

Lecture 18: Capital regulation

Capital regulation has been with us almost from Chapter 1, so by now there can be few surprises. The idea that bank owners (shareholders) should participate in the risks taken by the bank instead of risking only borrowed money is so intuitive that it seems to need no explanation. However, looking at the matter from a theoretical angle, things become more complicated, so that the common sense which is good and useful may not always give the correct answer.

In the model of Allen, Carletti and Marquez, the unregulated bank will by itself choose a higher capital ratio than if it were regulated. This is a surprising conclusion, and one would suspect that the model has some rather peculiar features, as indeed it has. In the beginning all is quite standard, the bank chooses both its capital ratio and the risk level of its investment, and it is disciplined by the depositors since the deposit rate depends on the risk. But on the loan side things are slightly unusual, either the bank is owned by the borrowers or there is strong competition for borrowers, in any case the bank chooses the loan rate (and risk level) so as to maximize borrower profits. This determines an equilibrium capital ratio without any need for a regulator.

When the regulator steps in, the capital ratio will be determined from social welfare considerations, in the primitive setup of the model this means that it should maximize borrower profits *plus* bank profits, and for suitable parameter values this optimal capital ratio may be *lower* than the ratio found in the equilibrium without a regulator. This looks of course rather strange, it happened since the regulator forced the bank to pay more attention to its own profits than it would have done in the market (where it was subject to strong competition for borrowers).

Notice, by the way, that in the model we have introduced a *cost of equity* to the bank, presumably some kind of opportunity cost, reflecting what the shareholders could have obtained elsewhere, and in most cases this cost is assumed to be higher than the cost of borrowed funds. This gives rise to some trouble with the Modigliani-Miller theorem saying that the value of the firm is independent of the proportion of equity in total capital, but again this probably corresponds to intuition and practical reasoning.

The Hakenes-Schnabel model in 18.1.3 uses the Allen-Gale model (in the Boyd-deNicoló version) from Chapter 11, and its purpose is to show that increasing the capital ratio can result in a more risky (understood in a particular way) investment policy of the bank rather than the converse which was to be expected.

The model is not quite easy to follow for several reasons. In the Allen-Gale world, investments either succeed or fail, and if they fail then everything is lost. If the model

is to be used for tracing the effects of changes in the capital ratio, it should matter for the bank how much will be lost in the case of failure, and therefore the Allen-Gale setup is modified: There are two types of investments, either (uncorrelated) in a sector with many small firms or (correlated) in a sector with one big firm, all have the same payoff and probability of success. The bank (for some reason not explained) chooses a mixed strategy for investment, that is it chooses the probability of investing in the first (uncorrelated) sector. If it has invested in the uncorrelated sector, then by the law of large numbers, a share $p(s)$ of the firms will succeed and yield p , and the bank will survive, but with the correlated sector the bank will necessarily fail in the case that the investment fails.

Using another trick (a cost function of particular form connected with the choice of mixed strategy), the optimum will be interior (probability of uncorrelated investment > 0 and < 1), and a change in capital ratio will change this optimum, under suitable assumptions in such a way that the probability of uncorrelated investment decreases. Again, the model is somewhat peculiar so that the conclusions should be taken with a grain of salt, only indicating that increasing capital ratios has the opposite effect of what was to be expected. You should not feel obliged to go into details with the model.

The section on Basel I-IV covers only what you more or less know already. One can see a trend (or rather two different trends) in the Basel accords, one comprising I and II moving towards more sophisticated approaches to the concept of risk-weighted assets, and another one from the financial crisis and onwards with attempts to limit the possibilities of reducing the capital requirements by too creative ways of computing risk-weighted assets. In Basel II this is seen not only from the new additional capital reserves introduced, but in particular from the introduction of the leverage rule, which tries to cut through the complex internal measurements setting a lower bound on equity.

The time after Basel III saw the introduction of further rules of this type, thus an additional capital reserve became mandatory for systemically important banks, and with Basel IV we have a partial return to the way of measuring risk-weighted assets in Basel I, namely the so-called *floor*: The size of risk-weighted assets used for computing capital requirements cannot be smaller than 72,5% of its value if computed using the standardized approach. In other words, there is a limit to how much the equity requirements can be reduced by careful use of internal methods.

This development over the last years can be seen as a general agreement that the banks were allowed too much freedom in the determination of their capital requirements, and the new rules are designed to reduce possible misuse. There are other ways in which the intuitive notion capital reserve can be diluted, in particular by refining the notion of equity, which is not only common stock but can also contain loans in the form of bonds with some particular properties, the so-called Coco (Con-

tingent Convertible) bonds, which are bonds which are converted to equity if certain stipulated conditions are fulfilled (typically that the shares fall below a certain value). This means that even though the bond owners are not shareholders, they become so if the bank gets into trouble, so they can be seen as a defence line against depositor losses on line with ordinary common stock.

The model in section 18.3 deals with a more realistic problem than those considered in the beginning of the chapter, namely the possibility that banks reduce assets rather than increase equity as a result of stricter capital regulation, we pass quickly over the formalism and stay with what is behind.

A similar quick approach is used in our treatment of the final section 18.4 which treats a proposal for a self-regulating financial sector. There are two main ingredients in this proposal, namely

- (i) a form of *narrow banking*, namely a demand that deposits should be fully matched by very secure papers such as government bonds, and
- (ii) a version of *contingent convertible* bonds for the funding of all remaining bank business. The bonds convert to equity in an automatic way, namely whenever the value of the equity will increase by this conversion.

The proposed way of funding the financial sector is shown to be consistent, at least in theory. You don't need to go into details with the formalism, which however is not too formidable, anyway the proposal which has not found much enthusiasm among practical decision makers. Anyway, it is worth noticing as one of several features (blockchain, open banking etc.) which may change the financial sector in a fundamental way in only a few years from now.

We read: Chapter 18.