

system, the profile of leverage Λ and the structure of the financial system given by Π . Total lending to end users is increasing in equity and in leverage, as one would expect. More subtle is the role of the financial system, as given by the matrix Π . Define the vector z as

$$z \equiv (I - \Pi) u \tag{7}$$

where

$$u \equiv \begin{bmatrix} 1 \\ \vdots \\ 1 \end{bmatrix}$$

so that $z_i = 1 - \sum_{j=1}^n \pi_{ij}$. In other words, z_i is the proportion of bank i 's debt held by the outside claimholders - the sector $n+1$. Then, total lending to end-user borrowers $\sum_i y_i$ can be obtained by post-multiplying equation (6) by u so that

$$\sum_{i=1}^n y_i = \sum_{i=1}^n e_i z_i (\lambda_i - 1) + \sum_{i=1}^n e_i \tag{8}$$

Equation (8) is the key balance sheet identity for the financial sector as a whole, where all the claims and obligations between banks have been netted out. The left hand side is the total lending to the end-user borrowers. The second term on the right hand side of (8) is the total equity of the banking system, and the first term is the total funding to the banking sector provided by the *outside* claimholders (note that the second term can be written as $\sum_{i=1}^n x_i z_i$). Thus, from equation (8) we see the importance of the structure of the financial system for the supply of credit. Ultimately, credit supply to end-users must come either from the equity of the banking system, or the funding provided by non-banks. Greenlaw et al (2008) uses this framework to calibrate the aggregate consequences of banking sector lending contraction that results from the combination of capital losses and deleveraging from subprime losses.

The aggregate balance sheet identity of the financial intermediary sector given by (8) can be explained more informally as follows. Take the balance sheet of an individual bank, given by Figure 6. The bank has claims on ultimate borrowers (loans to firms and households), but it also has assets that are claims against other banks. On the liabilities side, the bank has obligations to outside creditors (such as retail depositors), but it also has obligations to other banks.

Figure 6

Balance sheet of individual bank

Assets	Liabilities
Loans to firms, households	Liabilities to non-banks (e.g. deposits)
Claims on other banks	Liabilities to other banks
	Equity

Individual bank