kappa_0^d + \kappa_1^d pd_j - pd_i, \\
J^a &= \min(J^r, \underline{J}).
\end{aligned}$$

We are interested in computing the variance of dividend growth rates, the variance of returns and the covariance between a pair of returns. This will allow us to compute the volatility of returns and the correlation of returns.

Applying Lemma 4 below to the J^a process and conditioning on n jumps, we get that

$$\begin{aligned}
E[J^a|n] &= E[\min(J^r, \underline{J})|n] \\
&= E[J^r 1_{(J^r<\underline{J})}|n] + \underline{J}E[1_{(J^r\geq\underline{J})}|n] \\
&= n\theta_r \Phi\left(\frac{\underline{J}-n\theta_r}{\sqrt{n}\delta_r}\right) - \sqrt{n}\delta_r \phi\left(\frac{\underline{J}-n\theta_r}{\sqrt{n}\delta_r}\right) + \underline{J}\Phi\left(\frac{n\theta_r-\underline{J}}{\sqrt{n}\delta_r}\right),
\end{aligned}$$

and

$$\begin{aligned}
E[{J^a}^2|n] &= E[\min(J^r, \underline{J})^2|n] \\
&= E[{J^r}^2 1_{(J^r<\underline{J})}|n] + \underline{J}^2 E[1_{(J^r\geq\underline{J})}|n] \\
&= \left(n\delta_r^2 + n^2\theta_r^2\right)\Phi\left(\frac{\underline{J}-n\theta_r}{\sqrt{n}\delta_r}\right) - \sqrt{n}\delta_r(\underline{J}+n\theta_r)\phi\left(\frac{\underline{J}-n\theta_r}{\sqrt{n}\delta_r}\right) + \underline{J}^2\Phi\left(\frac{n\theta_r-\underline{J}}{\sqrt{n}\delta_r}\right).
\end{aligned}$$

Note that the corresponding moments for the J^d process are:

$$\begin{aligned}
E[J^d|n] &= n\theta_d \\
E[{J^d}^2|n] &= n\delta_d^2 + n^2\theta_d^2.
\end{aligned}$$

We now average over all possible realizations of the number of jumps n to get:

$$\begin{aligned}
E[J^d] &= \sum_{n=1}^{\infty}\frac{e^{-\omega}\omega^n}{n!}E[J^d|n] = \theta_d, \\
E[{J^d}^2] &= \sum_{n=1}^{\infty}\frac{e^{-\omega}\omega^n}{n!}E[{J^d}^2|n] = \delta_d^2 + 2\theta_d^2, \\
E[J^a] &= \sum_{n=1}^{\infty}\frac{e^{-\omega}\omega^n}{n!}E[J^a|n] \equiv \theta_a, \\
E[{J^a}^2] &= \sum_{n=1}^{\infty}\frac{e^{-\omega}\omega^n}{n!}E[{J^a}^2|n], \\
E[J^d J^a] &= \sum_{n=1}^{\infty}\frac{e^{-\omega}\omega^n}{n!}n\theta_d E[J^a|n], \\
E[J^{d,1}J^{d,2}] &= \sum_{n=1}^{\infty}\frac{e^{-\omega}\omega^n}{n!}(n\theta_d)(n\theta_d) = 2\theta_d^2
\end{aligned}$$

where we used our assumption that $\omega = 1$, which implies that $\sum_{n=1}^{\infty}\frac{e^{-\omega}\omega^n}{n!}n = 1$ and $\sum_{n=1}^{\infty}\frac{e^{-\omega}\omega^n}{n!}n^2 = 2$. The last but one expression uses the fact that the two jumps are uncorrelated, conditional on a given number of jumps. The last expression computes the expectation of the product of the idiosyncratic jumps for two different stocks. Note that the correlation between these two idiosyncratic jump processes is zero if and only if $\theta_d = 0$, an assumption we make in our calibration.

Dividend Growth and Return Volatility The variance of dividend growth of a firm can be computed as follows

$$
\begin{aligned}
Var[\Delta d_i] &= (1-p_i)E[\left(\Delta d_i^{ND}\right)^2] + p_i E[\left(\Delta d_i^{D}\right)^2] - \left[(1-p_i)E[\Delta d_i^{ND}] + p_i E[\Delta d_i^{D}]\right]^2, \\
&= (1-p_i)\left[\mu_d^2 + \phi_d^2\sigma_{ci}^2 + \sigma_{di}^2\right] \\
&\quad + p_i\left[\mu_d^2 + \phi_d^2\sigma_{ci}^2 + \sigma_{di}^2 + E[J^{d2}] + \lambda_d^2 E[J^{a2}] + 2\lambda_d E[J^d J^a] - 2\mu_d(E[J^d] + \lambda_d E[J^a])\right] \\
&\quad - \left[(1-p_i)\mu_d + p_i[\mu_d - E[J^d] - \lambda_d E[J^a]]\right]^2, \\
&= \phi_d^2\sigma_{ci}^2 + \sigma_{di}^2 + p_i(\delta_d^2 + 2\theta_d^2 + \lambda_d^2 E[J^{a2}] + 2\lambda_d E[J^d J^a]) - p_i^2(\theta_d + \lambda_d\theta_a)^2
\end{aligned}
$$

Similarly, mean dividend growth is given by $E[\Delta d_i] = \mu_d - p_i(\theta_d + \lambda_d\theta_a)$. If $\theta_d = 0$, as we assume, mean dividend growth is simply $\mu_d - p_i\lambda_d\theta_a$.

The variance of returns can be derived similarly, with the only added complication that we need to take into account state transitions from i to j that affect the mean return μ_{rij}.

$$
\begin{aligned}
Var[r_i] &= (1-p_i)E[\left(r_i^{ND}\right)^2] + p_i E[\left(r_i^{D}\right)^2] - \left[(1-p_i)E[r_i^{ND}] + p_i E[r_i^{D}]\right]^2, \\
&= (1-p_i)\left[\sum_{j=1}^{I}\pi_{ij}\mu_{rij}^2 + \phi_d^2\sigma_{ci}^2 + \sigma_{di}^2\right] \\
&\quad + p_i\left[\sum_{j=1}^{I}\pi_{ij}\mu_{rij}^2 + \phi_d^2\sigma_{ci}^2 + \sigma_{di}^2 + E[J^{d2}] + \lambda_d^2 E[J^{a2}] + 2\lambda_d E[J^d J^a] - 2\sum_{j=1}^{I}\pi_{ij}\mu_{rij}(E[J^d] + \lambda_d E[J^a])\right] \\
&\quad - \left[\sum_{j=1}^{I}\pi_{ij}\mu_{rij} - p_i(E[J^d] + \lambda_d E[J^a])\right]^2, \\
&= \zeta_{ri} + \phi_d^2\sigma_{ci}^2 + \sigma_{di}^2 + p_i(\delta_d^2 + 2\theta_d^2 + \lambda_d^2 E[J^{a2}] + 2\lambda_d E[J^d J^a]) - p_i^2(\theta_d + \lambda_d\theta_a)^2,
\end{aligned}
$$

where

$$
\zeta_{ri} \equiv \sum_{j=1}^{I}\pi_{ij}\mu_{rij}^2 - \left(\sum_{j=1}^{I}\pi_{ij}\mu_{rij}\right)^2,
$$

is an additional variance term that comes from state transitions that affect the price-dividend ratio. The volatility of the stock return is the square root of the variance.

Covariance of Returns The covariance of a pair of returns (r^1, r^2) in state i is:

$$
\begin{aligned}
Cov[r_i^1, r_i^2] &= (1-p_i)E[r_i^{1,ND} r_i^{2,ND}] + p_i E[r_i^{1,D} r_i^{2,D}] \\
&\quad - \left[(1-p_i)E[r_i^{1,ND}] + p_i E[r_i^{1,D}]\right]\left[(1-p_i)E[r_i^{2,ND}] + p_i E[r_i^{2,D}]\right], \\
&= (1-p_i)\left[\sum_{j=1}^{I}\pi_{ij}\mu_{rij}^2 + \phi_d^2\sigma_{ci}^2 + \sigma_{di}^2\xi_d\right] \\
&\quad + p_i\left[\sum_{j=1}^{I}\pi_{ij}\mu_{rij}^2 + \phi_d^2\sigma_{ci}^2 + \sigma_{di}^2\xi_d + E[J^{d,1}J^{d,2}] + \lambda_d^2 E[J^{a2}] + 2\lambda_d E[J^d J^a] - 2\sum_{j=1}^{I}\pi_{ij}\mu_{rij}(\theta_d + \lambda_d\theta_a)\right] \\
&\quad - \left(\sum_{j=1}^{I}\pi_{ij}\mu_{rij}\right)^2 - p_i^2(\theta_d + \lambda_d\theta_a)^2 + 2\sum_{j=1}^{I}\pi_{ij}\mu_{rij}(\theta_d + \lambda_d\theta_a), \\
&= \zeta_{ri} + \phi_d^2\sigma_{ci}^2 + \sigma_{di}^2\xi_d + p_i(2\theta_d^2 + \lambda_d^2 E[J^{a2}] + 2\lambda_d E[J^d J^a]) - p_i^2(\theta_d + \lambda_d\theta_a)^2,
\end{aligned}
$$

where we recall that ξ_d is the fraction of the variance of the Gaussian ϵ shock that is common across all stocks. The correlation between two stocks is the ratio of the covariance to the variance (given symmetry).

Equity Risk premium By analogy with the derivations above, we have

$$\begin{aligned} E[J^c] &= \sum_{n=1}^{\infty} \frac{e^{-\omega}\omega^n}{n!} E[J^c|n] = \theta_c, \\ E[J^d J^c] &= \sum_{n=1}^{\infty} \frac{e^{-\omega}\omega^n}{n!} (n\theta_d)(n\theta_d) = 2\theta_c\theta_d, \\ E[J^a J^c] &= \sum_{n=1}^{\infty} \frac{e^{-\omega}\omega^n}{n!} n\theta_c E[J^a|n] \end{aligned}$$

We also have

$$\begin{aligned} m^{ND} &= \mu_{mij} - \gamma\sigma_{ci}\eta, \\ m^D &= \mu_{mij} - \gamma\sigma_{ci}\eta + \gamma J^c, \\ \mu_{mij} &= \alpha\log\beta + (\alpha-1)(\kappa_0^c + wc_j - \kappa_1^c wc_i) - \gamma\mu_c, \end{aligned}$$

The equity risk premium is $-Cov(m,r)$, which can be derived similarly to the covariance between two returns. In particular:

$$\begin{aligned} Cov[m_i, r_i] &= (1-p_i)E[m_i^{ND} r_i^{ND}] + p_i E[m_i^D r_i^D] \\ &\quad - \left[(1-p_i)E[m_i^{ND}] + p_i E[m_i^D]\right]\left[(1-p_i)E[r_i^{ND}] + p_i E[r_i^D]\right], \\ &= (1-p_i)\left[\sum_{j=1}^{I} \pi_{ij}\mu_{rij}\mu_{mij} - \gamma\phi_d\sigma_{ci}^2\right] \\ &\quad + p_i\left[\sum_{j=1}^{I} \pi_{ij}\mu_{rij}\mu_{mij} - \gamma\phi_d\sigma_{ci}^2 - \gamma E[J^d J^c] - \gamma\lambda_d E[J^a J^c] + \gamma\sum_{j=1}^{I}\pi_{ij}\mu_{rij}\theta_c - \sum_{j=1}^{I}\pi_{ij}\mu_{mij}(\theta_d + \lambda_d\theta_a)\right] \\ &\quad - \left[\sum_{j=1}^{I}\pi_{ij}\mu_{mij} + p_i\gamma\theta_c\right]\left[\sum_{j=1}^{I}\pi_{ij}\mu_{rij} - p_i(\theta_d + \lambda_d\theta_a)\right] \\ &= \zeta_{mi} - \gamma\phi_d\sigma_{ci}^2 - p_i\gamma(2\theta_d\theta_c + \lambda_d E[J^c J^a]) + p_i^2\gamma\theta_c(\theta_d + \lambda_d\theta_a), \end{aligned}$$

where

$$\zeta_{mi} \equiv \sum_{j=1}^{I}\pi_{ij}\mu_{rij}\mu_{mij} - \left(\sum_{j=1}^{I}\pi_{ij}\mu_{rij}\right)\left(\sum_{j=1}^{I}\pi_{ij}\mu_{mij}\right).$$

A.4 Auxiliary Lemmas

Lemma 1. *Let $x \sim N(\mu_x, \sigma_x^2)$ and $y \sim N(\mu_y, \sigma_y^2)$ with $Corr(x,y) = \rho_{xy}$. Then*

$$E[\exp(ax+by)1_{c>y}] = \Psi(a,b;x,y)\Phi\left(\frac{c - \mu_y - b\sigma_y^2 - a\rho_{xy}\sigma_x\sigma_y}{\sigma_y}\right) \tag{9}$$

where $\Psi(a,b;x,y) = \exp\left(a\mu_x + b\mu_y + \frac{a^2\sigma_x^2}{2} + \frac{b^2\sigma_y^2}{2} + ab\rho_{xy}\sigma_x\sigma_y\right)$ is the bivariate normal moment-generating function of x and y evaluated at (a,b).

Proof. Lemma 1 First, note that $x|y \sim N\left(\mu_x + \frac{\rho_{xy}\sigma_x}{\sigma_y}[y-\mu_y], \sigma_x^2(1-\rho_{xy}^2)\right)$, therefore

$$E[\exp(ax)|y] = Q\exp\left(\frac{a\rho_{xy}\sigma_x}{\sigma_y}y\right)$$

where $Q = \exp\left(a\mu_x - \frac{a\rho_{xy}\sigma_x\mu_y}{\sigma_y} + \frac{a^2\sigma_x^2(1-\rho_{xy}^2)}{2}\right)$. Denote $\Gamma = E[\exp(ax+by)1_{c>y}]$, then:

$$\begin{aligned}
\Gamma &= E[E\{\exp(ax)|y\}\exp(by)1_{c>y}] \\
&= QE\left[\exp\left(y\left\{\frac{a\rho_{xy}\sigma_x}{\sigma_y}+b\right\}\right)1_{c>y}\right] \\
&= Q\int_{-\infty}^{c}\exp\left(y\left\{\frac{a\rho_{xy}\sigma_x}{\sigma_y}+b\right\}\right)dF(y) \\
&= Q\int_{-\infty}^{c}\exp\left(y\left\{\frac{a\rho_{xy}\sigma_x}{\sigma_y}+b+\frac{\mu_y}{\sigma_y^2}\right\}-\frac{y^2}{2\sigma_y^2}-\frac{\mu_y^2}{2\sigma_y^2}\right)\frac{dy}{\sigma_y\sqrt{2\pi}} \\
&\quad \text{Complete the square} \\
&= Q\exp\left(\frac{\sigma_y^2}{2}\sigma_y\left\{\frac{a\rho_{xy}\sigma_x}{\sigma_y}+b\right\}^2+\mu_y\left\{\frac{a\rho_{xy}\sigma_x}{\sigma_y}+b\right\}\right)\int_{-\infty}^{c}\exp\left(-\frac{\left[y-\sigma_y^2\left\{\frac{a\rho_{xy}\sigma_x}{\sigma_y}+b+\frac{\mu_y}{\sigma_y^2}\right\}\right]^2}{2\sigma_y^2}\right)\frac{dy}{\sigma_y\sqrt{2\pi}} \\
&\quad \text{Substitute } u = \frac{y-\sigma_y^2\left\{\frac{a\rho_{xy}\sigma_x}{\sigma_y}+b+\frac{\mu_y}{\sigma_y^2}\right\}}{\sigma_y},\ du\sigma_y = dy \\
&= \exp\left(a\mu_x+\frac{a^2\sigma_x^2(1-\rho_{xy}^2)}{2}+\frac{\sigma_y^2}{2}\left\{\frac{a\rho_{xy}\sigma_x}{\sigma_y}+b\right\}^2+b\mu_y\right)\Phi\left(\frac{c-b\sigma_y^2-a\rho_{xy}\sigma_x\sigma_y-\mu_y}{\sigma_y}\right)
\end{aligned}$$

□

Lemma 2. *Let $x \sim N(\mu_x, \sigma_x^2)$, then*

$$E\left[\Phi\left(b_0+b_1x\right)\exp\left(ax\right)1_{x<c}\right] = \Phi\left(\frac{b_0-t_1}{\sqrt{1+b_1^2\sigma_x^2}}, \frac{c-t_2}{\sigma_x}; \rho\right)\exp(z_1) \qquad (10)$$

where $t_1 = -b_1t_2$, $t_2 = a\sigma_x^2+\mu_x$, $z_1 = \frac{a^2\sigma_x^2}{2}+a\mu_x$, $\rho = \frac{-b_1\sigma_x}{\sqrt{1+b_1^2\sigma_x^2}}$, and $\Phi(\cdot\ ,\cdot\ ;\rho)$ is the cumulative density function (CDF) of a bivariate standard normal with correlation parameter ρ.

Proof. Lemma 2 Denote $\Omega = E\left[\Phi\left(b_0 + b_1 x\right)\exp\left(ax\right)1_{x<c}\right]$, then:

$$\begin{aligned}
\Omega &= \int_{-\infty}^{c}\int_{-\infty}^{b_0+b_1x} \exp\left(ax\right) dF(v) dF(x) \\
&= \int_{-\infty}^{c}\int_{-\infty}^{b_0+b_1x} \exp\left(ax - \frac{v^2}{2} - \frac{\left[x-\mu_x\right]^2}{2\sigma_x^2}\right)\frac{dv\ dx}{\sigma_x 2\pi} \\
&\quad \text{Substitute } v = u + b_1 x,\ dv = du \\
&= \int_{-\infty}^{c}\int_{-\infty}^{b_0} \exp\left(ax - \frac{(u+b_1x)^2}{2} - \frac{\left[x-\mu_x\right]^2}{2\sigma_x^2}\right)\frac{du\ dx}{\sigma_x 2\pi} \\
&= \int_{-\infty}^{c}\int_{-\infty}^{b_0} \exp\left(-\frac{u^2}{2} - x^2\left(\frac{1}{2\sigma_x^2} + \frac{b_1^2}{2}\right) - b_1 ux + 0u + x\left(a + \frac{\mu_x}{\sigma_x^2}\right) - \frac{\mu_x^2}{2\sigma_x^2}\right)\frac{du\ dx}{\sigma_x 2\pi} \\
&\quad \text{Complete the square in two variables using Lemma 3} \\
&= \int_{-\infty}^{c}\int_{-\infty}^{b_0} \exp\left\{\begin{pmatrix} u-t_1 \\ x-t_2 \end{pmatrix}'\begin{pmatrix} s1 & s2 \\ s2 & s3 \end{pmatrix}\begin{pmatrix} u-t_1 \\ x-t_2 \end{pmatrix} + z_1\right\}\frac{du\ dx}{\sigma_x 2\pi} \\
&= \int_{-\infty}^{c}\int_{-\infty}^{b_0} \exp\left(-\frac{1}{2}(U-T)'(-2S)(U-T) + z_1\right)\frac{du\ dx}{\sigma_x 2\pi}
\end{aligned}$$

where $U = (u,x), T = (t_1,t_2), -2S = \begin{pmatrix} 1 & b_1 \\ b_1 & b_1^2 + \frac{1}{\sigma_x^2} \end{pmatrix}, (-2S)^{-1} = \begin{pmatrix} 1 + b_1^2\sigma_x^2 & -b_1\sigma_x^2 \\ -b_1\sigma_x^2 & \sigma_x^2 \end{pmatrix}$. This is the CDF for $U \sim N(T, (-2S)^{-1})$. Let $w_1 = \frac{u-t_1}{\sqrt{1+b_1^2\sigma_x^2}}$, $w_2 = \frac{x-t_2}{\sigma_x}$, and $\Sigma = \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix}$ with $\rho = \frac{-b_1\sigma_x}{\sqrt{1+b_1^2\sigma_x^2}}$. We have that $W' = (w_1, w_2) \sim N(0,\Sigma)$. Also, $du = dw_1\sqrt{1+b_1^2\sigma_x^2}$ and $dx = dw_2\sigma_x$.

$$\begin{aligned}
\Omega &= \exp(z_1)\left\{\int_{-\infty}^{\frac{c-t_2}{\sigma_x}}\int_{-\infty}^{\frac{b_0-t_1}{\sqrt{1+b_1^2\sigma_x^2}}} \exp\left(-\frac{1}{2}W'\Sigma^{-1}W\right)\frac{dw_1\ dw_2}{2\pi\sqrt{1-\rho^2}}\right\}\sqrt{1+b_1^2\sigma_x^2}\sqrt{1-\rho^2} \\
&= \Phi\left(\frac{b_0-t_1}{\sqrt{1+b_1^2\sigma_x^2}}, \frac{c-t_2}{\sigma_x}; \rho\right)\exp(z_1)
\end{aligned}$$

where we used that $\sqrt{1+b_1^2\sigma_x^2}\sqrt{1-\rho^2} = 1$, and where completing the square implies $t_1 = -b_1 t_2$, $t_2 = a\sigma_x^2 + \mu_x$, $s_1 = -.5$, $s_2 = -.5b_1$, $s_3 = -.5b_1^2 - \frac{1}{2\sigma_x^2}$, and $z_1 = \frac{a^2\sigma_x^2}{2} + a\mu_x$ by application of Lemma 3. ☐

Lemma 3. *Bivariate Complete Square*

$$Ax^2 + By^2 + Cxy + Dx + Ey + F = \begin{pmatrix} x-t_1 \\ y-t_2 \end{pmatrix}'\begin{pmatrix} s_1 & s_2 \\ s_2 & s_3 \end{pmatrix}\begin{pmatrix} x-t_1 \\ y-t_2 \end{pmatrix} + z_1$$

where

$$\begin{aligned}
t_1 &= -(2BD - CE)/(4AB - C^2) & s_1 &= A \\
t_2 &= -(2AE - CD)/(4AB - C^2) & s_2 &= C/2 \\
z_1 &= F - \frac{BD^2 - CDE + AE^2}{4AB - C^2} & s_3 &= B.
\end{aligned}$$

The following lemma will be useful in deriving the variance and covariances of stock returns.

Lemma 4. *Let* $Z \sim N(\mu, \sigma^2)$ *and define* $\phi = \phi\left(\frac{b-\mu}{\sigma}\right)$ *and* $\Phi = \Phi\left(\frac{b-\mu}{\sigma}\right)$. *Then*

$$\begin{aligned}
E[Z1_{Z<b}] &= \mu\Phi - \sigma\phi, & (11) \\
E[Z^2 1_{Z<b}] &= \left(\sigma^2 + \mu^2\right)\Phi - \sigma(b+\mu)\phi & (12)
\end{aligned}$$

Proof.

$$E[Z1_{Z<b}] = E[Z|Z<b]Pr(Z<b) = \left(\mu - \frac{\sigma\phi}{\Phi}\right)\Phi = \mu\Phi - \sigma\phi$$

The second result is shown similarly:

$$\begin{aligned} E[Z^2 1_{Z<b}] &= E[Z^2|Z<b]Pr(Z<b) \\ &= (Var[Z^2|Z<b] + E[Z|Z<b]^2)Pr(Z<b) \\ &= \left(\sigma^2 - \frac{\sigma(b-\mu)\phi}{\Phi} - \sigma^2\frac{\phi^2}{\Phi^2} + \left[\mu - \frac{\sigma\phi}{\Phi}\right]^2\right)\Phi \\ &= \left(\sigma^2 + \mu^2\right)\Phi - \sigma(b+\mu)\phi. \end{aligned}$$

□

B Thomson Reuters Business Classification

Thomson Reuters (TR) has developed a market-based business classification system for firms. Using this system, TR classifies more than 72,000 firms, spread across 130 countries, into one of 837 business activities or 136 different industries. The TR business classification system is used widely by the industry. More than 8,000 different indices use the TR business classification system for benchmarking, index computation, and ETF construction.

For classifying firms, TR looks at the markets a firm serves. This system is used to classify firms as a whole. If a firm has different business segments, then the business activity of the dominant segment determines the firm's classification. Dominant business segments are identified using the revenue, assets, or operating profit thresholds. TR regularly reviews and revises its business classification system to ensure that the business classification assignment for a particular firm remains valid. In this process, over 60,000 firms are reviewed every year by the TR business classification team.

Further details regarding the business classification system can be obtained from http://financial.thomsonreuters.com/en/products/data-analytics/market-data/indices/trbc-indices.html

C Additional results

We present additional results and robustness tests.

Risk-adjusted returns for financial and non-financial firms Figure CI plots the abnormal return to the LMS portfolio of financial firms by country, corresponding to the estimates in Table CI. The red line plots the cross-sectional median risk-adjusted return for the LMS portfolio. The risk-adjusted returns are annualized and expressed in percentage.

Figure CII plots the abnormal return to the LMS portfolio of financial firms relative to the abnormal return of the LMS portfolio of non-financial firms by country. The black solid line plots the mean annualized risk-adjusted return of large over small financial firms across all countries in our sample. The red line plots the cross-sectional median risk-adjusted return for the LMS portfolio. The risk-adjusted returns are annualized and expressed in percentage. Statistical significance for the risk-adjusted returns is reported in Table 3.

Risk-adjusted returns for financial and non-financial firms adjusted for delisting Table CII shows the risk-adjusted returns for the size-sorted portfolios of financial and non-financial firms after adjusting for delisting returns. To identify delisted firms in TRD, we use the fact that even after a firm delists, TRD continues to report its monthly total equity return and market capitalization as a stale value that does not vary. We then impute a -100% return to the stock return of all delisted firms so identified. Finally, we use the data, adjusted for delisting returns, to form the size-sorted portfolios (separately) for financial and non-financial firms in each country. The imputation of a -100% to all delisted firms is equivalent to assuming that all delistings are on account of financial distress or bankruptcy.

Returns denominated in US Dollars Panel A of Table CIII shows the results for returns denominated in US Dollars. When we analyze returns denominated in US Dollars, we use the US, the Regional, or the Global Fama-French factors. The US factors are from the model of Fama and French (1993). Brooks and Negro (2005) show that country-specific factors within regions can be mostly explained by regional factors. Therefore we also use data for regional Fama-French factors available from Kenneth French's website. The regional factors are available for 4 regions namely, Asia, Japan, Europe, and North America. We apply the corresponding regional factors when we analyze returns denominated in US Dollars for countries located in each of the 4 regions above. Finally, we also use the Global Fama-French factors, data for which is also available from Kenneth French's website. Panel A of Table CIII shows that irrespective of the factor model used, a long-short position that goes long $1 in the portfolio of largest financial firms by market capitalization and short $1 in a portfolio of the smallest financial firms by market capitalization loses at least 10% (approximately) over the entire sample. This return spread is statistically significant at the 1% level or better.

Additional risk factors The differences in risk adjusted returns of size-sorted portfolios of financial firms in Table 3 tend to be larger than the differences in raw portfolio returns in Table 2. This is because larger financial firms are more levered and hence impute higher market betas to Large financial intermediary stock portfolios. Frazzini and Pedersen (2014) show that high beta assets are associated with low average risk adjusted returns. Further, Frazzini and Pedersen also document that a long-short portfolio that goes long in high-beta stocks and short in low-beta stocks generates significant negative risk-adjusted returns. In addition, by granting the shareholders of large financial firms a menu of out-of-the money put options, the government reduces the negative co-skewness of large financial intermediary stock returns. Harvey and Siddique (2000) already show that co-skewness is priced in the cross-section of US stock returns. To account for these additional explanatory variables, Panel B of Table CIII shows estimates for average risk-adjusted returns for the augmented 5-factor model. In addition to the three Fama-French factors, we also include the "Betting against Beta" factor from Frazzini and Pedersen (2014) and a co-skewness factor from Harvey and Siddique (2000). We follow the procedure in Harvey and Siddique to construct the traded co-skewness factor for each country in our sample. As is clear from Panel B of Table CIII our results are essentially unchanged. The annual return on a portfolio that goes long $1 in a portfolio of `Large` financial firms and short $1 in a portfolio of small financial firms is still large, negative, and statistically significant. The loss on this portfolio is -10.26% when these additional risk factors are included.

Banks and financial services firms CIV reports the risk-adjusted returns for the size-sorted portfolios of banks and financial services firms in each country. Each row in Table CIV corresponds to data for a distinct country in our sample. The table also shows the risk-adjusted return for the top and bottom deciles of banks and financial services firms as well as the results separately for Emerging and Developed markets.

Largest commercial banks by country CV shows the risk-adjusted returns for the top 3 commercial banks in each country. Panel A collects the estimate for each individual country, whereas Panel B reports estimates when pooling the data across Emerging and Developed markets.

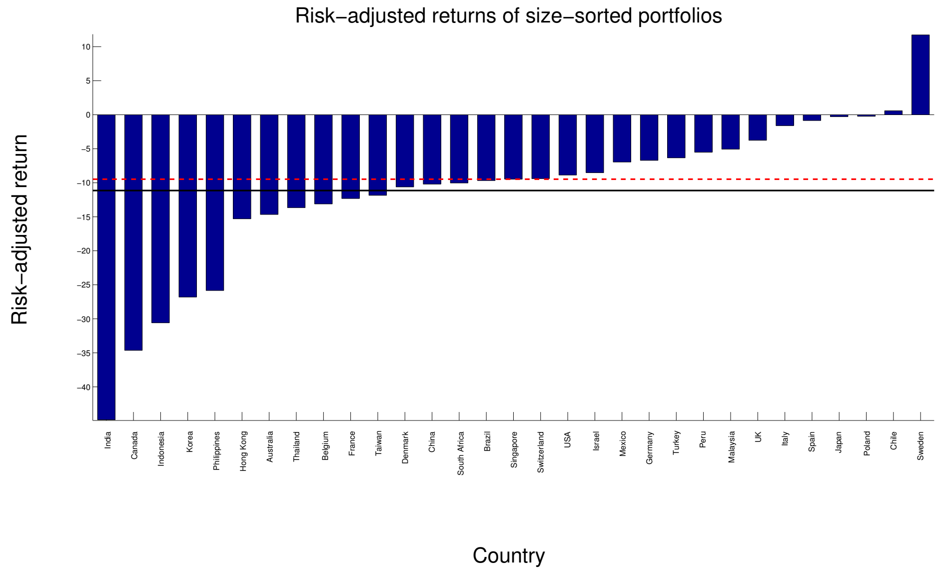

Figure CI. Risk-adjusted returns for size-sorted portfolios of financial firms

This figure presents the risk-adjusted returns of size-sorted portfolios of financial firms by country. In each month, for each country, we sort financial firms into 10 portfolios by market capitalization. The figure plots the annualized risk-adjusted return of large over small financial firms. All returns are denominated in local currency for each country. The black solid line presents the cross-sectional average risk-adjusted return and the red dashed line presents the cross-sectional median risk-adjusted return for the `LMS` portfolio. For each country, the longest available sample till 2013 is selected.

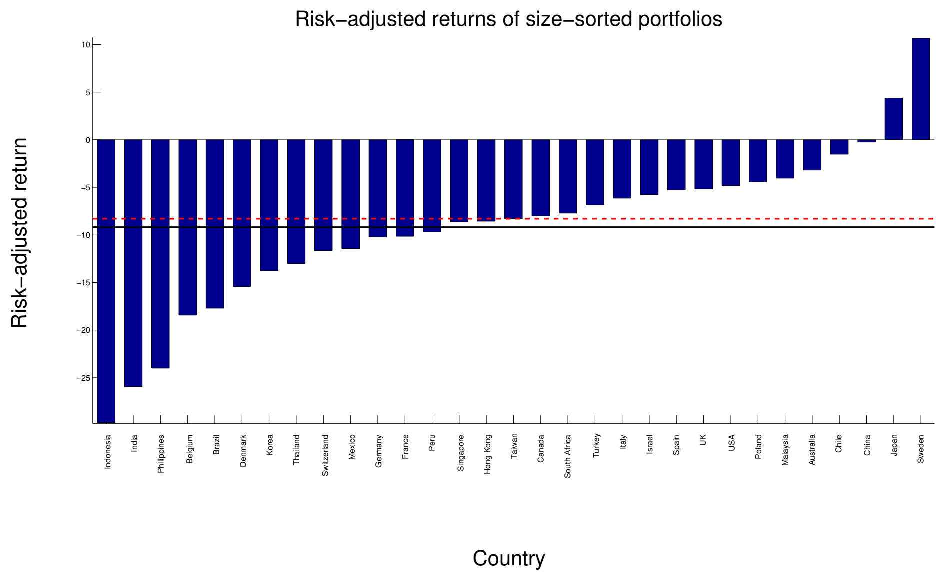

Figure CII. Risk-adjusted returns for size-sorted portfolios of financial firms vs non-financial firms

This figure presents the risk-adjusted returns of size-sorted portfolios of financial firms vs non-financial firms by country. In each month, for each country, we sort financial firms and non-financial firms, separately, into 10 portfolios by market capitalization. All returns are denominated in local currency for each country. The black solid line presents the cross-sectional average risk-adjusted return and the red dashed line presents the cross-sectional median risk-adjusted return for the `LMS` portfolio. For each country, the longest available sample till 2013 is selected.

Table CI. Risk adjusted returns for size-sorted portfolios of financial firms and non-financial firms by country

Notes: This table presents the estimates from the pooled OLS regression of monthly excess returns of size-sorted portfolios on equity risk factors. All returns and risk factors are expressed in local currency. In each month, for each country, we sort financial firms and non-financial firms separately into 10 size-sorted portfolios by market capitalization. `Large` and `Small` denote the portfolios of firms with the highest and lowest market capitalization, respectively. We regress excess returns to `Large`, `Small`, and their difference, denoted `LMS`, on the Fama and French (1993) risk factors. The table displays the estimates for the abnormal return (α) and its t-statistic based on standard errors clustered by time and country. Columns titled `Fin` refer to financial firms, columns titled `Non-fin` refer to non-financial firms, and columns titled `Fin Minus Non-fin` refer to their difference. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels respectively. Coefficients are annualized, multiplied by 100, and expressed in percentages. For each country, the longest available sample till 2013 is selected.

	`Fin`		`Non-fin`		`Fin Minus Non-Fin`	
Country	α	t-stat	α	t-stat	α	t-stat
Australia	-14.66***	-3.63	-11.46***	-6.17	-3.19	-0.79
Belgium	-13.12***	-3.78	5.31***	3.88	-18.43***	-5.00
Brazil	-9.68*	-1.80	8.02***	3.33	-17.70***	-2.69
Canada	-34.63***	-5.38	-26.63***	-10.28	-8.00	-1.30
Chile	0.58	0.19	2.10	1.37	-1.52	-0.39
China	-10.20***	-2.41	-9.95***	-4.50	-0.25	-0.05
Denmark	-10.62***	-3.69	4.80***	3.37	-15.41***	-4.46
France	-12.32***	-3.65	-2.17*	-1.75	-10.14***	-2.80
Germany	-6.71***	-2.42	3.51***	2.58	-10.22***	-2.93
Hong Kong	-15.30***	-2.96	-6.74***	-2.60	-8.56**	-1.97
India	-44.84***	-6.43	-18.89***	-5.66	-25.94***	-4.66
Indonesia	-30.59***	-4.17	-0.87	-0.44	-29.72***	-3.50
Israel	-8.52**	-1.96	-2.78	-1.27	-5.75	-1.38
Italy	-1.61	-0.46	4.54***	3.30	-6.14*	-1.68
Japan	-0.29	-0.09	-4.66***	-4.56	4.38	1.44
Malaysia	-5.06	-1.50	-1.02	-0.49	-4.04	-1.03
Mexico	-6.96	-1.48	4.46***	2.50	-11.42**	-2.12
Peru	-5.51	-0.68	4.17**	1.99	-9.68	-1.19
Philippines	-25.84***	-4.16	-1.84	-1.14	-24.00***	-3.73
Poland	-0.23	-0.02	4.20	0.99	-4.43	-0.35
Singapore	-9.48***	-2.63	-0.85	-0.47	-8.63*	-1.94
South Africa	-10.04***	-2.47	-2.33	-1.27	-7.71	-1.57
South Korea	-26.80***	-4.36	-13.04***	-4.89	-13.76**	-2.14
Spain	-0.85	-0.18	4.42***	2.52	-5.28	-1.00
Sweden	11.74**	2.17	1.08	0.56	10.66*	1.75
Switzerland	-9.40***	-3.87	2.22	1.60	-11.62***	-3.74
Taiwan	-11.85***	-2.47	-3.55**	-2.07	-8.30	-1.37
Thailand	-13.66**	-2.06	-0.67	-0.46	-12.99**	-2.00
Turkey	-6.34	-0.88	0.50	0.18	-6.84	-0.85
UK	-3.75	-1.35	1.42	1.10	-5.17*	-1.92
USA	-8.87***	-2.41	-4.07**	-2.14	-4.80*	-1.68

Table CII. Risk adjusted returns for size-sorted portfolios adjusted for delisting

Notes: This table presents the estimates from the OLS regression of monthly excess returns of size-sorted portfolios on equity risk factors. All returns and risk factors are expressed in local currency. In each month, for each country, we sort financial firms and non-financial firms separately into 10 size-sorted portfolios by market capitalization. When a firm delists from the sample, we impute a return of -100%. `Large` and `Small` denote the portfolios of firms with the highest and lowest market capitalization, respectively. We regress excess returns to `Large`, `Small`, and their difference, denoted `LMS`, on the Fama and French (1993) risk factors. In Panel A, for each country we display the estimates for the abnormal return (α) for `LMS` and its t-statistic. In Panel B, we report estimates of α from pooled regressions for: `Large`; `Small`; `LMS` across all markets; `LMS` across `Developed` markets; `LMS` across `Emerging` markets. Pooled standard errors are clustered by time and country. Columns titled `Fin` refer to financial firms, columns titled `Non-fin` refer to non-financial firms, and columns titled `Fin Minus Non-fin` refer to their difference. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels respectively. Coefficients are annualized, multiplied by 100, and expressed in percentages. For each country, the longest available sample till 2013 is selected.

	`Fin`		`Non-fin`		`Fin Minus Non-Fin`	
Country	α	t-stat	α	t-stat	α	t-stat
Panel A: Country-level LMS						
Australia	-12.49***	-3.03	-12.08***	-6.52	-0.41	-0.10
Belgium	-10.94***	-2.36	2.30	1.43	-13.25***	-2.65
Brazil	-11.76**	-2.00	4.09*	1.63	-15.85**	-2.15
Canada	-33.83***	-5.25	-25.66***	-9.80	-8.17	-1.32
Chile	2.47	0.51	1.47	0.85	1.00	0.20
China	-10.20***	-2.41	-10.26***	-4.62	0.06	0.01
Denmark	-12.38***	-3.61	3.64**	2.10	-16.02***	-3.83
France	-9.79***	-2.94	-1.65	-1.24	-8.15**	-2.14
Germany	-6.38*	-1.83	3.39**	2.14	-9.77***	-2.58
Hong Kong	-15.55***	-2.99	-6.71***	-2.55	-8.84**	-2.04
India	-43.03***	-6.01	-17.60***	-5.56	-25.44***	-4.38
Indonesia	-31.29***	-4.18	-0.32	-0.16	-30.97***	-3.58
Israel	-8.25*	-1.86	-3.48*	-1.62	-4.76	-1.10
Italy	1.42	0.39	3.53***	2.47	-2.12	-0.52
Japan	-0.61	-0.19	-4.28***	-4.04	3.67	1.15
Malaysia	-5.40	-1.59	-1.95	-0.91	-3.44	-0.86
Mexico	-4.40	-0.62	1.16	0.61	-5.56	-0.77
Peru	7.62	0.75	-1.21	-0.40	8.82	0.85
Philippines	-25.50***	-4.04	-2.93*	-1.74	-22.57***	-3.46
Poland	0.57	0.05	4.45	0.93	-3.88	-0.30
Singapore	-8.59**	-2.31	-2.49	-1.31	-6.11	-1.33
South Africa	-4.78	-0.98	-4.14**	-2.15	-0.64	-0.12
South Korea	-23.39***	-3.55	-13.10***	-4.89	-10.29	-1.52
Spain	2.49	0.31	1.03	0.49	1.46	0.20
Sweden	11.46**	2.20	-2.15	-0.92	13.61**	2.19
Switzerland	-10.13***	-3.96	-0.52	-0.32	-9.60***	-2.90
Taiwan	-11.77***	-2.40	-3.57**	-2.07	-8.20	-1.32
Thailand	-12.88*	-1.95	-1.14	-0.77	-11.73*	-1.80
Turkey	-4.94	-0.65	0.28	0.10	-5.22	-0.63
UK	-0.13	-0.05	3.78***	2.62	-3.91	-1.36
USA	-6.39*	-1.82	-1.63	-0.86	-4.76*	-1.67
Panel B: Pooled estimates						
Large	-4.01***	-3.86	-0.40	-0.78	-3.61***	-3.08
Small	5.10**	2.29	2.71**	2.03	2.39*	1.73
LMS	-9.11***	-3.85	-3.11**	-2.29	-6.00***	-3.53
LMS Developed	-8.14***	-3.28	-3.58**	-1.99	-4.56***	-2.66
LMS Emerging	-12.38***	-2.81	-2.63	-1.42	-9.75***	-3.00

Table CIII. Risk adjusted returns for size-sorted portfolios of financial firms, alternative risk factors

Notes: This table presents the estimates from the pooled OLS regression of monthly excess returns of size-sorted portfolios of financial firms on equity risk factors. All In each month, for each country, we sort financial firms into 10 size-sorted portfolios by market capitalization. `Large` and `Small` denote the portfolios of firms with the highest and lowest market capitalization, respectively. We regress the return in their difference, denoted `LMS`, on risk factors, and report the abnormal return (α) and its t-statistic based on standard errors clustered by time and country. The first two columns report the results for the longest available sample for each country, the next two columns report the results over 1990-2013, and the last two columns report the results over 2000-2013. In Panel A returns and risk factors expressed in USD and the risk factors are either the US, or Regional, or Global Fama-French factors. In Panel B, returns and risk factors are expressed in local currency, and the risk factors are the standard Fama and French (1993) factors augmented by either the "Betting against Beta" factor from Frazzini and Pedersen (2014), the co-skewness factor from Harvey and Siddique (2000), and a Volatility factor that goes long financials in the bottom decile of idiosyncratic volatility and short financials in the top decile of idiosyncratic volatility, or all three together. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels respectively. Coefficients are annualized, multiplied by 100, and expressed in percentages.

	Full Sample		1990-2013		2000-2013	
Country	α	t-stat	α	t-stat	α	t-stat
Panel A: USD-denominated returns						
USD, US FF3	-11.75***	-4.75	-11.72***	-4.50	-9.74***	-3.66
USD, Regional FF3	-11.06***	-4.56	-11.26***	-4.57	-11.14***	-4.26
USD, Global FF3	-10.88***	-4.37	-11.13***	-4.40	-9.79***	-3.90
Panel B: Additional risk factors: BAB, Co-Skewness, and Volatility Factor						
BAB	-10.40***	-4.13	-10.67***	-4.20	-10.51***	-3.91
Co-Skew	-10.40***	-4.46	-10.63***	-4.54	-10.74***	-4.28
Vol	-11.08***	-4.46	-11.51***	-4.51	-11.57***	-4.33
BAB, Co-Skew, Vol	-10.94***	-4.11	-11.14***	-4.16	-11.03***	-3.91

Table CIV. Risk adjusted returns for size-sorted portfolios of Banks and Financial Services firms only

Notes: This table presents the estimates from the OLS regression of monthly excess returns of size-sorted portfolios of banks and financial services firms and non-financial firms on equity risk factors. All returns and risk factors are expressed in local currency. In each month, for each country, we sort banks and financial services firms and non-financial firms separately into 10 size-sorted portfolios by market capitalization. `Large` and `Small` denote the portfolios of firms with the highest and lowest market capitalization, respectively. We regress excess returns to `Large`, `Small`, and their difference, `LMS`, on the Fama and French (1993) risk factors. In Panel A, for each country we display the estimates for the abnormal return (α) for `LMS` and its t-statistic. In Panel B, we report estimates of α from pooled regressions for: `Large`; `Small`; `LMS` across all markets; `LMS` across `Developed` markets; `LMS` across `Emerging` markets. Pooled standard errors are clustered by time and country. Columns titled `Fin` refer to banks and financial services firms, columns titled `Non-fin` refer to non-financial firms, and columns titled `Fin Minus Non-fin` refer to their difference. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels respectively. Coefficients are annualized, multiplied by 100, and expressed in percentages. For each country, the longest available sample till 2013 is selected.

	`Fin`		`Non-fin`		`Fin Minus Non-Fin`	
Country	α	t-stat	α	t-stat	α	t-stat
			Panel A: Country-level LMS			
Australia	-17.58***	-3.21	-11.44***	-6.15	-6.14	-1.19
Belgium	-17.27**	-2.32	5.42***	3.97	-21.47***	-2.47
Brazil	-6.96	-1.30	7.96***	3.30	-14.92**	-2.27
Canada	-39.92***	-5.30	-26.73***	-10.33	-13.19*	-1.86
Chile	-4.88	-1.31	1.92	1.27	-6.41	-1.44
China	-9.49	-0.89	-9.77***	-4.36	0.23	0.02
Denmark	-16.89***	-4.40	4.71***	3.32	-21.71***	-4.80
France	-14.58***	-3.20	-2.07*	-1.67	-12.50***	-2.61
Germany	-7.54*	-1.76	3.28***	2.45	-10.88***	-2.51
Hong Kong	-10.33*	-1.75	-6.85***	-2.63	-3.54	-0.60
India	-56.52***	-6.12	-18.89***	-5.66	-37.62***	-5.53
Indonesia	-22.54***	-2.40	-0.76	-0.38	-22.15**	-2.00
Israel	-8.97	-1.37	-2.78	-1.27	-6.19	-1.00
Italy	-4.67	-1.22	4.55***	3.30	-9.19**	-2.20
Japan	-0.33	-0.10	-4.66***	-4.56	4.29	1.18
Malaysia	-8.57	-1.26	-1.06	-0.52	-4.69	-0.65
Mexico	-9.87*	-1.74	4.19***	2.35	-13.57**	-2.13
Peru	-16.30*	-1.93	4.15**	1.98	-21.26***	-2.45
Philippines	-22.85***	-2.83	-1.83	-1.13	-21.44**	-2.32
Poland	4.46	0.30	4.00	0.94	0.46	0.03
Singapore	-5.60	-0.93	-0.94	-0.52	-4.52	-0.67
South Africa	-3.10	-0.38	-2.35	-1.27	0.39	0.05
South Korea	-26.95***	-4.23	-13.04***	-4.89	-13.86**	-2.05
Spain	-9.96	-1.49	4.54***	2.61	-16.39**	-2.11
Sweden	3.37	0.30	0.91	0.47	2.63	0.28
Switzerland	-9.34***	-2.88	2.02	1.45	-11.36***	-2.99
Taiwan	-5.52	-0.63	-3.30*	-1.91	-2.96	-0.24
Thailand	-16.39	-1.25	-0.67	-0.46	-14.89	-1.31
Turkey	-4.59	-0.60	0.65	0.23	-5.13	-0.60
UK	-3.72	-1.08	1.42	1.10	-5.14	-1.48
USA	-10.88***	-2.72	-4.07**	-2.14	-6.81**	-2.08
			Panel B: Pooled estimates			
Large	-2.02*	-1.81	1.44***	2.84	-3.45***	-2.84
Small	9.48***	3.58	3.99***	3.02	5.24***	2.86
LMS	-11.37***	-4.24	-2.55*	-1.75	-8.65***	-4.51
LMS Developed	-11.24***	-4.23	-3.25*	-1.71	-7.76***	-3.97
LMS Emerging	-14.00***	-2.52	-1.65	-0.78	-12.43***	-3.30

Table CV. Risk adjusted returns for top-3 Banks only

Notes: This table presents the estimates from the OLS regression of monthly excess returns of top 3 banks (as measured by market capitalization) on standard stock risk factors by country. All returns and risk factors are expressed in local currency. In each month, for each country, we select the top 3 banks by market capitalization. The table presents the estimates from the OLS regression of monthly excess returns of a value-weighted portfolio of the 3 largest banks on the three Fama and French (1993) stock risk factors i.e. the market, small minus big, and high minus low, respectively. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels respectively. Coefficients are annualized and multiplied by 100 and expressed in percentages. For the pooled regressions, standard errors are clustered by time and country. For each country, the longest available sample till 2013 is selected.

Country	α	t-stat
Panel A: Country-level		
Australia	-4.57*	-1.87
Belgium	-12.77**	-2.07
Brazil	1.69	0.38
Canada	-0.22	-0.13
Chile	14.21***	3.24
China	-0.17	-0.03
Denmark	-14.15***	-4.96
France	-6.23**	-2.09
Germany	-8.09***	-3.51
Hong Kong	3.43	1.24
India	3.40	0.87
Indonesia	-3.37	-0.71
Israel	-0.77	-0.18
Italy	-3.98	-1.33
Japan	-2.11	-0.48
Malaysia	4.71*	1.85
Mexico	9.73**	2.02
Peru	2.57	0.61
Philippines	-0.63	-0.23
Poland	7.29**	2.12
Singapore	0.34	0.16
South Africa	7.66*	1.93
South Korea	-7.09	-1.34
Spain	-2.46	-1.05
Sweden	-2.47	-0.68
Switzerland	-5.96**	-2.41
Taiwan	-9.30***	-2.67
Thailand	0.09	0.02
Turkey	1.19	0.26
UK	-3.54***	-4.38
USA	-10.51***	-3.42
Panel B: Pooled estimates		
Developed	-5.16***	-4.47
Emerging	3.81**	2.55

Table CVI. Performance of the `LMS` portfolio for financial firms during economic crisis

Notes: This table shows the value of a $100 invested in a portfolio that goes long in large financial firms and short in small financial firms during economic crisis. In each country, an economic crisis is defined as quarters in which the GDP is either below the $10^{th}-$percentile level for that country. In each month, for each country, we sort financial firms and non-financial firms separately into 10 size-sorted portfolios by market capitalization. `Small` and `Large` refers to firms with the lowest and highest market capitalization, respectively. `LMS` is the monthly excess return of large over small firms. In each country, $100 is invested in this portfolio at the start of the crisis. The column labeled `Value` represents the risk-adjusted return on this portfolio at the end of the crisis. The columns labeled `Delistings` represents the average number of financial firms that are classified as `Small` at the start of the crisis that delist per month during the crisis in excess of the number of firms that are in the `Large` portfolio at the start of the crisis that delist per month during the crisis. The number of delisted firms is expressed as a percentage of firms in the `Small` and `Large` portfolio at the start of the crisis, respectively.

	`Value`	`Crisis delistings`		
Country		`Small`	`Large`	`LMS`
Panel A: Country-level				
Australia	128.36	2.38	2.22	-0.16
Belgium	81.42	2.22	0.00	-2.22
Brazil	96.99	0.00	0.00	0.00
Canada	80.46	0.62	0.00	-0.62
Chile	123.12	0.00	0.00	0.00
China	111.95	0.00	0.00	0.00
Denmark	136.95	0.95	0.00	-0.95
France	167.22	1.11	0.38	-0.73
Germany	104.78	0.41	1.79	1.38
Hong Kong	99.13	0.00	0.00	0.00
India	85.84	0.00	0.00	0.00
Indonesia	67.41	2.22	0.00	-2.22
Israel	89.98	0.00	0.00	0.00
Italy	91.60	0.00	0.00	0.00
Japan	106.01	0.37	0.13	-0.24
Malaysia	69.54	0.00	0.00	0.00
Mexico	110.70	0.00	0.00	0.00
Peru	101.23	0.00	0.00	0.00
Philippines	93.91	0.00	0.00	0.00
Poland	129.56	0.37	0.21	-0.15
Singapore	80.67	1.85	0.00	-1.85
South Africa	169.96	0.00	0.00	0.00
South Korea	69.82	6.06	0.00	-6.06
Spain	114.07	0.00	0.00	0.00
Sweden	169.61	0.00	0.00	0.00
Switzerland	118.87	0.00	0.00	0.00
Taiwan	114.48	4.17	0.00	-4.17
Thailand	80.50	1.18	0.49	-0.69
Turkey	45.26	0.00	0.00	0.00
UK	138.87	2.05	0.86	-1.19
USA	107.75	0.66	0.00	-0.66
Panel B: Group averages				
All countries	106.00	0.86	0.20	-0.66
Developed markets	116.19	0.90	0.38	-0.52
Emerging markets	97.61	0.82	0.04	-0.78