## Leverage in a Crisis

The He and Krishnamurthy models imply that the financial intermediary sector – measured broadly, and not just focused for example on hedge funds – has leverage that _rises_ during crisis. The prediction is due to a mix of general equilibrium and corporate finance arguments. First, in the model, in general equilibrium the intermediary sector must retains the bulk of risk exposure from intermediated assets. For example, in the recent crisis this means that while MBS gets shuffled around across different parts of intermediary sector, in the end it is the intermediary sector that retains most of the MBS. Households don't suddenly bypass intermediaries and purchase subprime MBS in their direct invesment portfolios. Second, negative shocks to the intermediary sector deplete their equity faster than their debt, and moreover make it harder to raise new equity relative to debt. This last logic comes from thinking about corporate finance: equity is junior to debt and so in an environment where there may be financing frictions, equity frictions are tighter than debt frictions. The two points combine to imply that when there are negative shocks the intermediary sector holds intermediated assets using less equity and more debt. That is, leverage of the intermediary sector rises.
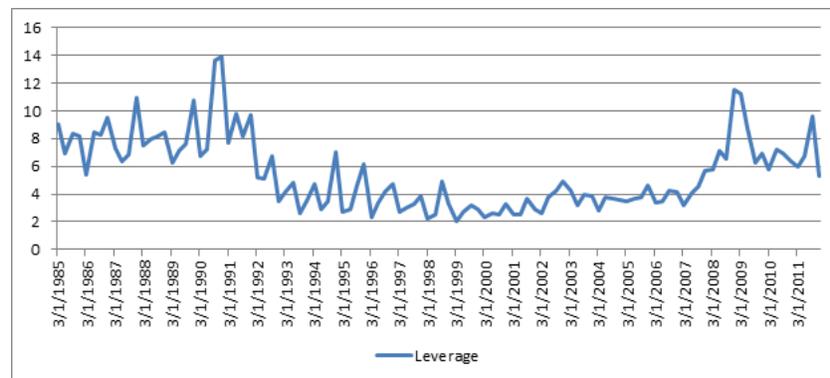
The figure above plots leverage for the commercial banking sector and the investment banking sector from 1985 to 2009. Leverage here is measured as total book value of assets of that sector divided by the market value of equity of that sector. Focusing on the period from 2000 onwards, the graphs shows that leverage rises slowly from 2000 to 2007, but then increases rapidly during the crisis, before falling in early 2009 as the economy exits from the crisis.

Looking at earlier periods, we see a jump in leverage in 1993/1994. This corresponds to the mortgage and bond market meltdown during this period. We also see a rise in leverage in the early 1990s credit crunch period, where banks had taken large losses on real estate investments.
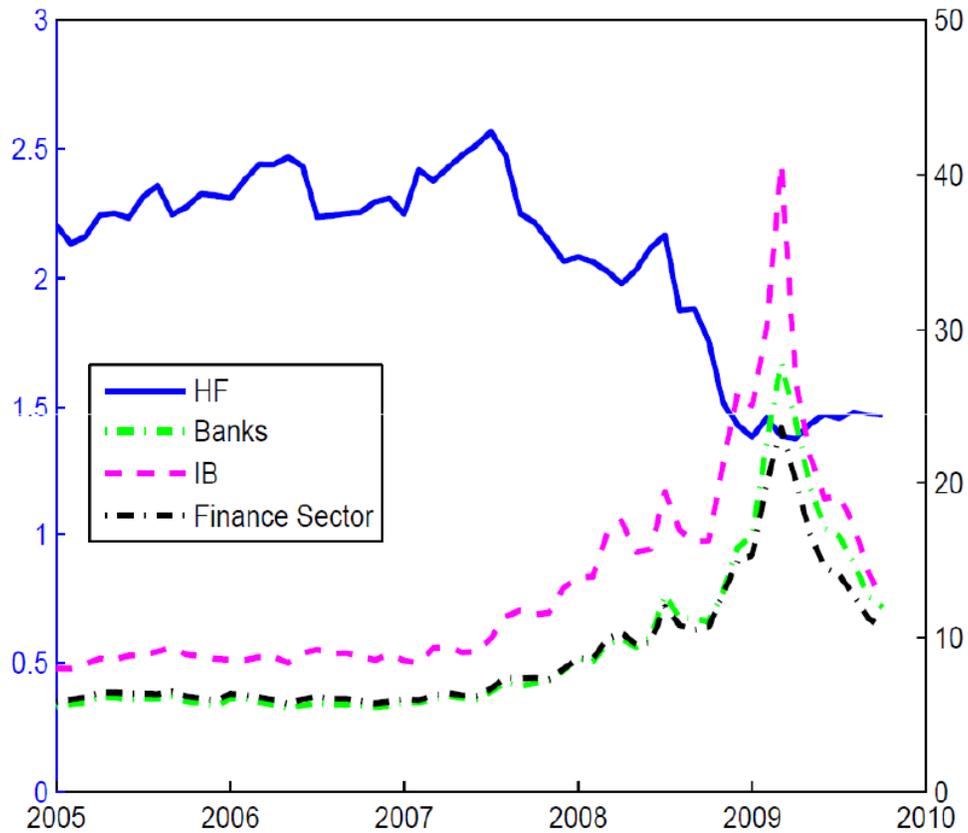
The above figure is taken from Ang, Gorovvy, and Van-Inwegen (2010) and focuses in on the recent period. The leverage patterns for the banks and investment banks (and overall finance sector) are similar to the earlier graph. However, note that the hedge fund sector deleverages over the crisis. This picture helps to put other accounts of deleveraging into perspective: such accounts focus on the hedge fund and shadow banking sector. Importantly, the evidence does not contradict the basic pattern predicted by He and Krishnamurthy which is about leverage of the entire financial sector.

Commercial Bank Leverage

	Q1 2009
Total Assets	7608
Total Liabilities	6845
Equity Capital	763
Preferred Stock (including TARP) raised in 2008	233
"True" Capital	530
Leverage at 763 of Equity Capital	10.0
Leverage in Q4 2007	10.4
Leverage at 530 of Equity Capital	14.4
Leverage if true Assets are lower by 150	19.6
Leverage if true Assets are lower by 300	31.8

- IMF loss estimates as of Oct 2008: >$1.5tn (banks say $500bn)
- Level 3 assets (a subset of securities carried at fair value): $225bn

Finally, the above table is from He, Khang and Krishnamurthy (2010). The table computes leverage in 2007 and 2009 based on reported book value of assets and *book value of equity*, which is the leverage measure most used for regulatory purposes. The table considers remarking the asset value in 2009 based on alternative (and more plausible) loss scenarios. The leverage measure is very sensitive to accurately measuring asset values, and accounting measures for the financial sector are very noisy in this regard. This is why it is critical to use *market values of equity* when constructing leverage, as we do in the previous figures.